

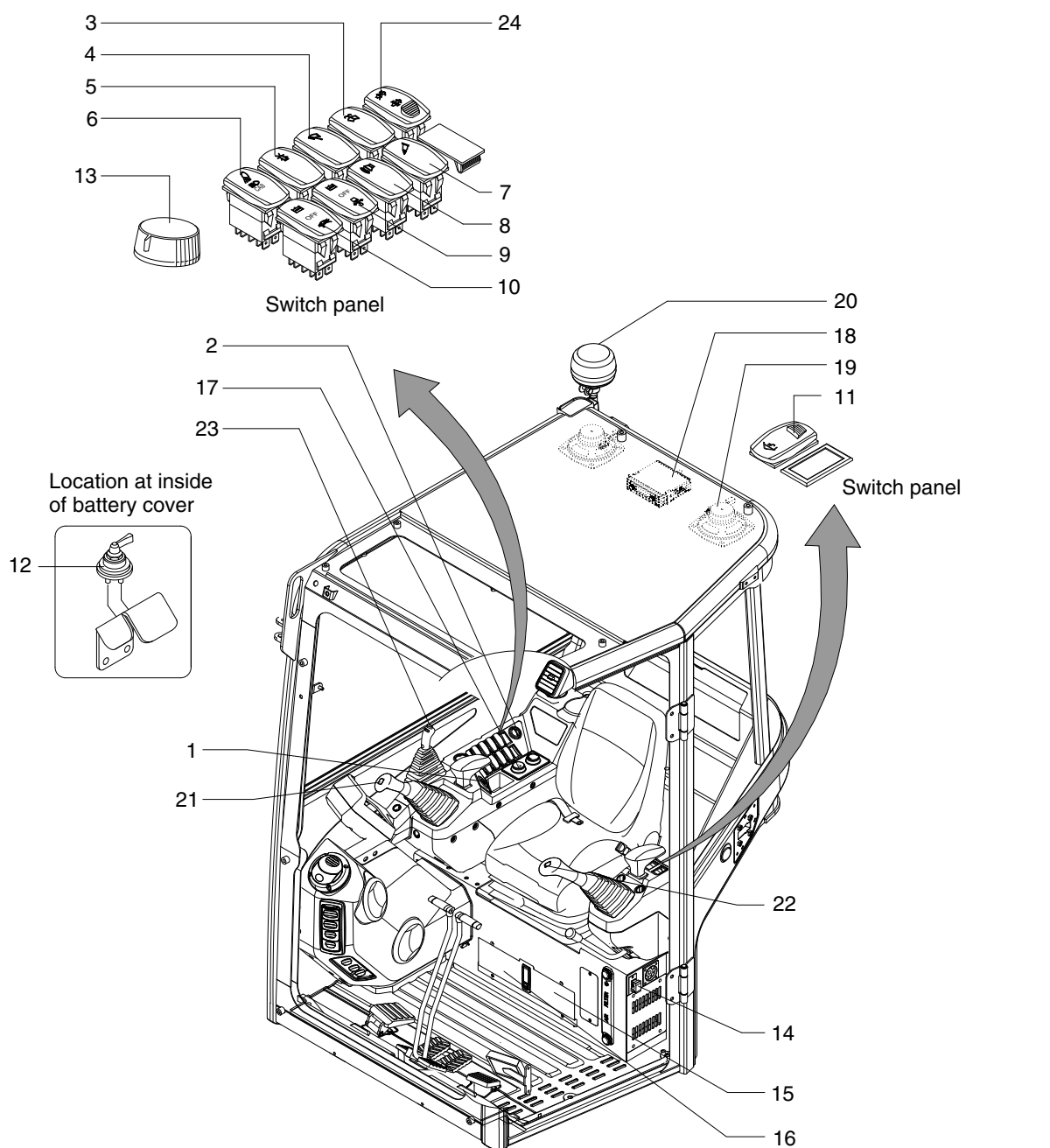
SECTION 4 ELECTRICAL SYSTEM

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SECTION 4 ELECTRICAL SYSTEM

GROUP 1 COMPONENT LOCATION

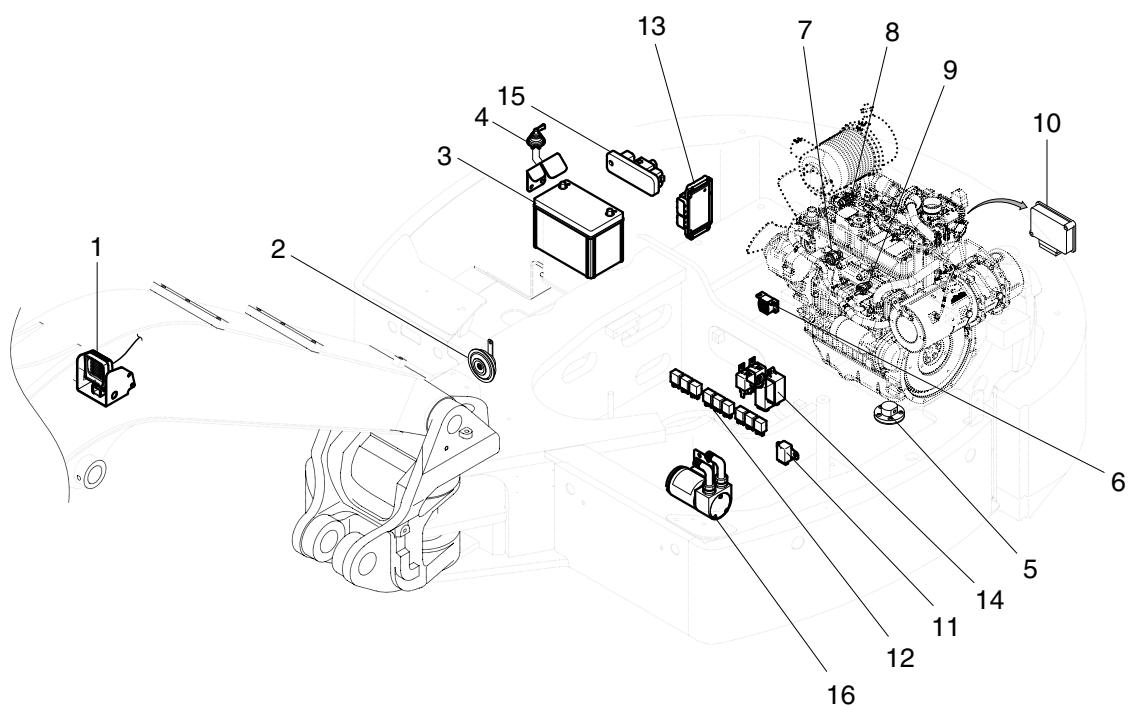
1. LOCATION 1



55ACR4EL01

- | | | |
|-------------------------|---------------------------|---|
| 1 Start switch | 10 Aux 1 switch | 19 Speaker |
| 2 Power socket | 11 Quick coupler switch | 20 Beacon lamp |
| 3 Washer switch | 12 Master switch | 21 RH control lever switch |
| 4 Wiper switch | 13 Accel dial | (horn, quick coupler, breaker, 2-way) |
| 5 Beacon lamp switch | 14 Emergency stop switch | 22 LH control lever switch |
| 6 Work light switch | 15 Relay box | (rotating, proportional on/off) |
| 7 Breaker select switch | 16 Fuse box | 23 Dozer control switch |
