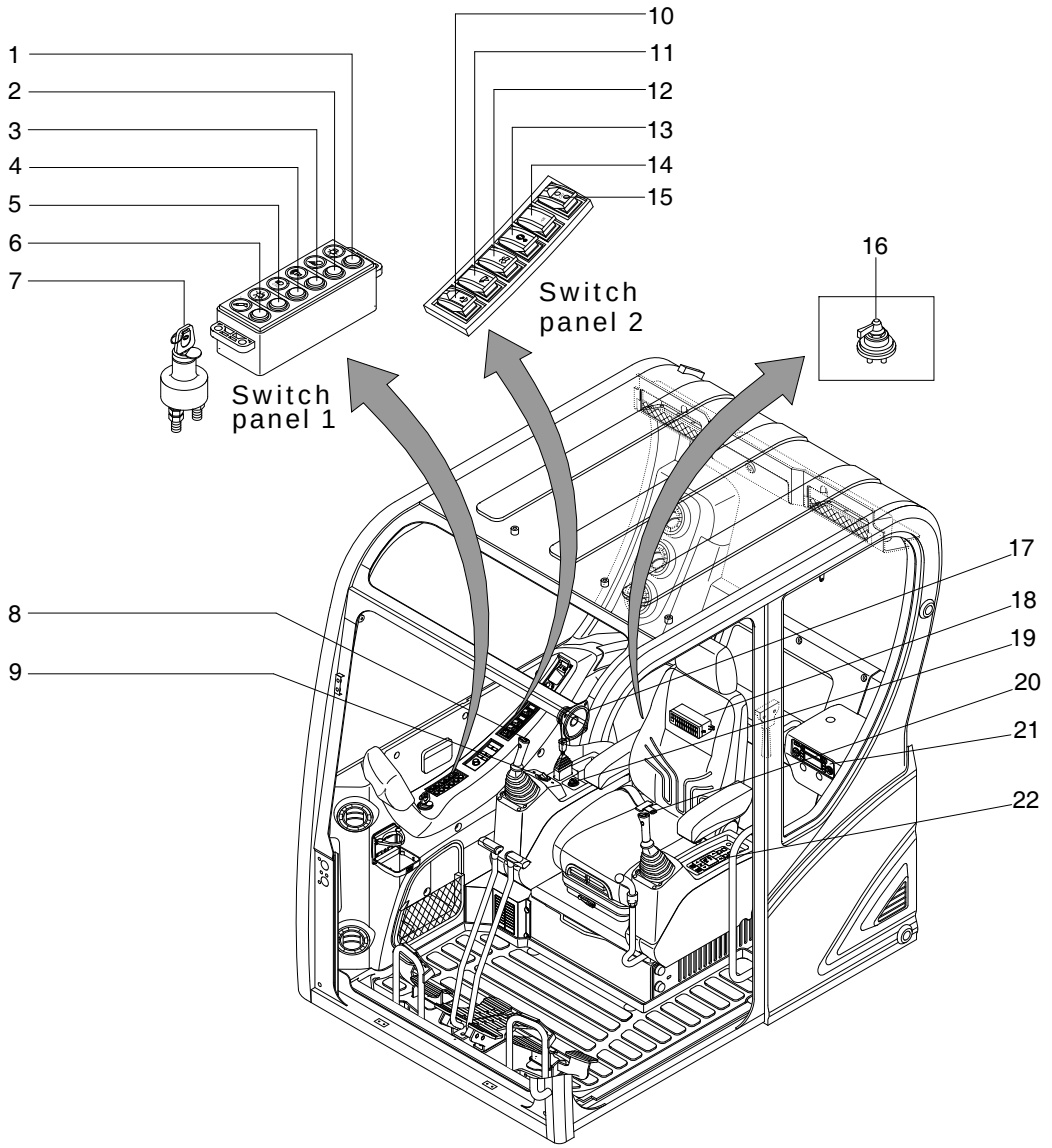
# SECTION 4 ELECTRICAL SYSTEM

# GROUP 1 COMPONENT LOCATION

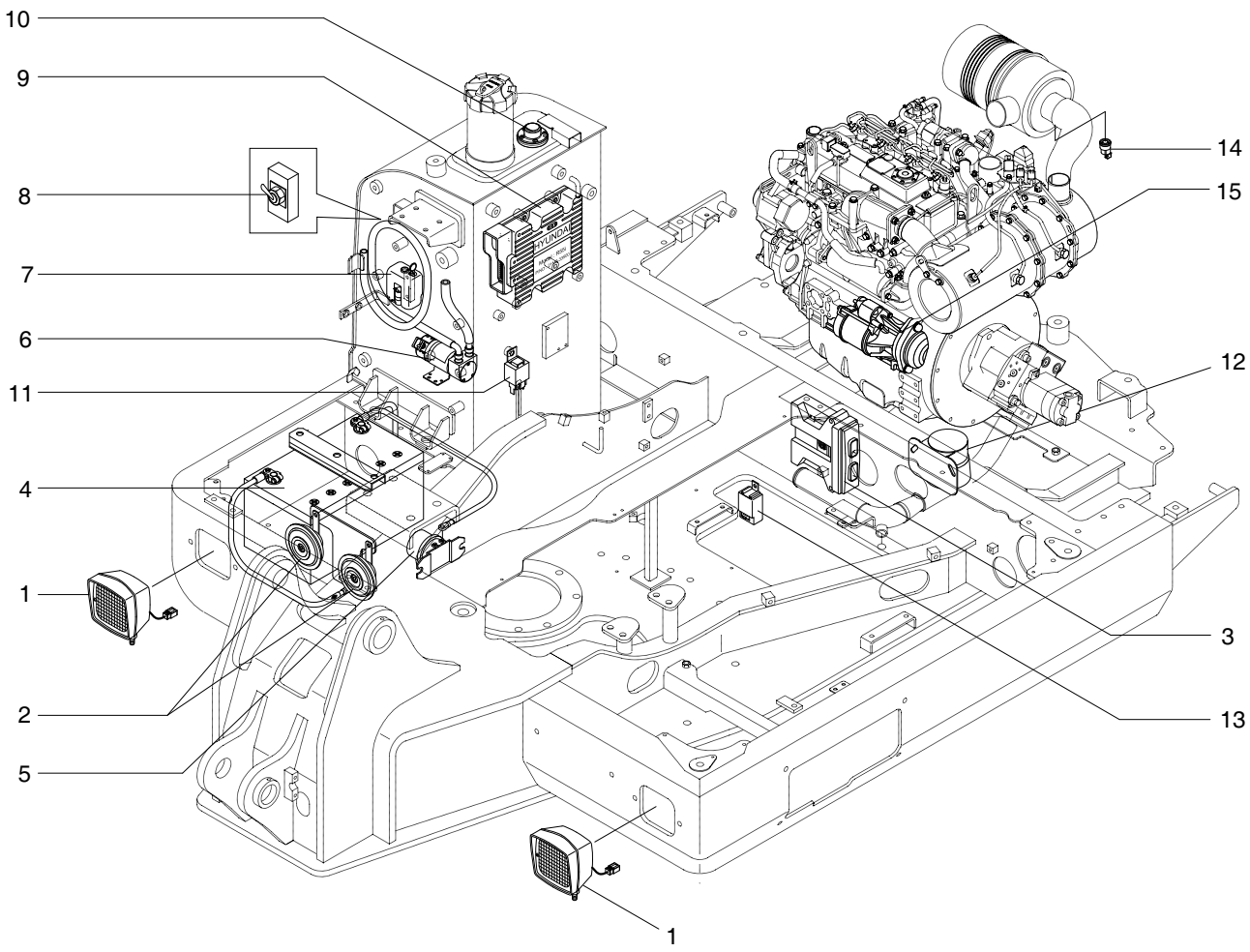
## 1. LOCATION 1




HX65A4EL01

| | | | | | |
|---|---|---|---|---|---|
| 1 | Head light switch | 8 | Breaker operation switch (opt) | 15 | Master switch |
| 2 | Work light switch | 9 | Accel dial switch | 16 | Travel straight switch |
| 3 | Travel alarm switch | 10 | Quick clamp switch | 17 | Horn switch |
| 4 | Cab light switch | 11 | DPF switch | 18 | Aircon & heater controller |
| 5 | Beacon switch (opt) | 12 | Wiper switch | 19 | Radio & USB player |
| 6 | Breaker selection switch (opt) | 13 | Washer switch | 20 | Fuse box |
| 7 | Start switch | 14 | Overload switch (opt) | 21 | Service meter |

## 2. LOCATION 2




HX65A4EL02

| | | | | | |
|---|---|---|---|---|---|
| 1 | Work lamp | 6 | Fuel filler pump | 11 | Power relay |
| 2 | Horn | 7 | Washer tank assy | 12 | Travel alarm buzzer |
| 3 | PVG controller | 8 | Filler pump toggle switch | 13 | Warning buzzer |
| 4 | Battery | 9 | MCU | 14 | Air cleaner switch |
| 5 | Battery relay | 10 | Fuel sender | 15 | Alternator |

# 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.**


HX65A4CD01

※ **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

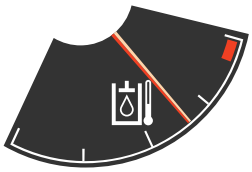
290F3CD53

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

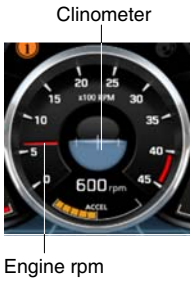
HX60A3CD55A

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




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.

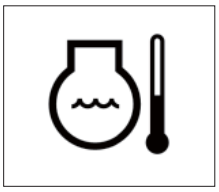
④ When the battery voltage is higher than 11.5 V, the pop-up off.

## 4) WARNING LAMPS


65A3CD109A

※ 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 3-17 for the switch.

### (1) Engine coolant temperature warning lamp



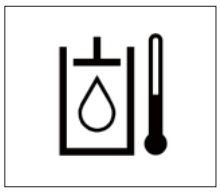
290F3CD61

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



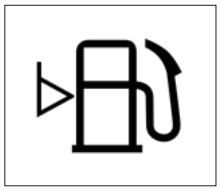
290F3CD62

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

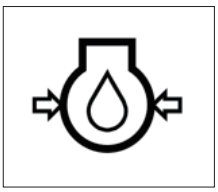
290F3CD64

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

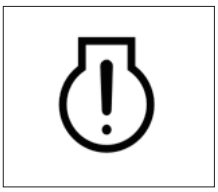


290F3CD65

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

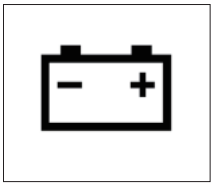


290F3CD66

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.**

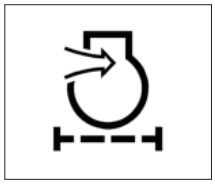
### (7) Battery charging warning lamp



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.

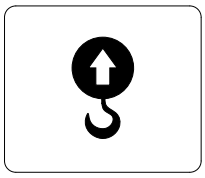
### (8) Air cleaner warning lamp



290F3CD68

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

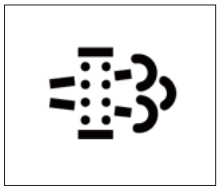
### (9) Overload warning lamp (opt)



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

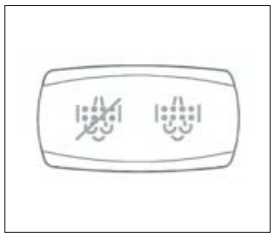
| Procedure | Soot Amount | DPF Warning Lamp | Check engine warning lamp | Decrease in Torque | Remark |
|---|---|---|---|---|---|
| 1 | Less than 99% | - | - | - | No action (Manual regeneration according to the equipment) |
| 2 | 100~105% | - | - | - | Regeneration is started. Performed in high temperature (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**



HW65A3CD24K

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

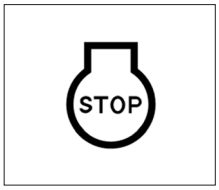
② Manual (Forced) regeneration procedure
Park the machine on a well-ventilated area, and keep away from inflammable materials to set the machine as shown below.
- Operate the machine until the engine coolant and oil temperature becomes 40˚C or more.
- Engine speed is set to low speed.
- Put the gear 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.**

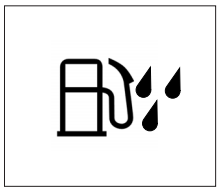
### (11) Stop engine warning lamp




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

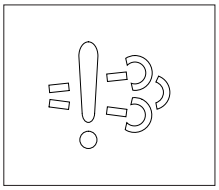
① This warning lamp lights up when the water separator is full of water or malfunctioning.
② When this lamp lights up, stop the machine and drain water from the water separator.

### (13) 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.

### (14) 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.

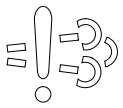
② Please refer to the exhaust gas control system below.

#### ※ Exhaust Gas Control System

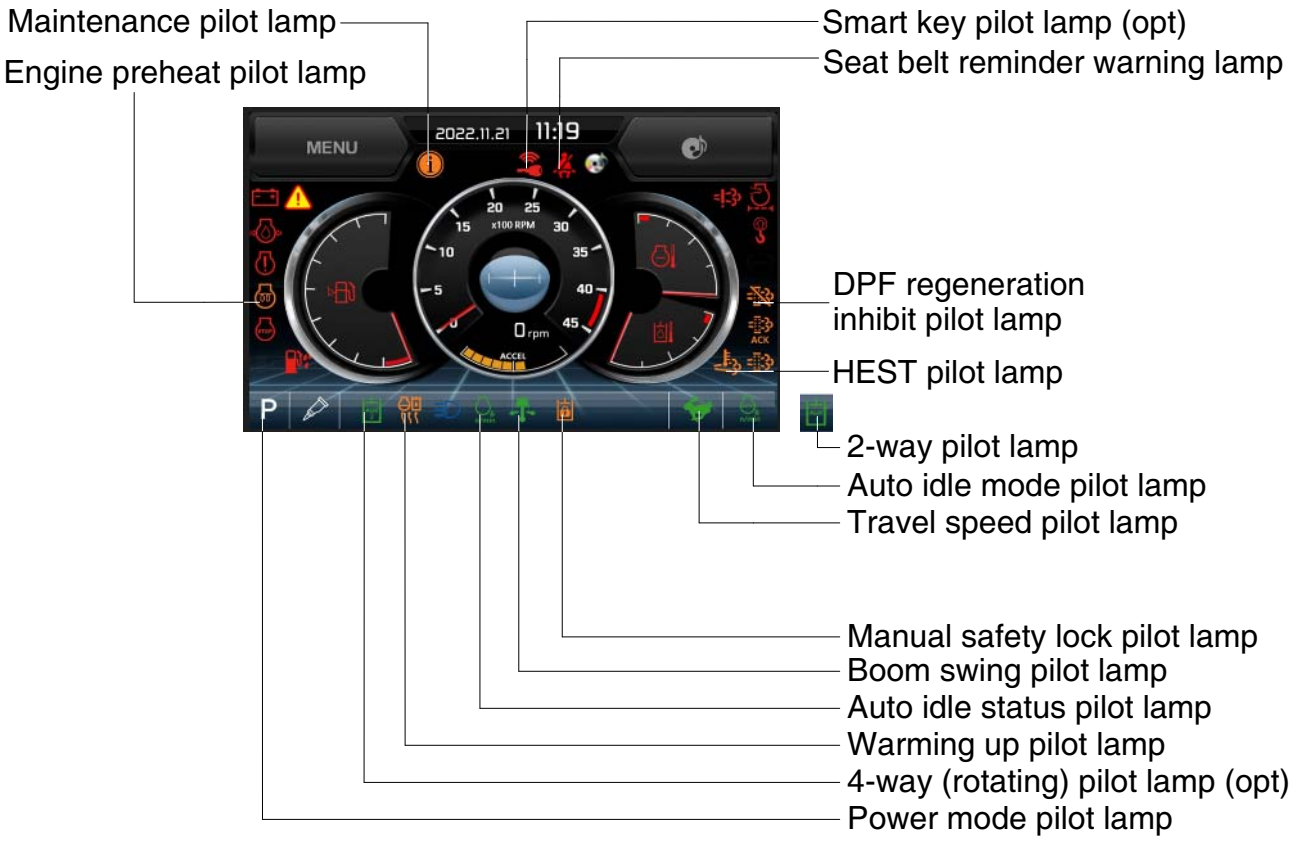
This machine is equipped with the engine exhaust gas emission control system that satisfies the exhaust gas emission regulations. The owner/driver has the responsibility of proper operation and maintenance on the exhaust control system provided in the guaranteed provisions related to emission.

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

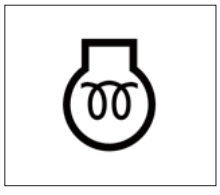



65A3CD112

#### (1) Mode pilot lamps

| No | Mode | Pilot lamp | Selected mode |
|---|---|---|---|
| 1 | Power mode | P | Heavy duty power work mode |
| | | S | Standard power mode |
| 2 | Travel mode | | Low speed traveling |
| | | | High speed traveling |
| 3 | Auto idle mode | AUTO n/min | Auto idle mode |
| | | n/min | Auto idle status |

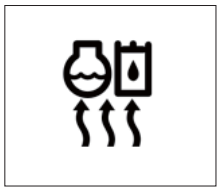
#### (2) Preheat pilot lamp



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.
※ **Refer to the operator's manual page 4-4.**

### (3) Warming up pilot lamp

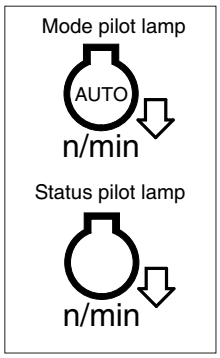


290F3CD80

① This lamp is 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



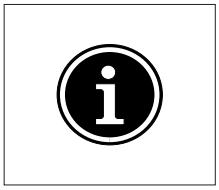

85A3CD106

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



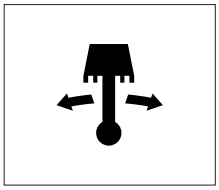
HX60A3CD116

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 4-20.**

### (6) Boom swing pilot lamp

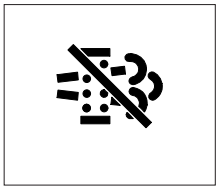


HX603CD82

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

※ **Refer to the operator's manual page 3-44.**

### (7) DPF regeneration inhibit warning lamp

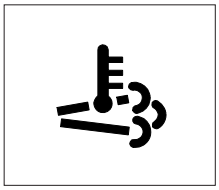


85A3CD107

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

※ **Refer to the operator's manual page 3-40 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.

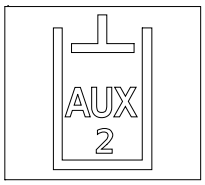
② The lamp will also illuminate during a manual regeneration.

