

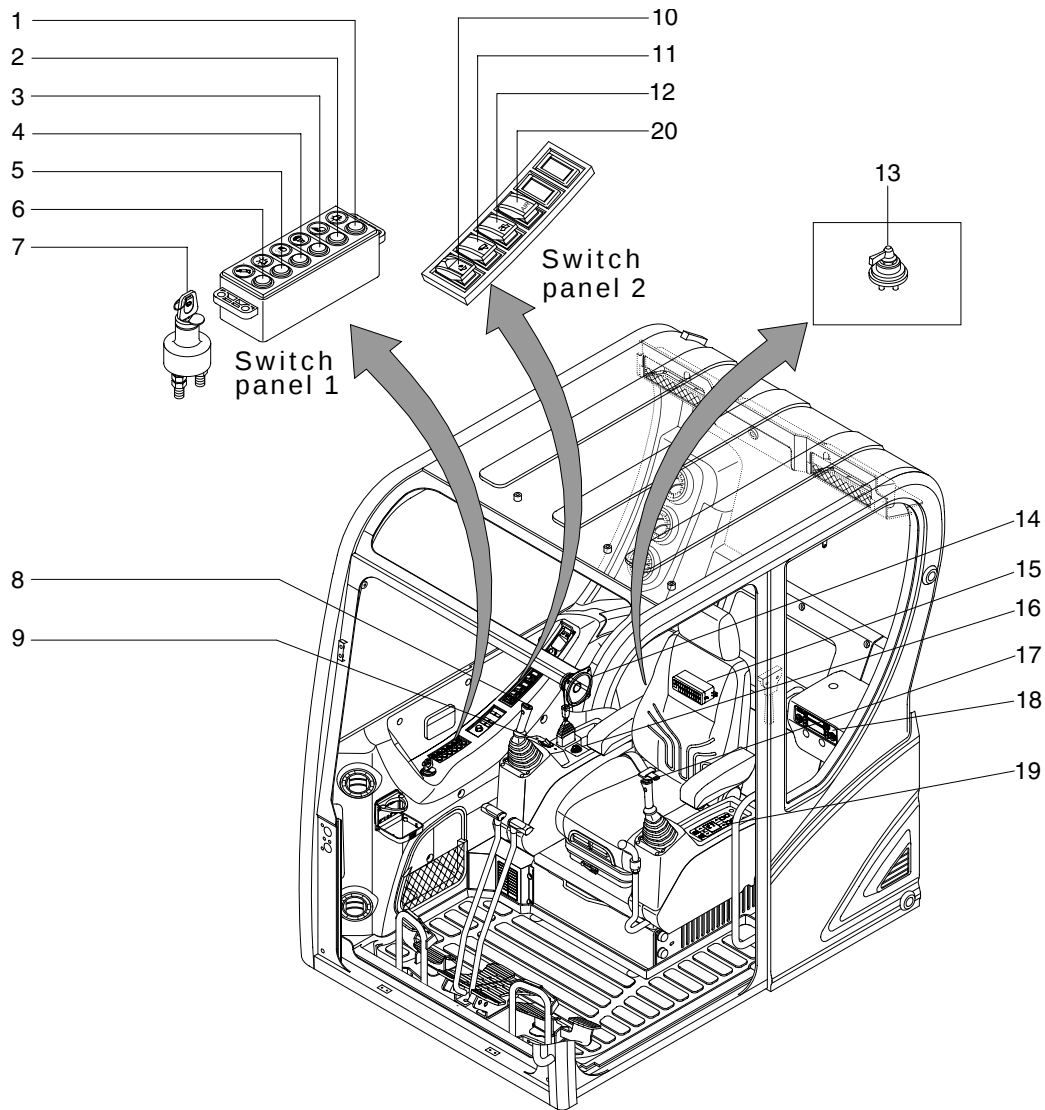
SECTION 4 ELECTRICAL SYSTEM

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SECTION 4 ELECTRICAL SYSTEM

GROUP 1 COMPONENT LOCATION

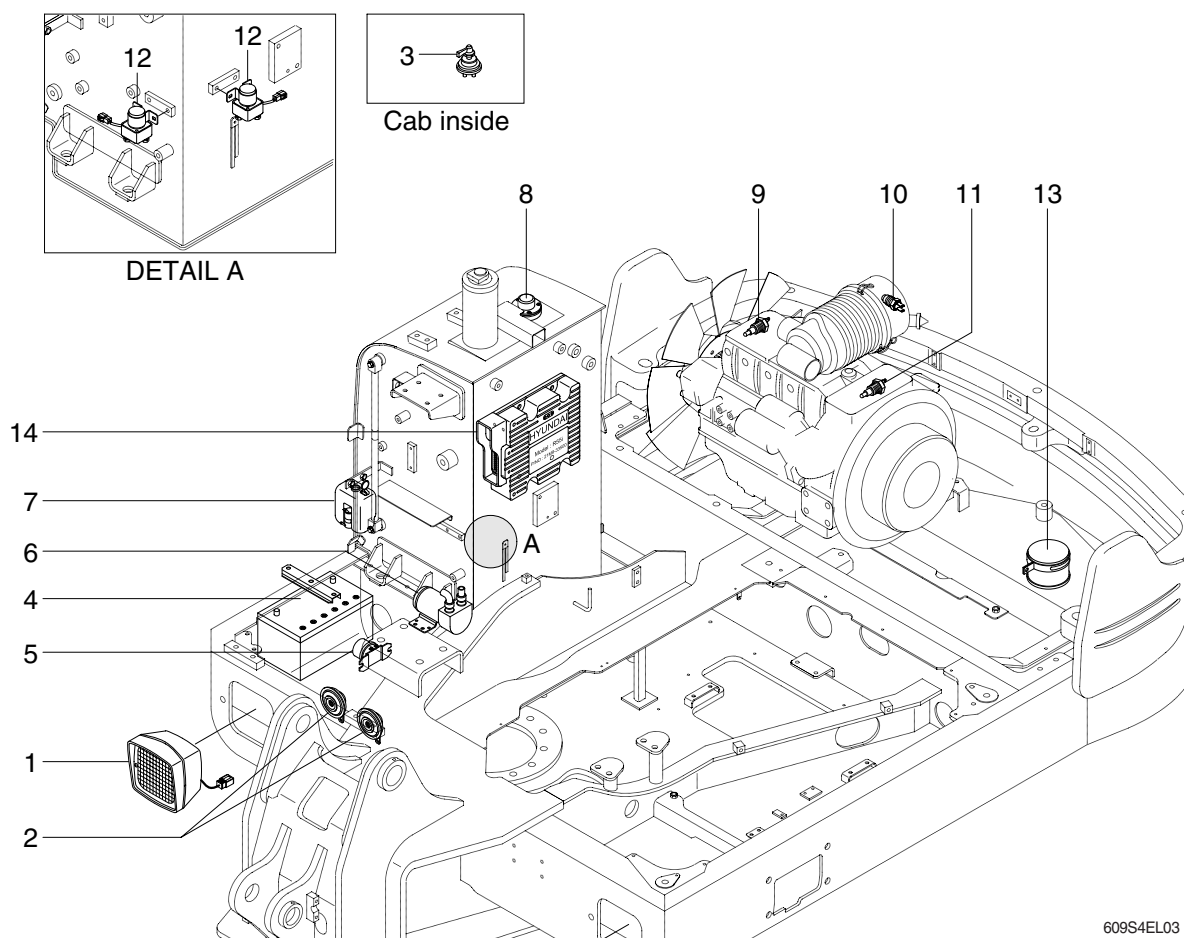
1. LOCATION 1



609S4EL02

- | | | |
|----------------------------|----------------------------|-------------------------------|
| 1 Head light switch | 8 Breaker operation switch | 15 Fuse box |
| 2 Work light switch | Woodgrab control switch | 16 Cigar lighter |
| 3 Travel alarm switch | (RH, option) | 17 Horn switch |
| 4 Cab light switch | 9 Accel dial switch | Woodgrab control switch |
| 5 Beacon switch | 10 Quick clamp switch | (LH, option)) |
| 6 Breaker selection switch | 11 Wiper switch | 18 Radio & USB player |
| 7 Start switch | 12 Washer switch | 19 Aircon & heater controller |
| | 13 Master switch | 20 Air compressor switch |
| | 14 Speaker | |

2. LOCATION 2



- | | | |
|-----------------|-----------------------|-------------------------------|
| 1 Lamp | 6 Fuel filler pump | 11 Engine oil pressure switch |
| 2 Horn | 7 Washer pump | 12 Relays |
| 3 Master switch | 8 Fuel sender | 13 Travel alarm buzzer |
| 4 Battery | 9 Coolant temp sender | 14 MCU |
| 5 Battery relay | 10 Air cleaner switch | |

GROUP 2 MONITORING SYSTEM

1. OUTLINE

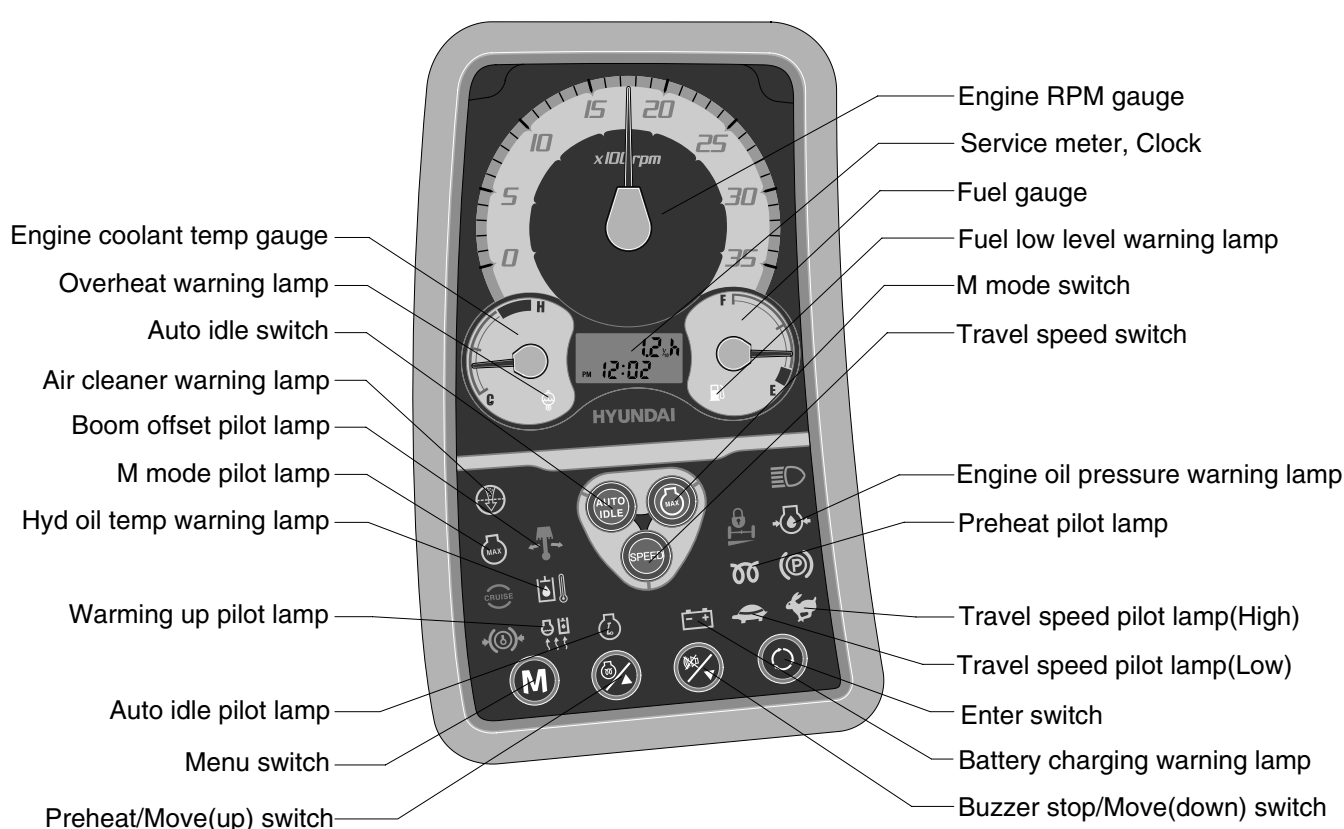
Monitoring system consists of the monitor part and switch part.

The monitor part gives warnings when any abnormality occurs in the machine and informs the condition of the machine.

Various select switches are built into the monitor panel, which act as the control portion of the machine control system.

2. CLUSTER

1) MONITOR PANEL



559S3CD02

2) CLUSTER CHECK PROCEDURE

(1) Start key : ON

① Check monitor initial 6 seconds

- a. All lamps light up.
- b. Buzzer sound.

② Check monitor after 3 seconds : Indicate machine condition

- a. Tachometer : 0 rpm
- b. Fuel gauge : Pointed at appropriate level
- c. Engine coolant temperature gauge : Pointed at appropriate level
- d. Warning lamp
 - ※ During start key ON the engine oil pressure lamp and battery charging lamp go on, but it is not abnormal.
 - ※ When engine coolant temperature below 30°C, the warming up lamp lights up and then operating the preheat switch.

(2) Start of engine

① Check machine condition

- a. Tachometer pointed at present rpm
- b. Gauge and warning lamp : Indicate at present condition.
 - ※ When normal condition : All warning lamp OFF
- c. Travel speed pilot lamp : Low (turtle)

② When abnormal condition

- a. The lamp lights up and the buzzer sounds.
- b. If BUZZER STOP switch is pressed, buzzer sound is canceled but the lamp light up until normal condition.

3. CLUSTER CONNECTOR

1) CN-56 CONNECTOR

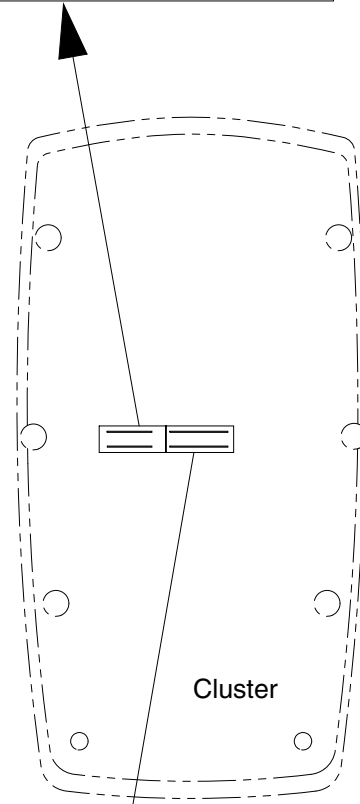
No.	Signal	Input/Output
1	Null	-
2	Null	-
3	Alternator signal	Input
4	Null	-
5	Tacho signal	Input
6	Anti-restart signal	Output
7	Pre-heat signal	Output
8	Travel relay	Output
9	Battery power 12V	-
10	Power IG 12V	-
11	Null	Input
12	Illumination	Input
13	Null	-
14	Null	-
15	Fuel level sender	Input
16	Hyd oil temp sendor	Input
17	Water temp sender	Input
18	GND	-
19	GND	-
20	GND	-

2) CN-57 CONNECTOR

No.	Signal	Input/Output
1	Null	-
2	Engine oil pressure switch	Input
3	Air cleaner signal	Input
4	Boom swing signal	-
5	Null	-
6	Null	-
7	Null	-
8	Null	-
9	Program dump	-
10	Null	-
11	COM-GND	Input
12	RS232-RX	Input
13	RS232-TX	Output
14	RS485-RX	Input
15	RS485-TX	Output
16	Null	Input

CN-56

10	9	8	7	6	5	4	3	2	1
20	19	18	17	16	15	14	13	12	11



CN-57

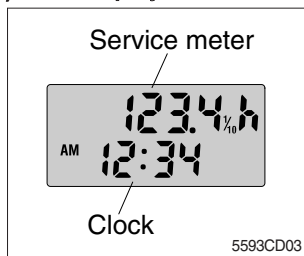
8	7	6	5	4	3	2	1
16	15	14	13	12	11	10	9

5594EL15

4. CLUSTER FUNCTION

1) GAUGES AND DISPLAYS

(1) LCD display



① **Service meter** : This meter shows the total operation hours of the machine.