| 8 Travel alarm switch | 17 Air conditioner switch | (dozer floating, angle dozer, 2-speed travel) |
| 9 Aux 2 switch | 18 New cassette radio | 24 DPF switch |

2. LOCATION 2



55ACR4EL02

- | | | | | | |
|---|---------------------|----|-----------------------------|----|------------------------|
| 1 | Work lamp | 7 | Engine oil pressure switch | 13 | Hydraulic control unit |
| 2 | Low horn | 8 | Air cleaner pressure switch | 14 | Power relay |
| 3 | Battery | 9 | Water temperature sender | 15 | Battery power relay |
| 4 | Master switch | 10 | ECU | 16 | Fuel filler pump |
| 5 | Fuel sender | 11 | Inlet wiper relay | | |
| 6 | Travel alarm buzzer | 12 | Micro 12V relay | | |

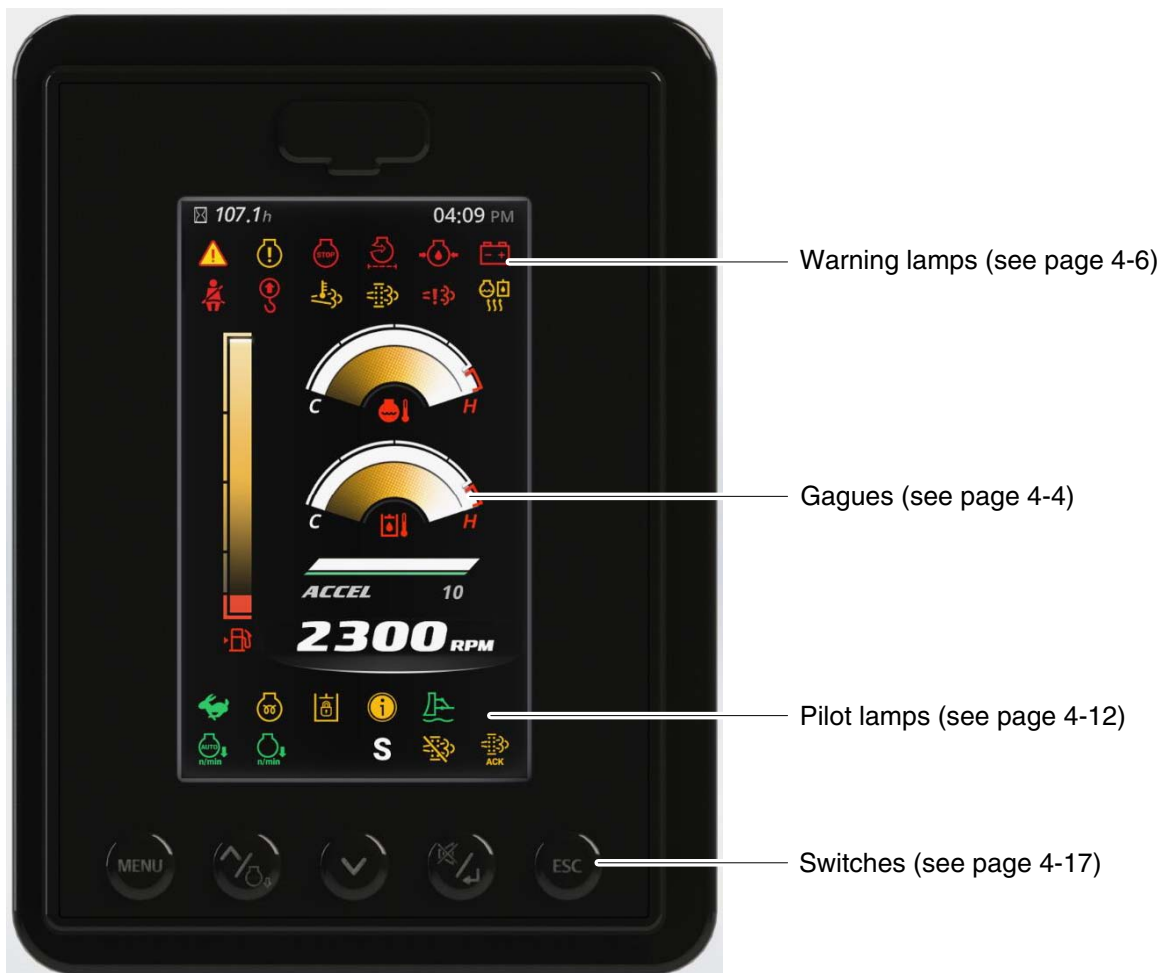
GROUP 2 MONITORING SYSTEM

1) CLUSTER

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.