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

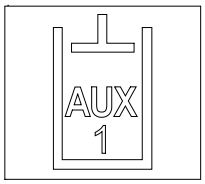


HW60A3CD48A

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 operator's manual page 3-42.**

### (10) 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.**

### (11) 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 3-45 for the safety knob.**

### (12) Smart key pilot lamp (opt)

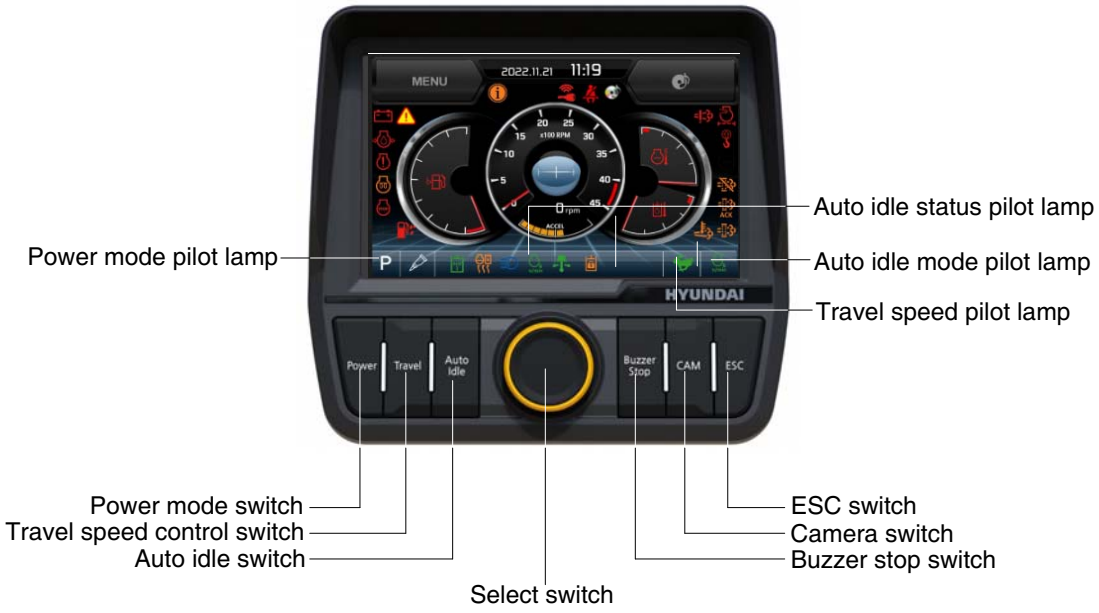
300A3CD36A

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

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

※ **Refer to the page 4-28.**

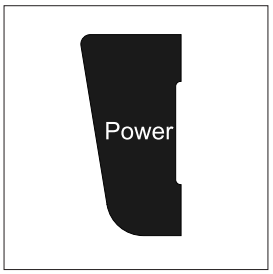
## 6) SWITCHES




65A3CD117A

※ **When the switches are selected, the pilot lamps are displayed on the LCD. Refer to the page 4-13 for details.**

### (1) Power mode switch

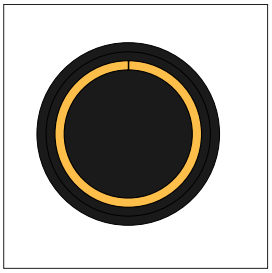



HX60A3CD118

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

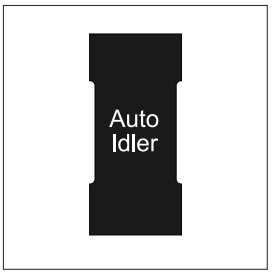
① This switch is used to select or change the menu or input value.

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

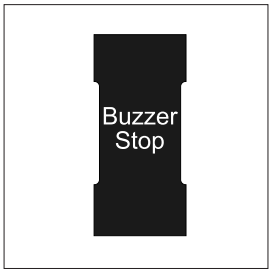



HX60A3CD120

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

※ **Refer to the page 4-13 for details.**

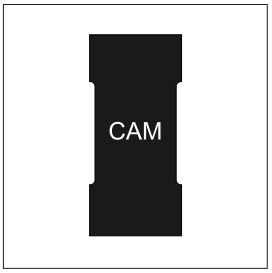
### (4) Buzzer stop switch




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

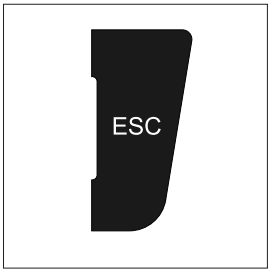



HX60A3CD122

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.**

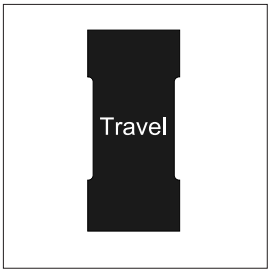
### (6) Escape switch




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

Tap
MENU or
Press

Press

### 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 | Active fault - Machine<br>Active fault - Engine<br>Logged fault - Machine/engine<br>Delete logged fault<br>Monitoring - Machine<br>Monitoring - Switch<br>Monitoring - Output | MCU<br>ECU<br>MCU, ECU<br>MCU, ECU<br>Engine rpm, oil temp, voltage and pressure etc.<br>Digital switch status<br>Digital output status |
| 2 |  Management | Maintenance information<br>Option flow control<br><br>ESL mode setting<br>Change password<br>Machine information<br>A/S phone number<br>Cluster update<br>CAN update<br>Service menu | Elapsed time, Change interval, Replacement etc.<br>Opt attch set, Proportional flow control set, Confifirmation<br>ESL mode setting<br>Password change<br>Cluster, MCU, Engine, Machine<br>A/S phone number, A/S phone number change<br>Application, System<br>Program download, Update<br>Power shift, Operating hour, Gauge type, Rpm, AVCU set, Language update etc |
| 3 |  Display | Clock<br>Brightness<br>Unit<br>Language | Current time set<br>Manual, Auto<br>Temperature, Pressure, Flow, Distance, Volumn<br>22 kinds |
| 4 |  Utilities | Entertainment<br>Camera setting<br><br>Clinometer setting<br>Manual<br>Emergency mode<br><br>Quick cooling mode | Video/music file playing<br>Setup of number of active cameras, display sequences, and camera numbers<br>Initializing slope sensor<br>Display cluster manual<br>Back-up switch for failed cluster switch and accel dial<br>To maximize engine cooling performance |

## (2) Monitoring

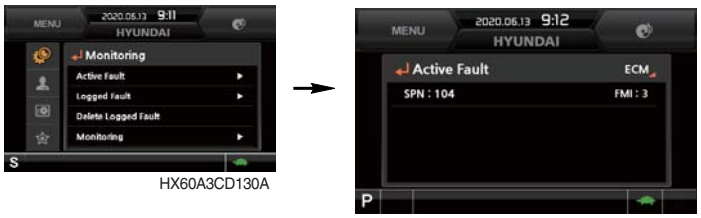
### ① Active fault - Machine


HX60A3CD130A

HX60A3CD131A

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

### ② Active fault - Engine




HX60A3CD130A

HX60A3CD133A

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

### ③ Logged fault - Machine/ Engine


HX60A3CD134A

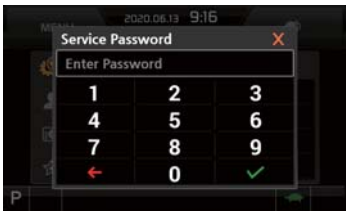
HX60A3CD135A

HX60A3CD136A

· 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.

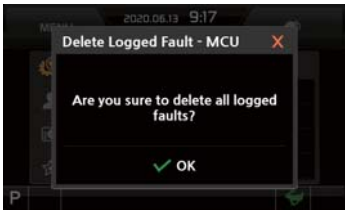
## ④ Delete logged fault


HX60A3CD143A

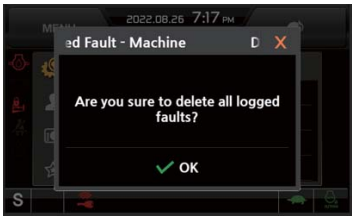



HX60A3CD144A


HW60AH3CD145A




HX60A3CD146A




HW60AH3CD147A

· 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)


HX60A3CD137A


HX60A3CD138A

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

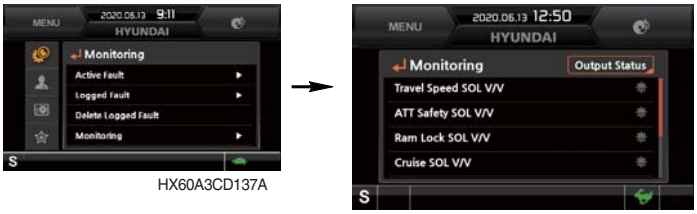
## ⑥ Monitoring (switch status)


HX60A3CD137A


HX60A3CD140A

· 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)



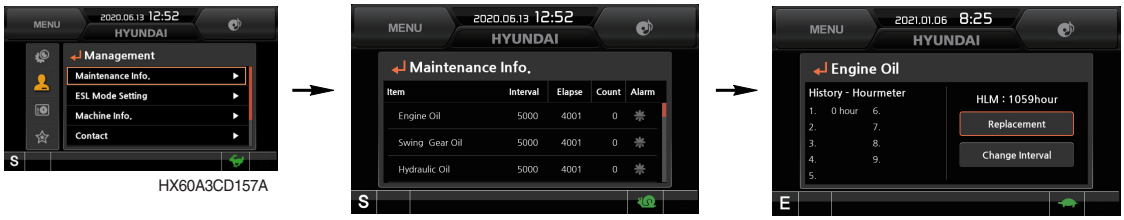

HX60A3CD137A

HX60A3CD142A

- 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




HX60A3CD157A HX60A3CD199K HX60A3CD159A

- 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


HW60A3CD33OA HW60A3CD41OA HW60A3CD42O

- 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

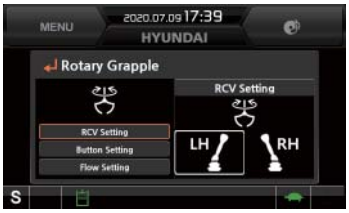
The preferable value of each option attachment can be set by this menu.

a) Rotary setting


HW60A3CD42O


HW60A3CD51OA

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




HW60A3CD52OA

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


HW60A3CD53OA

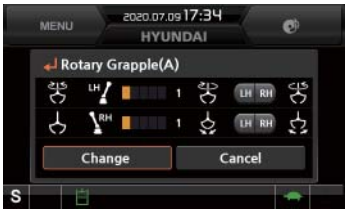
· Button setting (CW rotation)
– Select LH for CW rotation → RH set for CCW rotation automatically


HW60A3CD54OA

· Flux setting
– Enable set from level 1 to level 5.

## b) Grapple setting


HW60A3CD42O

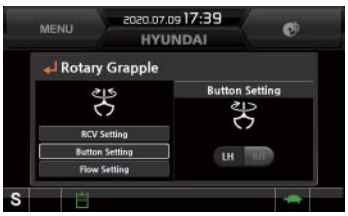



HW60A3CD61OA

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


HW60A3CD62OA

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




HW60A3CD63OA

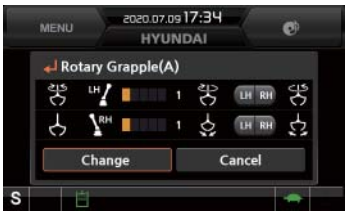
· Button setting (Close)
– Select RH for Close → LH set for open automaticalally


HW60A3CD72OA


HW60A3CD64OA

· Flow setting
– Enable set from level 1 to level 5.


HW60A3CD42O



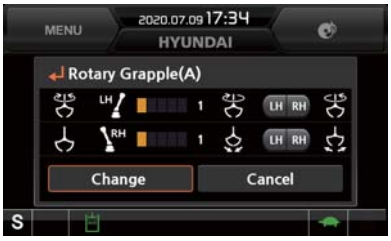

HW60A3CD71OA

· 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) Confifirmation


HX60A3CD81OA




HW60A3CD71OA

※ 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


HX60A3CD148A


HX60A3CD149A

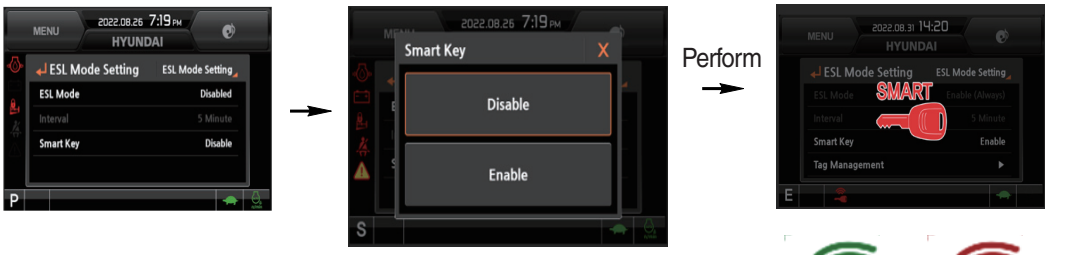

HW60AH3CD150A

– 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.

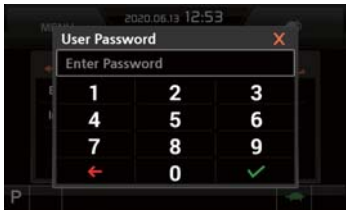
### ※ Engine Starting Condition

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

## ④ Password change

– The password is 5~10 digits.


HX60A3CD151A




HX60A3CD149A

Enter the current password


HX60A3CD153A

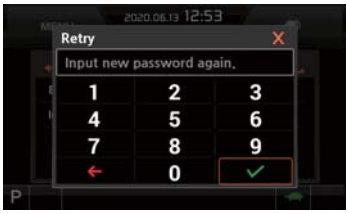
Select the password change


HX60A3CD149A

Enter the new password


HX60A3CD155A

Enter the new password again




HX60A3CD156A

Saved the new password in the MCU

## ⑤ Machine information


HX60A3CD160A


HX60A3CD161A


HX60A3CD162A

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

## ⑥ A/S phone number

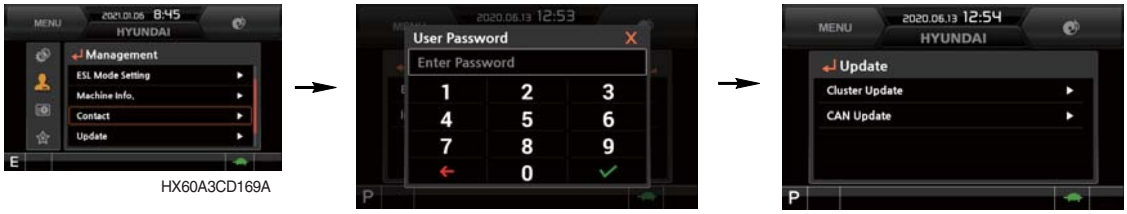

HX60A3CD163A


HX60A3CD164A


HX60A3CD165A

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

## ⑦ Cluster update




HX60A3CD169A HX60A3CD149A HX60A3CD170A

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


HX60A3CD172A HX60A3CD173A HX60A3CD174A

Select application item Select file to update Select OK

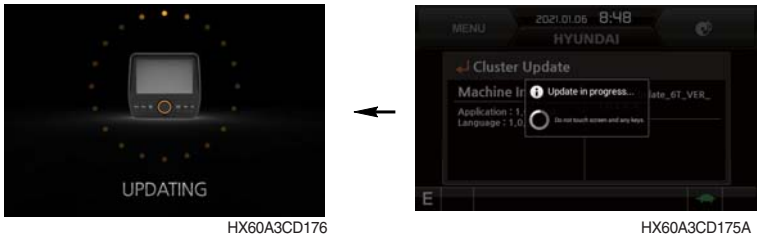

HX60A3CD176 HX60A3CD175A

Completed In process

### b. System update


HX60A3CD177A HX60A3CD173A HX60A3CD174A

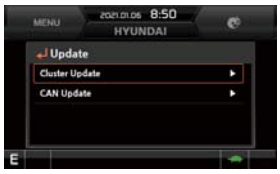
Select system item Select file to update Select OK



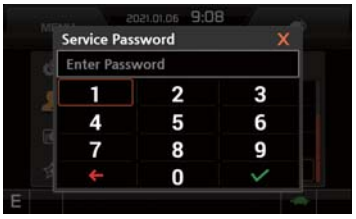

HX60A3CD176 HX60A3CD175A

Completed In process

## ⑧ CAN update




HX60A3CD169A




HX60A3CD149A

Enter the user password


HX60A3CD179A

Select the CAN update

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

※ **Do not turn power off while updating.**

### a. Download


HX60A3CD180A

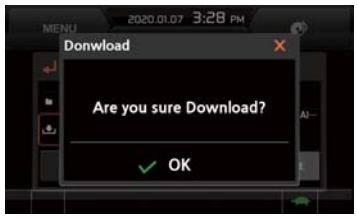
Select update device


HX60A3CD181A

Select download

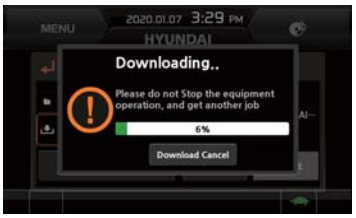

HX60A3CD182A

Select download after choose update file




HX60A3CD183A

Confirm download




HX60A3CD184A

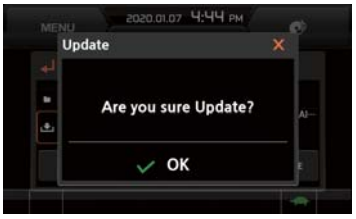
Stop download when select the cancel


HX60A3CD185A

### b. Update

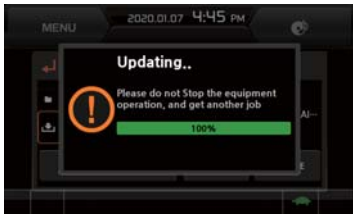

HX60A3CD186A

Select update after the download.




HX60A3CD187A

Confirm the update




HX60A3CD188A

In process update


HX60A3CD175A

Completed update


HX60A3CD190A

Select the OK to update another application program

### ⑨ Service menu


HX60A3CD165A HX60A3CD144A HX60A3CD168A

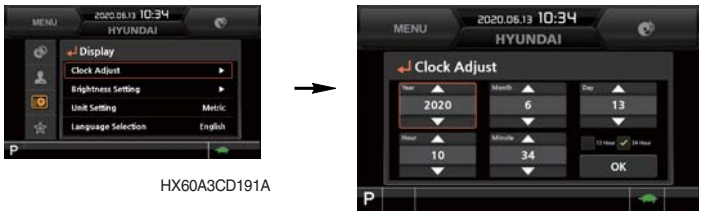
Enter the manager password

· 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)


HX60A3CD197A

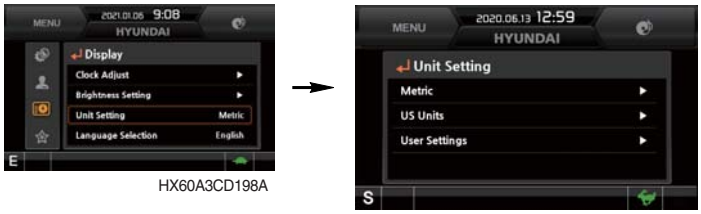
Auto (day/night)

HX60A3CD196A

Auto (day time)

· 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




HX60A3CD198A

HX60A3CD199A

– 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


HX60A3CD200A

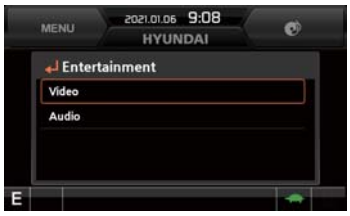
HX60A3CD201A

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

## (5) Utilities

### ① Entertainment


HX60A3CD70A




HX60A3CD208A

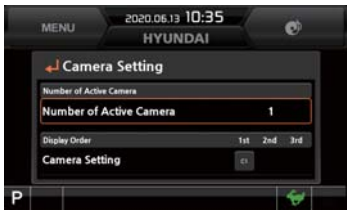

HX60A3CD209A

- 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


HX60A3CD202A




HX60A3CD203A

- 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.

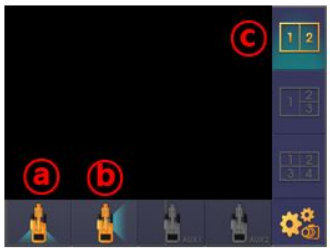

### 2) Cam image control (CIC) mode

– Touch ⓐ(Rear), ⓑ(RH) button on screen to set single-view camera mode.
– Touch ⓒ(2CH-split-view) button to set split-view camera mode.

ⓐ (Rear)

ⓑ (RH)

ⓒ (2CH Split-view)




Rear / RH view option

### 3) Split-view Camera order setting

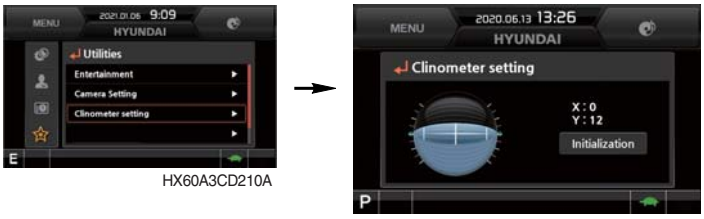
– Touch ⓓ (camera setting) button to set split-view camera order.