※ Always ensure the operating condition of the meter during the machine operation.

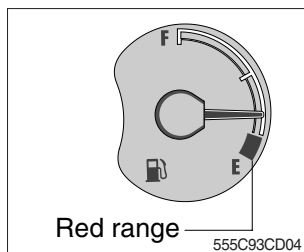
※ The last unit $\frac{1}{10}$ indicates 1/10 of 4 hours.

(for example : $\frac{1}{10}$ indicates 6 minutes)

② **Clock** : This displays the current time.

※ Refer to the "menu switch" for the setting time/ESL switch.

(2) Fuel gauge



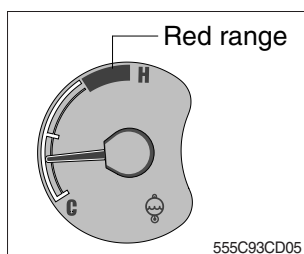
① This gauge indicates the amount of fuel in the fuel tank.

② Fill the fuel when the red range or warning lamp  blinks.

※ **If the gauge indicate the red range or warning lamp .**

Even though the machine is on the normal condition, check the electric device as that can be caused by the poor connection of electricity or sensor.

(3) Engine coolant temperature gauge



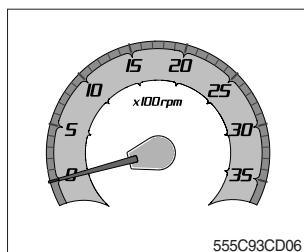
① This indicates the temperature of coolant.

② When the red range pointed or warning lamp  blinks, engine do not abruptly stop but run it at medium speed to allow it to cool gradually, then stop it.

Check the radiator and engine.

※ **If the engine is stopped without cooled down running, the temperature of engine parts will rise suddenly, this could cause severe engine trouble.**

(4) Engine rpm gauge



① This gauge displays the number of engine revolutions per minute.

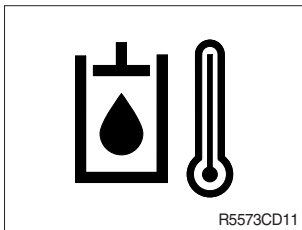
2) WARNING AND PILOT LAMPS

(1) Fuel low level warning lamp



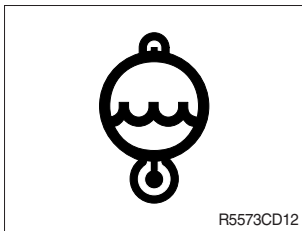
- ① This lamp blinks and the buzzer sounds when the level of fuel is below 18 l (4.8 U.S. gal).
- ② Fill the fuel immediately when the lamp blinks.

(2) Hydraulic oil temperature warning lamp



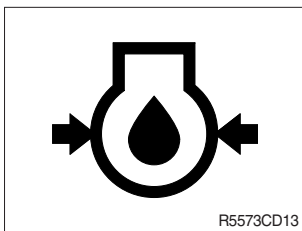
- ① This warning lamp operates and the buzzer sounds when the temperature of hydraulic oil is over 105°C (221°F) .
- ② Check the hydraulic oil level when the lamp blinks.
- ③ Check for debris between oil cooler and radiator.

(3) Overheat warning lamp



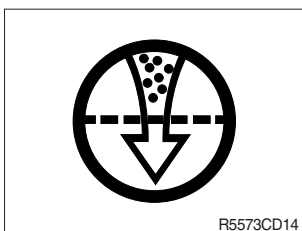
- ① This lamp blinks and the buzzer sounds when the temperature of coolant is over the normal temperature 110°C (230°F) .
- ② Check the cooling system when the lamp blinks.

(4) Engine oil pressure warning lamp



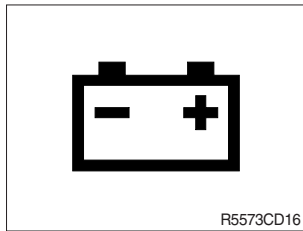
- ① This lamp blinks and the buzzer sounds after starting the engine because of the low oil pressure.
- ② If the lamp blinks during engine operation, shut OFF engine immediately. Check oil level.

(5) Air cleaner warning lamp



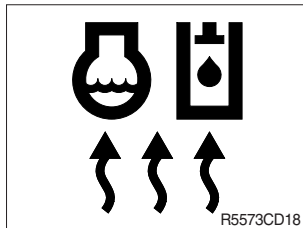
- ① This lamp blinks and the buzzer sounds when the filter of air cleaner is clogged.
- ② Check the filter and clean or replace it.

(6) Battery charging warning lamp



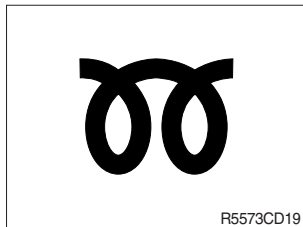
- ① This lamp blinks and the buzzer sounds when the starting switch is ON, it is turned OFF after starting the engine.
- ② Check the battery charging circuit when this lamp blinks during engine operation.

(7) Warming up pilot lamp



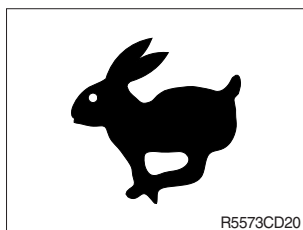
- ① This lamp is turned ON when the coolant temperature is below 30°C (86°F).
- ② The automatic warming up is cancelled when the engine coolant temperature is above 30°C, or when 10 minutes have passed since starting.

(8) Preheat pilot lamp



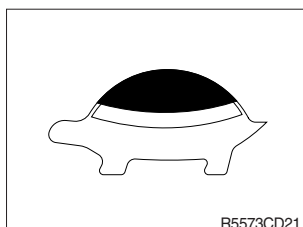
- ① When engine preheating switch is turned ON, pilot lamp comes ON.
- ② Refer to the preheating switch for details.

(9) Travel speed pilot lamp (high)



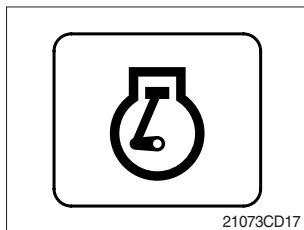
- ① When this lamp turned ON, the machine travel high speed.
- ② Refer to the travel speed select switch for details.

(10) Travel speed pilot lamp (low)



- ① When this lamp turned ON, the machine travel low speed.
- ② Refer to the travel speed select switch for details.

(11) Auto idel pilot lamp



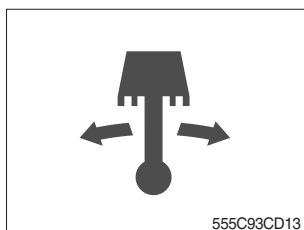
- ① If the control lever and pedal are not moved for several seconds with auto idle switch pressed, the indicator illuminates and engine speed is decelerated.
- ② If the auto idle switch is pressed once more or the control lever or pedal is moved, the indicator turns off and the number of engine revolution is turned to the previous condition.

(12) M mode pilot lamp



- ① This lamp is ON when the M mode switch is pressed.
- ② Engine is operated with a maximum speed.

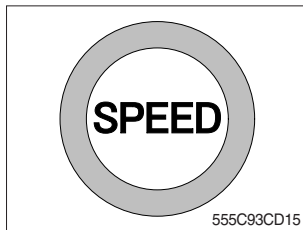
(13) Boom offset pilot lamp



- ① This lamp is ON when the boom swing pedal is operated.

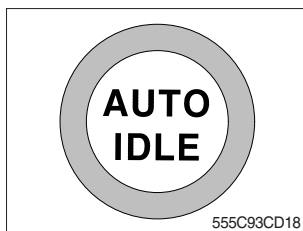
3) SWITCHES

(1) Travel speed control switch



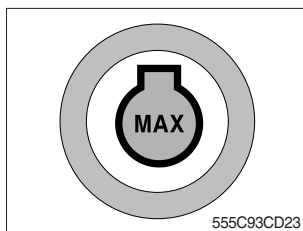
- ① This switch is to control the travel speed which is changed to high speed (rabbit mark) by pressing the switch and low speed (turtle mark) by pressing it again.

(2) Auto idle switch



- ① This switch is used to actuate or cancel the auto idle function.
- ② When the switch actuated and all control levers and pedals are at neutral position, engine speed will be lowered automatically to save fuel consumption.

(3) M mode switch



- ① This switch is used to maximum power.
- ② When this switch is pressed, the M mode pilot lamp is ON or OFF.

(4) Move (down) & buzzer stop switch



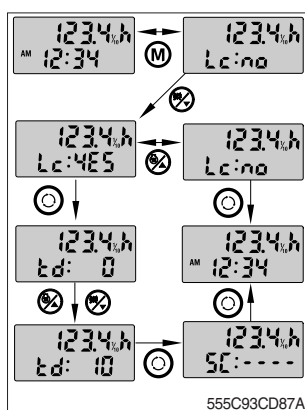
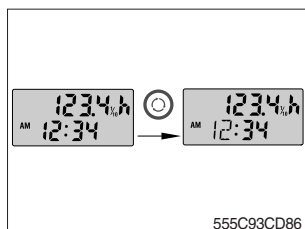
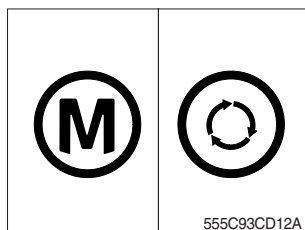
- ① When the starting switch is turned ON first, normally the alarm buzzer sounds for 6 seconds during lamp check operation.
- ② The lamp lights ON and the buzzer sounds when the machine has a problem.
In this case, press this switch and buzzer stops, but the lamp lights until the problem is cleared.
- ③ This switch is used to move down or decrease input value.

(5) Preheat/Move (up) switch



- ① When the preheat switch is pressed, the preheating function is actuated within 15 seconds.
- ② After the preheat pilot lamp is turned OFF, engine start.
- ③ This switch is used to move up or increase input value.

(6) Menu and enter switch



① These switches are used to set time or set ESL (Engine Start Limit) function.

- The Enter button (⊙) is used to select a function.
- The Menu button (M) is used to select a menu or return to the time display menu.

② Setting time

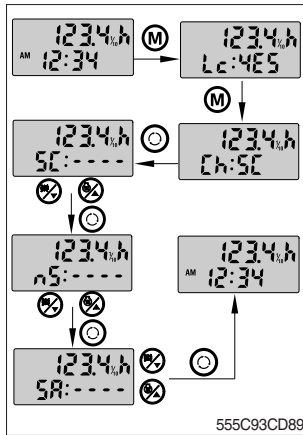
- Press Enter button (⊙) to set time, then the screen will be changed to a display for time setting as a following picture and time cipher will blink.
- **Set hours** : When the cipher for hour blinks, press up (↕) or down (↘) button and set the hour.
- **Set minutes** : When the cipher for minute blinks, press up (↕) or down (↘) button and set the minute.

③ Set ESL (Engine Start Limit) function

- Press Menu button (M), the display is changed from the time display menu to ESL function menu.
- Select YES or NO by Move button (↕, ↘) and set the ESL function by the Enter button (⊙).
 - YES : ESL function is activated.
 - NO : ESL function is cancelled.

④ Set the interval time

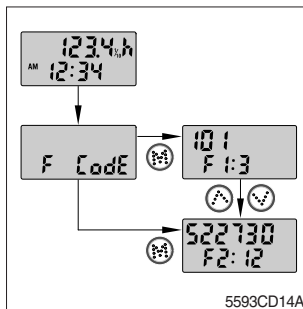
- Select ESL function to YES and press the Enter button (⊙), then the display is changed to the interval time set menu.
- Set the interval time by move button (↕, ↘) and press the Enter button (⊙).
- You can finish setting the interval time by inputting the password and pressing the Enter button (⊙) once more.
- Interval times : 5 kinds (0, 10, 30, 60 minutes, 1 day)
- ※ If the ESL function is set to YES, the password is required when a operator starting engine first.
But the operator can restart the engine within the interval time period without inputting the password.



⑤ Change password

- Select ESL function to YES and press the Menu button (M), the display is shifted to the password change menu.
- Input a new password (Sn : - - - -) after enter the current password successfully (SC : - - - -).
- Push enter (C) button for a second to finish the setting after the new password is entered once again (SA : - - - -).
- When the setting is done, the display will blink 3 times and return to the time display screen.