The LCD is to display for monitoring, manage and display set with the switches.

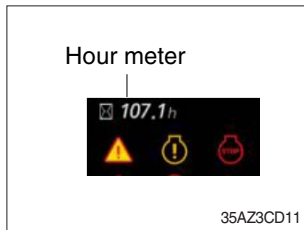
- ※ The cluster installed on this machine does not entirely guarantee the condition of the machine. Daily inspection should be performed according to the operator's manual chapter 6, Maintenance.
- ※ When the cluster provides a warning, immediately check the problem and perform the required action.



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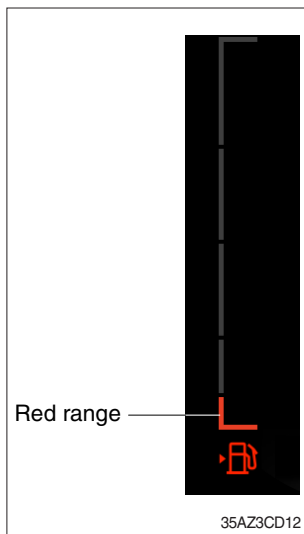
2) GAUGES AND DISPLAYS

(1) Hour meter



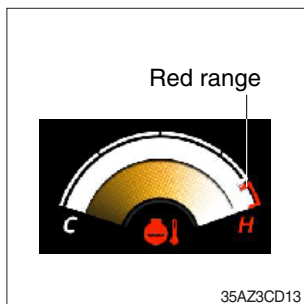
- ① This meter shows the total operation hours of the machine.
- ② Always ensure the operating condition of the meter during the machine operation.
Inspect and service the machine based on hours as indicated in chapter 6, maintenance.

(2) Fuel gauge



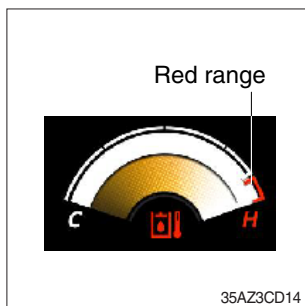
- ① This gauge indicates the amount of fuel in the fuel tank.
- ② Fill the fuel when in the red range or warning lamp  ON.
※ If the gauge illuminates the red range or warning lamp  ON even though the machine is in the normal condition range, check the electric device as this can be caused by poor connection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

(3) Engine coolant temperature gauge



- ① This indicates the temperature of coolant.
· Red range : Above 110°C (230°F)
- ② When the red range pointed or warning lamp  ON, 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.
※ If the gauge indicates the red range or warning lamp  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) Hydraulic oil temperature gauge



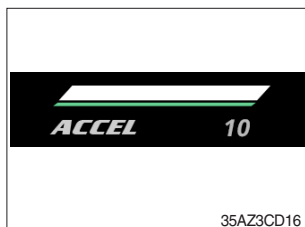
- ① This gauge indicates the temperature of hydraulic oil.
 - Red range : Above 105°C (221°F)
- ② If the indicator is in the red range or lamp  ON in red, reduce the load on the system. If the gauge stays in the red range, stop the machine and check the cause of the problem.
- ※ If the gauge indicates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



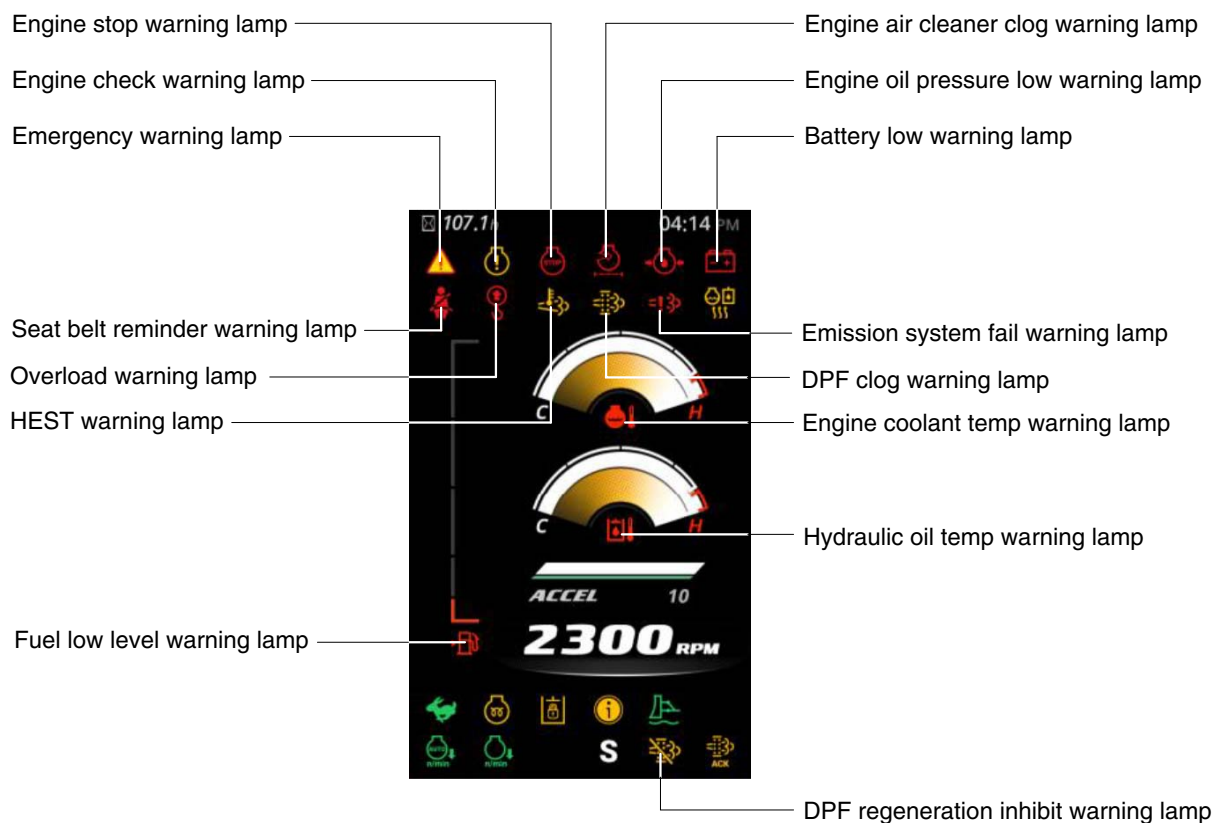
- ① This displays the engine speed.
- ② This displays the tilt of machine.