ⓓ(Camera Setting)


Rear / RH view option

– You can change spilt-view camera order on display order menu.

### ③ Clinometer setting

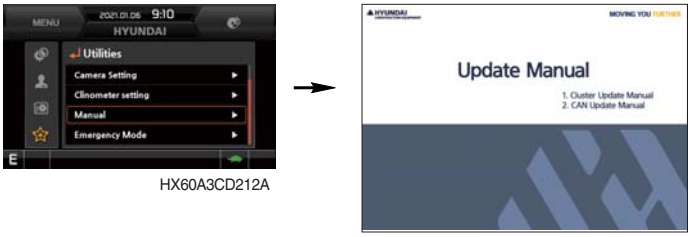



HX60A3CD210A

HX60A3CD211A

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

### ④ Manual

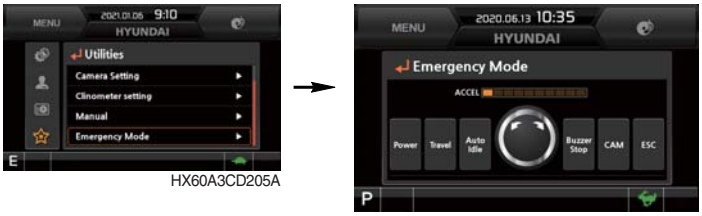



HX60A3CD212A

HX60A3CD213A

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

### ⑤ Emergency mode




HX60A3CD205A

HX60A3CD206A

· 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.

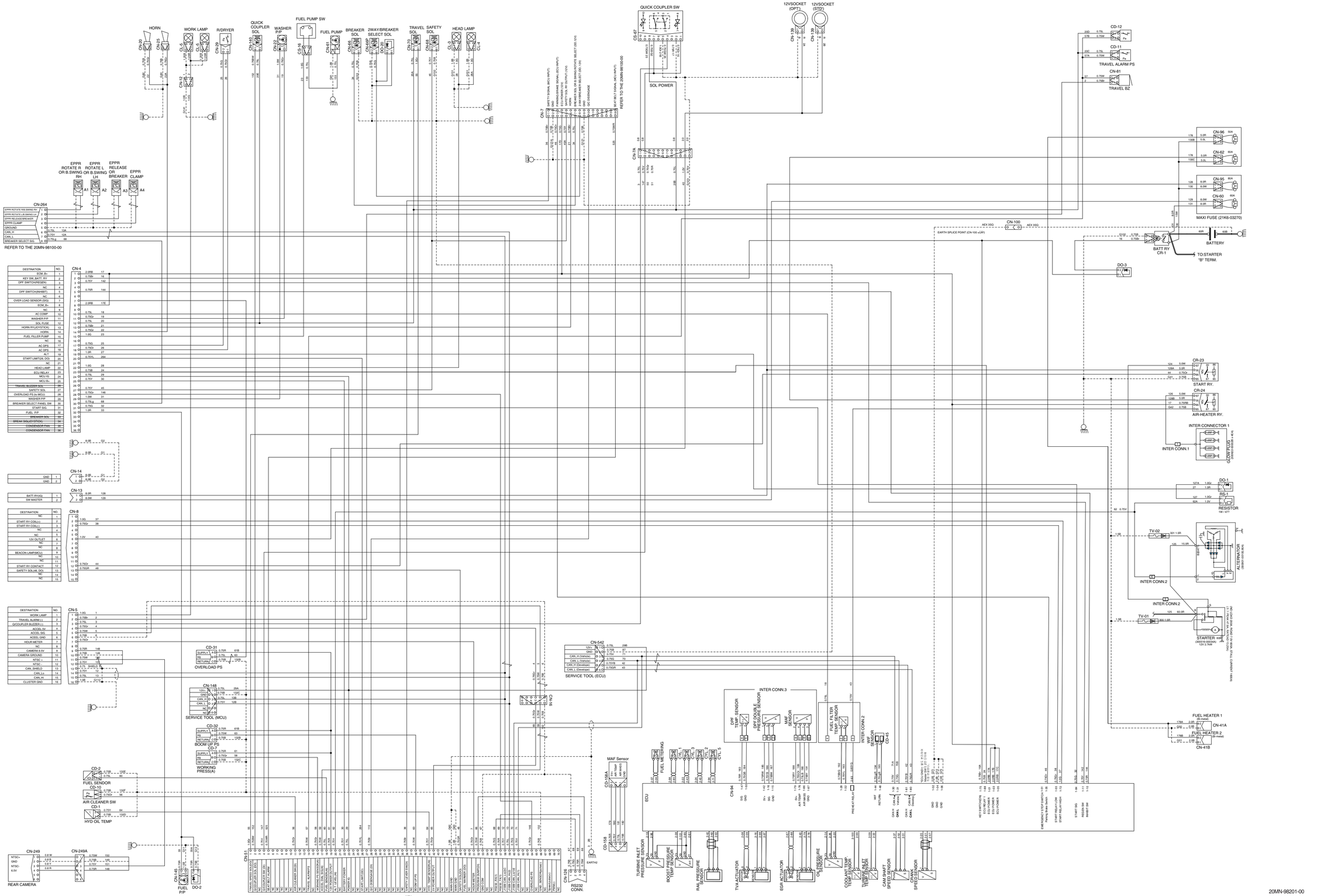
### ⑥ Quick Cooling Mode


HW60AH3CD205A

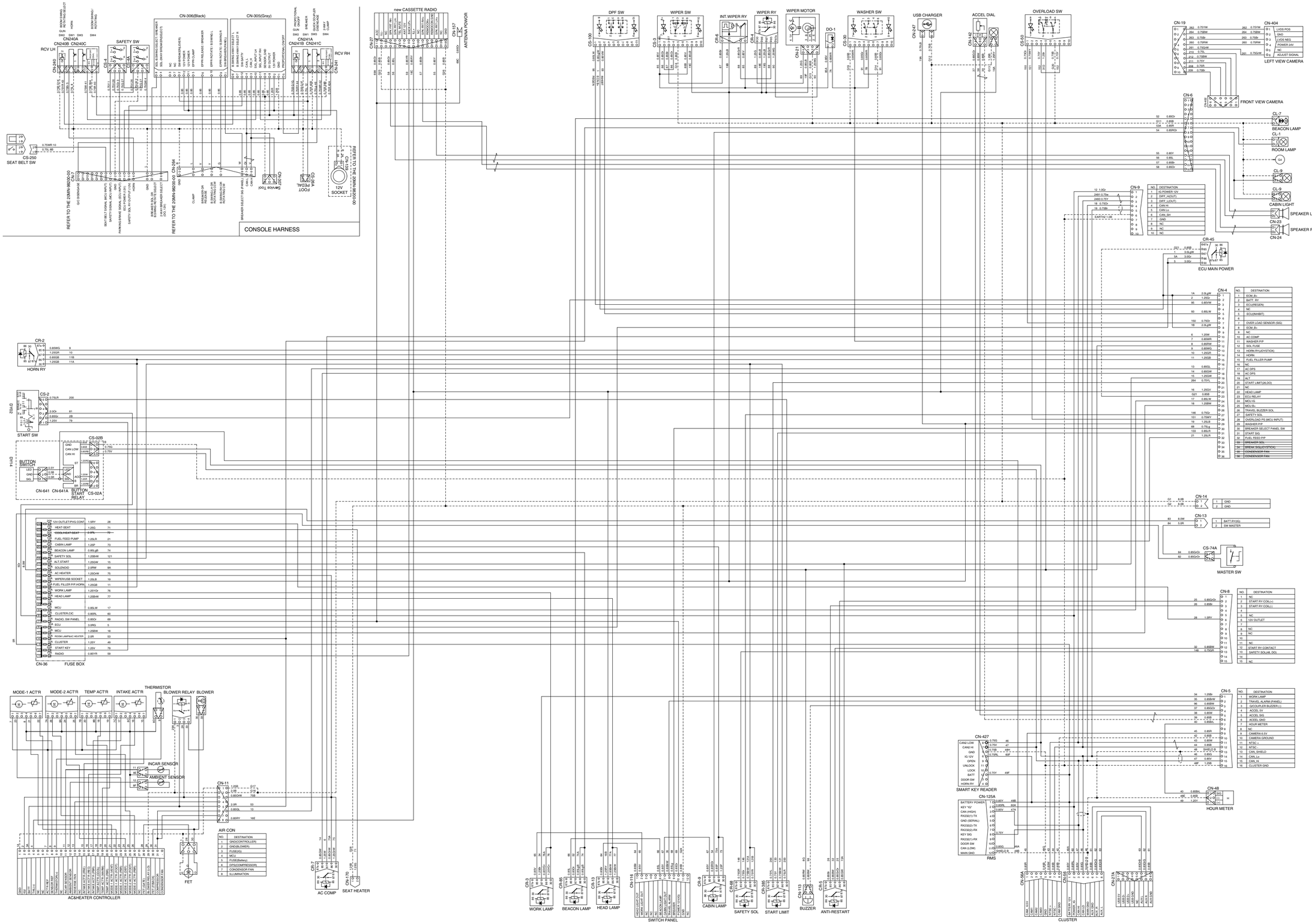
HW60AH3CD206A

· 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

## · ELECTRICAL CIRCUIT (1/2)



# · ELECTRICAL CIRCUIT (2/2)




| NO. | DESTINATION |
|---|---|
| 1 | IG POWER 12V |
| 2 | DIFF_IN(OUT) |
| 3 | DIFF_L(OUT) |
| 4 | CAN HI |
| 5 | CAN Lo |
| 6 | CAN_SH |
| 7 | GND |
| 8 | NC |
| 9 | NC |
| 10 | NC |

| NO. | DESTINATION |
|---|---|
| 1 | ECM_B+ |
| 2 | BATT_RY |
| 3 | ECU(REGEN) |
| 4 | NC |
| 5 | ECU(IN4BIT) |
| 6 | |
| 7 | OVER LOAD SENSOR (ISG) |
| 8 | ECM_B+ |
| 9 | NC |
| 10 | AC COMP |
| 11 | WASHER P/P |
| 12 | SOL FUSE |
| 13 | HORN RY(JOYSTICK) |
| 14 | HORN |
| 15 | FUEL FILLER PUMP |
| 16 | NC |
| 17 | AC DPS |
| 18 | AC DPS |
| 19 | ALT |
| 20 | START LIMIT(DLOG) |
| 21 | NC |
| 22 | HEAD LAMP |
| 23 | ECU RELAY |
| 24 | MCU IG |
| 25 | MCU B+ |
| 26 | TRAVEL BUZZER SOL |
| 27 | SAFETY SOL |
| 28 | OVERLOAD PS (MCU INPUT) |
| 29 | WASHER P/P |
| 30 | BREAKER SELECT PANEL SW |
| 31 | START SIG |
| 32 | FUEL FEED P/P |
| 33 | ~~BREAKER SOL~~ |
| 34 | ~~BREAK SIG(JOYSTICK)~~ |
| 35 | ~~CONDENSOR FAN~~ |
| 36 | ~~CONDENSOR FAN~~ |

| NO. | DESTINATION |
|---|---|
| 1 | NC |
| 2 | START RY COIL(-) |
| 3 | START RY COIL(-) |
| 4 | |
| 5 | NC |
| 6 | 12V OUTLET |
| 7 | |
| 8 | NC |
| 9 | NC |
| 10 | |
| 11 | NC |
| 12 | START RY CONTACT |
| 13 | SAFETY SOL(+B, DO) |
| 14 | |
| 15 | NC |

| NO. | DESTINATION |
|---|---|
| 1 | WORK LAMP |
| 2 | TRAVEL ALARM (PANEL) |
| 3 | QUICKCOUPLER BUZZER (-) |
| 4 | ACCEL 5V |
| 5 | ACCEL SIG |
| 6 | ACCEL GND |
| 7 | HOUR METER |
| 8 | NC |
| 9 | CAMERA 8.5V |
| 10 | CAMERA GROUND |
| 11 | NTSC_I |
| 12 | NTSC |
| 13 | CAN_SHIELD |
| 14 | CAN_Lo |
| 15 | CAN_Hi |
| 16 | CLUSTER GND |

| NO. | DESTINATION |
|---|---|
| 1 | LVDS POS |
| 2 | GND |
| 3 | LVDS NEG |
| 4 | POWER 24V |
| 5 | NC |
| 6 | ACUIST SIGNAL |

| NO. | DESTINATION |
|---|---|
| 1 | GND |
| 2 | GND |

| NO. | DESTINATION |
|---|---|
| 1 | BATT.RY(IG) |
| 2 | SW MASTER |

| NO. | DESTINATION |
|---|---|
| 1 | GND |
| 2 | GND |
| 3 | CAN LOW |
| 4 | CAN HI |
| 5 | IG 12V |
| 6 | OPEN |
| 7 | UNLOCK |
| 8 | LOCK |
| 9 | BATT |
| 10 | DOOR SW |
| 11 | HORN RY |

| NO. | DESTINATION |
|---|---|
| 1 | BATTERY POWER |
| 2 | KEY "IG" |
| 3 | CAN (HIGH) |
| 4 | RX232(1)-TX |
| 5 | GND (SERIAL) |
| 6 | RX232(2)-TX |
| 7 | RX232(2)-RX |
| 8 | KEY SIG |
| 9 | RX232(1)-RX |
| 10 | DOOR SW |
| 11 | CAN (LOW) |
| 12 | MAIN GND |

| NO. | DESTINATION |
|---|---|
| 1 | GRD(CONTROLLER) |
| 2 | GND(BLOWER) |
| 3 | FUSE(IG) |
| 4 | MCU |
| 5 | FUSE(Battery) |
| 6 | DFS(COMPRESSOR) |
| 7 | CONDENSOR FAN |
| 8 | ILLUMINATION |

| NO. | DESTINATION |
|---|---|
| 1 | 12V OUTLET/RVG CONT |
| 2 | HEAT-SEAT |
| 3 | COOL/HEAT-SEAT |
| 4 | FUEL FEED PUMP |
| 5 | CABIN LAMP |
| 6 | BEACON LAMP |
| 7 | SAFETY SOL |
| 8 | ALT.START |
| 9 | SOLENOID |
| 10 | AC HEATER |
| 11 | WIPER/USB SOCKET |
| 12 | FUEL FILLER P/P,HORN |
| 13 | WORK LAMP |
| 14 | HEAD LAMP |
| 15 | MCU |
| 16 | CLUSTER,CIC |
| 17 | RADIO, SW PANEL |
| 18 | ECU |
| 19 | MCU |
| 20 | ROOM LAMP/AC HEATER |
| 21 | CLUSTER |
| 22 | START KEY |
| 23 | RADIO |

20MN-98100-01

## 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]

- → Fuse box [No.1] → New cassette radio [CN-27 (8)]
- → Fuse box [No.2] → Start switch [CS-2 (1)]
- → Fuse box [No.3]
  - → Cluster [CN-56 (1)]
  - → Hour meter [CN-48 (1)]
  - → RMS [CN-125A (1)]
  - → Smart key reader [CN-427 (12)]
- → Fuse box [No.4]
  - → I/conn [CN-11 (5)]
    - → AC & Heater controller [3]
    - → Blower relay [2]
  - → I/conn [CN-6 (7)] → Room lamp [CL-1 (2)]
- → Fuse box [No.5] → I/conn [CN-4 (25)] → MCU [CN-51 (22)]
- → Fuse box [No.6] → ECU main power relay [CR-45 (30, 86)]

※ I/conn : Intermediate connector

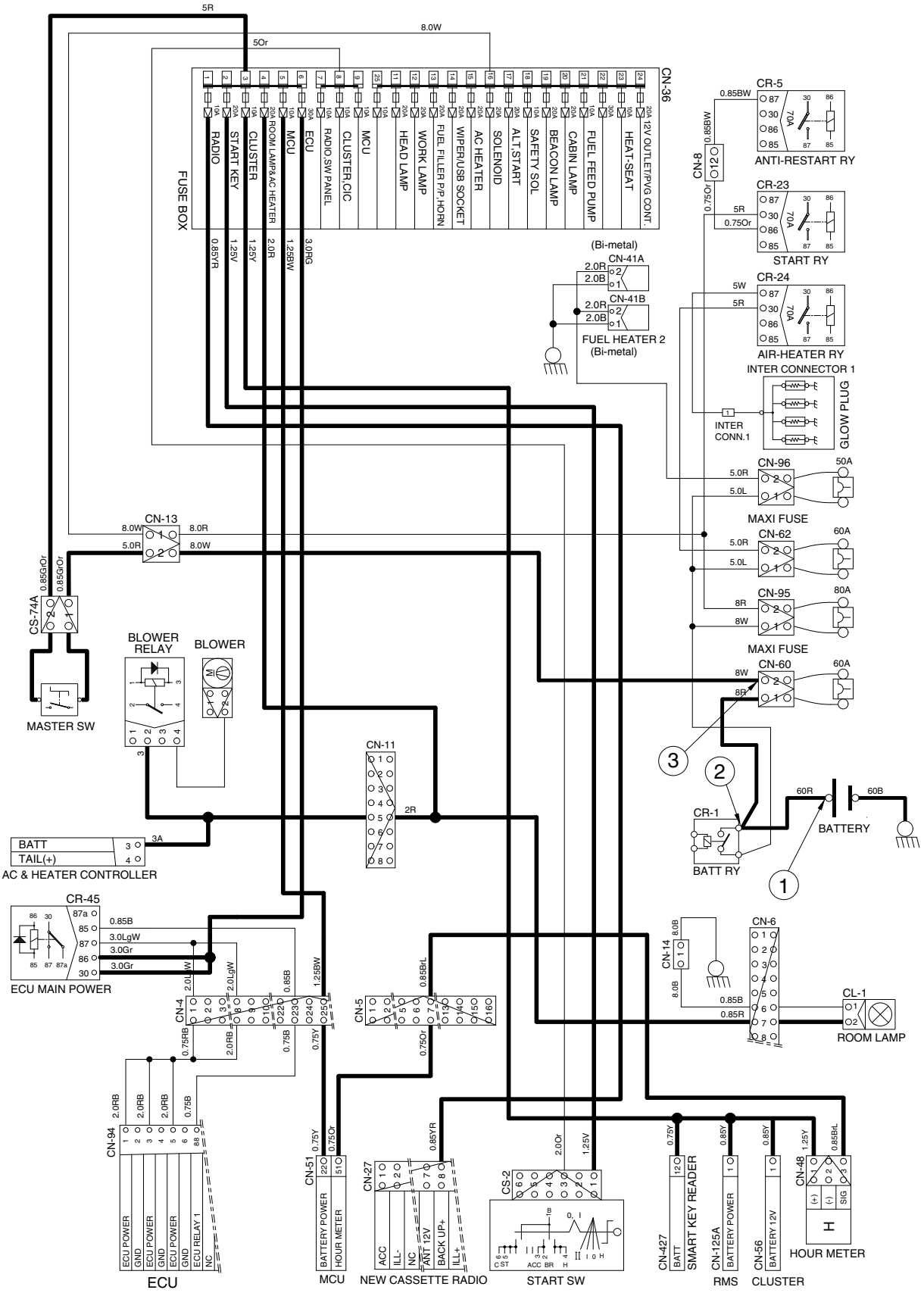
### 2) CHECK POINT

| Engine | Start switch | Check point | Voltage |
|---|---|---|---|
| STOP | OFF | ① - GND (battery $B^+$)<br>② - GND (battery relay)<br>③ - GND (fusible link) | 10~12.5V |

※ GND : Ground

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

# POWER CIRCUIT




HX65A4EL05

※ 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.2 → Start key [CS-2 (1)]