※ **Default password : 0000**



⑥ Check machine diagnostic codes

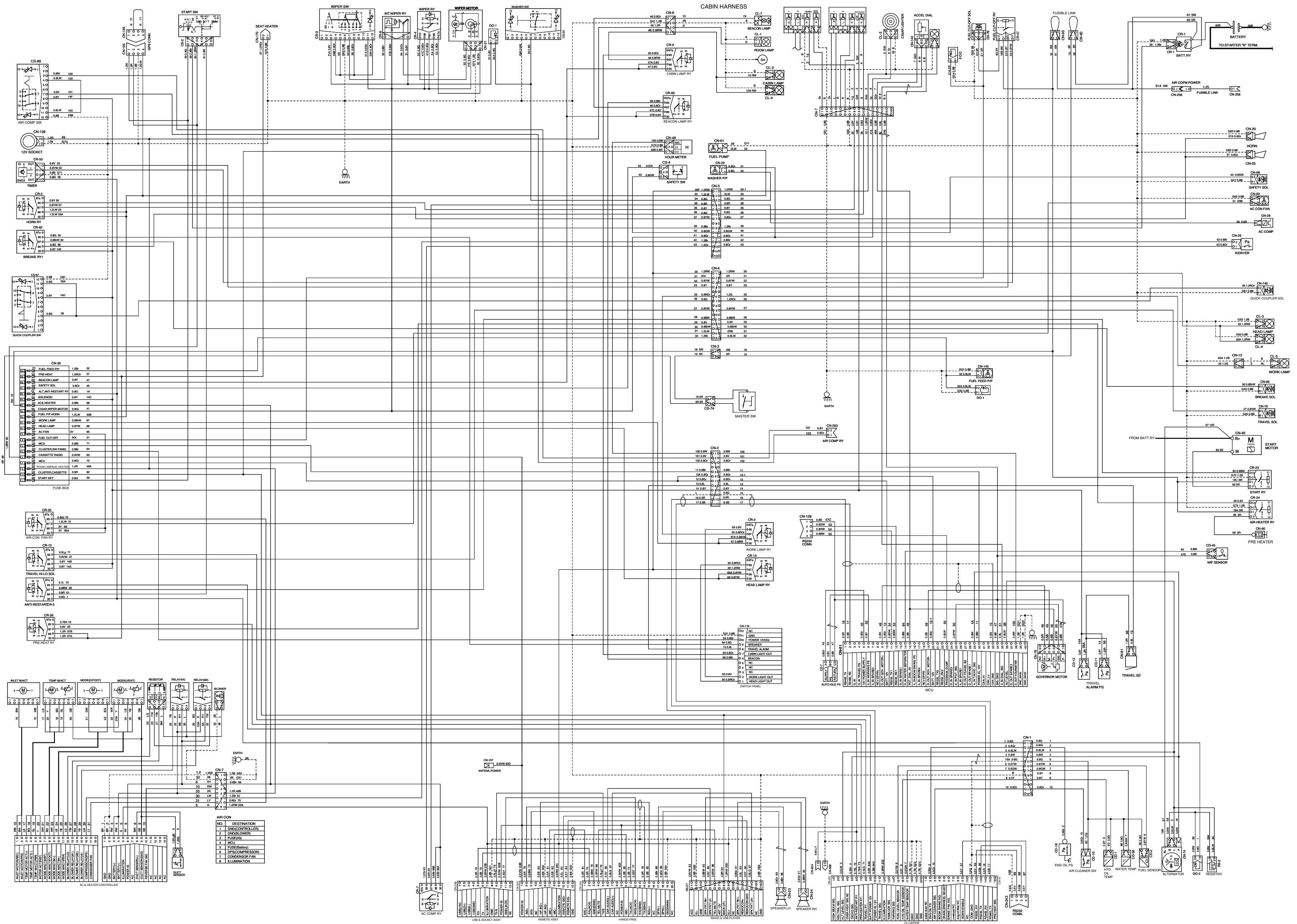
- If the F : Code is displayed on the LCD display, you can check faults of the machine.
- The machine fault code is displayed by pressing the Menu button (M).
- Other fault codes can be displayed by using the Move up / down button (↑, ↓).

※ **Refer to the following pages for the fault codes.**

⑦ Machine fault code

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

GROUP 3 ELECTRICAL CIRCUIT



MEMORANDUM

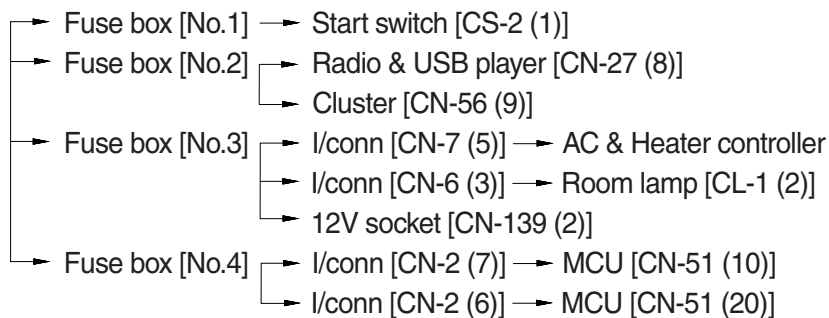
1. POWER CIRCUIT

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 → Battery relay → Fusible link (CN-60) → I/conn [CN-3 (2)] → Master switch [CS-74]



※ I/conn : Intermediate connector

2) CHECK POINT

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

※ GND : Ground

4-17

2. STARTING CIRCUIT

1) OPERATING FLOW

Battery (+) terminal → Battery relay [CR-1] → Fusible link [CN-60]
→ I/conn [CN-3 (2)] → Master switch [CS-74] → Fuse box No.1 → Start key [CS-2 (1)]

※ Start switch : ON

→ Start switch ON [CS-2 (2)] → I/conn [CN-5 (9)] →
Battery relay [CR-1]: Battery relay operating (all power is supplied with the electric component)
→ Start switch ON [CS-2 (3)] → Fuse box (all power is supplied with electric component)

※ Start switch : START

Start switch START [CS-2 (5)] → Anti-restart relay [CR-5 (86) → (87)] → I/conn [CN-4 (11)]
→ Start relay [CR-23 (C2) → (2)] → Starter motor operating

2) CHECK POINT

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

※ GND : Ground

The diagram illustrates the electrical system of a vehicle, showing the connection between various components and the battery. The components include:

- BATTERY**: The main power source, connected to the alternator and the starter.
- ALTERNATOR**: The component that generates electricity, connected to the battery and the fuse box.
- STARTER**: The component that starts the engine, connected to the battery and the starter relay.
- FUSE BOX**: The central hub for the electrical system, containing fuses for various circuits.
- CLUSTER**: The instrument cluster, connected to the fuse box and the master switch.
- MASTER SW**: The master switch, connected to the fuse box and the cluster.
- FUEL FEED P/P**: The fuel feed pump, connected to the fuse box.
- PRE-HEAT**: The pre-heat system, connected to the fuse box.
- BEACON LAMP**: The beacon lamp, connected to the fuse box.
- SAFETY SOL**: The safety solenoid, connected to the fuse box.
- ALT. ANT. RESTART RY**: The alternate anti-restart relay, connected to the fuse box.
- SOLENOID**: The solenoid, connected to the fuse box.
- AC & HEATER**: The air conditioning and heater, connected to the fuse box.
- CIGAR, WIPER MOTOR**: The cigar and wiper motor, connected to the fuse box.
- FUEL P/P, HORN**: The fuel pump and horn, connected to the fuse box.
- WORK LAMP**: The work lamp, connected to the fuse box.
- HEAD LAMP**: The head lamp, connected to the fuse box.
- AC FAN**: The air conditioning fan, connected to the fuse box.
- FUEL CUT-OFF**: The fuel cut-off system, connected to the fuse box.
- MCU**: The microcontroller unit, connected to the fuse box.
- CLUSTER, SW PANEL**: The cluster and switch panel, connected to the fuse box.
- CASSETTE RADIO**: The cassette radio, connected to the fuse box.
- MCU**: The microcontroller unit, connected to the fuse box.
- R/LAMP & A/C HEATER**: The right lamp and air conditioning heater, connected to the fuse box.
- CLUSTER, CASSETTE**: The cluster and cassette, connected to the fuse box.
- START KEY**: The start key, connected to the fuse box.
- FUSE BOX**: The central hub for the electrical system, containing fuses for various circuits.
- GPS CONN.**: The GPS connection, connected to the fuse box.
- TIMER**: The timer, connected to the fuse box.
- ANTI-RESTART RY**: The anti-restart relay, connected to the fuse box.
- PRE-HEAT RY**: The pre-heat relay, connected to the fuse box.
- START SW**: The start switch, connected to the fuse box.
- CR-24**: The air heater, connected to the fuse box.
- CR-40**: The pre-heater, connected to the fuse box.
- CR-45**: The starter, connected to the fuse box.
- CR-23**: The start relay, connected to the fuse box.
- CR-1**: The battery relay, connected to the fuse box.
- CR-5**: The anti-restart relay, connected to the fuse box.
- CR-36**: The pre-heat relay, connected to the fuse box.
- CR-74**: The master switch, connected to the fuse box.
- CR-47**: The fuel cut-off relay, connected to the fuse box.
- CR-79**: The fuel cut-off solenoid, connected to the fuse box.
- DO-3**: The fuel cut-off solenoid, connected to the fuse box.
- DO-2**: The fuel cut-off solenoid, connected to the fuse box.
- DO-1**: The fuel cut-off solenoid, connected to the fuse box.
- DO-4**: The fuel cut-off solenoid, connected to the fuse box.
- DO-5**: The fuel cut-off solenoid, connected to the fuse box.
- DO-6**: The fuel cut-off solenoid, connected to the fuse box.
- DO-7**: The fuel cut-off solenoid, connected to the fuse box.
- DO-8**: The fuel cut-off solenoid, connected to the fuse box.
- DO-9**: The fuel cut-off solenoid, connected to the fuse box.
- DO-10**: The fuel cut-off solenoid, connected to the fuse box.
- DO-11**: The fuel cut-off solenoid, connected to the fuse box.
- DO-12**: The fuel cut-off solenoid, connected to the fuse box.
- DO-13**: The fuel cut-off solenoid, connected to the fuse box.
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- DO-98**: The fuel cut-off solenoid, connected to the fuse box.
- DO-99**: The fuel cut-off solenoid, connected to the fuse box.
- DO-100**: The fuel cut-off solenoid, connected to the fuse box.

3. CHARGING CIRCUIT

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

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

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

1) OPERATING FLOW

(1) Warning flow

Alternator "L" terminal → I/conn [CN-1 (3)] → Cluster [CN-56 (3)] → Cluster warning lamp
→ MCU [CN-51 (36)]

(2) Charging flow

Alternator "B+" terminal → Battery relay → Battery (+) terminal

2) CHECK POINT

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

※ GND : Ground

The diagram illustrates the electrical system for a vehicle, showing the connection between a central fuse box and various components. The components are organized into a table at the bottom, with their pin connections and wire colors specified. The wiring harness is shown with various connectors (CN-1, CN-3, CN-4, CN-5, CN-23, CN-24, CN-36, CN-45, CN-47, CN-51, CN-57, CN-74, CN-79, CN-125, CN-170, CN-171, CN-172, CN-173, CN-174, CN-175, CN-176, CN-177, CN-178, CN-179, CN-180, CN-181, CN-182, CN-183, CN-184, CN-185, CN-186, CN-187, CN-188, CN-189, CN-190, CN-191, CN-192, CN-193, CN-194, CN-195, CN-196, CN-197, CN-198, CN-199, CN-200) and various switches (START SW, MASTER SW, CR-1, CR-2, CR-3, CR-4, CR-5, CR-6, CR-7, CR-8, CR-9, CR-10, CR-11, CR-12, CR-13, CR-14, CR-15, CR-16, CR-17, CR-18, CR-19, CR-20, CR-21, CR-22, CR-23, CR-24, CR-25, CR-26, CR-27, CR-28, CR-29, CR-30, CR-31, CR-32, CR-33, CR-34, CR-35, CR-36, CR-37, CR-38, CR-39, CR-40, CR-41, CR-42, CR-43, CR-44, CR-45, CR-46, CR-47, CR-48, CR-49, CR-50, CR-51, CR-52, CR-53, CR-54, CR-55, CR-56, CR-57, CR-58, CR-59, CR-60, CR-61, CR-62, CR-63, CR-64, CR-65, CR-66, CR-67, CR-68, CR-69, CR-70, CR-71, CR-72, CR-73, CR-74, CR-75, CR-76, CR-77, CR-78, CR-79, CR-80, CR-81, CR-82, CR-83, CR-84, CR-85, CR-86, CR-87, CR-88, CR-89, CR-90, CR-91, CR-92, CR-93, CR-94, CR-95, CR-96, CR-97, CR-98, CR-99, CR-100).

Component Table:

Pin	Component	Wire Color
1	HIGH BEAM SIG.	10
2	NEUTRAL SIG.	20
3	ALT. LEVEL SIG.	30
4	OVERHEAT SIG. NC	40
5	TACHO SIG.	50
6	ANTI-RESTART RY.	60
7	PRE-HEATER RY.	70
8	TRAVEL RY.	80
9	BATT. POWER 12V	90
10	POWER IG 12V	100
11	TRAVEL SIG.	110
12	ILLUMINATION	120
13	RAMLOCK SIG.	130
14	PARKING SIG.	140
15	FUEL LEVEL SENSOR	150
16	HYD. OIL TEMP. SENSOR	160
17	WATER TEMP. SENSOR	170
18	GND	180
19	GND	190
20	GND	200
21	water level NC	210
22	ENG. OIL PS.	220
23	AIR CLEANER SIG.	230
24	BOOM SWING SIG.	240
25	CHAWLER WHEEL SELECT	250
26	overload NC	260
27	BRAKE FAIL SIG.	270
28	overload NC	280
29	ENG. OIL TEMP. NC	290
30	DOWN ENABLE	300
31	NC	310
32	COM. GND	320
33	RS232 TX	330
34	RS485 RX	340
35	RS485 TX	350
36	PRE HEAT SIG.	360

Wiring Diagram Details:

- 1:** Battery connection to the main power line.
- 2:** Battery connection to the BATT. RY. (Battery Relay).
- 3:** Connection to the ALT. (Alternator) and the RS-2 resistor.
- 4:** Connection to the RS-2 resistor.
- 5:** Connection to the ALT. (Alternator) and the RS-2 resistor.

4. HEAD AND WORK LAMP CIRCUIT

1) OPERATING FLOW

Fuse box (No.10) → Head lamp relay [CR-13 (30, 86)]

Fuse box (No.11) → Work lamp relay [CR-3 (30, 86)]

(1) Head lamp switch ON

Head lamp switch ON [CN-116(1)] → Head lamp relay [CR-13 (85) → (87)]

- I/conn [CN-4 (2)] → Head lamp ON [CL-3, 4 (2)]
- I/conn [CN-5 (1)] → I/conn [CN-7 (11)] → Cigar lighter [CL-2 (1)]
- Remote controller illumination ON [CN-245 (9)]
- Radio & USB player illumination ON [CN-27 (9)]
- USB & Socket illumination ON [CN-246 (7)]
- Cluster illumination ON [CN-56 (12)]
- I/conn [CN-2 (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-4 (8)]