(6) Accel dial gauge



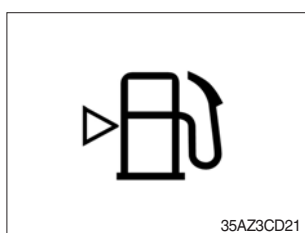
- ① This gauge indicates the level of accel dial from 0 to 10 step.

3) WARNING LAMPS



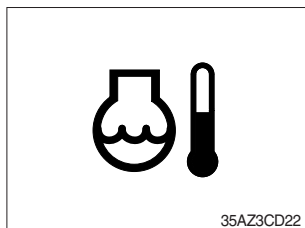
48AZ3CD20

(1) Fuel low level warning lamp



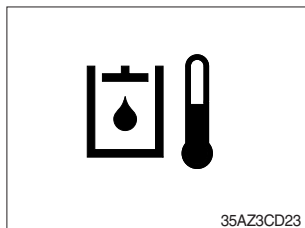
- ① This lamp lights up and buzzer sounds when the level of fuel is below 18.9 ℓ (5.0 U.S. gal).
- ② Fill the fuel immediately when the lamp ON.

(2) Engine coolant temperature warning lamp



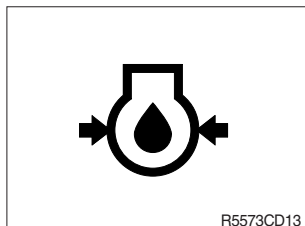
- ① This lamp lights up and buzzer sounds when the temperature of coolant is over the normal temperature 115°C (239°F) .
- ② Check the cooling system when the lamp ON.

(3) Hydraulic temperature warning lamp



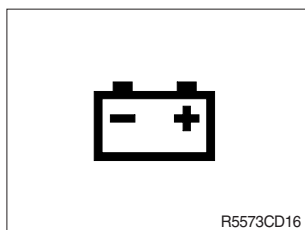
- ① This lamp lights up and buzzer sounds when the temperature of coolant is over the normal temperature 105°C (221°F).
- ② Check the cooling system when the lamp ON.

(4) Engine oil pressure low warning lamp



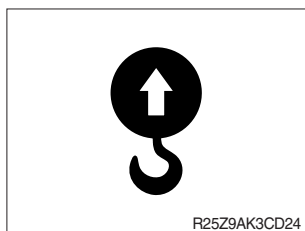
- ① This lamp lights up and buzzer sounds after starting the engine because of the low oil pressure.
- ② If the lamp ON during engine operation, shut OFF engine immediately. Check oil level.

(5) Battery low warning lamp



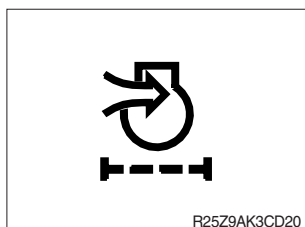
- ① This lamp lights up and buzzer sounds when the starting switch is ON, it is turned OFF after starting the engine.
- ② Check the battery charging circuit when this lamp blinks during engine operation.

(6) Overload warning lamp



- ① When the machine is overloaded, this lamp blinks and buzzer sounds.
- ② Reduce the machine load.

(7) Air cleaner clog warning lamp



- ① This lamp lights up and buzzer sounds when the element of the air cleaner is clogged.
- ② Check, clean or replace element.

(8) Emergency warning lamp



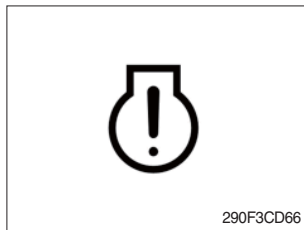
① This lamp pops up and the buzzer sounds when each of the below warnings occurs.

- Hydraulic oil temperature high warning lamp ON
- Engine coolant temperature high warning lamp ON
- Communication error with ECU

※ **The pop-up warning lamp moves to the original position and lights up when the buzzer stop switch is pushed or pop-up is touched. 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.

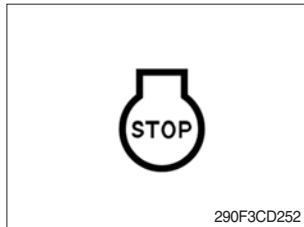
(9) Check engine warning lamp



① This warning lamp lights up and buzzer sounds when the engine must be checked.

※ **When the warning lamp lights up, stop the machine and find the cause for repair.**

(10) Engine stop warning lamp



① If this warning lamp lights up and buzzer sounds, stop the engine immediately and check the engine.

② Check the fault codes on the monitor.

※ **Please contact your Hyundai service center or local dealer.**

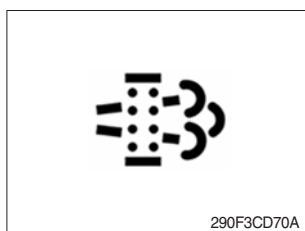
(11) Seat belt reminder warning lamp



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

② Fasten the seat belt.

(12) DPF clog warning lamp



- ① This warning lamp lights up and the buzzer sounds when the regeneration is needed.
- ② For details, please refer to the after-treatment system below.