※ Start switch : ON

→ Start switch ON [CS-2 (2)] → I/conn [CN-4 (2)] → ECU [CN-94 (1-75)]
→ Battery relay [CR-1]

Battery relay [CR-1] : Battery relay operating (all power is supplied with the electric component)

→ Start switch ON [CS-2 (3)] → Fuse box (No. 7, 8, 9)] → I/conn [CN-4 (24)] →
MCU [CN-51 (23)]

※ Start switch : START

Start switch START [CS-2 (6)] → Start limit relay [CR-385 (30) → (87)] → I/conn [CN-4 (31)]
→ ECU [CN-94A (1-84) → (1-72)]
→ I/conn [CN-8 (3) → Anti-restart relay [CR-5 (85) → (87)] → I/conn [CN-8 (12)]
→ Start relay [CR-23 (86) → (87)] → Starter operating

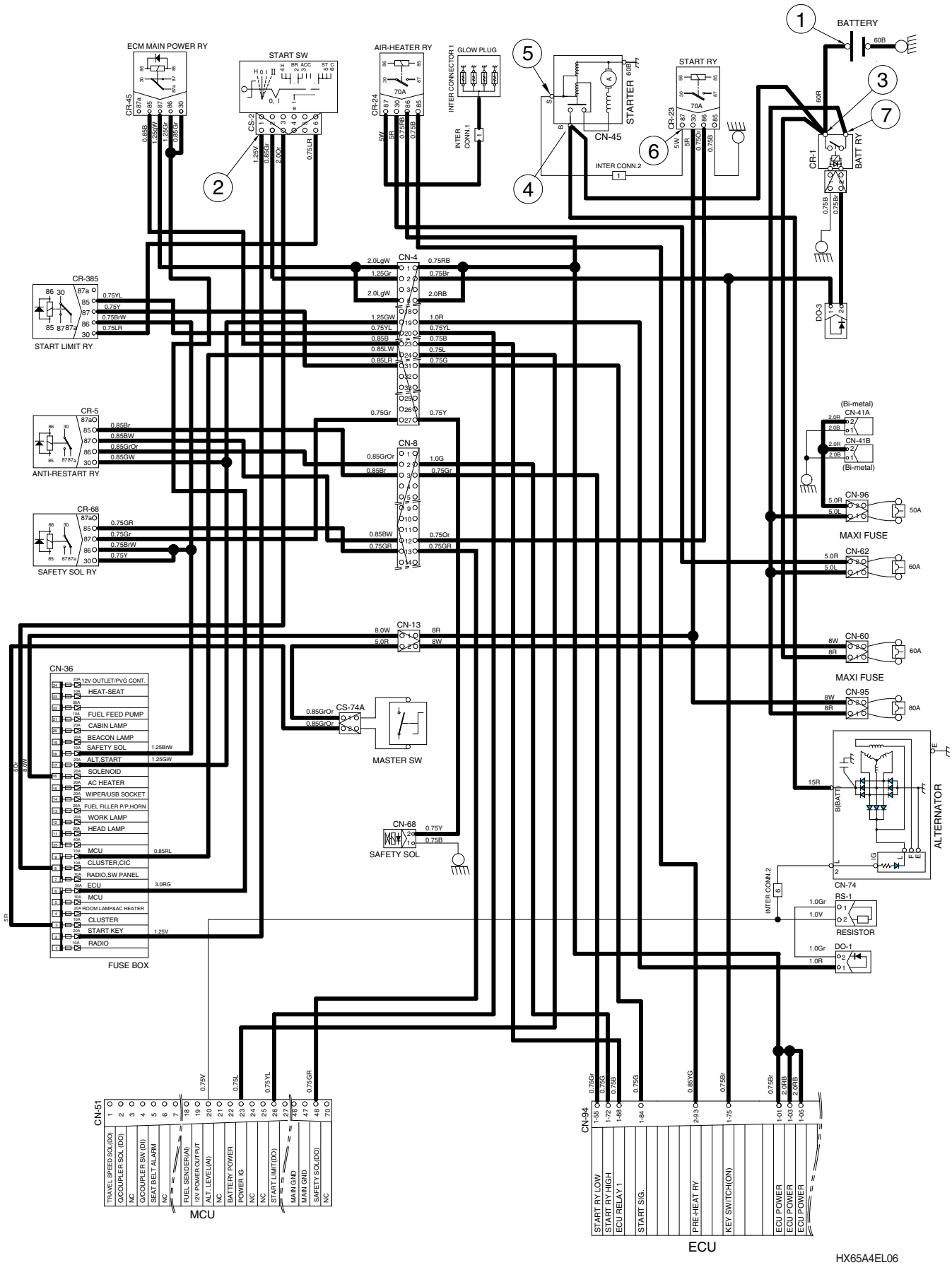
### 2) CHECK POINT

| Engine | Start switch | Check point | Voltage |
|---|---|---|---|
| Operating | START | ① – GND (battery $B^+$)<br>② – GND (start key)<br>③ – GND (battery relay M4)<br>④ – GND (starter B)<br>⑤ – GND (starter S)<br>⑥ – GND (start relay)<br>⑦ – GND (battery relay M8) | 10~12.5V |

※ GND : Ground

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

# STARTING CIRCUIT




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

## 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)] → I/conn 2 [6] → MCU [CN-51 (20)] → Cluster warning lamp

#### (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 [CN-74A] → Fuse box [CN-36 No.1~6]
- → Maxi fuse [CN-95] → I/conn [CN-13 (1)] → Fuse box [CN-36 No.11~25]

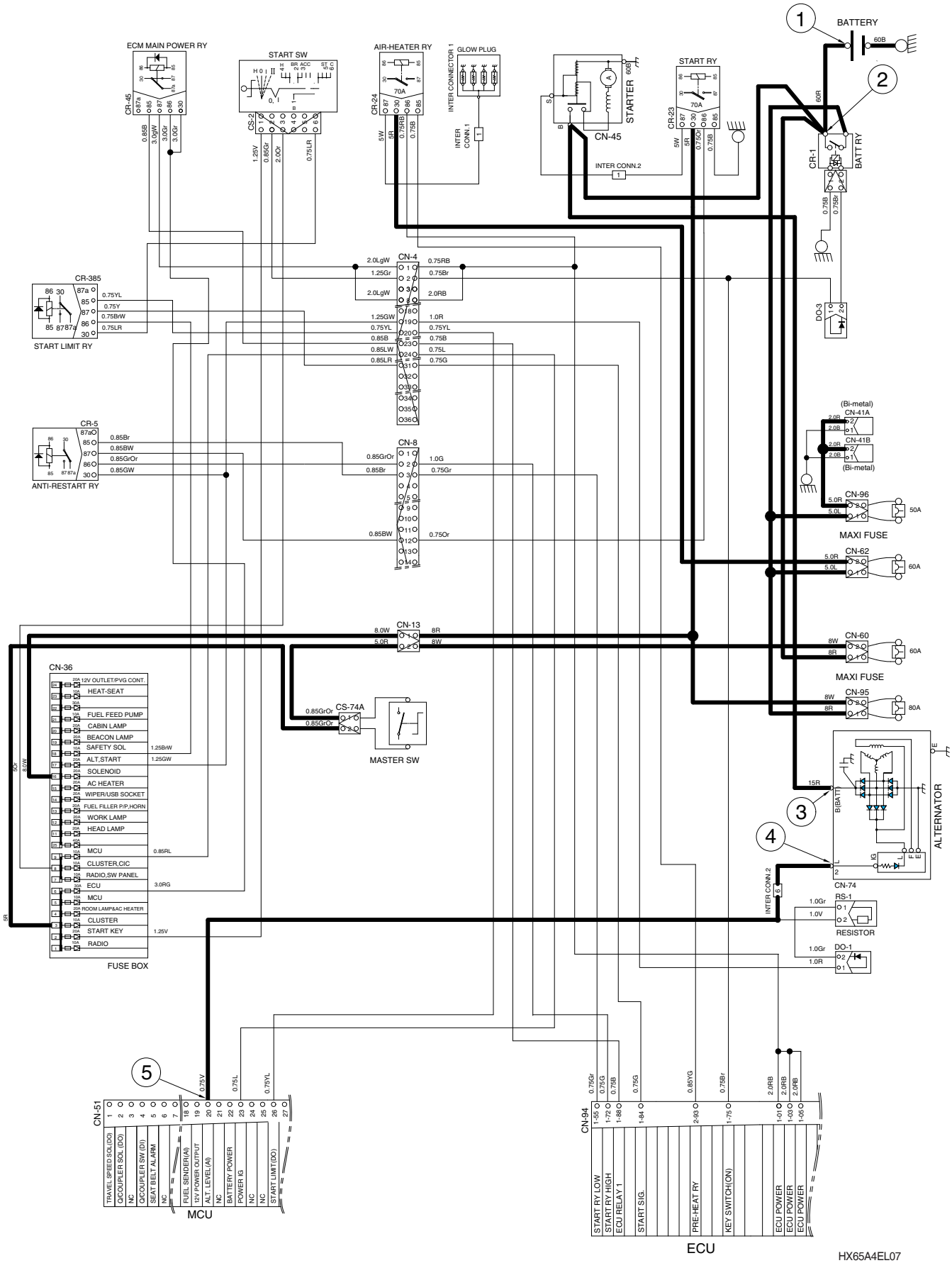
### 2) CHECK POINT

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

※ GND : Ground

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

# CHARGING CIRCUIT




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

## 4. HEAD AND WORK LAMP CIRCUIT

### 1) OPERATING FLOW

Fuse box (No.11) → Head lamp relay [CR-13 (30, 86)]
Fuse box (No.12) → Work lamp relay [CR-3 (30, 86)]
Fuse box (No.7) → Switch panel [CR-116 (10)]

#### (1) Head lamp switch ON

Head lamp switch ON [CN-116 (1)] → Head lamp relay [CR-13 (85) → (87)]
- → I/conn [CN-4 (22)] → Head lamp ON [CL-3, 4 (2)]
- → New cassette radio illumination ON [CN-27 (9)]
- → Accel dial illumination ON [CN-142 (2)
- → I/conn [CN-11 (8)] → AC/Heater controller illumination ON

#### (2) Work lamp switch ON

Work light switch ON [CN-116 (2)] → Work lamp [CR-3 (85) → (87)] → I/conn [CN-5 (1)]
I/conn [CN-12 (2)] → Work lamp ON [CL-5 (2)]

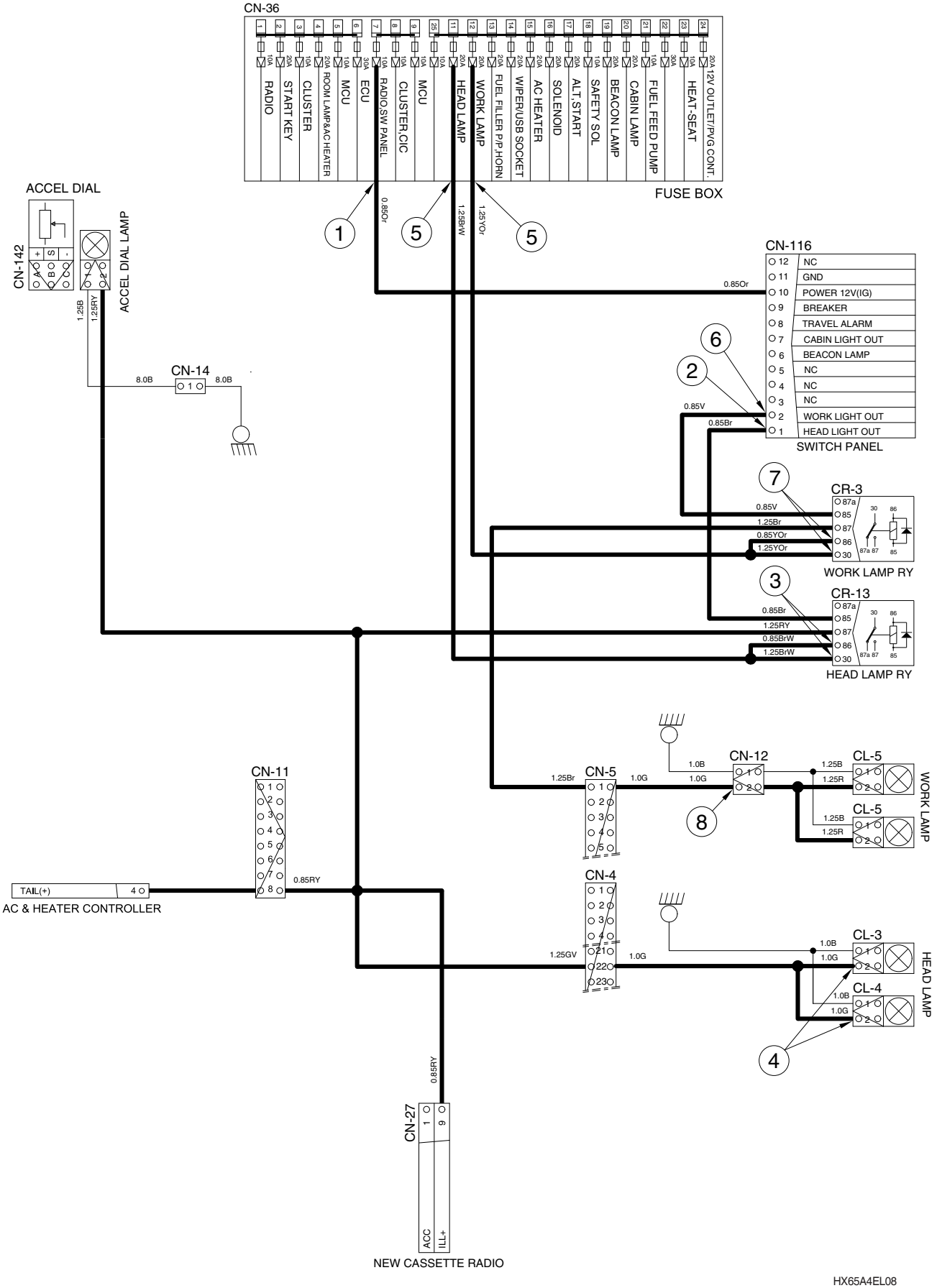
### 2) CHECK POINT

| Engine | Start switch | Check point | Voltage |
|---|---|---|---|
| STOP | ON | ① - GND (fuse box)<br>② - GND (switch power output)<br>③ - GND (switch relay input)<br>④ - GND (head light)<br>⑤ - GND (fuse box)<br>⑥ - GND (switch power output)<br>⑦ – GND (switch relay input)<br>⑧ - GND (work light) | 10~12.5V |

※ GND : Ground

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

# HEAD AND WORK LAMP CIRCUIT




HX65A4EL08

※ 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.18) → Beacon lamp relay [CR-85 (30, 86)]
Fuse box (No.20) → Cab lamp relay [CR-9 (30, 86)]
Fuse box (No.7) → Switch panel [CN-116 (10)]

#### (1) Beacon lamp switch ON

Beacon lamp switch ON [CN-116 (6)] → Beacon lamp relay [CR-85 (85) → (87)]
→ I/conn [CN-6 (5)] → Beacon lamp ON [CL-7 (2)]

#### (2) Cab lamp switch ON

Cab lamp switch ON [CN-116 (7)] → Cab lamp relay [CR-9 (85) → (87)] → I/conn [CN-6 (8)]
→ Cab lamp ON [CL-9 (2)]

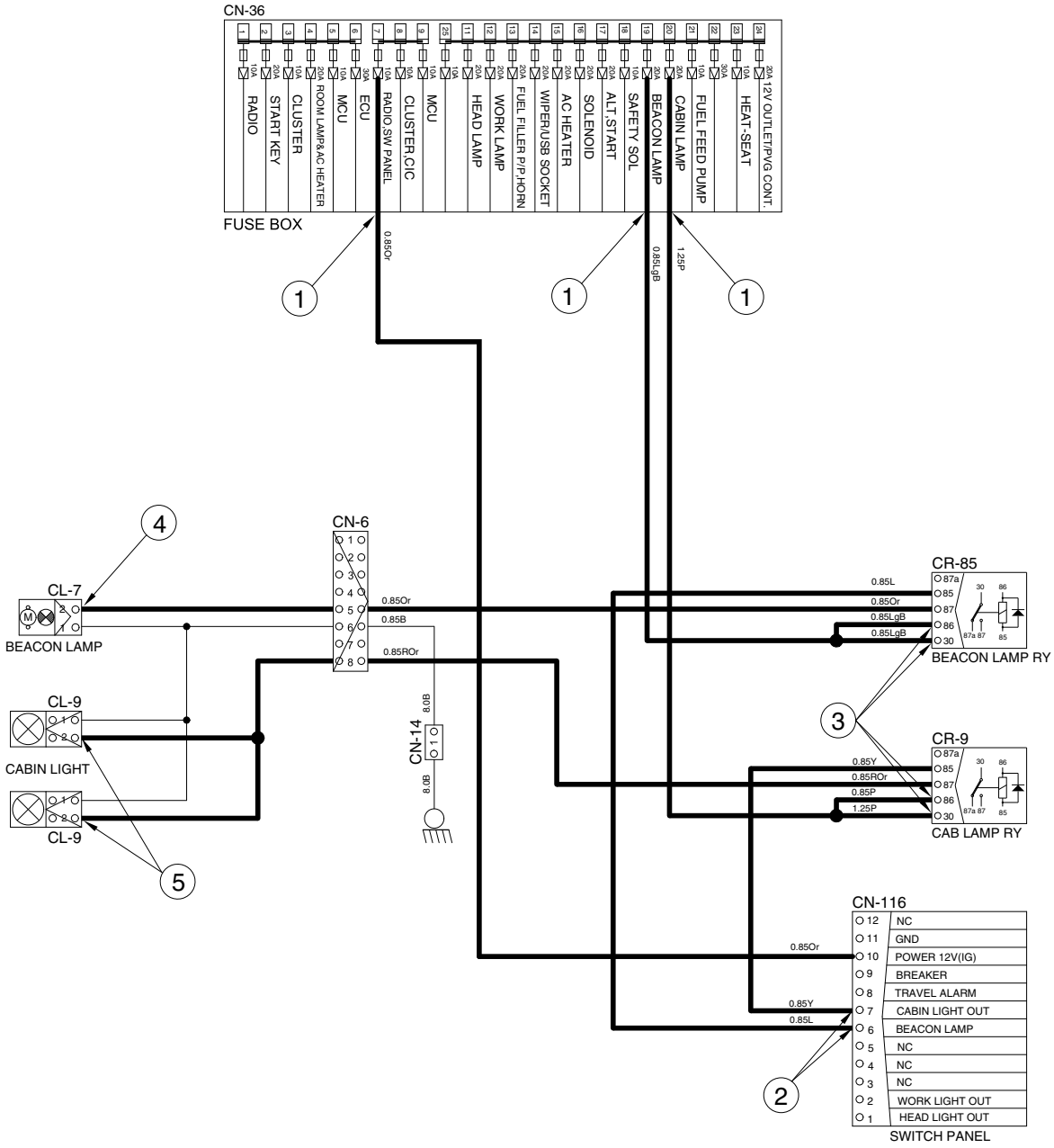
### 2) CHECK POINT

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

※ GND : Ground

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

# BEACON AND CAB LAMP CIRCUIT




HX65A4EL09

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

## 6. WIPER AND WASHER CIRCUIT

### 1) OPERATING FLOW

**(1) Key switch ON**

Fuse box (No.14) → Wiper relay [CR-4 (86, 87)]
→ Int wiper relay [CR-6 (3)]
→ Wiper switch [CS-3 (8)]
→ Wiper motor [CN-21 (3)]
→ I/conn [CN-4 (29)] → Washer pump [CN-22 (2)]

**(2) Wipe switch ON : 1st step** (intermittent speed)

Wiper switch ON [CS-3 (8)→(3)] → Int wiper relay [CR-6 (4)→(2)] → Wiper relay [CR-4 (85)→(30)]
→ Washer motor operating [CN-21 (4)]