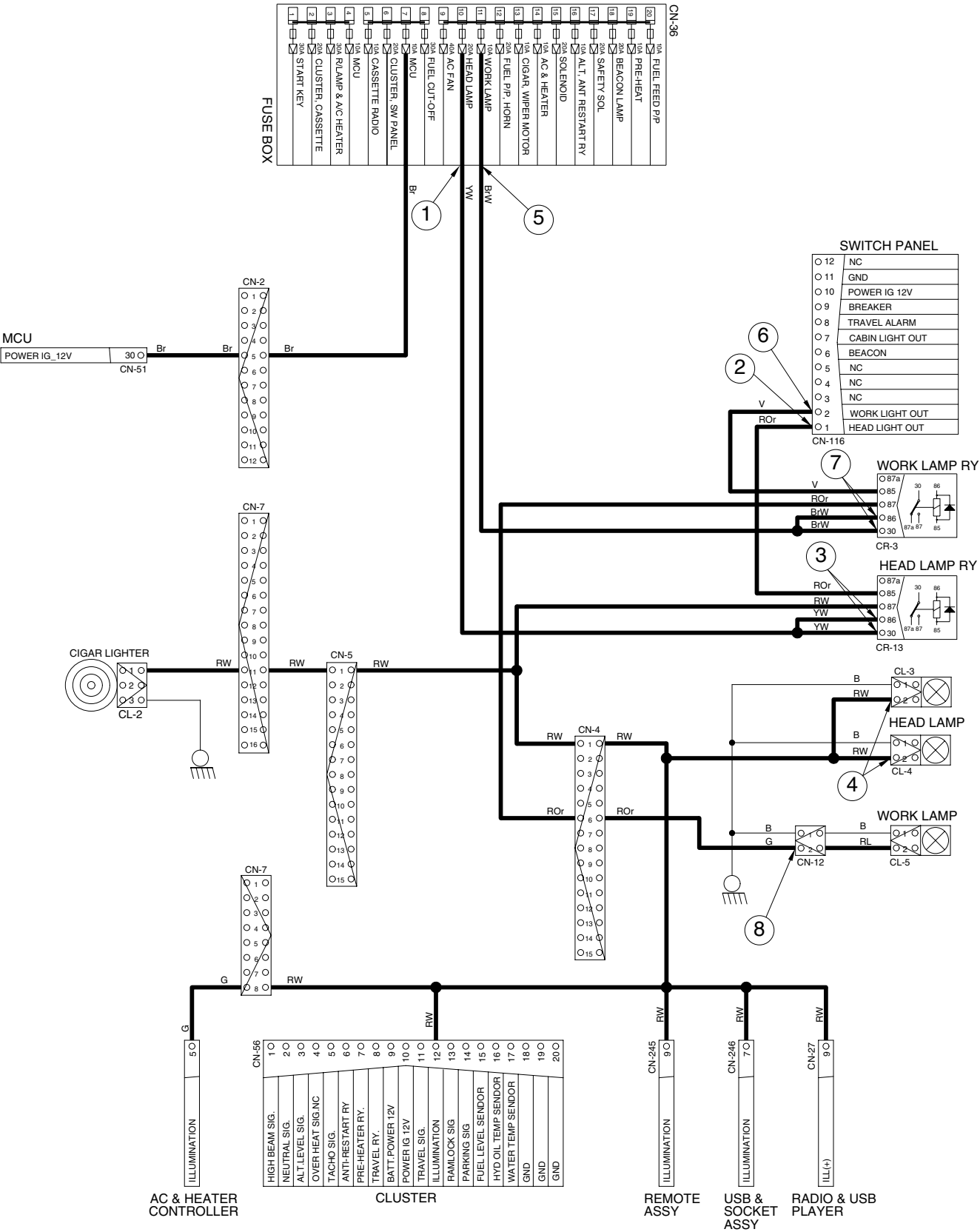
I/conn [CN-12 (2)] → Work lamp ON [CL-5 (2)]

2) CHECK POINT

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

※ GND : Ground

HEAD AND WORK LAMP CIRCUIT



5. BEACON LAMP AND CAB LAMP CIRCUIT

1) OPERATING FLOW

Fuse box (No.18)  Beacon lamp relay [CR-85 (30, 86)]
Cab lamp relay [CR-9 (30, 86)]

(1) Beacon lamp switch ON

Beacon lamp switch ON [CN-116 (6)] → Beacon lamp relay [CR-85 (85) → (87)] →
I/conn [CN-6 (1)] → Beacon lamp ON [CL-7]

(2) Cab lamp switch ON

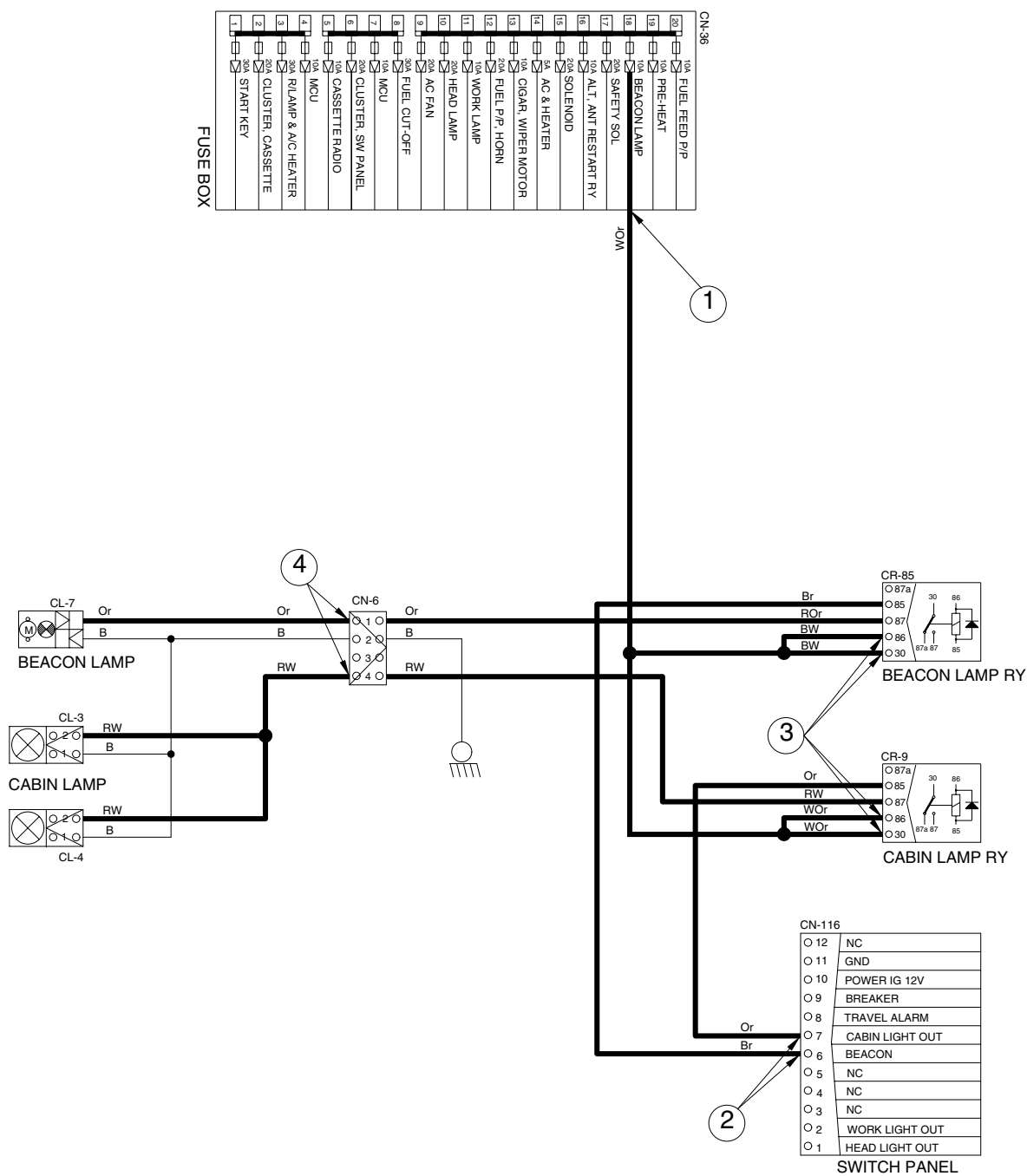
Cab lamp switch ON [CN-116 (7)] → Cab lamp relay [CR-9 (85) → (87)] → I/conn [CN-6 (4)]
→ Cab lamp ON [CL-3, 4]

2) CHECK POINT

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

※ GND : Ground

BEACON LAMP CIRCUIT

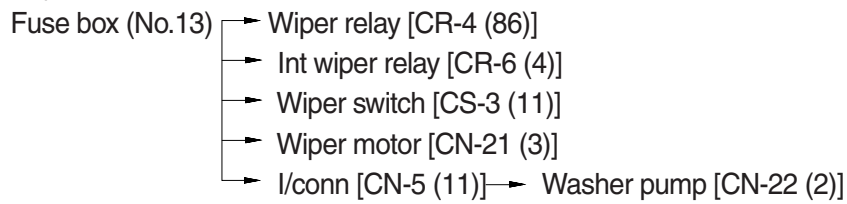


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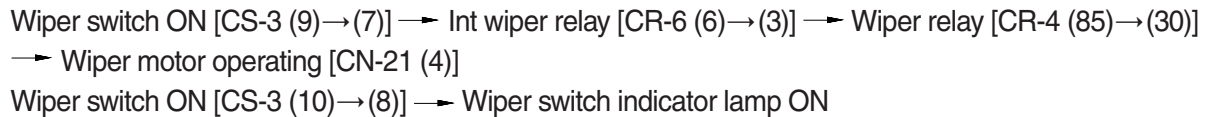
6. WIPER AND WASHER CIRCUIT

1) OPERATING FLOW

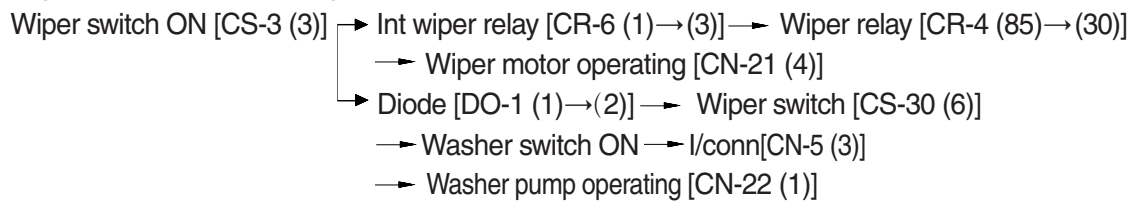
(1) Key switch ON



(2) Wiper switch ON : 1st step



(3) Wiper switch ON : 2nd step



(4) Auto parking (when switch OFF)