※ DPF : Diesel Particulate Filter

※ 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.

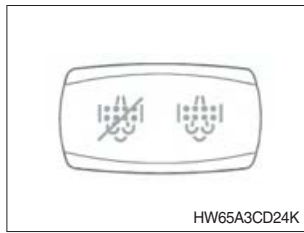
When the regeneration is not performed successfully according to the procedure, warning lamp relevant to the each operating condition is turned ON.

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.

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

※ Manual (Forced) DPF regeneration method



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

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

① Manual regeneration condition

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

② Manual (Forced) regeneration procedure

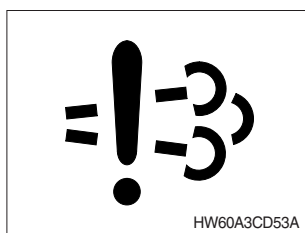
Park the machine on a well-ventilated area, and keep away from inflammable materials to set the machine as shown below.

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

③ Regeneration switch is activated to initiate the regeneration procedure.

※ Refer to the operator's manual page 3-35 for the DPF switch.

(13) Exhaust system failure warning lamp



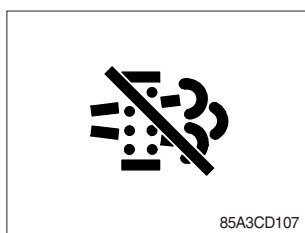
- ① This warning lamp is turned ON in 3 cases such as when the quantitative distribution is stopped, poor reagent quality and monitoring malfunction, etc.
- ② Please refer to the exhaust gas control system below.

※ 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.

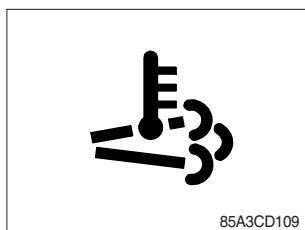
(14) DPF regeneration inhibit warning lamp



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

※ Refer to page the operator's manual 3-35 for the DPF switch.

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

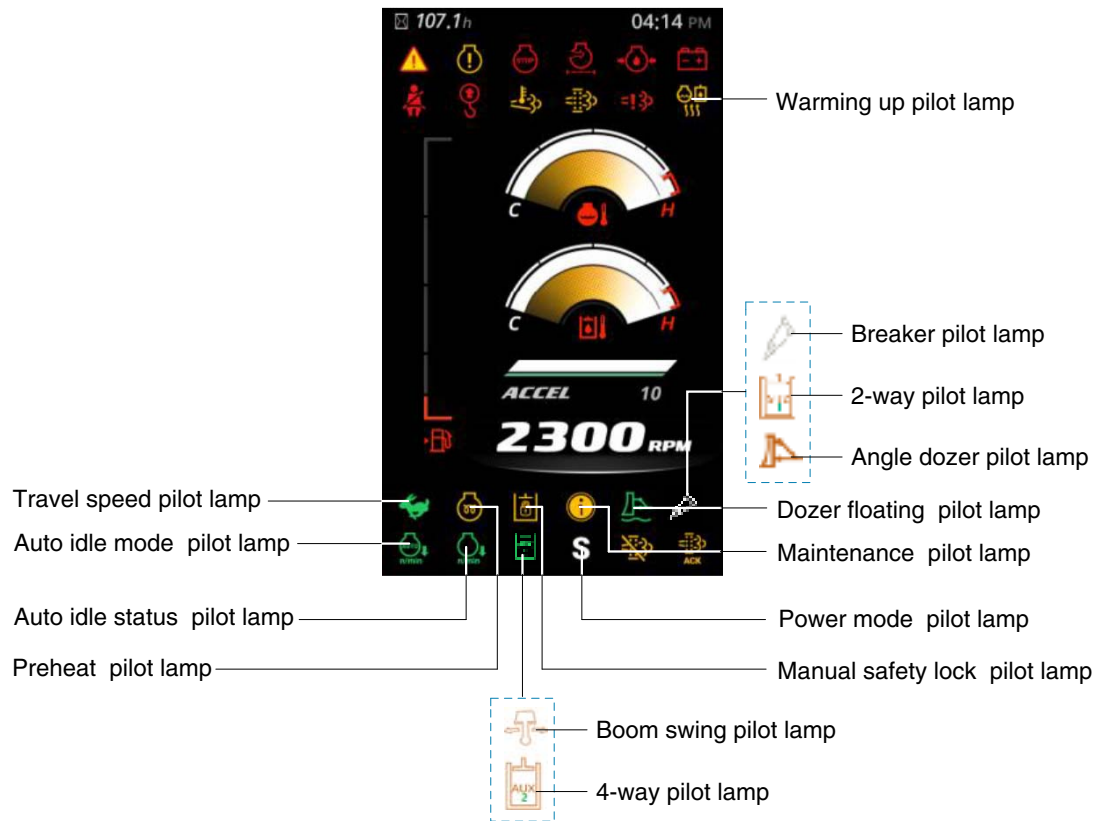


- ① This warning lamp indicates, when illuminated, that exhaust temperatures are high due to regeneration of the DPF.
- ② The lamp will also illuminate during a manual regeneration.
- ③ When this lamp is illuminated, be sure the exhaust pipe outlet is not directed at any surface or material that can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

4) PILOT LAMP

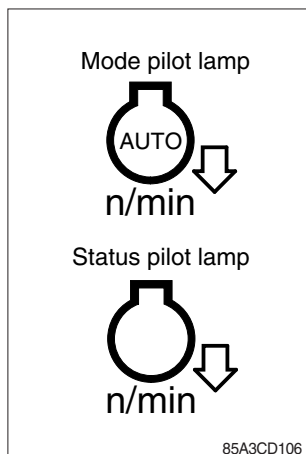


35AZ3CD30

(1) Power mode pilot lamp

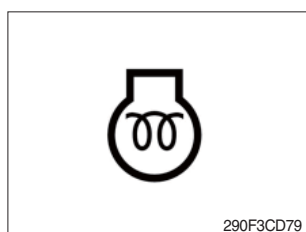
No	Mode	Pilot lamp	Selected mode
1	Power mode	P	Heavy duty power mode (2000 rpm)
		S	Standard power mode (1750 rpm)
2	Travel mode		Low speed traveling
			High speed traveling