**(3) Wiper switch ON : 2nd step** (continual)

Wiper switch ON [CS-3 (8)→(1)] → Int wiper relay [CR-6 (1)→(2)] → Wiper relay [CR-4 (85)→(30)]
→ Wiper motor operating [CN-21 (4)]

**(4) Washer switch ON**

Washer switch ON [CS-30 (2,5)] → I/conn [CN-4 (11)] → Washer pump operating [CN-22 (1)]
→ Int wiper relay [CR-6 (1)→(2)] → Wiper relay [CR-4 (85)→(30)]
→ Wiper motor operating [CN-21 (4)]

**(5) Auto parking** (when switch OFF)

Switch OFF → Wiper relay OFF
→ Int wiper relay OFF → Wiper motor [CN-21 (3)→(1)]
→ Wiper relay [CR-4 (87a)→(30)] → Wiper motor [CN-21 (4)]
→ Wiper motor parking position by wiper motor controller

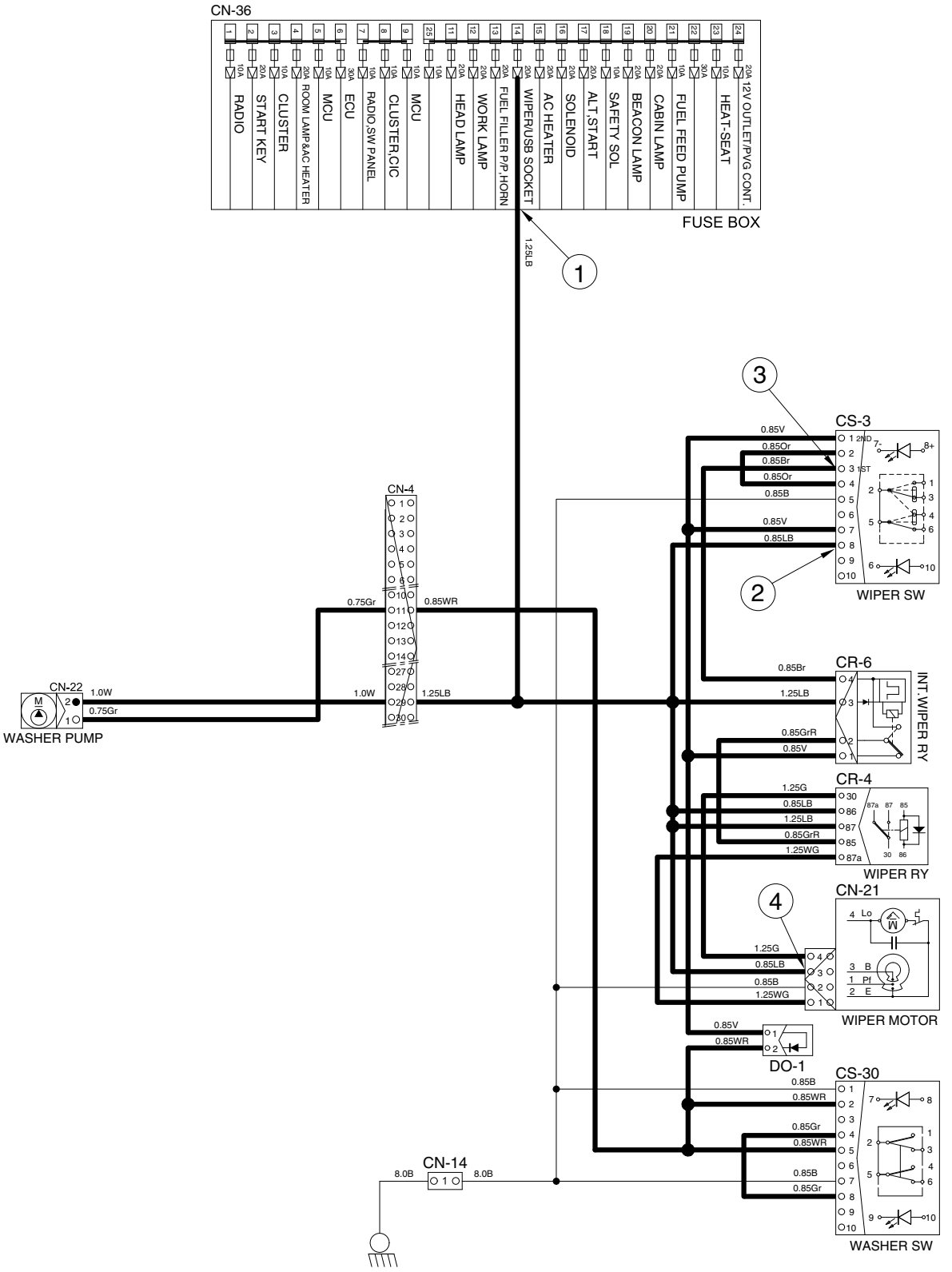
### 2) CHECK POINT

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

※ GND : Ground

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

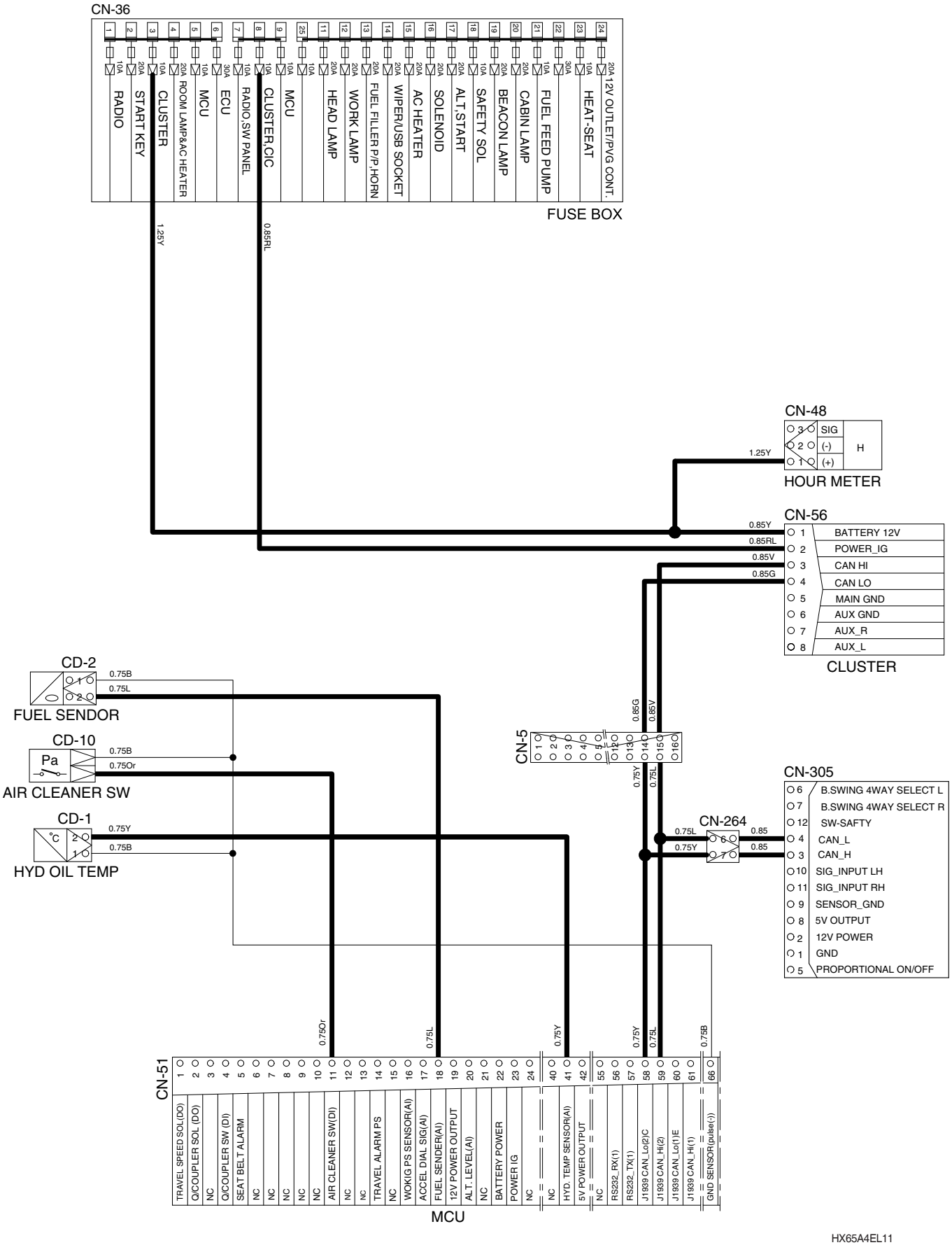
# WIPER AND WASHER CIRCUIT




HX65A4EL10

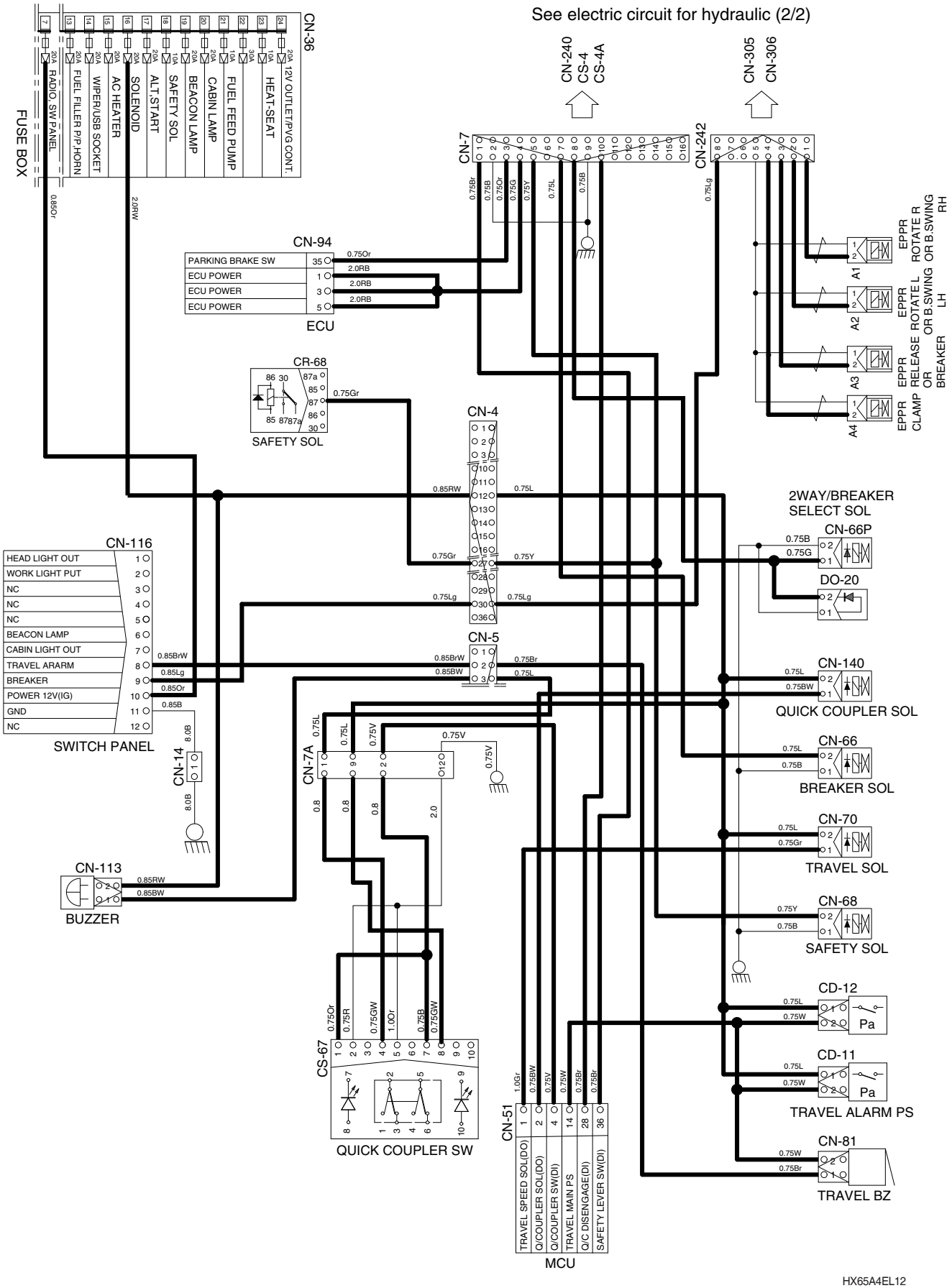
※ The circuit diagram may differ from the equipment, so please check before a repair.

# MONITORING CIRCUIT



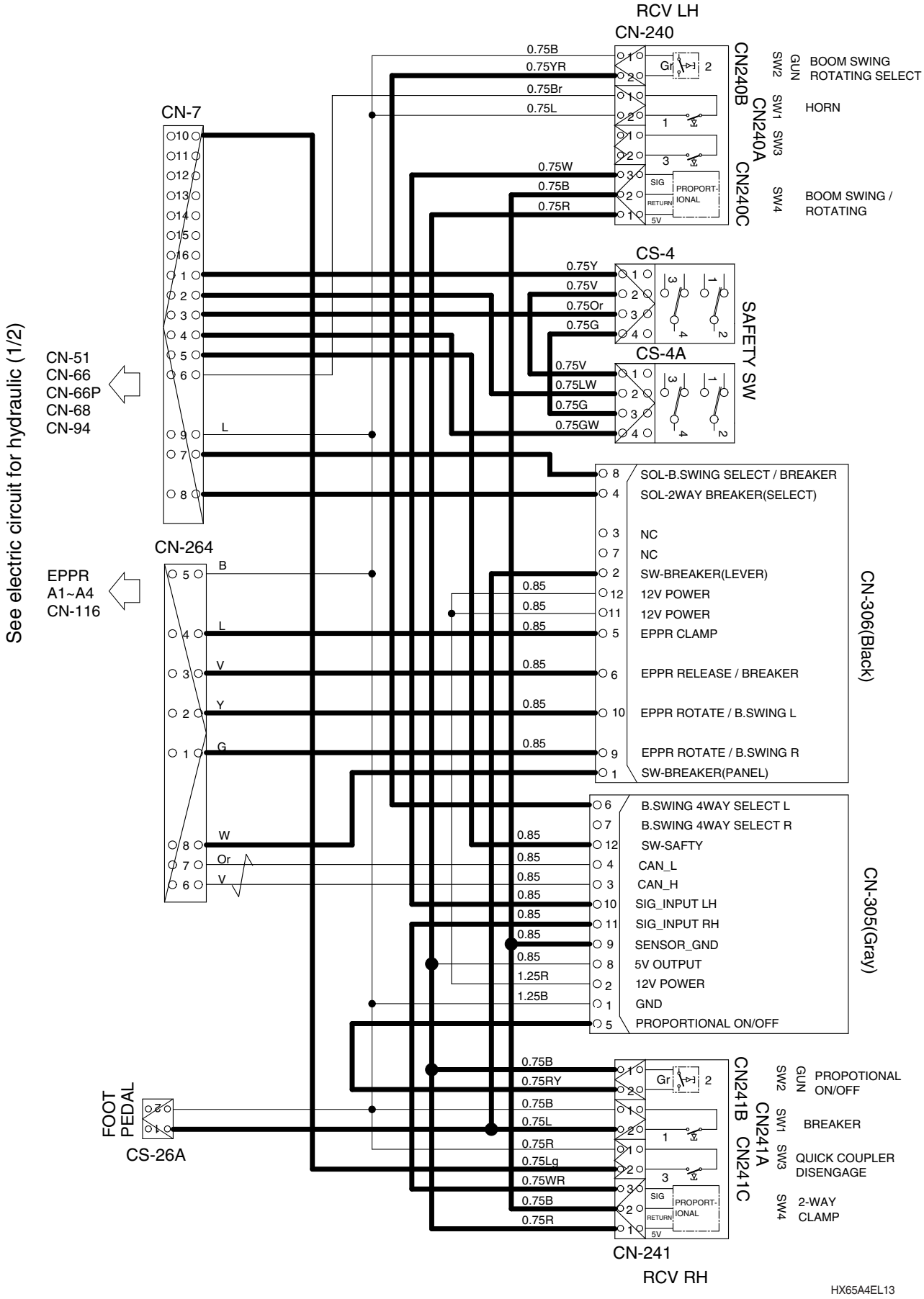

※ The circuit diagram may differ from the equipment, so please check before a repair.

# ELECTRIC CIRCUIT FOR HYDRAULIC (1/2)



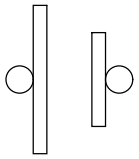
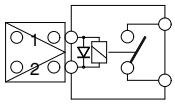
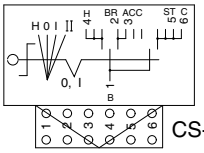
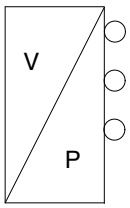
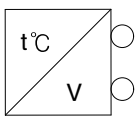
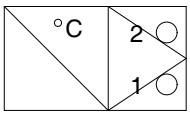

※ The circuit diagram may differ from the equipment, so please check before a repair.

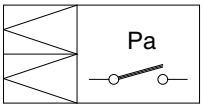
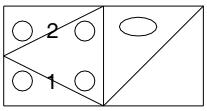
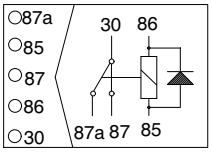
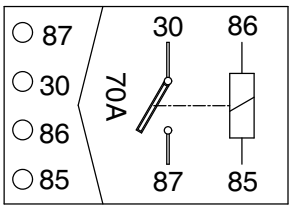
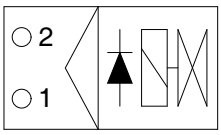
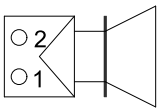
# ELECTRIC CIRCUIT FOR HYDRAULIC (2/2)

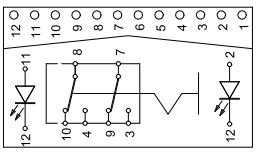
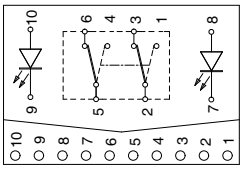
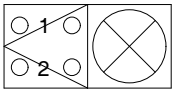
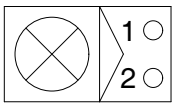
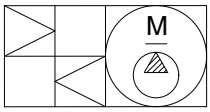
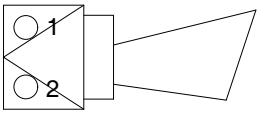


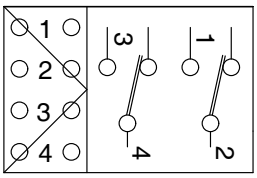
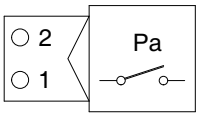
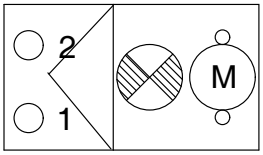
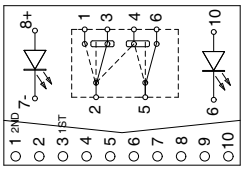
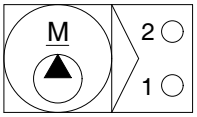
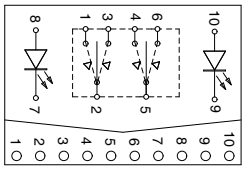

※ The circuit diagram may differ from the equipment, so please check before a repair.