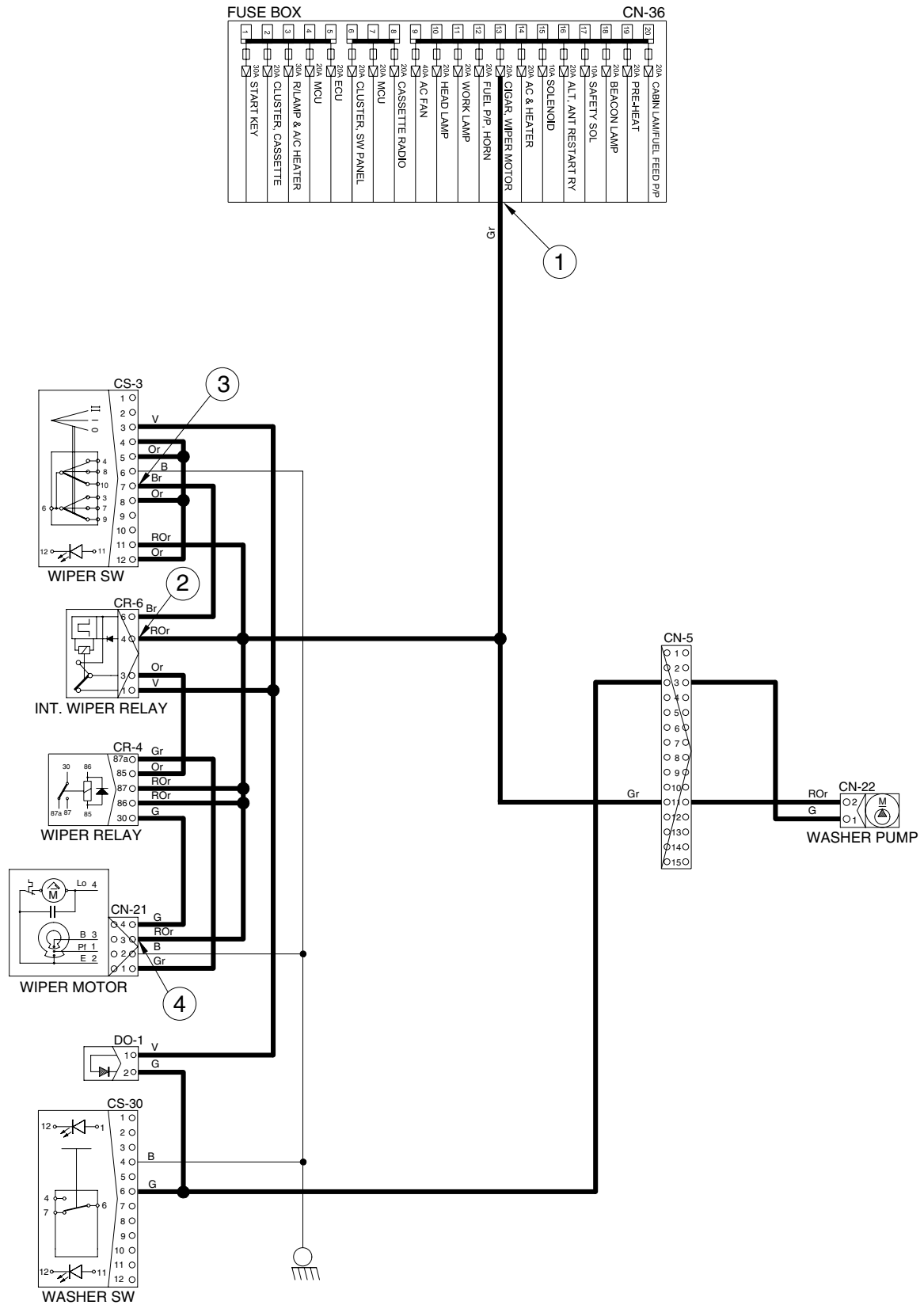


2) CHECK POINT

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

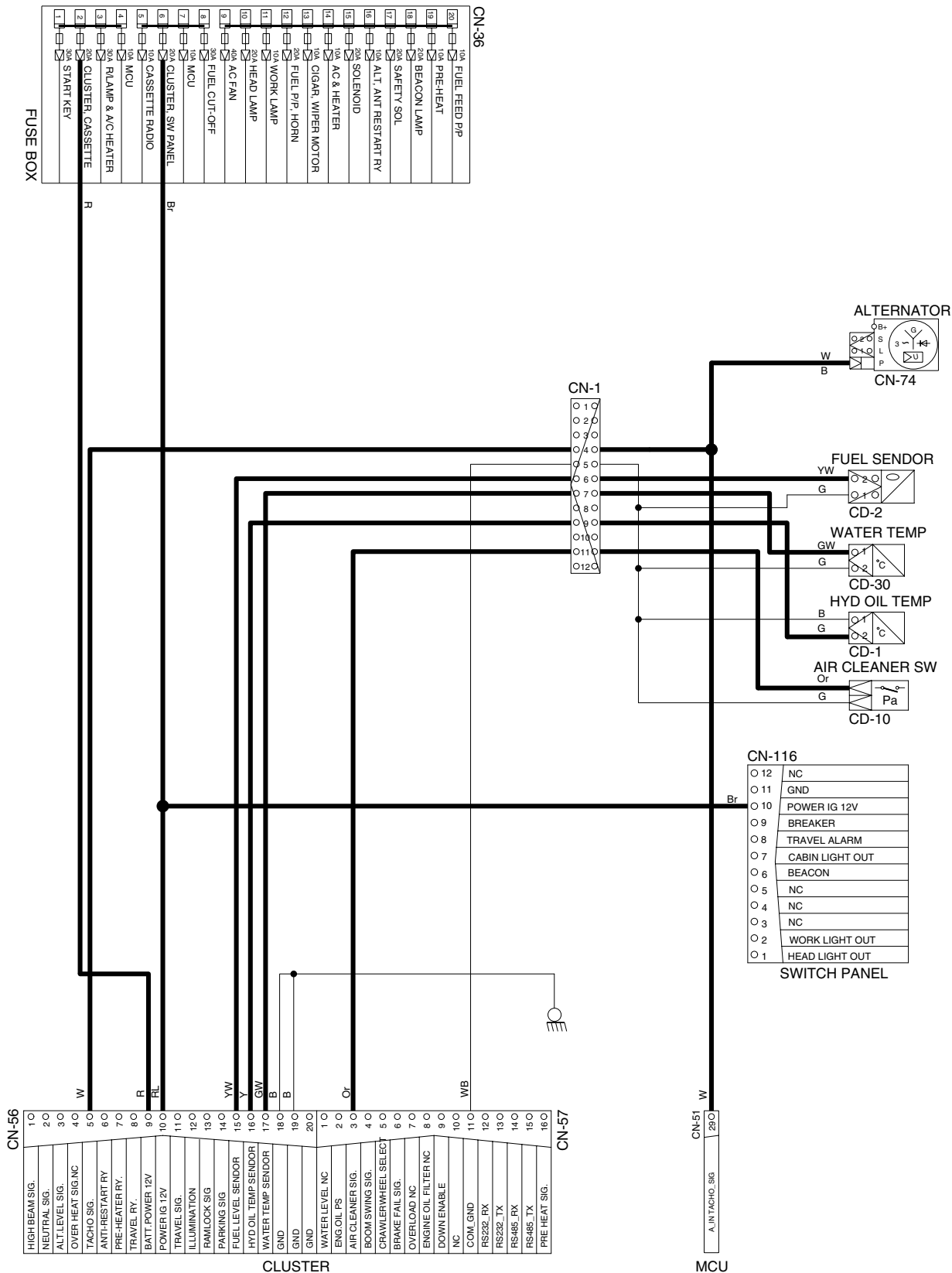
※ GND : Ground

WIPER AND WASHER CIRCUIT

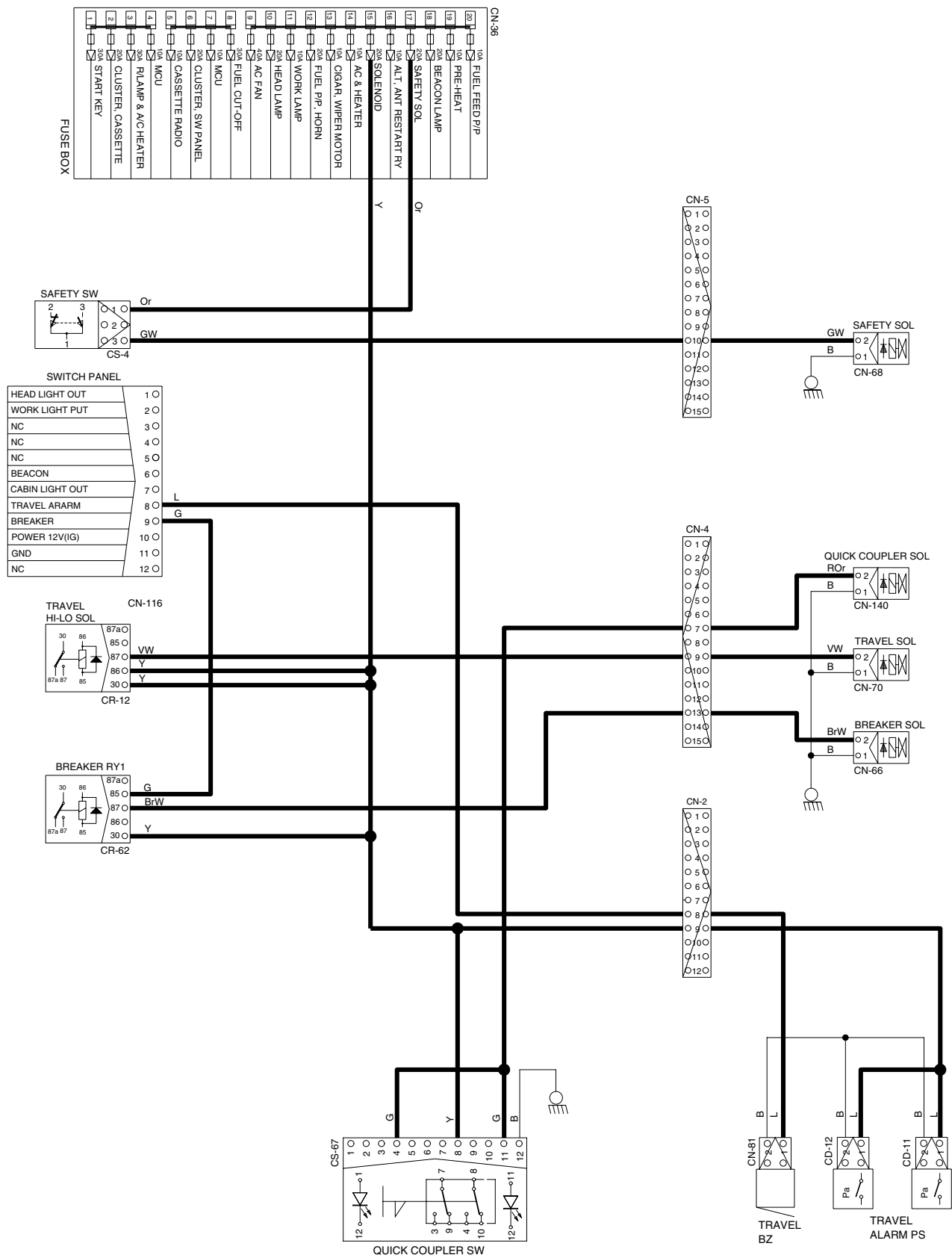


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MONITORING CIRCUIT

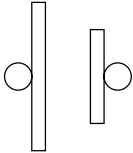
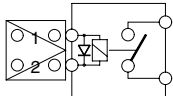
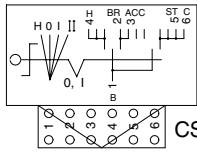
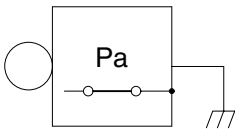
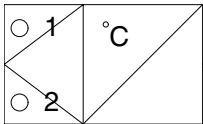


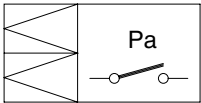
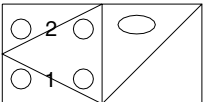
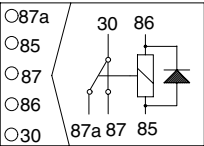
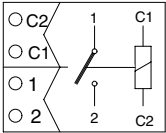
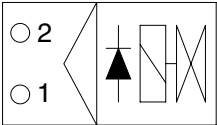
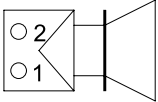
ELECTRIC CIRCUIT FOR HYDRAULIC

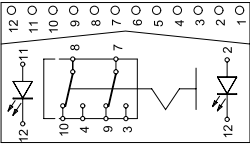
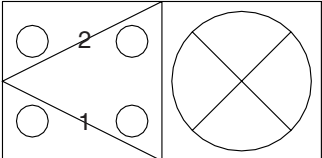
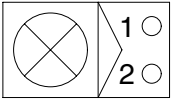
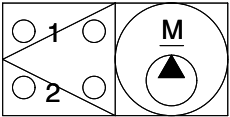
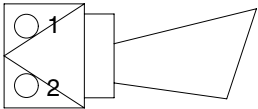


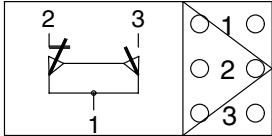
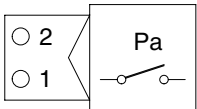
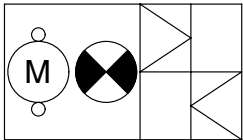
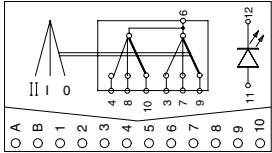
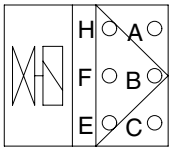
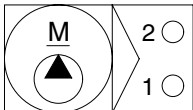
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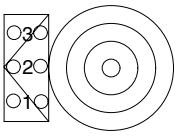
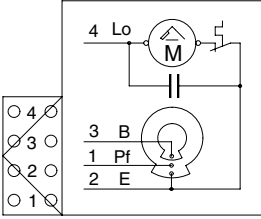
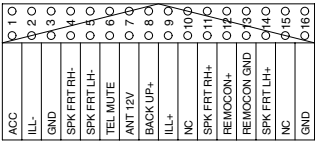
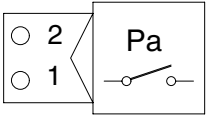
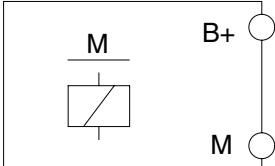
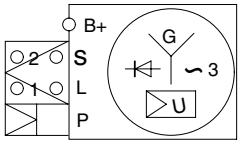
GROUP 4 ELECTRICAL COMPONENT SPECIFICATION

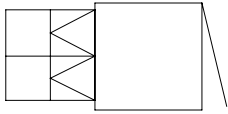
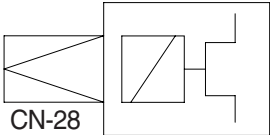
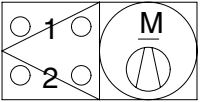
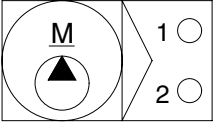
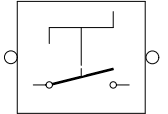
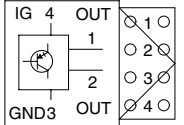
Part name	Symbol	Specification	Check
Battery		12V × 100Ah	※ Check specific gravity 1.280 over : over charged 1.280 ~ 1.250 : normal 1.250 below : recharging
Battery relay	 CR-1	Rated load : 12V 100A (continuity) 1000A (30 second)	※ Check coil resistance Normal : about 12 Ω ※ Check contact Normal : ∞ Ω
Start key	 CS-2	12V	※ Check contact OFF : ∞ Ω (for each terminal) ON : 0 Ω (for terminal 1-3 and 1-2) START : 0 Ω (for terminal 1-5)
Pressure switch (for engine oil)	 CD-18	0.5 kgf/cm ² (N.C TYPE)	※ Check resistance Normal : 0 Ω (CLOSE)
Coolant temperature sensor	 CD-8	-	※ Check resistance 50°C : 804 Ω 80°C : 310 Ω 100°C : 180 Ω

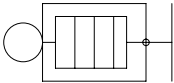
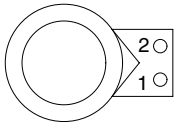
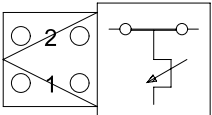
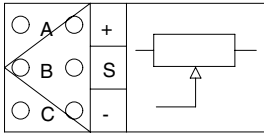
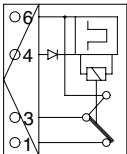
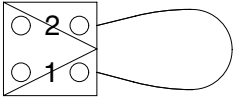
Part name	Symbol	Specification	Check
Air cleaner pressure switch	 CD-10	Pressure : 635mmH ₂ O (N.O TYPE)	※ Check contact Normal : ∞ Ω
Fuel sender	 CD-2	-	※ Check resistance Full : 100 Ω Low : 500 Ω Empty warning : 700 Ω
Relay	 CR-2 CR-3 CR-4 CR-5 CR-7 CR-9 CR-12 CR-13 CR-33 CR-36 CR-62 CR-85	12V 20A	※ Check resistance Normal : about 200 Ω (for terminal 85-86) : 0 Ω (for terminal 30-87a) : ∞ Ω (for terminal 30-87)
Relay	 CR-23 CR-24 CR-47	12V 60A	※ Rated coil current 1.2±0.3A
Solenoid valve	 CN-66 CN-68 CN-70 CN-140	12V 1A	※ Check resistance Normal : 15~25 Ω (for terminal 1-2)
Speaker	 CN-23(LH) CN-24(RH)	4 Ω 20W	※ Check resistance Normal : 4 Ω

Part name	Symbol	Specification	Check
Quick clamp switch	 CS-67	12V 16A	※ Check contact Normal OFF - $\infty \Omega$ (for terminal 1-5,2-6) - 0Ω (for terminal 5-7,6-8)
Lamp	 CL-3 CL-4 CL-5	12V 55W (H3 TYPE)	※ Check disconnection Normal : 1.2Ω
Room lamp	 CL-1	12V 10W	※ Check disconnection Normal : a few Ω
Fuel filler pump	 CN-145	12V 35 l / min	※ Check operation Supply power (for terminal 1) : 12V
Horn	 CN-20 CN-25	12V	$100 \pm 5\text{dB}$

Part name	Symbol	Specification	Check
Safety switch	 CS-4	Micro	※ Check contact Normal : 0 Ω (for terminal A-B) : ∞ Ω (for terminal A-C) Operating : ∞ Ω (for terminal A-B) : 0 Ω (for terminal A-C)
Pressure switch	 CD-7 CD-11 CD-12	10bar (N.C type)	※ Check contact Normal : 0.1 Ω
Beacon lamp	 CL-7	12V (Strobe type)	※ Check disconnection Normal : a few Ω
Wiper switch	 CS-3	12V 16A	※ Check contact Normal : ∞ Ω
Fuel cut-off solenoid	 CN-79	12V	※ Check operation Rated full current : 12V 33A Rated hold current : 12V 0.8A
Washer pump	 CN-22	12V 3.8A	※ Check contact Normal : 3 Ω (for terminal 1-2)

Part name	Symbol	Specification	Check
Cigar lighter	 CL-2	12V 10A 1.4W	※ Check coil resistance Normal : about 1MΩ ※ Check contact Normal : ∞ Ω Operating time : 5~15sec
Wiper motor	 CN-21	12V 3A	※ Check contact Normal : 6 Ω (for terminal 2-6)
Radio & USB player	 CN-27	24V 2A	※ Check voltage 20 ~ 25V (for terminal 1-3, 3-8)
Receiver dryer	 CN-29	12V	※ Check contact Normal : 0 Ω
Starter	 CN-45	12V	※ Check contact Normal : 0.1 Ω
Alternator	 CN-74	12V 55A	※ Check contact Normal : 0 Ω (for terminal B ⁺ -1) Normal : 24 ~ 27.5V

Part name	Symbol	Specification	Check
Travel buzzer	 CN-81	12V	-
Compressor	 CN-28	12V 38W	-
Air con fan motor	 CN-83	12V 8.5A	-
Fuel feed pump	 CN-145	12V	-
Master switch		12V 1000A	-
Timer		12V	-

Part name	Symbol	Specification	Check
Preheater	 CN-80	12V 42A 500W	-
12V socket	 CN-139	12V 120W	-
Duct sensor		1°C OFF 4°C ON	※ Check resistance Normal : 0 Ω (for terminal 1-2) the atmosphere temp : over 4°C
Accel dial	 CN-142	-	※ Check resistance Normal : about 5k Ω (for terminal A-C) ※ Check voltage Normal : about 5V (for terminal A-C) : 2~4.5V (for terminal C-B)
Int wiper relay	 CR-6	12V 12A	-
Fusible link	 CN-60 CN-95	12V, 30A (CN-65) 12V, 60A (CN-95)	-