(2) Auto idle status/ mode pilot lamp



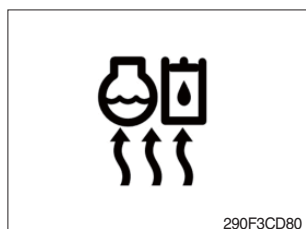
- ① The auto idle mode pilot lamp will light up when the idle mode is selected.
- ② The auto idle status pilot lamp will light up when all levers and pedals are at neutral position and the auto idle mode is selected.
- ③ One of the lever or pedal is operated, the status lamp will go off and the engine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

(3) Preheat pilot lamp



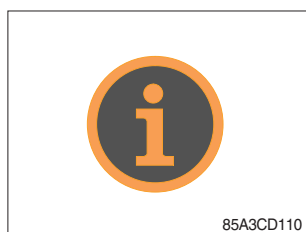
- ① Turning the start key switch to the ON position starts preheating in cold weather.
 - ② Start the engine after this lamp goes OFF.
- ※ Refer to the operator's manual page 4-4 for details.

(4) Warming up pilot lamp



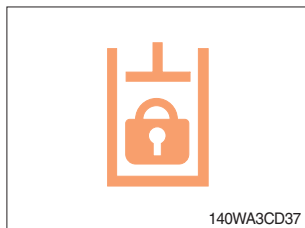
- ① This lamp lights up when the coolant temperature is below 30°C (86°F).
- ② The automatic warming up is cancelled when the engine coolant temperature is above 30°C (86°F), or when 10 minutes have passed since starting the engine.

(5) Maintenance pilot lamp



- 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.

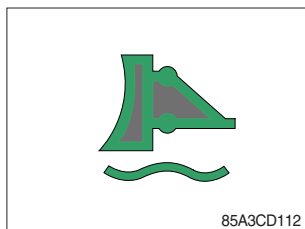
(6) Manual safety lock pilot lamp



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

※ Refer to the operator's manual page 3-35 for the safety lever.

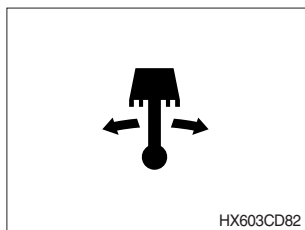
(7) Dozer floating pilot lamp



① This lamp will be light up when the dozer floating lever is pressed.

※ Refer to the operator's manual page 3-37.

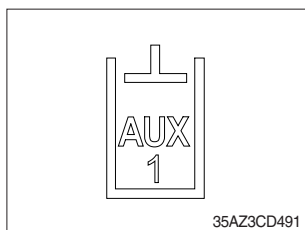
(8) Boom swing pilot lamp



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

※ Refer to the operator's manual page 3-35.

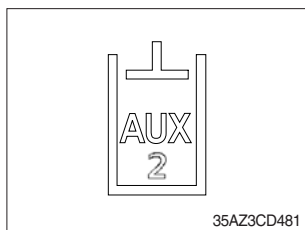
(9) 2-way pilot lamp



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

※ Refer to the page 4-28.

(10) 4-way (rotating) pilot lamp



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

※ Refer to the page 4-28.

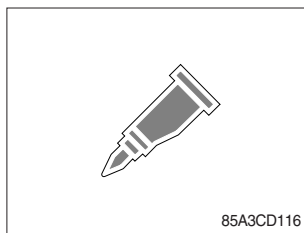
(11) Angle dozer pilot lamp



① This lamp will be light up when the AUX 1 switch is pressed to ANGLE DOZER positions.

※ Refer to the operator's manual page 3-35.

(12) Breaker pilot lamp



① This lamp will be light up when the breaker select switch is pressed.

※ Refer to the operator's manual page 3-34.

5) SWITCHES

Sound short beep when each button is pressed.

(1) Menu button



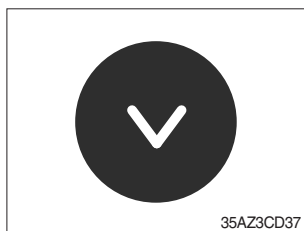
- ① Go into the menu screen.
- ※ Please refer to page 4-17.

(2) Left/up/(+) and auto idle button



- ① Move left in sub menu.
- ② Move up in menu list
- ③ Increase input value in menu
- ④ Auto idle ON or OFF in the operation screen

(3) Right/down/(-) button



- ① Move right in sub menu.
- ② Move down in menu list
- ③ Decrease input value in menu