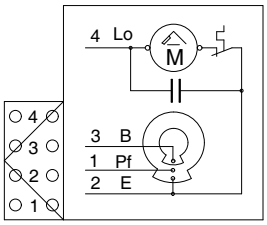
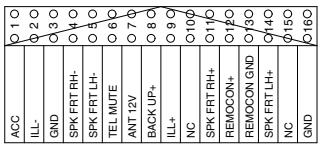
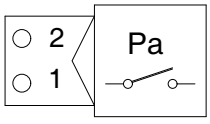
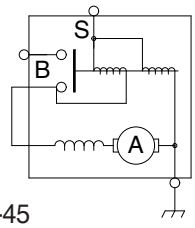
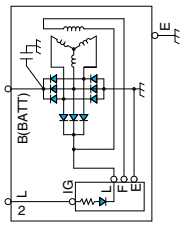
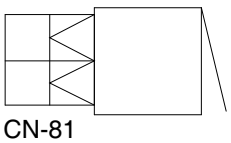
# GROUP 4 ELECTRICAL COMPONENT SPECIFICATION

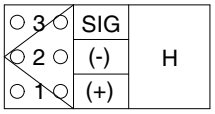
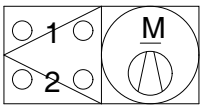
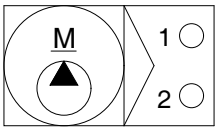
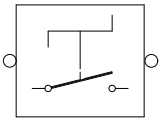
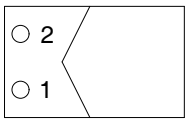
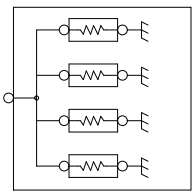
| Part name | Symbol | Specification | Check |
|---|---|---|---|
| Battery |  | 12V × 100Ah | ※ Check specific gravity<br>1.280 over : over charged<br>1.280 ~ 1.250 : normal<br>1.250 below : recharging |
| Battery relay |  <br>CR-1 | Rated load : 12V<br>100A (continuity)<br>1000A (30 second) | ※ Check coil resistance<br>Normal : about 12Ω<br>※ Check contact<br>Normal : ∞Ω |
| Start switch |  <br>CS-2 | 12V | ※Check contact<br>OFF : ∞Ω(for each terminal)<br>ON : 0Ω(for terminal 1-3 and 1-2)<br>START : 0Ω(for terminal 1-6) |
| Pressure switch (for engine oil) |  | - | ※ Check resistance<br>Normal : 0Ω(CLOSE) |
| Coolant temperature sensor |  | - | ※ Check resistance<br>50˚C : 804Ω<br>80˚C : 310Ω<br>100˚C : 180Ω |
| Hydraulic temperature sensor |  | - | ※ Check resistance<br>50˚C : 804Ω<br>80˚C : 310Ω<br>100˚C : 180Ω |

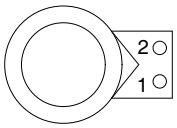
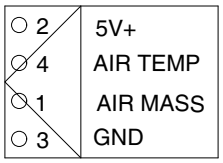
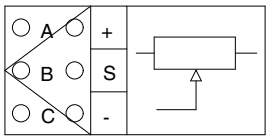
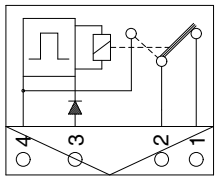
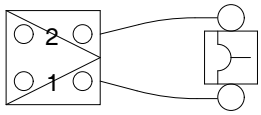
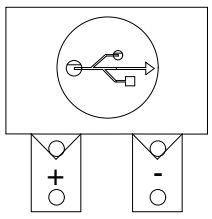
| Part name | Symbol | Specification | Check |
|---|---|---|---|
| Air cleaner pressure switch |  CD-10 | Pressure: 635mm$H_2O$ (N.O TYPE) | ※ Check contact<br>Normal : ∞Ω |
| Fuel sender |  CD-2 | - | ※ Check resistance<br>Full : 100Ω<br>Low : 500Ω<br>Empty warning : 700Ω |
| Relay |  CR-2 CR-3 CR-4 CR-5<br>CR-7 CR-9 CR-13 CR-45<br>CR-68 CR-85 CR-385 | 12V 20A | ※ Check resistance<br>Normal : about 200Ω<br>(for terminal 85-86)<br>: 0Ω (for terminal 30-87a)<br>: ∞Ω (for terminal 30-87) |
| Relay (Start, Air heater) |  | 12V 70A | ※ Rated coil current 1.2±0.3A |
| Solenoid valve |  CN-66 CN-66P CN-68<br>CN-70 CN-140 | 12V 1A | ※ Check resistance<br>Normal : 15~25Ω<br>(for terminal 1-2) |
| Speaker |  CN-23(LH)<br>CN-24(RH) | 4Ω 20W | ※Check resistance<br>Normal : 4Ω |

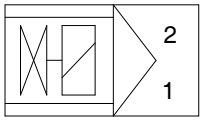
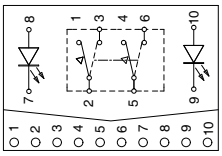
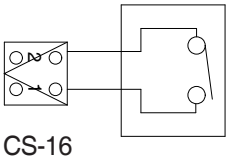
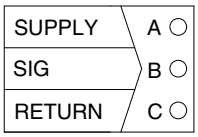
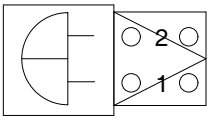
| Part name | Symbol | Specification | Check |
|---|---|---|---|
| Overload switch |  CS-50 | 12V 16A | ※ Check contact<br>Normal<br>OFF - ∞Ω (for terminal 1-5,2-6)<br>- 0Ω (for terminal 5-7,6-8) |
| Quick clamp switch |  CS-67 | 12V 16A | ※ Check contact<br>Normal<br>OFF - ∞Ω (for terminal 1-5,2-6)<br>- 0Ω (for terminal 5-7,6-8) |
| Lamp |  CL-3 CL-4<br>CL-5 CL-9 | 12V 55W<br>(H3 TYPE) | ※ Check disconnection<br>Normal : 1.2Ω |
| Room lamp |  CL-1 | 12V 10W | ※ Check disconnection<br>Normal : a few Ω |
| Fuel filler pump |  CN-61 | 12V<br>35 ℓ/min | ※Check operation<br>Supply power (for terminal 1) : 12V |
| Horn |  CN-20 CN-25 | 12V | 100±5dB |

| Part name | Symbol | Specification | Check |
|---|---|---|---|
| Safety switch |  CS-4 CS-4A | – | – |
| Pressure switch |  CD-11 CD-12 | 10bar<br>(N.C type) | ※ Check contact<br>Normal : 0.1Ω |
| Beacon lamp |  CL-7 | 12V<br>(Strobe type) | ※ Check disconnection<br>Normal : a few Ω |
| Wiper switch |  | 12V 16A | ※Check contact<br>Normal : ∞Ω |
| Washer pump |  CN-22 | 12V 3.8A | ※Check contact<br>Normal : 3Ω(for terminal 1-2) |
| DPF switch |  CS-100 | 12V 16A | ※ Check contact<br>Normal : ∞Ω(for terminal 1-2, 4-5) |

| Part name | Symbol | Specification | Check |
|---|---|---|---|
| Wiper motor |  CN-21 | 12V 3A | – |
| New cassette radio |  CN-27 | 24V 2A | ※ Check voltage<br>20 ~ 25V<br>(for terminal 1-3, 3-8) |
| Receiver dryer |  CN-29 | 12V<br>(N.O type) | ※ Check contact<br>Normal : ∞Ω(for terminal 1-2) |
| Starter |  CN-45 | 12V 2.5kW | ※ Check contact<br>Normal : 0.1Ω |
| Alternator |  CN-74 | 12V 90A | ※ Check contact<br>Normal : 0Ω(for terminal B-L) |
| Travel buzzer |  CN-81 | 12V | - |

| Part name | Symbol | Specification | Check |
|---|---|---|---|
| Hour meter |  CN-48 | 12V | - |
| Air con blower |  | 12V 8.5A | - |
| Fuel feed pump |  CN-145 | 12V | - |
| Master switch |  CS-74A | 12V 1000A | - |
| Fuel heater |  CN-41A CN-41B | 12V 38W | - |
| Glow plug |  | - | - |

| Part name | Symbol | Specification | Check |
|---|---|---|---|
| 12V socket |  CN-139 | 12V 120W | - |
| MAF sensor |  CD-158A | 5V | - |
| Accel dial |  CN-142 | - | ※ Check resistance<br>Normal : about 5kΩ<br>(for terminal A-C)<br>※ Check voltage<br>Normal : about 5V<br>(for terminal A-C)<br>: 2~4.5V<br>(for terminal C-B) |
| Int wiper relay |  CR-6 | 12V 12A | - |
| Maxi fuse |  CN-60 CN-62<br>CN-95 CN-96 | 12V, 50A (CN-96)<br>12V, 60A (CN-60, 62)<br>12V, 80A (CN-95) | - |
| USB charger |  CN-247 | - | - |

| Part name | Symbol | Specification | Check |
|---|---|---|---|
| EPPR valve |  A1, A2, A3, A4 | - | - |
| Washer switch |  CS-30 | 12V 16A | ※ Check resistance<br>Normal<br>OFF -∞ Ω (for terminal 2-3, 5-6) |
| Fuel pump switch |  CS-16 | - | - |
| Pressure sensor |  CD-7 CD-31 CD-32 | 8~30A | ※ Check contact<br>Normal -0.1 Ω |
| Buzzer |  CN-113 | 12V | - |

# GROUP 5 CONNECTORS

## 1. CONNECTOR DESTINATION

| Connector number | Type | No. of pin | Destination | Connector part No. | |
|---|---|---|---|---|---|
| | | | | Female | Male |
| CN-4 | AMP | 36 | Cabin room harness - Main harness | 1743059-2 | 1743062-3 |
| CN-5 | AMP | 16 | Cabin room harness - Main harness | 368047-1 | 368050-1 |
| CN-6 | AMP | 16 | Cabin harness - Cabin room lamp harness | 368047-1 | 368050 |
| CN-7 | AMP | 16 | Main harness-console harness | 368047-1 | 368050-1 |
| CN-7A | AMP | 12 | Main harness-console harness | 174661-2 | 368537-1 |
| CN-8 | - | 15 | Cabin room harness-Main harness | 2-85262-1 | 368301-1 |
| CN-9 | AMP | 10 | AAVM harness | 174655-2 | 174657-2 |
| CN-11 | DEUTSCH | 8 | Air-con harness | DT06-8S-EP06 | - |
| CN-12 | AMP | 2 | Main harness - Boom lamp harness | S816-002002 | S816-102002 |
| CN-13 | KET | 2 | Earth | MG620557-5 | MG620558-5 |
| CN-14 | - | 2 | Earth | S813-030201 | - |
| CN-16 | AMP | 6 | Power connector | 174264-2 | - |
| CN-16A | AMP | 6 | Power connector | - | 174262-2 |
| CN-19 | AMP | 10 | AAVM-RH camera harness | 174655-2 | 174657-2 |
| CN-20 | DEUTSCH | 2 | Horn | DT06-2S-EP06 | - |
| CN-21 | AMP | 4 | Wiper harness | 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 | KUM | 16 | Cassette & radio | PK145-16017 | - |
| CN-27A | - | 8 | Cassette & radio | - | S816-108002 |
| CN-29 | KET | 2 | Receiver dryer | MG640795 | - |
| CN-36 | - | - | Fuse box | 21MN-55100 | - |
| CN-41A | DELPHI | 2 | Fuel heater 1 | 15300027 | - |
| CN-41B | DELPHI | 2 | Fuel heater 2 | 15300027 | - |
| CN-45 | TERM | - | Starter | - | - |
| CN-48 | TERM | 4 | Hour meter | 2-520193-2 | - |
| CN-51 | AMP | 70 | MCU | 1-968879-1 | - |
| CN-56 | AMP | 8 | Cluster | - | S816-106002 |
| CN-56A | AMP | 8 | Cluster | 174982 | - |
| CN-60 | AMP | 8 | Maxi fuse | 21K6-03270 | 03.01060 |
| CN-61 | DEUTSCH | 2 | Fuel filler pump | DT06-2S-EP06 | DT04-2P-E005 |
| CN-62 | - | - | Maxi fuse | 21K6-03270 | 03.01060 |

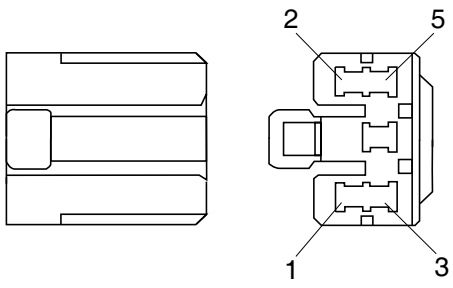
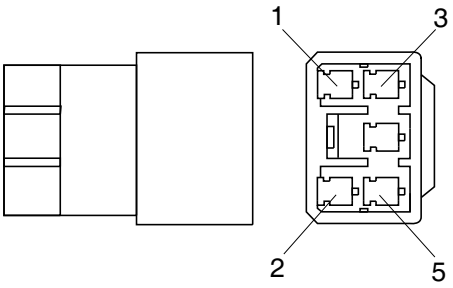
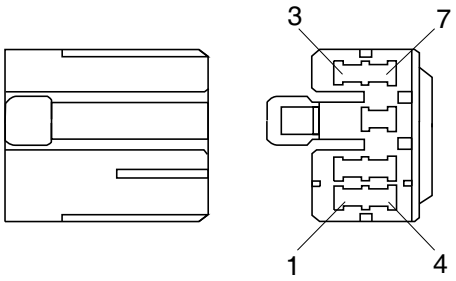
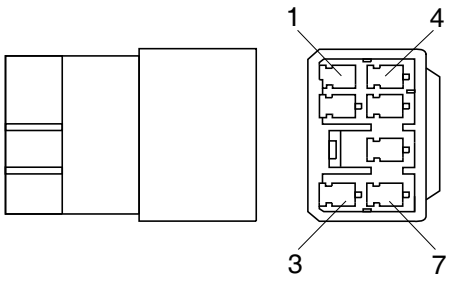
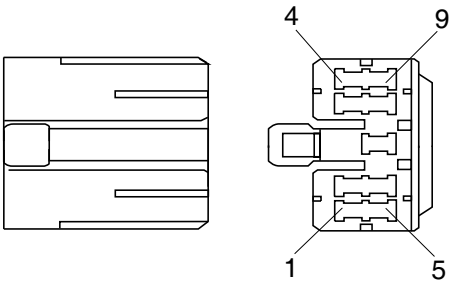
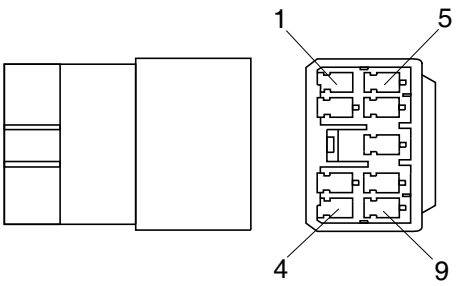
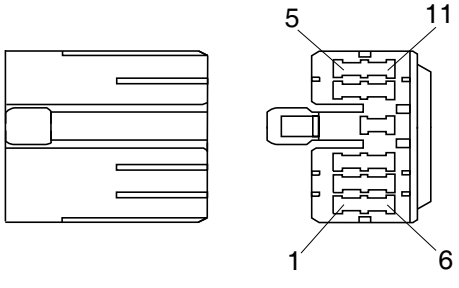
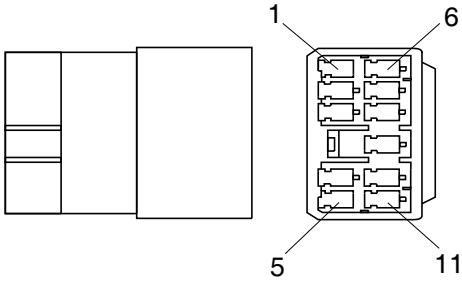
| Connector number | Type | No. of pin | Destination | Connector part No. | |
|---|---|---|---|---|---|
| | | | | Female | Male |
| CN-66 | DEUTSCH | 2 | Breaker solenoid | DT06-2S-EP06 | - |
| CN-66P | DEUTSCH | 2 | 2way / breaker select sol | DT06-2S-EP06 | DT04-2P-E005 |
| CN-68 | DEUTSCH | 2 | Safety solenoid | DT06-2S-EP06 | - |
| CN-70 | DEUTSCH | 2 | Travel HI-LO solenoid | DT06-2S-EP06 | - |
| CN-74 | DONGA | 1 | Alternator | S820-408000 | - |
| CN-81 | DEUTSCH | 2 | Travel buzzer | DT06-2S-EP06 | DT04-2P-E005 |
| CN-94 | BOSCH | 91 | ECU | 1 928 405 452 | - |
| CN-95 | - | - | Maxi fuse | 21K6-03270 | 03.01080 |
| CN-96 | - | - | Maxi fuse | 21K6-03270 | 03.01050 |
| CN-100 | KET | 1 | ECU ground | MG640944-5 | - |
| CN-113 | AMP | 2 | Buzzer | S810-002202 | - |
| CN-116 | AMP | 12 | Switch panel | 368542-1 | - |
| CN-125A | DEUTSCH | 12 | RMS | DT06-126-P021 | DT04-12PA-P021 |
| CN-126 | DEUTSCH | 4 | RS232 | DT06-4S-EP06 | DT04-4P-E005 |
| CN-139 | AMP | 2 | 12V socket (opt) | 172434-2 | - |
| CN-139 | AMP | 2 | 12V socket (std) | 174198-1 | - |
| CN-140 | DEUTSCH | 2 | Quick coupler | DT06-2S-EP06 | DT04-2P-E005 |
| CN-142 | DEUTSCH | 3 | Accel dial | DT06-3S-EP06 | - |
| CN-142 | AMP | 2 | Accel dial lamp | 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 | AMP | 2 | Seat heat switch | 12162017 | - |
| CN-170 | - | 2 | Seat belt switch | 12052641 | - |
| CN-240 | DEUTSCH | 3 | Boom swing/rotating | DT06-3S-EP06 | - |
| CN-240A | DEUTSCH | 2 | Horn | - | DT04-2P-E005 |
| CN-240B | DEUTSCH | 3 | Boom swing/rotating sel | DT06-2S-EP06 | - |
| CN-240C | - | 1 | - | - | S822-114000 |
| CN-241 | DEUTSCH | 3 | 2 way clamp | DT06-3S-EP06 | - |
| CN-241A | DEUTSCH | 2 | Breaker | - | DT04-2P-E005 |
| CN-241B | DEUTSCH | 3 | Proportional ON/OFF | DT06-2S-EP06 | - |
| CN-241C | - | 1 | Q/C disengage | - | S822-114000 |
| CN-247 | AMP | 1 | USB socket | 171809 | - |
| CN-249A | DEUTSCH | 6 | Rear camera | DT06-6S-EP06 | DT04-6P-E005 |
| CN-264 | DEUTSCH | 8 | PVG EPPR | DT06-8S | DT04-8P |
| CN-264 | DEUTSCH | 8 | Console harness-Main harness | DT06-8S | - |
| CN-305 | DEUTSCH | 12 | AVCU | DTM06-06-12SA | - |
| CN-306 | DEUTSCH | 12 | AVCU | DTM06-06-12SB | - |