GROUP 5 CONNECTORS

1. CONNECTOR DESTINATION

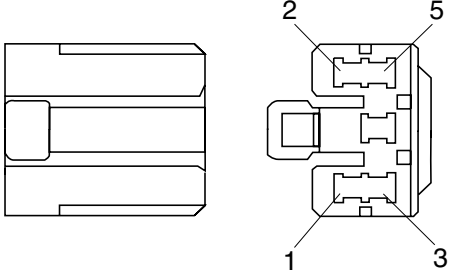
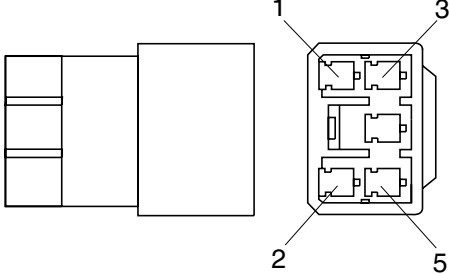
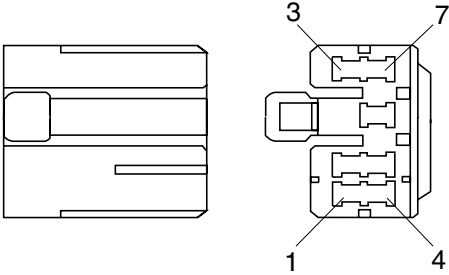
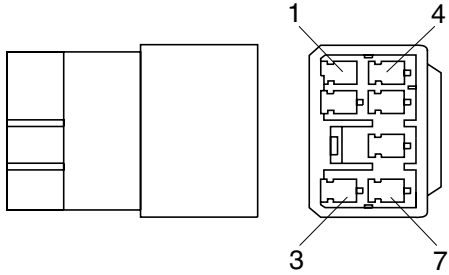
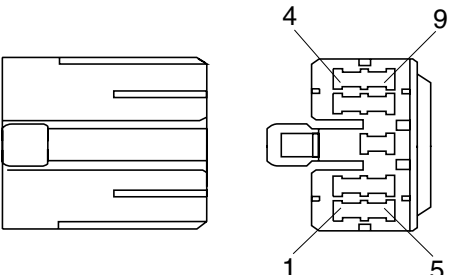
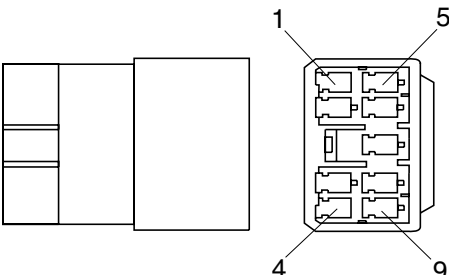
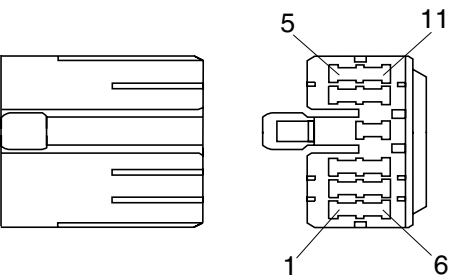
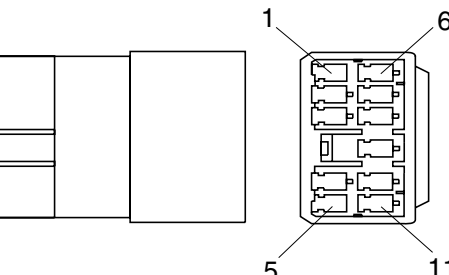
Connector number	Type	No. of pin	Destination	Connector part No.	
				Female	Male
CN-1	AMP	12	Cabin room harness - Main harness	S816-012002	S816-112002
CN-2	AMP	12	Aircon harness - Cabin room harness	S816-012002	S816-112002
CN-3	YAZAKI	2	Fusible link - Main harness	S813-030201	S813-130201
CN-4	AMP	15	Cabin room harness - Main harness	2-85262-1	368301-1
CN-5	AMP	15	Main harness - Cabin room harness	2-85262-1	368301-1
CN-6	DEUTSCH	4	Cabin room lamp harness - Cabin harness	DT06-4S-EP06	DT04-4P-E005
CN-7	AMP	16	Main harness - Console harness	2-85262-1	368030-1
CN-12	AMP	2	Boom harness - Main harness	S816-002002	S816-102002
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	MOLEX	2	Speaker LH	MG610070	-
CN-24	MOLEX	2	Speaker RH	MG610070	-
CN-25	DEUTSCH	2	Horn	DT06-2S-EP06	-
CN-27	-	16	Radio and USB player	PK145-16017	-
CN-28	AMP	1	Air-con comp	S810-001202	-
CN-29	KET	2	Receiver dryer	MG640795	-
CN-36	-	-	Fuse box	21L7-00250	-
CN-45	KET RING TERM	1	Starter	ST710246-2 S820-408000	-
CN-48	AMP	3	Hour meter	S816-003002	S816-103002
CN-51	DEUTSCH	40	MCU	DRC26-40SA	-
CN-55	AMP	2	Travel alarm PS	S816-002002	S816-102002
CN-56	AMP	20	Cluster	175967-2	-
CN-57	AMP	16	Cluster	175966-2	-
CN-60	YAZAKI	2	Fusible link	-	7122-4125-50
CN-61	TERM	1	Fuel filler pump	S822-014000	S822-114000
CN-66	DEUTSCH	2	Breaker solenoid	DT06-2S-EP06	-
CN-68	DEUTSCH	2	Safety solenoid	DT06-2S-EP06	-
CN-70	DEUTSCH	2	Travel HI-LO solenoid	DT06-2S-EP06	-
CN-74	KET	2	Alternator	ST710285-2	-
CN-76	KET	6	DC motor	MG640515-4	-
CN-79	YAZAKI	3	Fuel cut-off solenoid	S813-060300	-
CN-80	AMP	1	Pre heater	ST710384-2	-
CN-81	DEUTSCH	2	Travel buzzer	DT06-2S-EP06	DT04-2P-E005
CN-83	AMP	2	Air-con fan	MG640188-5	-

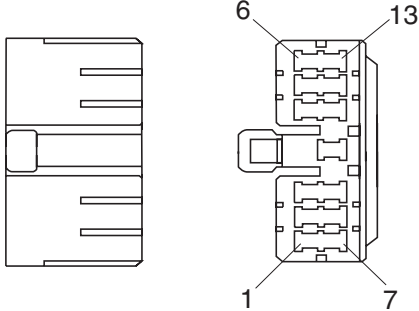
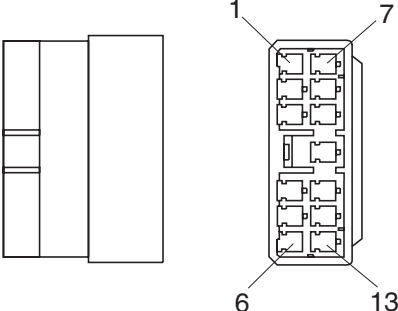
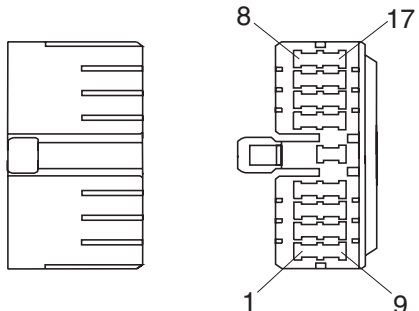
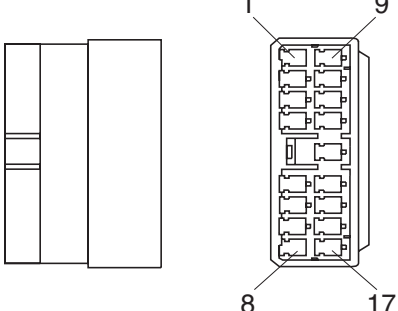
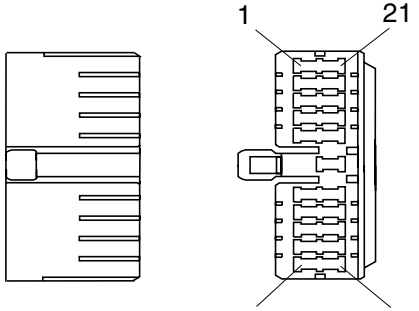
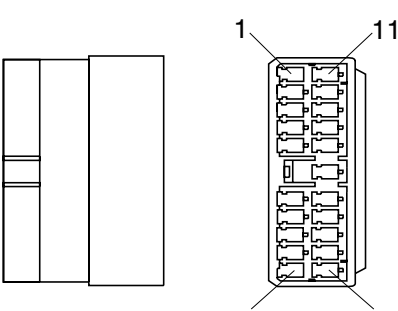
Connector number	Type	No. of pin	Destination	Connector part No.	
				Female	Male
CN-95	YAZAKI	2	Fusible link	-	S813-130201
CN-113	AMP	2	Buzzer	S810-002202	-
CN-116	AMP	12	Switch panel	368542-1	-
CN-139	AMP	2	12V socket	S810-002202	-
CN-140	DEUTSCH	2	Quick coupler	DT06-2S-EP06	DT04-2P-E005
CN-142	DEUTSCH	3	Accel dial	DT06-3S-EP06	-
CN-144	KET	20	Handfree	MG610240	-
CN-145	KET	2	Fuel feed pump	7123-6423-30	-
CN-170	AMP	2	Seat heat switch	12162017	-
CN-245	AMP	12	Remote controller assy	368542-1	-
CN-246	AMP	12	USB & Socket assy	174045-2	-
CN-258	KET	1	Aircon comp power	MG640944-5	MG650943-5
CN-263	DEUTSCH	2	Aircon comp relay	DT06-2S-EP06	DT04-2P-E005
· LAMP					
CL-1	KET	2	Room lamp	MG610392	-
CL-2	AMP	3	Cigar light	S810-003202	-
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	-
CL-7	-	1	Beacon lamp	-	S822-114000
CL-9	DEUTSCH	2	Cabin lamp	DT06-2S-EP06	-
CL-10	DEUTSCH	2	Cabin lamp	DT06-2S-EP06	-
· RELAY					
CR-1	AMP	2	Battery relay	S816-002002	S816-102002
CR-2	AMP	4	Horn relay	S810-004002	-
CR-3	AMP	4	Work lamp relay	S810-004002	-
CR-4	AMP	4	Wiper relay	S810-004002	-
CR-5	AMP	4	Anti-restart relay	S810-004002	-
CR-6	AMP	6	Int wiper relay	S810-006002	-
CR-12	AMP	4	Travel relay	S810-004002	-
CR-13	AMP	4	Head lamp relay	S810-004002	-
CR-23	KET	2	Start relay	S814-002001	-
CR-24	KET	2	Air heater relay	S814-002001	-
CR-33	AMP	4	Air-con fan relay	S810-004002	-
CR-36	AMP	4	Pre-heater relay	S810-004002	-
CR-47	KET	2	Fuel cut-off relay	S814-002001	-
CR-50	KET	4	Timer relay	MG610047-5	-
CR-85	AMP	4	Beacon lamp relay	S810-004002	-

Connector number	Type	No. of pin	Destination	Connector part No.	
				Female	Male
· 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	KET	1	Air cleaner switch	ST730057-2	-
CD-11	-	2	Travel pressure switch	MG640795	-
CD-12	-	2	Travel pressure switch	MG640795	-
CD-18	AMP	1	Engine oil pressure	ST710345-1	-
CD-30	AMP	2	Water temp	85202-1	-
CD-45	-	2	WIF sensor	-	S816-102003
DO-1	-	2	Diode	21EA-50570	-
DO-2	-	2	Diode	21EA-50570	-
DO-3	-	2	Diode	21EA-50570	-
· SWITCH					
CS-2	KET	6	Start key switch	S814-006000	-
CS-3	SWF	12	Wiper switch	589790	-
CS-4	AMP	3	Safety switch	S816-003002	-
CS-5	DEUTSCH	2	Horn-LH switch	-	DT04-2P-E005
CS-26	DEUTSCH	2	Breaker switch	-	DT04-2P-E005
CS-30	SWF	12	Wiper & washer switch	589790	-
CS-67	SWF	12	Quick coupler switch	589790	-
CS-74	YAZAKI	2	Master switch	S813-030201	-
CS-99	SWF	12	Air compressor switch	589790	-

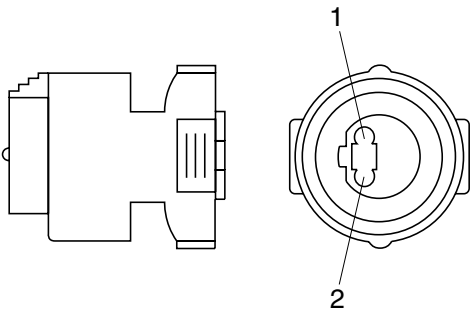
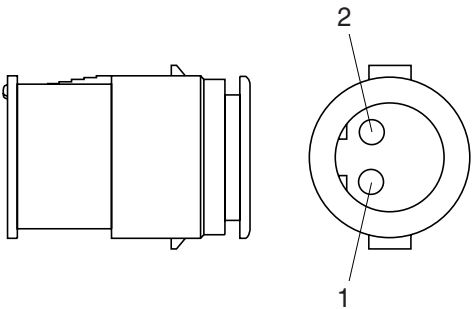
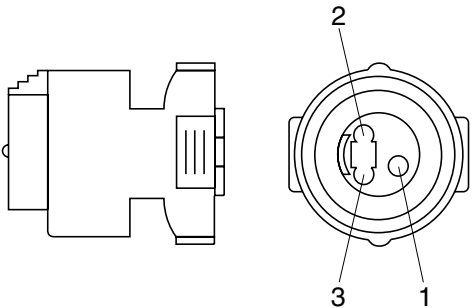
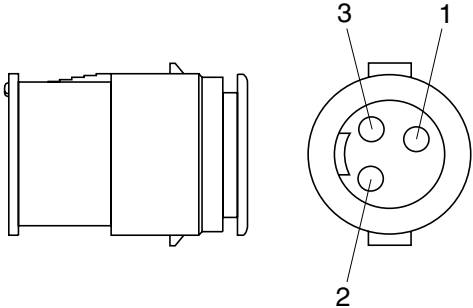
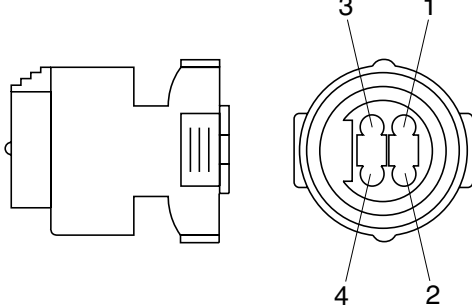
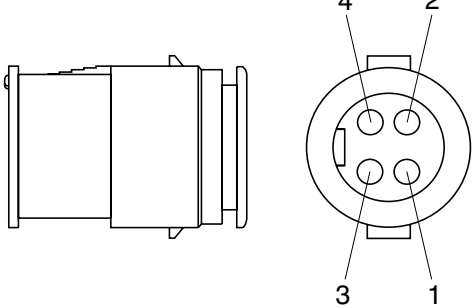
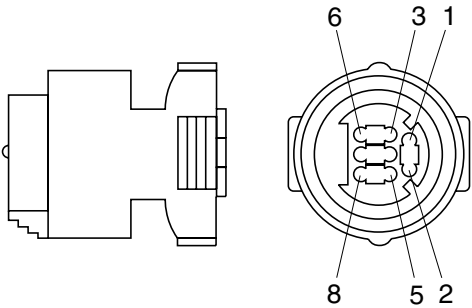
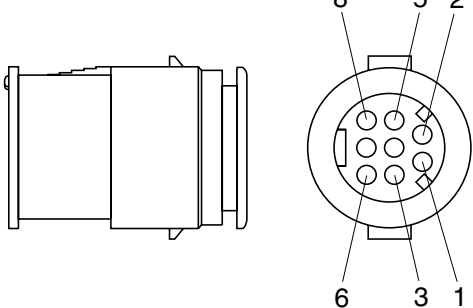
2. CONNECTION TABLE FOR CONNECTORS