(4) Enter and buzzer stop button



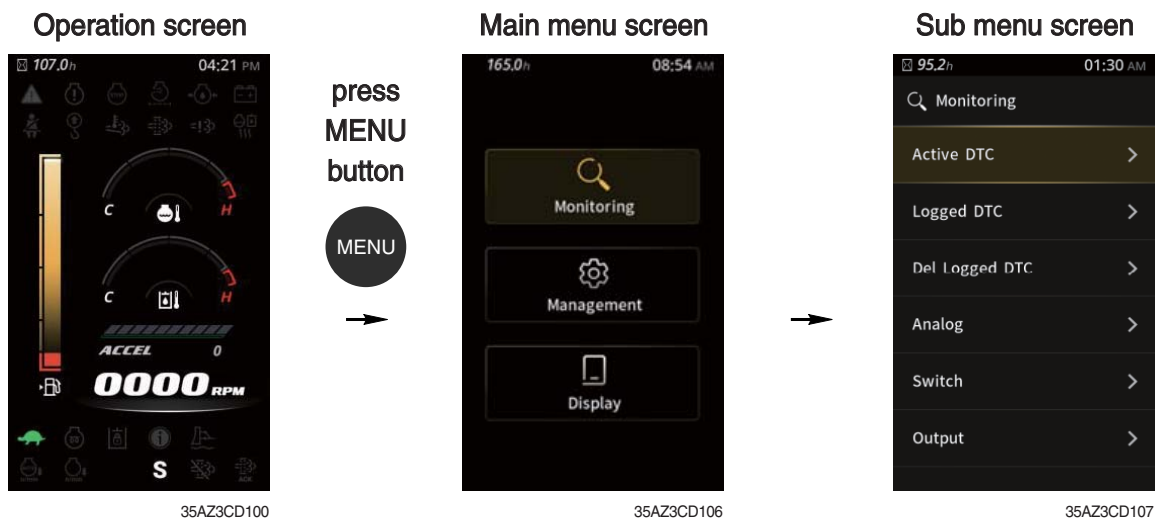
- ① Select menu (enter).
- ② Stop buzzer sound when press this button more than 1.7 sec.

(5) ESC/ rear camera button



- ① Escape in the menu.
- ② Rear camera ON or OFF in the operation screen

6) MAIN MENU



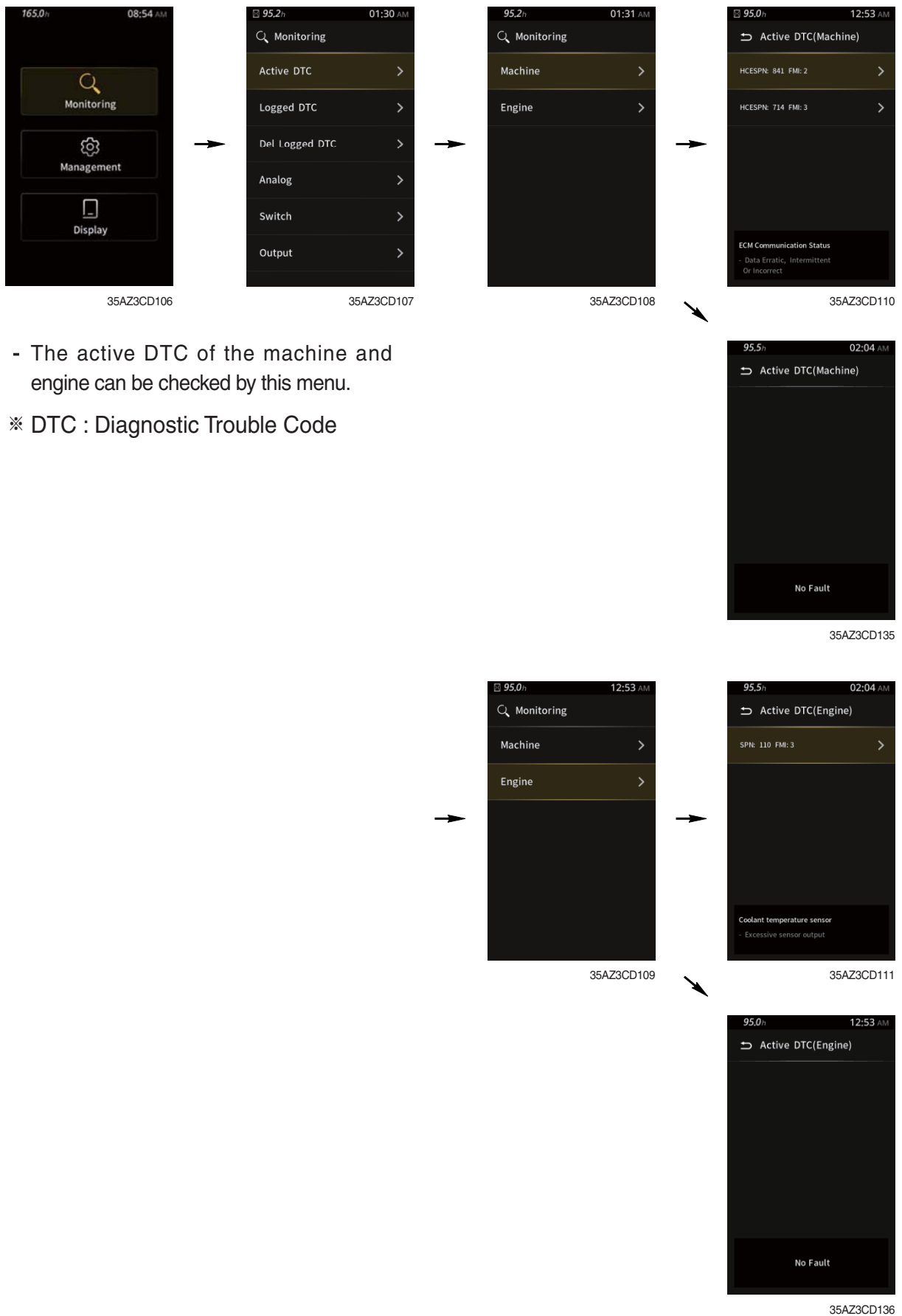
- ※ Please refer to the switches, page 4-16 for selection and change of menus and input values.
- ※ In the operation screen, press the menu button to access the sub-menu screen.