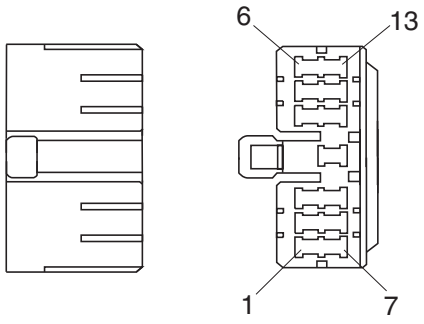
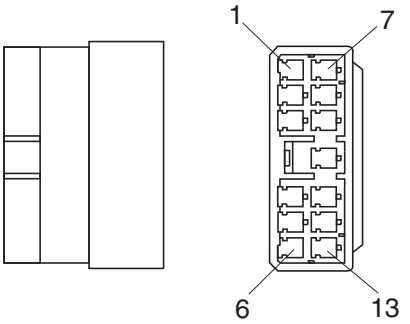
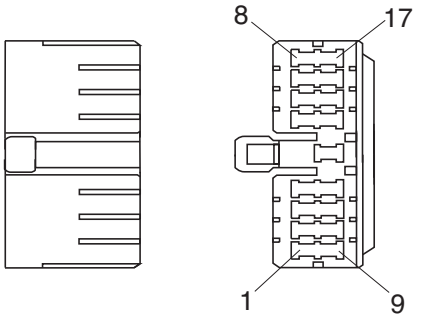
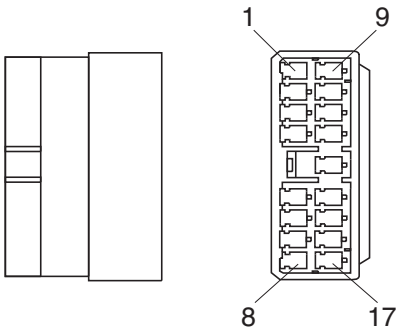
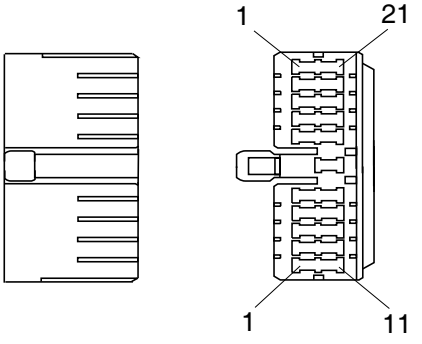
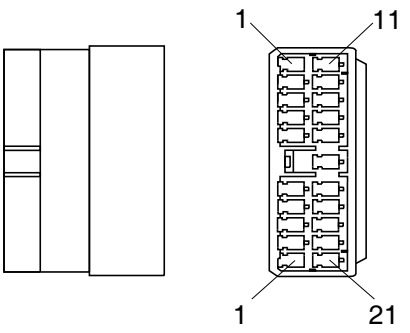
| Connector number | Type | No. of pin | Destination | Connector part No. | |
|---|---|---|---|---|---|
| | | | | Female | Male |
| CN-307 | DEUTSCH | 3 | Service tool | DT06-3S-EP06 | DT04-3P-E005 |
| CN-402 | DEUTSCH | 6 | Front view camera | DT06-6S-EP06 | DT04-6P-E005 |
| CN-404 | DEUTSCH | 6 | LH view camera | DT06-6S-EP06 | DT04-6P-E005 |
| CN-427 | - | 12 | Smart key reader | 5557-12R | 5559-12P |
| CN-542 | DEUTSCH | 6 | Service tool (ECU) | DT06-6S-EP06 | DT04-6P-E005 |
| CN-641 | KET | 3 | Button key (opt) | MG641035 | - |
| CN-641A | KET | 3 | BKCU | 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-3 | DEUTSCH | 2 | Head lamp | DT06-2S-EP06 | DT04-2P-E005 |
| CL-4 | DEUTSCH | 2 | Head lamp | DT06-2S-EP06 | DT04-2P-E005 |
| CL-5 | DEUTSCH | 2 | Work lamp | DT06-2S-EP06 | DT04-2P-E005 |
| 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 |
| · RELAY | | | | | |
| CR-1 | AMP | 2/- | Battery relay | S816-002002 | S816-100002 |
| CR-1 | DONGA | - | Battery relay contact (IG) | S820-408000 | - |
| CR-1 | DONGA | - | Battery relay contact ($B^+$) | S820-408000 | - |
| CR-2 | - | 5 | Horn relay | SJA003526-001 | - |
| CR-3 | - | 5 | Work lamp relay | SJA003526-001 | - |
| CR-4 | - | 5 | Wiper relay | SJA003526-001 | - |
| CR-5 | - | 5 | Anti-restart relay | SJA003526-001 | - |
| CR-6 | KET | 4 | Int wiper relay | MG652999 | - |
| CR-7 | - | 5 | AC comp relay | SJA003526-001 | - |
| CR-9 | - | 5 | Cabin lamp relay | SJA003526-001 | - |
| CR-13 | - | 5 | Head lamp relay | SJA003526-001 | - |
| CR-23 | KET | 4 | Start relay | MG612017-5 | - |
| CR-24 | KET | 4 | Air heater relay | MG612017-5 | - |
| CR-45 | - | 5 | ECU power relay | SJA003526-001 | - |
| CR-68 | - | 5 | Safety solenoid relay | SJA003526-001 | - |

| Connector number | Type | No. of pin | Destination | Connector part No. | |
|---|---|---|---|---|---|
| | | | | Female | Male |
| CR-85 | - | 5 | Beacon lamp relay | SJA003526-001 | - |
| CR-385 | - | 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-7 | DEUTSCH | 3 | Auto idle pressure switch | DT06-3S-EP06 | - |
| CD-10 | AMP | 2 | Air cleaner switch | 85202-1 | - |
| CD-11 | KET | 2 | Travel pressure switch | MG640795 | - |
| CD-12 | KET | 2 | Travel pressure switch | MG640795 | - |
| CD-31 | DEUTSCH | 3 | Overload pressure | DT06-3S-EP06 | DT04-3P-E005 |
| CD-32 | DEUTSCH | 3 | Boom up pressure | DT06-3S-EP06 | - |
| CD-45 | DEUTSCH | 2 | WIF sensor | DT06-2S-EP06 | - |
| CD-158 | AMP | 4 | MAF connector | - | 1-1564559-1 |
| CD-158A | AMP | 4 | MAF sensor | 1-178645-1 | - |
| DO-1 | AMP | 2 | Diode | 174352-2 | 21EA-50570 |
| DO-2 | AMP | 2 | Diode | 174352-2 | 21EA-50550 |
| DO-3 | - | 2 | Diode | S816-002002 | 21EA-50550 |
| DO-20 | AMP | 2 | Diode | S816-002002 | 21EA-50550 |
| · SWITCH | | | | | |
| CS-2 | KET | 6 | Start key switch | S814-006000 | - |
| CS-2A | - | 6 | Start key | S814-006000 | - |
| CS-2B | DEUTSCH | 3 | BKCU | DT06-3S-EP06 | DT04-3P-E005 |
| CS-3 | CARLING | 10 | Wiper switch | VC2-01 | - |
| CS-4 | AMP | 3 | Safety switch | 174257-2 | - |
| CS-4A | AMP | 4 | Safety switch | - | 174259-2 |
| CS-16 | AMP | 2 | Fuel filler pump switch | 174352-2 | 174354-2 |
| CS-26 | DEUTSCH | 2 | Fool pedal | DT06-2S-EP06 | - |
| CS-26A | AMP | 2 | Foot pedal | 174352-2 | 174359-2 |
| CS-30 | CARLING | 10 | Wiper/washer switch | VC2-01 | - |
| CS-50 | CARLING | 10 | Overload switch | VC2-01 | - |
| CS-67 | CARLING | 10 | Quick coupler switch | VC2-01 | - |
| CS-74A | YAZAKI | 2 | Master switch | S813-030201 | S813-130201 |
| CS-100 | CARLING | 10 | DPF switch | VC2-01 | - |
| CS-250 | DEUTSCH | 2 | Seat belt alarm | DT06-2S-EP06 | DT04-2P-E005 |

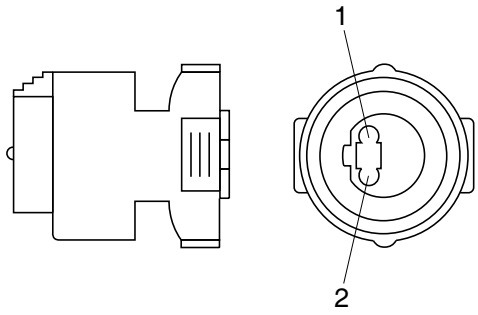
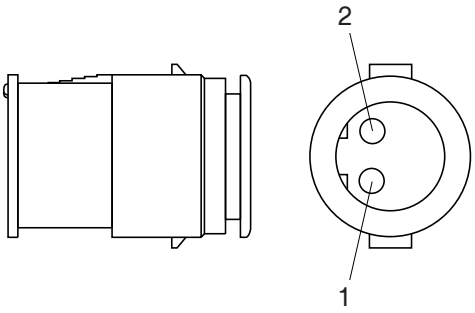
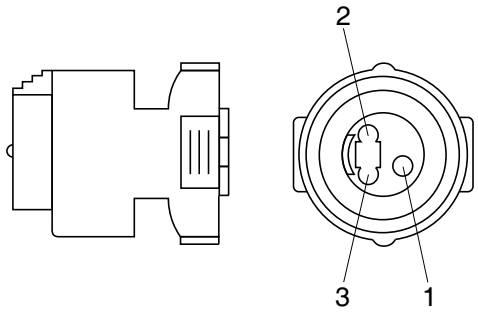
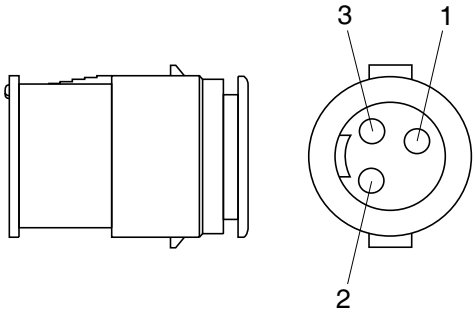
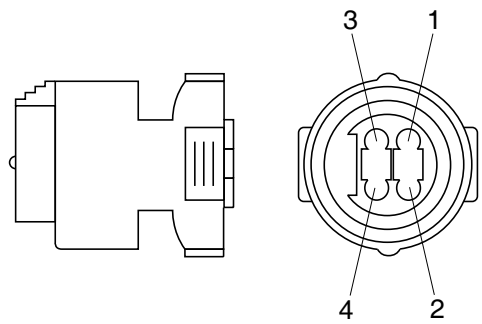
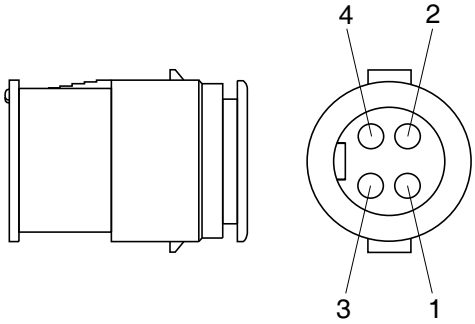
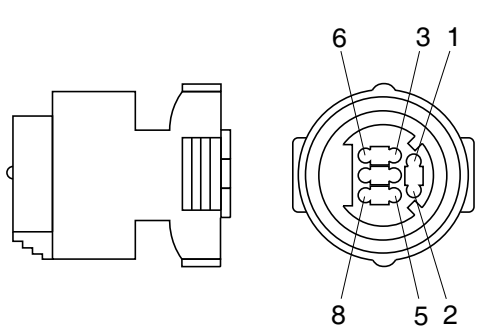
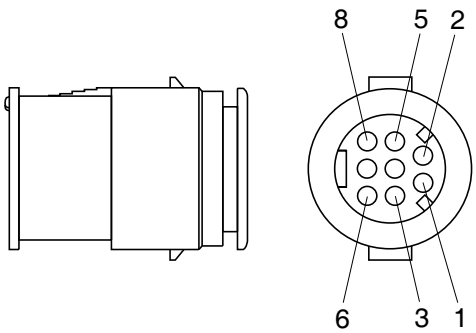
## 2. CONNECTION TABLE FOR CONNECTORS

### 1) PA TYPE CONNECTOR

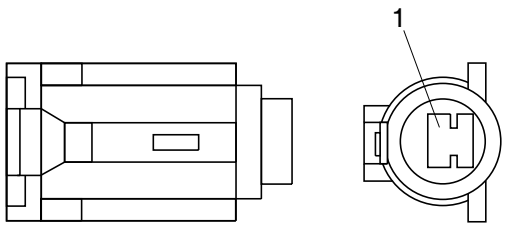
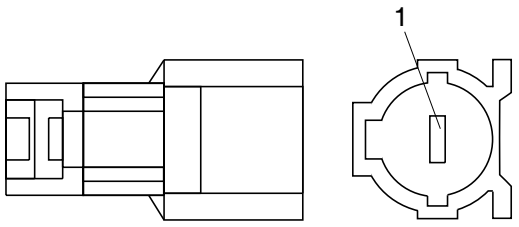
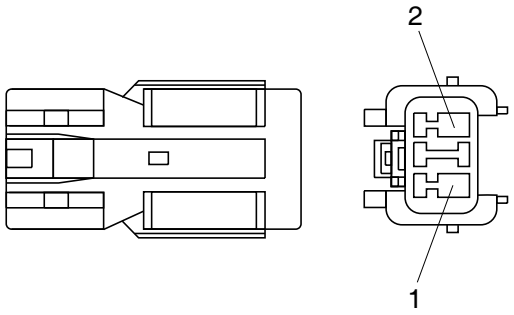
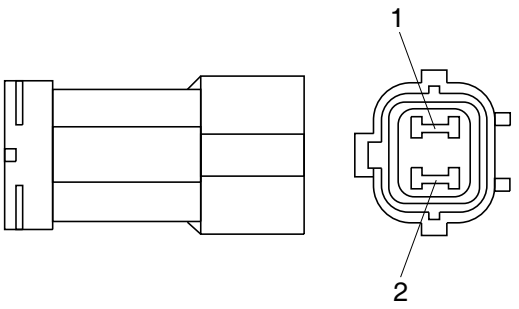
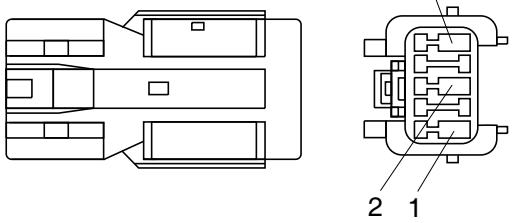
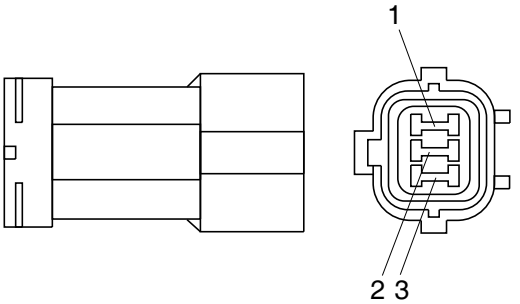
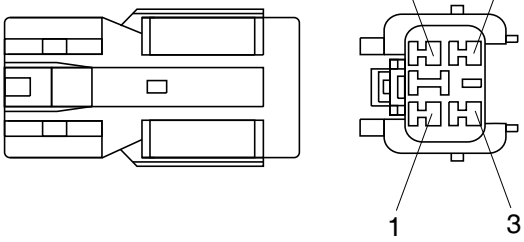
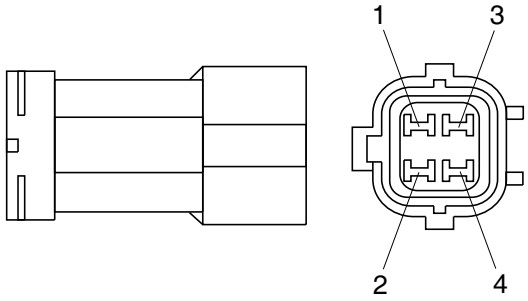
| No. of pin | Receptacle connector (female) | Plug connector (male) |
|---|---|---|
| 5 |  S811-005002 |  S811-105002 |
| 7 |  S811-007002 |  S811-107002 |
| 9 |  S811-009002 |  S811-109002 |
| 11 |  S811-011002 |  S811-111002 |

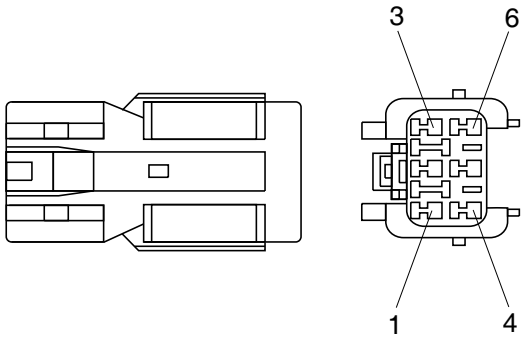
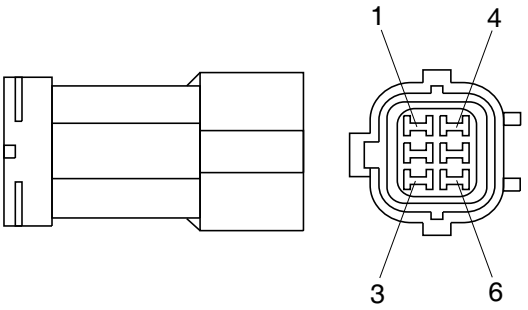
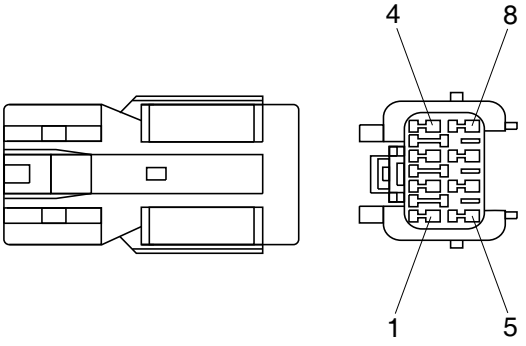
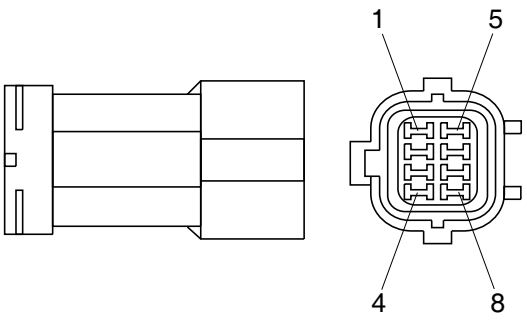
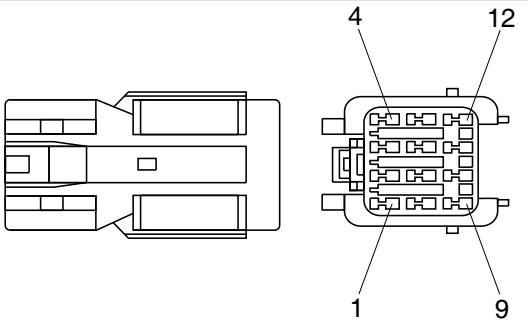
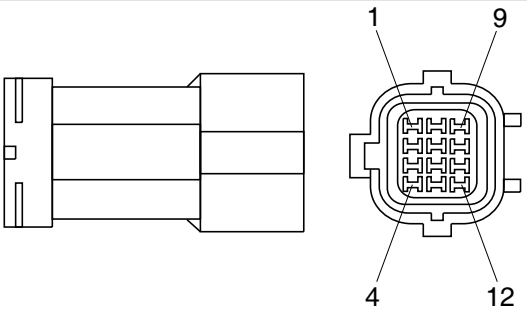
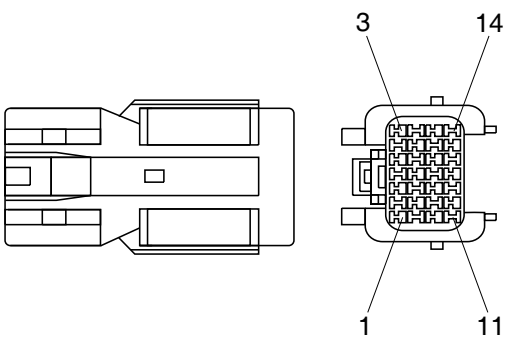
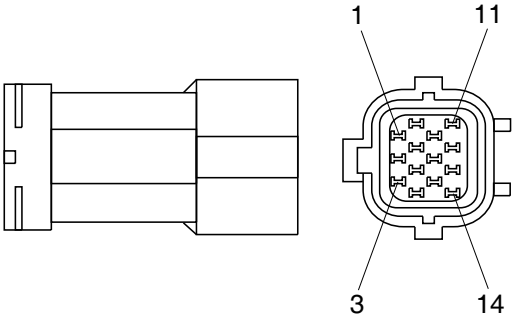
| No. of pin | Receptacle connector (female) | Plug connector (male) |
|---|---|---|
| 13 |  S811-013002 |  S811-113002 |
| 17 |  S811-017002 |  S811-117002 |
| 21 |  S811-021002 |  S811-121002 |