1) PA TYPE CONNECTOR

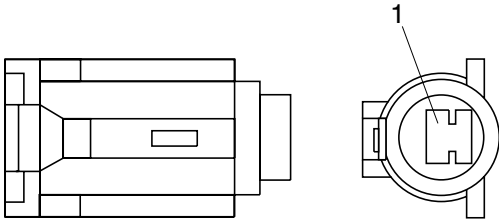
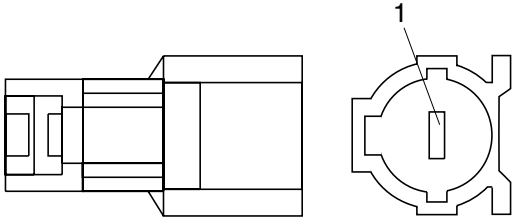
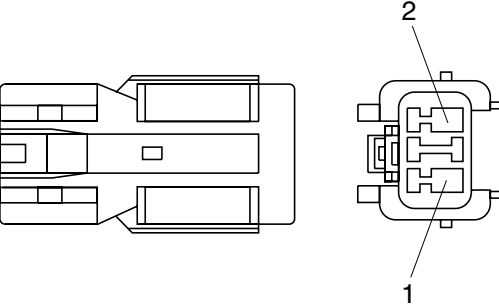
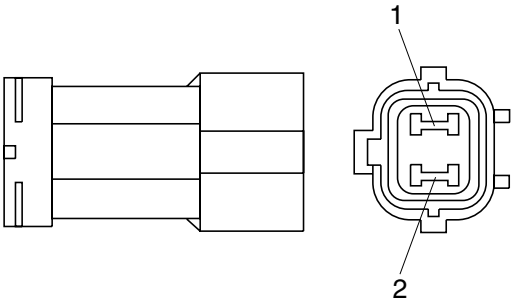
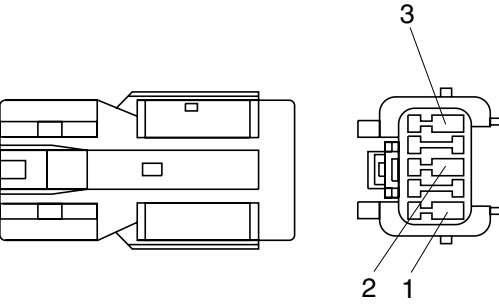
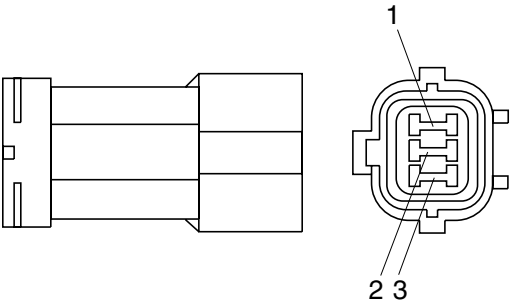
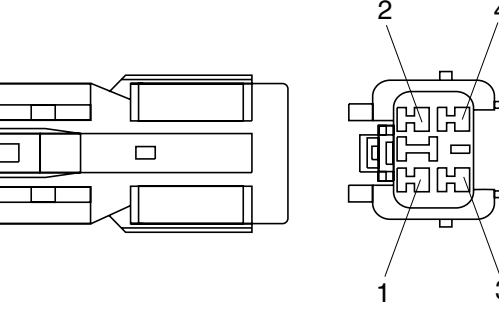
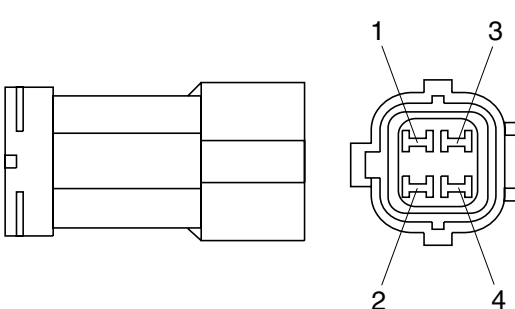
No. of pin	Receptacle connector (female)	Plug connector (male)
5	 S811-005002	 S811-105002
7	 S811-007002	 S811-107002
9	 S811-009002	 S811-109002
11	 S811-011002	 S811-111002

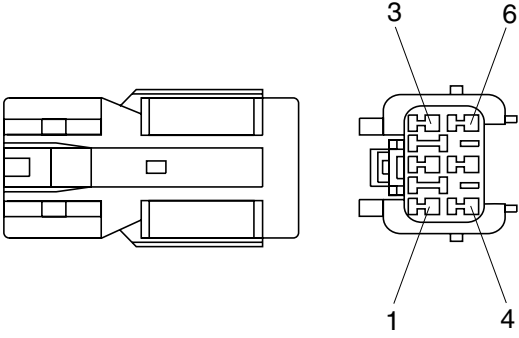
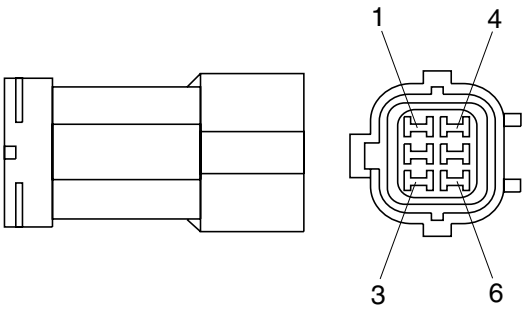
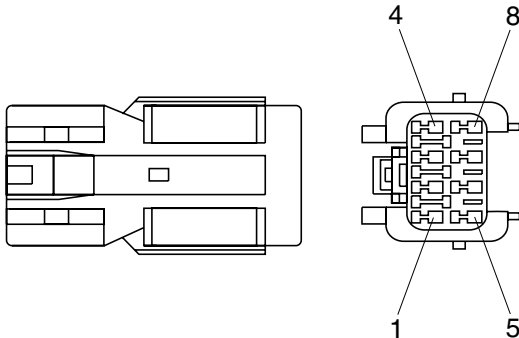
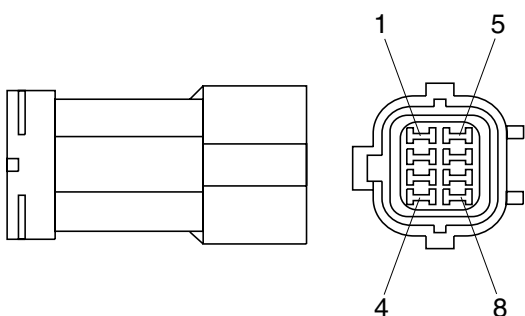
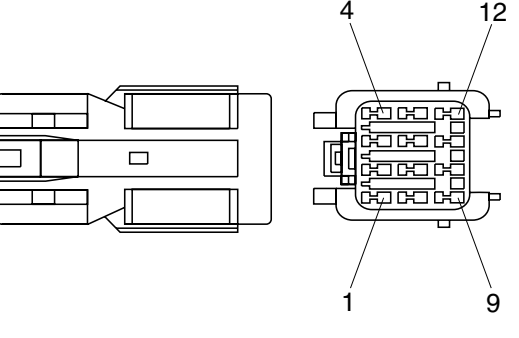
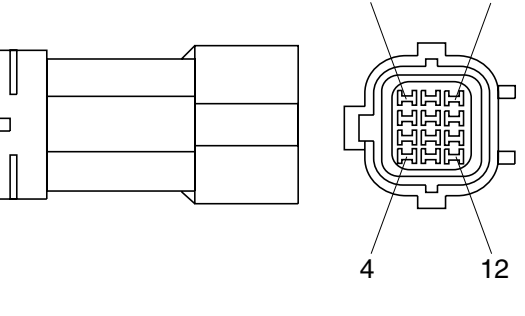
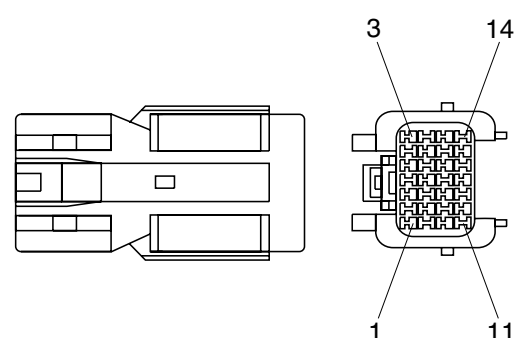
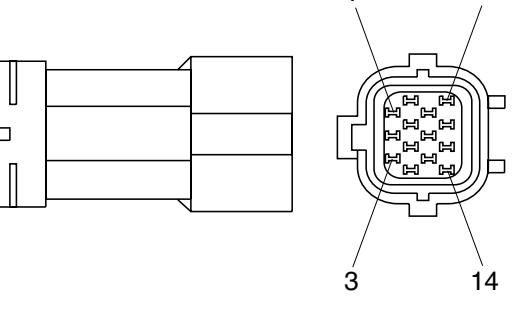
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17	 S811-017002	 S811-117002
21	 S811-021002	 S811-121002

2) J TYPE CONNECTOR

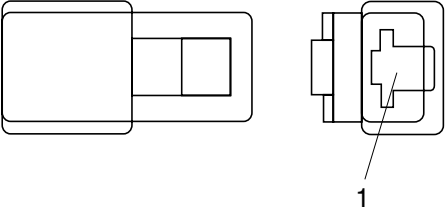
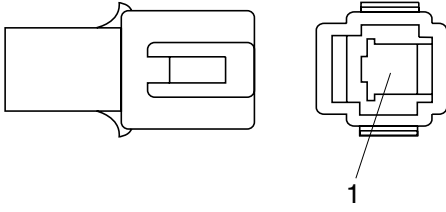
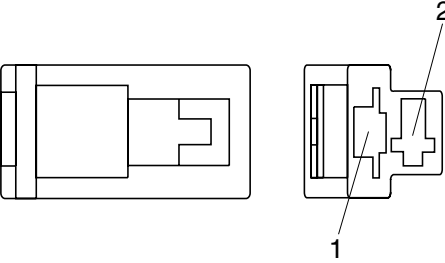
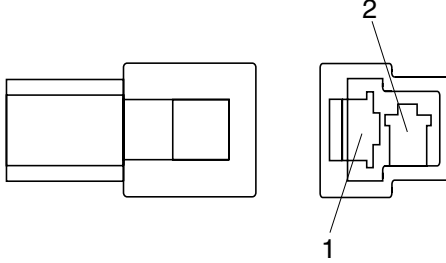
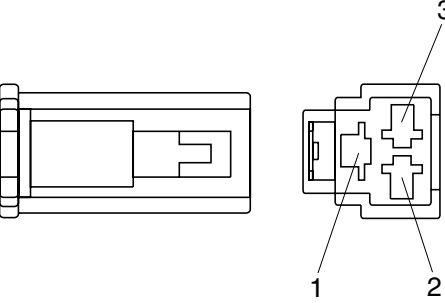
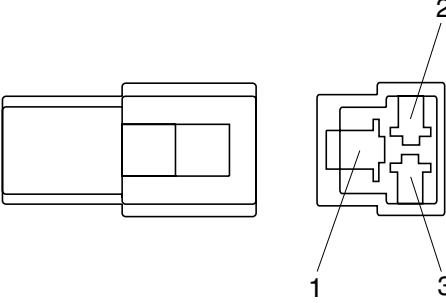
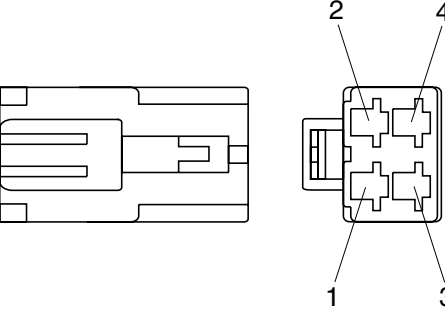
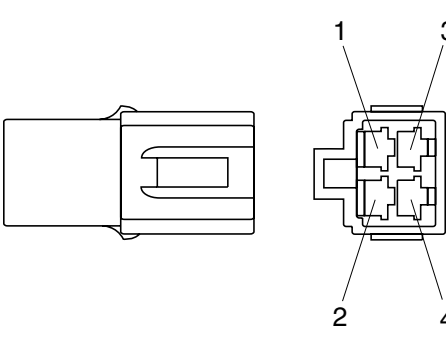
No. of pin	Receptacle connector (female)	Plug connector (male)
2	 S816-002001	 S816-102001
3	 S816-003001	 S816-103001
4	 S816-004001	 S816-104001
8	 S816-008001	 S816-108001

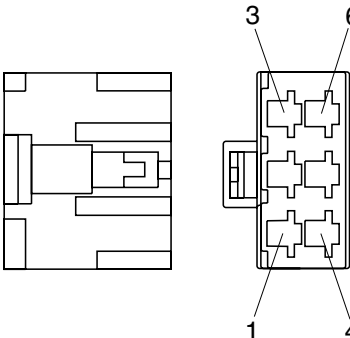
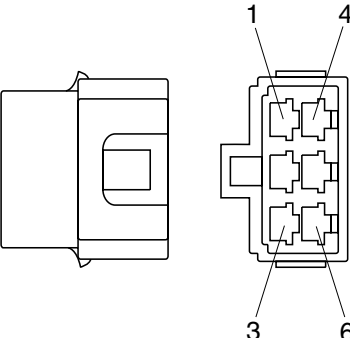
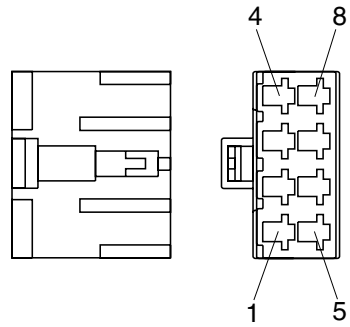
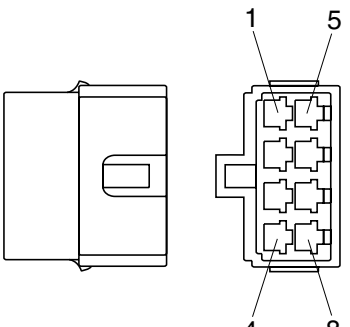
3) SWP TYPE CONNECTOR