## 2) J TYPE CONNECTOR

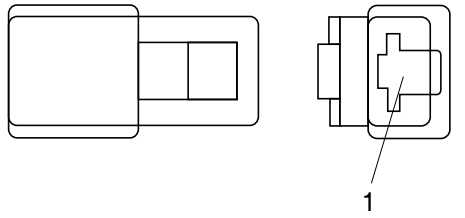
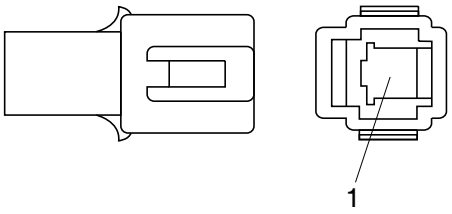
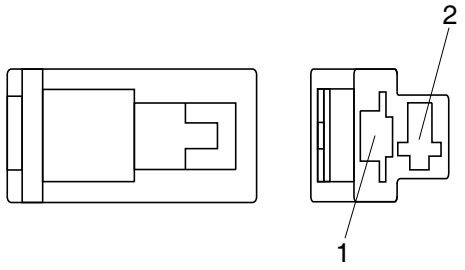
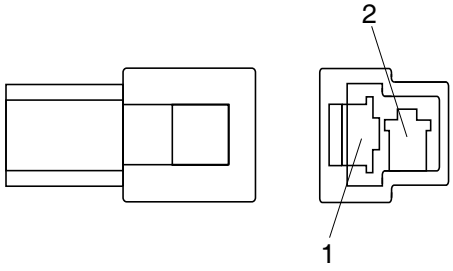
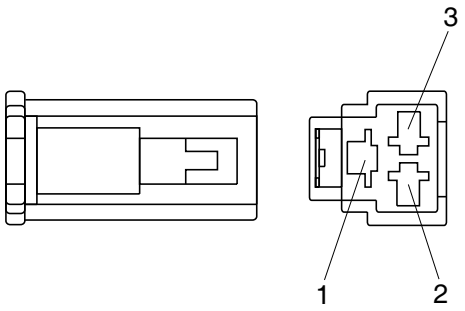
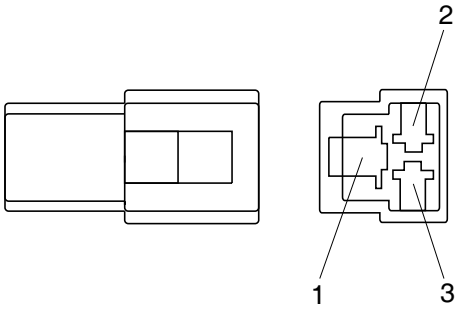
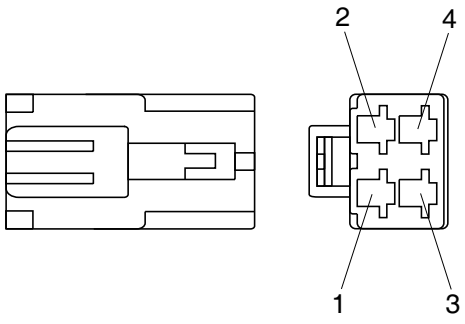
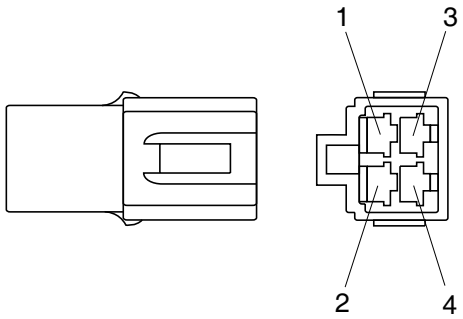
| No. of pin | Receptacle connector (female) | Plug connector (male) |
|---|---|---|
| 2 |  S816-002001 |  S816-102001 |
| 3 |  S816-003001 |  S816-103001 |
| 4 |  S816-004001 |  S816-104001 |
| 8 |  S816-008001 |  S816-108001 |

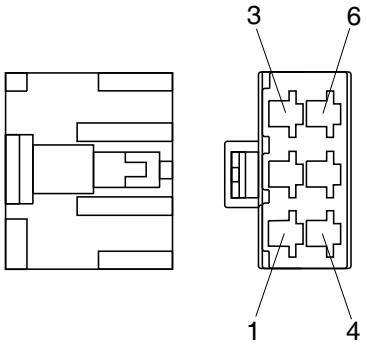
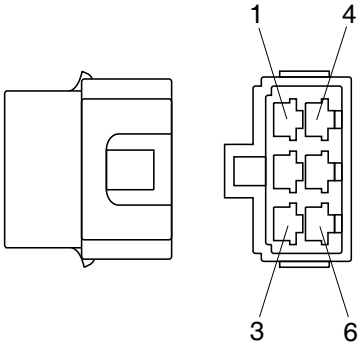
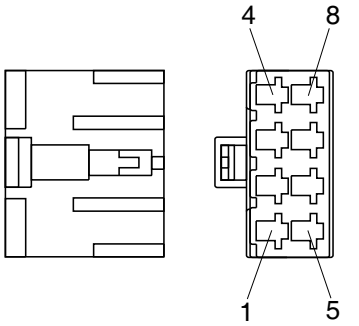
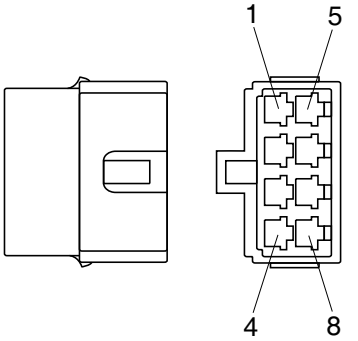
### 3) SWP TYPE CONNECTOR

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

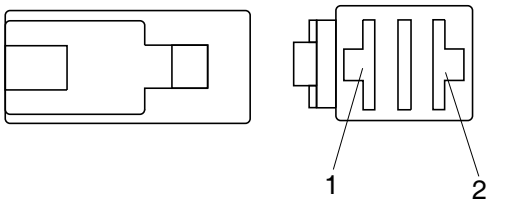
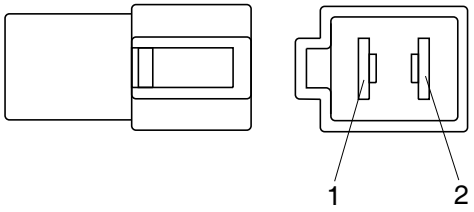
| No. of pin | Receptacle connector (female) | Plug connector (male) |
|---|---|---|
| 6 |  S814-006000 |  S814-106000 |
| 8 |  S814-008000 |  S814-108000 |
| 12 |  S814-012000 |  S814-112000 |
| 14 |  S814-014000 |  S814-114000 |

## 4) CN TYPE CONNECTOR

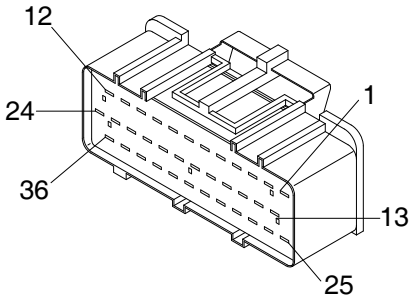
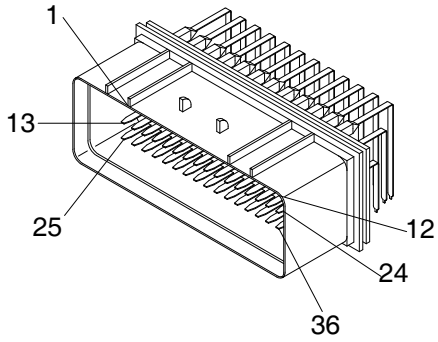
| No. of pin | Receptacle connector (female) | Plug connector (male) |
|---|---|---|
| 1 |  S810-001202 |  S810-101202 |
| 2 |  S810-002202 |  S810-102202 |
| 3 |  S810-003202 |  S810-103202 |
| 4 |  S810-004202 |  S810-104202 |

| No. of pin | Receptacle connector (female) | Plug connector (male) |
|---|---|---|
| 6 |  S810-006202 |  S810-106202 |
| 8 |  S810-008202 |  S810-108202 |

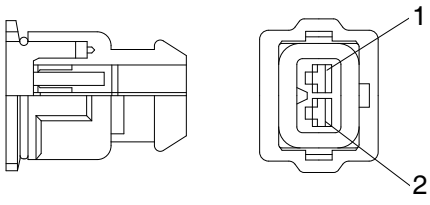
### 5) 375 FASTEN TYPE CONNECTOR

| No. of pin | Receptacle connector (female) | Plug connector (male) |
|---|---|---|
| 2 |  S810-002402 |  S810-102402 |

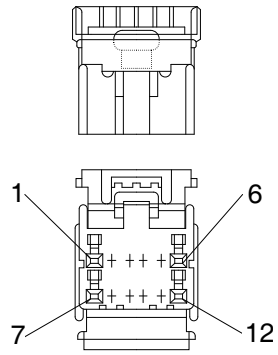
### 6) AMP ECONOSEAL CONNECTOR

| No. of pin | Receptacle connector (female) | Plug connector (male) |
|---|---|---|
| 36 |  344111-1 |  344108-1 |

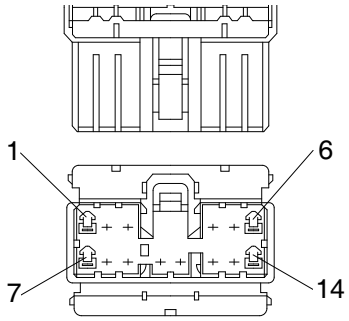
### 7) AMP TIMER CONNECTOR

| No. of pin | Receptacle connector (female) | Plug connector (male) |
|---|---|---|
| 2 |  85202-1 | |

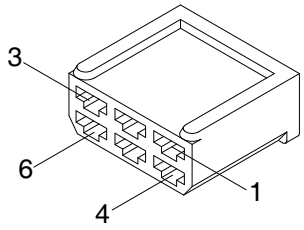
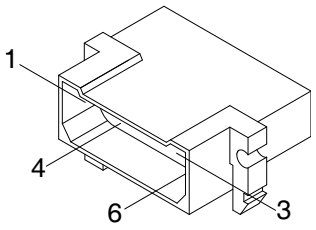
## 8) AMP 040 MULTILOCK CONNECTOR

| No. of pin | Receptacle connector (female) | Plug connector (male) |
|---|---|---|
| 12 |  174045-2 | |

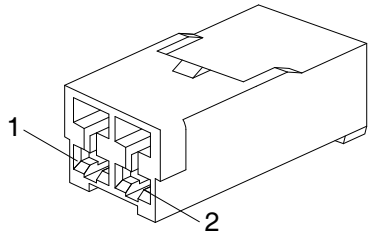
## 9) AMP 070 MULTILOCK CONNECTOR

| No. of pin | Receptacle connector (female) | Plug connector (male) |
|---|---|---|
| 14 |  173852 | |

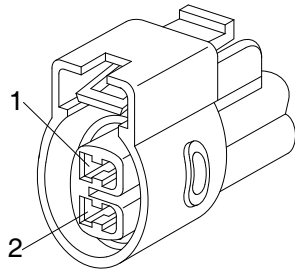
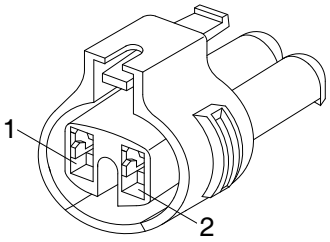
## 10) AMP FASTIN - FASTON CONNECTOR

| No. of pin | Receptacle connector (female) | Plug connector (male) |
|---|---|---|
| 6 |  925276-0 |  480003-9 |

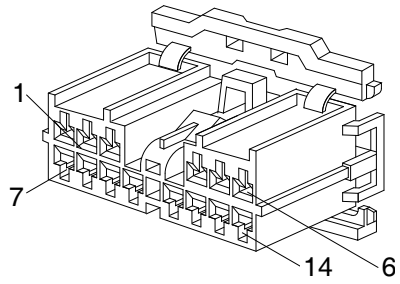
### 11) KET 090 CONNECTOR

| No. of pin | Receptacle connector (female) | Plug connector (male) |
|---|---|---|
| 6 |  MG610070 | |

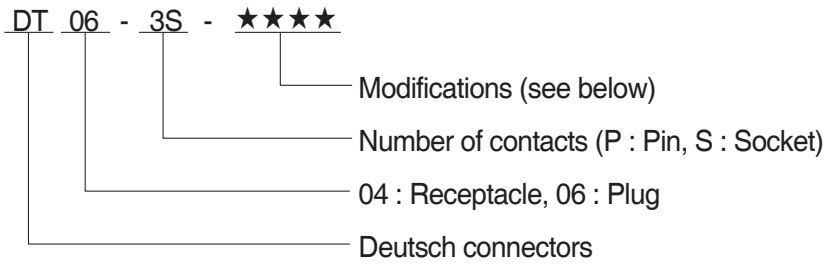
### 12) KET 090 WP CONNECTORS

| No. of pin | Receptacle connector (female) | Plug connector (male) |
|---|---|---|
| 2 |  MG640605 | |
| 2 |  MG640795 | |

### 13) KET SDL CONNECTOR

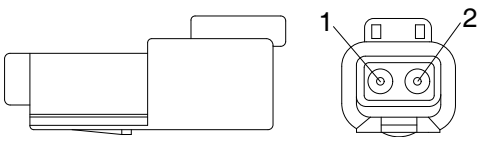
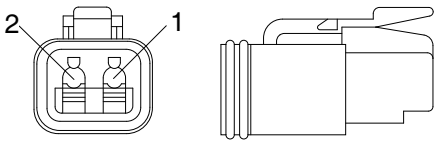
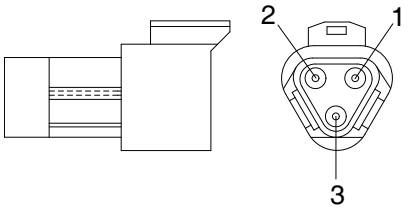
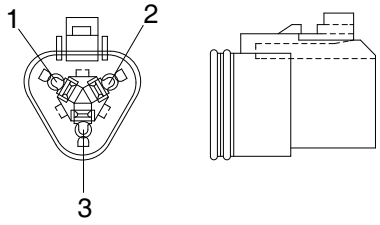
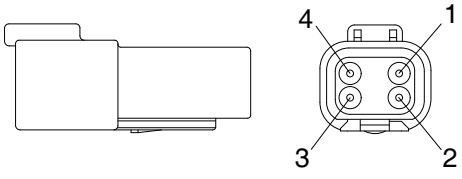
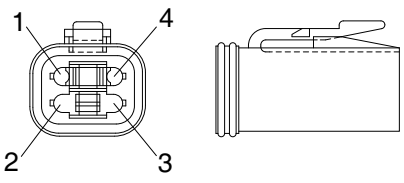
| No. of pin | Receptacle connector (female) | Plug connector (male) |
|---|---|---|
| 14 |  MG610406 | |

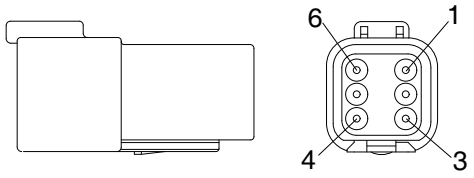
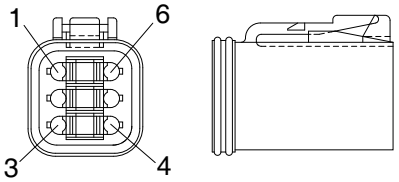
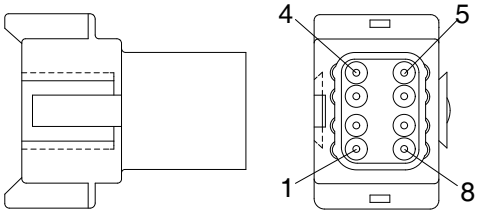
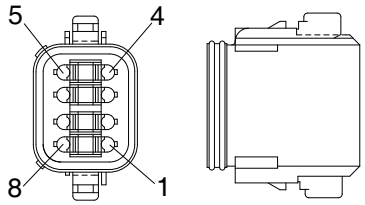
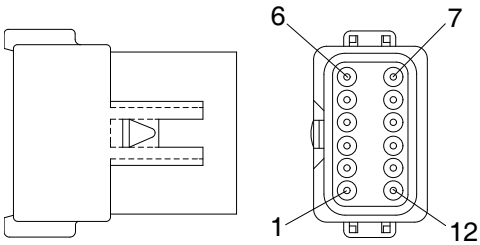
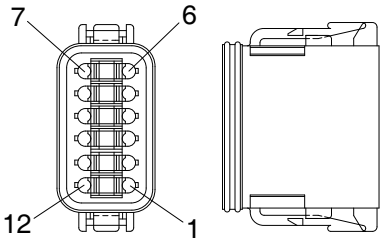
## 14) DEUTSCH DT CONNECTORS



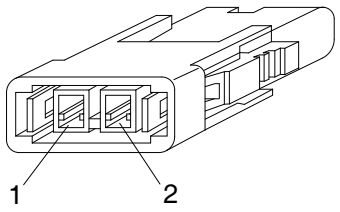

※ Modification

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

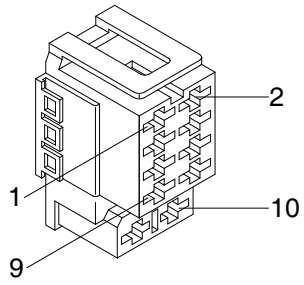
| No. of pin | Receptacle connector (female) | Plug connector (male) |
|---|---|---|
| 2 |  DT06-2S |  DT06-2P |
| 3 |  DT06-3S |  DT06-3P |
| 4 |  DT06-4S |  DT06-4P |

| No. of pin | Receptacle connector (female) | Plug connector (male) |
|---|---|---|
| 6 |  DT06-6S |  DT06-6P |
| 8 |  DT06-8S |  DT06-8P |
| 12 |  DT06-12S |  DT06-12P |

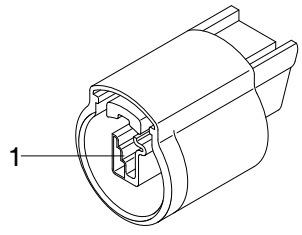
### 15) MOLEX 2CKTS CONNECTOR

| No. of pin | Receptacle connector (female) | Plug connector (male) |
|---|---|---|
| 2 |  35215-0200 | |

### 16) ITT SWF CONNECTOR

| No. of pin | Receptacle connector (female) | Plug connector (male) |
|---|---|---|
| 10 |  SWF593757 | |

### 17) MWP NMWP CONNECTOR

| No. of pin | Receptacle connector (female) | Plug 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 |

| Fault code | | Description |
|---|---|---|
| HCESPN | FMI | |
| 840 | 2 | Cluster communication data error |
| 841 | 2 | ECM communication data error |
| ISDP | 2 | Water in fuel warning |
| Lo bat | 2 | 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<br>(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<br>(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<br>(Detected an insufficient pressure drop) |
| 4335 | 16 | DEF underpressure error at AFTERRUN_PRESSURECOMPENSATION |
| 4344 | 2 | DEF backflow Line plausibility error at DETECTIONMODE<br>(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<br>(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<br>(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<br>(Insufficient temperature increment) |
| 5706 | 14 | DEF Supply module heater temperature plausibility fault at cold start<br>(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<br>(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<br>(Pedal & Engine speed demand from VCU) |
| 65400 | 22 | Message Check Sum Error of CAN Receive Frame SMVCU<br>(Pedal & Engine speed demand from VCU) |
| 65400 | 23 | Message Counter Error of CAN Receive Frame SMVCU<br>(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 |