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

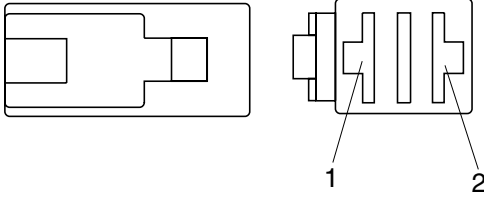
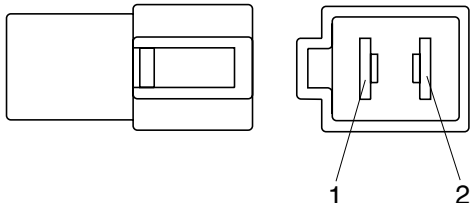
No. of pin	Receptacle connector (female)	Plug connector (male)
6	 S814-006000	 S814-106000
8	 S814-008000	 S814-108000
12	 S814-012000	 S814-112000
14	 S814-014000	 S814-114000

4) CN TYPE CONNECTOR

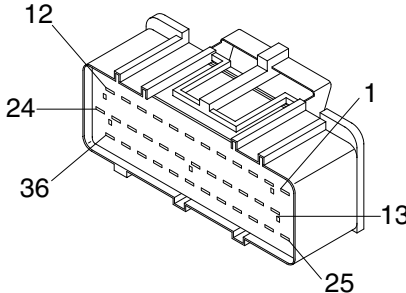
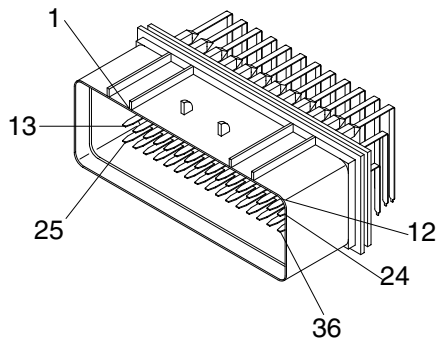
No. of pin	Receptacle connector (female)	Plug connector (male)
1	 S810-001202	 S810-101202
2	 S810-002202	 S810-102202
3	 S810-003202	 S810-103202
4	 S810-004202	 S810-104202

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

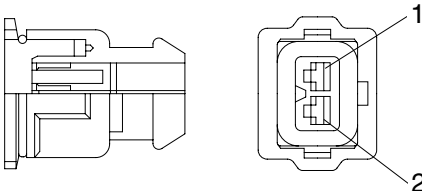
5) 375 FASTEN TYPE CONNECTOR

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

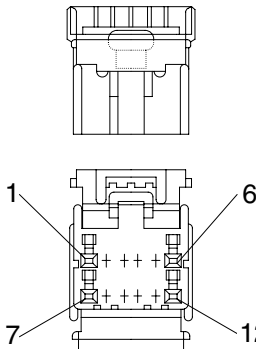
6) AMP ECONOSEAL CONNECTOR

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

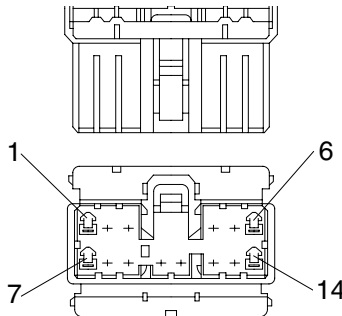
7) AMP TIMER CONNECTOR

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

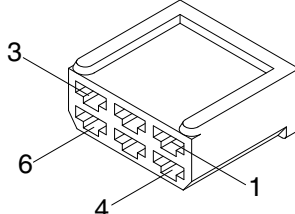
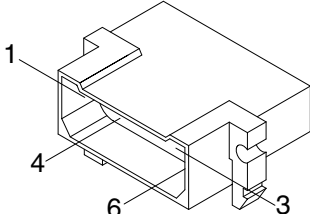
8) AMP 040 MULTILOCK CONNECTOR

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

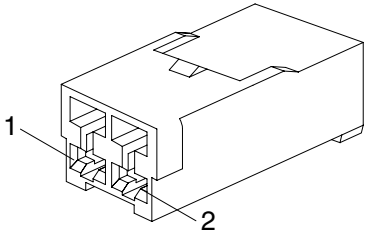
9) AMP 070 MULTILOCK CONNECTOR

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

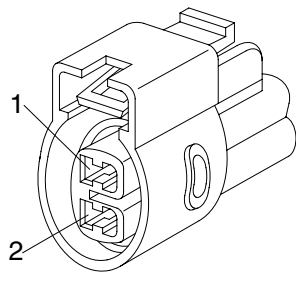
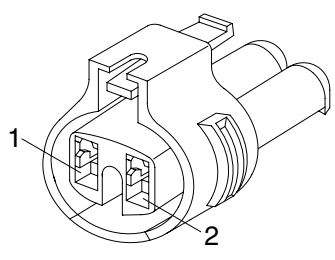
10) AMP FASTIN - FASTON CONNECTOR

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

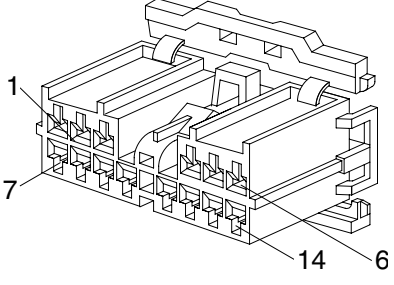
11) KET 090 CONNECTOR

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

12) KET 090 WP CONNECTORS

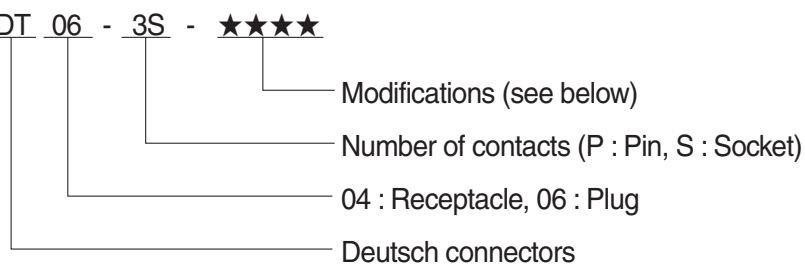
No. of pin	Receptacle connector (female)	Plug connector (male)
2	 MG640605	
2	 MG640795	

13) KET SDL CONNECTOR

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

14) DEUTSCH DT CONNECTORS

DT 06 - 3S - ★★★★★



※ Modification

E003 : Standard end cap - gray

E004 : Color of connector to be black

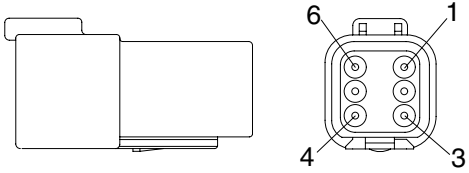
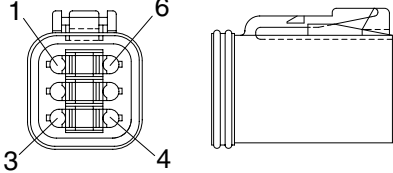
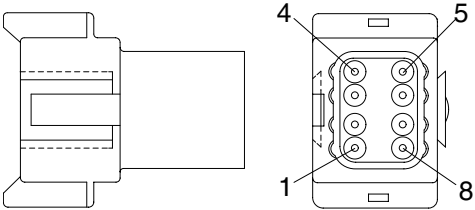
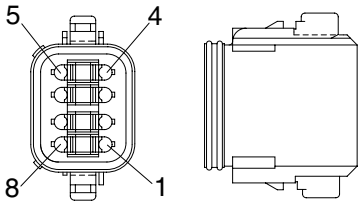
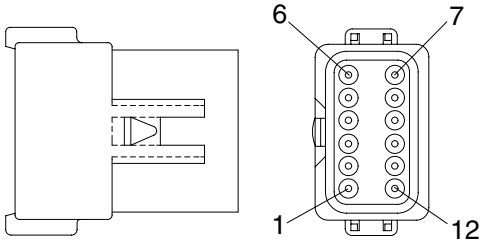
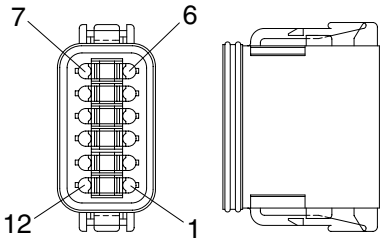
E005 : Combination - E004 & E003

EP04 : End cap

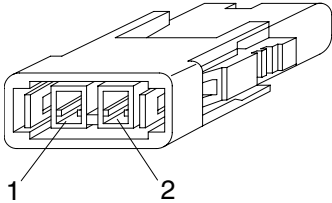
EP06 : Combination P012 & EP04

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

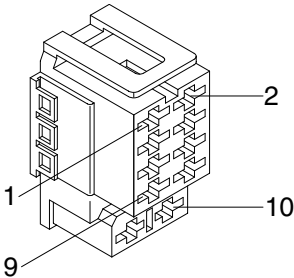
No. of pin	Receptacle connector (female)	Plug connector (male)
2	DT06-2S	DT06-2P
3	DT06-3S	DT06-3P
4	DT06-4S	DT06-4P

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

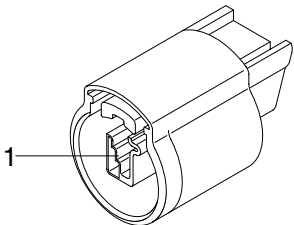
15) MOLEX 2CKTS CONNECTOR

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
840	2	Cluster communication data error
841	2	ECM communication data error
IDSP		Water in fuel warning
Lo bat		Low battery warning

2. ENGINE FAULT CODE

Fault code		Description	
YANMAR SPN	FMI	Area	Status
522400	2	Crankshaft speed sensor	Error (Abnormal signal)
	5		Error (No-signal)
522401	2	Camshaft speed sensor	Error (Abnormal signal)
	5		Error (No-signal)
	7		Crank angle error
91	3	Accelerator sensor 1	Error (high voltage)
	4		Error (low voltage)
51	3	Intake throttle position sensor	Error (high voltage)
	4		Error (low voltage)
3251	3	DPF differential pressure sensor	Error (high voltage)
	4		Error (low voltage)
1209	3	EGR pressure sensor (high-pressure side)	Error (high voltage)
	4		Error (low voltage)
110	3	Coolant temperature sensor	Error (high voltage)
	4		Error (low voltage)
	0	Coolant temperature	High temperature (Overheat)
105	3	Air temperature sensor	Error (high voltage)
	4		Error (low voltage)
3250	3	DPF middle temperature sensor	Error (high voltage)
	4		Error (low voltage)
3242	3	DPF inlet temperature sensor	Error (high voltage)
	4		Error (low voltage)
174	3	Fuel temperature sensor	Error (high voltage)
	4		Error (low voltage)
	0	Fuel temperature	High Temperature
157	3	Rail pressure sensor	Error (high voltage)
	4		Error (low voltage)
102	3	EGR Low-side pressure sensor	Error (high voltage)
	4		Error (low voltage)
108	3	Atmospheric pressure sensor	Error (high voltage)
	4		Error (low voltage)
3609	3	DPF Hi-side pressure sensor	Error (high voltage)
	4		Error (low voltage)
1485	7	Main relay	Stick error
	2		Power off without self-holding
522243	6	Starting aid relay	Short-circuit with ground
	5		Disconnection

Fault code		Description	
YANMAR SPN	FMI	Area	Status
2950	5	Intake throttle actuator	H-bridge circuit : No-Load
	3		H-bridge output 1 : Short-circuit with power supply
	4		H-bridge output 1 : Short-circuit with ground
2951	3		H-bridge output 2 : Short-circuit with power supply
	4		H-bridge output 2 : Short-circuit with ground
651	5	Injector 1 : Cylinder No. 4 Port : 1-2	Disconnection
	11		Failure
	3		Short-circuit
	6		Short-circuit (internal coil)
653	5	Injector 2 : Cylinder No. 2 Port : 2-1	Disconnection
	11		Failure
	3		Short-circuit
	6		Short-circuit (internal coil)
654	5	Injector 3 : Cylinder No. 1 Port : 2-2	Disconnection
	11		Failure
	3		Short-circuit
	6		Short-circuit (internal coil)
652	5	Injector 4 : Cylinder No. 3 Prot : 1-1	Disconnection
	11		Failure
	3		Short-circuit
	6		Short-circuit (internal coil)
2797	6	Injecotor (Common)	Short circuit Cylinder No. 1,4
2798	6		Short circuit Cylinder No., 2,3
4257	12		IC error
633	5	Supply pump (MPROP)	Disconnection
	6		Hi-side : Short-circuit with ground
522571	3		Lo-side : Short-circuit with power supply
157	18	Rail pressure error	Rail pressure deviation error when actual pressure is too low
	15		Rail pressure deviation error when actual pressure is too high
	0		Fuel rail/System pressure : Too high
	16	PLV	Fuel system over pressure relief valve activated
190	16	Engine overspeed 1	
522610	19	CAN communication 1 (CAN 1)	CAN 1(for EGR) : Data length code error (received message)
	9		CAN 1(for EGR) : Time out error (received message)
522611	9		CAN 1(for exhaust throttle) : Time out error (received message)

Fault code		Description	
YANMAR SPN	FMI	Area	Status
522596	9	CAN communication 2 (CAN 2)	CAN2(TSC1) : Time out error (received message)
522599	9		CAN2(Y_ECR 1) : Time out error (received message)
522600	9		CAN2(Y_EC) : Time out error (received message)
522601	9		CAN2(Y_RSS) : Time out error (received message)
522602	9		CAN2(Y_ECM 3) for Bosch-ECU : Time out error (received message)
522603	9		CAN2(VH) : Time out error (received message)
2791	7	EGR valve	Feedback error
	12		Disconnection (Motor coil)
	12		Short circuit (Motor coil)
	12		Position sensor error
	9		CAN communication error
	12		Error (EGR valve target value)
	0		Error (high voltage)
	1		Error (low voltage)
	7		Stick error
	7		Initialize error
	1		Thermistor error (high temperature)
	1		Thermistor error (low temperature)
630	12	EEPROM	Deletion error
			Read error
			Write error
522994	12	E-ECU internal	Power supply for sensor 1 (5V) : Error
	12		Power supply for sensor 2 (5V) : Error
	12		Power supply for sensor 3 (5V) : Error
	12		Power supply for sensor (12V) : Error (high voltage)
	12		Power supply for sensor (12V) : Error (low voltage)
	12		Power supply for sensor internal : Error (high voltage)
	12		Power supply for sensor internal : Error (low voltage)
	12		Power supply for IC : Error (high voltage)
	12		Power supply for IC : Error (low voltage)
	3		Actuator relay 1 : Short-circuit with power supply
	3		Actuator relay 2 : Short-circuit with power supply
	4		Actuator relay 1 : Short-circuit with ground
	4		Actuator relay 2 : Short-circuit with ground
	12		WDA/ABE communication error
	12		CY146 SPI communication error
	12		CY320 SPI communication error
	12		R2S2 MSC communication error
	12		WDA/ABE shut off (Too low voltage)
	12		WDA/ABE shut off (Too high voltage)
	12		WDA/ABE shut off (Operation malfunction)
	11		ECU soft reset 1
	11		ECU soft reset 2
	11		ECU soft reset 3

Fault code		Description	
YANMAR SPN	FMI	Area	Status
522323	0	Air cleaner blockage alarm	
522329	0	Oily water separator alarm	
523249	5	Symptom " engine does not start "	
167	1	Charge failure	
100	4	Oil pressure switch	Disconnection
	1		Low pressure
3719	0	DPF	Over accumulation