(1) Structure

No	Main menu	Sub menu	Description
1	 Monitoring 35AZ3CD103	Active DTC Logged DTC Del logged DTC Analog Switch Output	Machine, Engine Machine, Engine Machine, Engine Hyd oil temp, Coolant temp, Battery volt Engine speed, Accel dial volt Safety lever, Dozer floating, Seat belt, Travel speed Travel speed sol, Dozer floating sol, Start limit relay, Buzzer
2	 Manage 35AZ3CD104	Operating hours Maintenance ESL mode setting Warning setting Password change Machine information Contact Aux. flow	Operating hours Elapsed time, Change interval, Replacement etc. Disabled, Enable (Always), Enable (Interval) Overload on/off Password change Machine, Engine, CMCU A/S phone number, A/S phone number change Aux. flow
3	 Display set 35AZ3CD105	Clock Brightness Unit Language	12 Hour, 24 Hour Manual, Auto Temperature, Pressure Korean, English, Turkish

(2) Monitoring

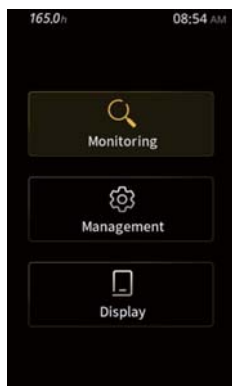
① Active DTC



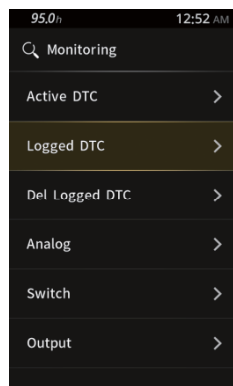
- The active DTC of the machine and engine can be checked by this menu.

※ DTC : Diagnostic Trouble Code

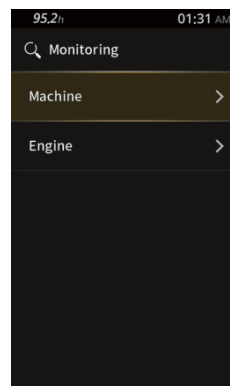
② Logged DTC



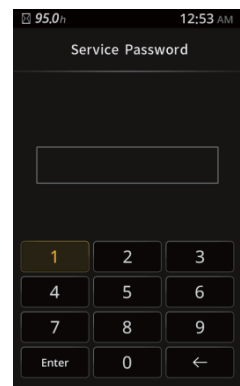
35AZ3CD106



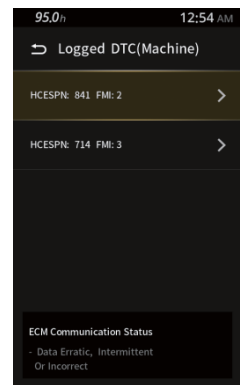
35AZ3CD112



35AZ3CD108

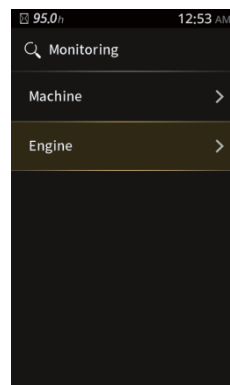


35AZ3CD113

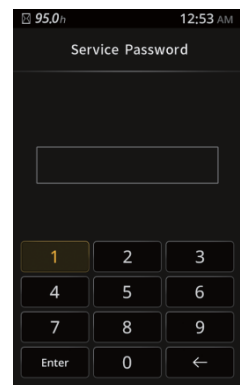


35AZ3CD114

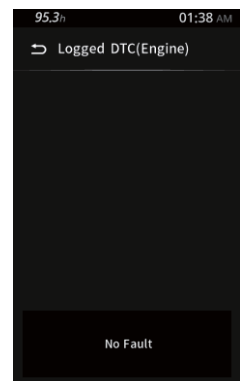
- The logged DTC of the machine and engine can be checked by this menu.
- This menu can be used only HCE service man.



35AZ3CD109

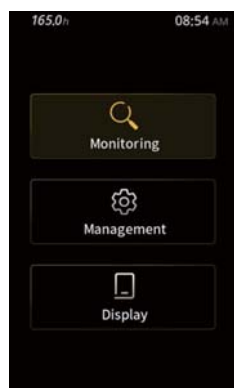


35AZ3CD113

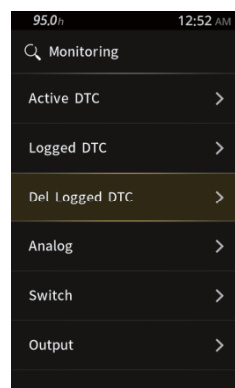


35AZ3CD137

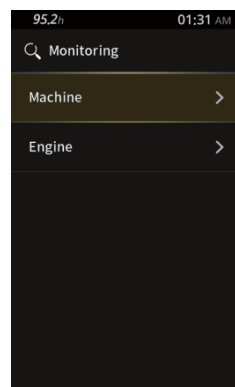
③ Delete logged DTC



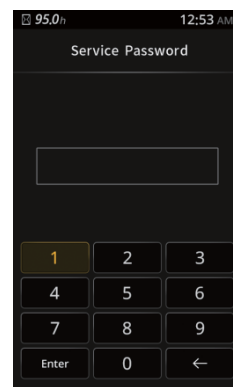
35AZ3CD106



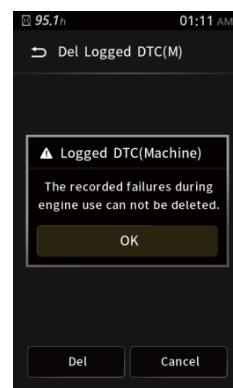
35AZ3CD116



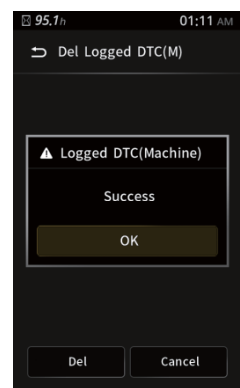
35AZ3CD108



35AZ3CD113



35AZ3CD119

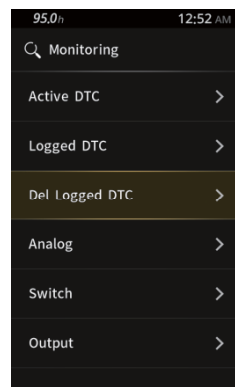


35AZ3CD118

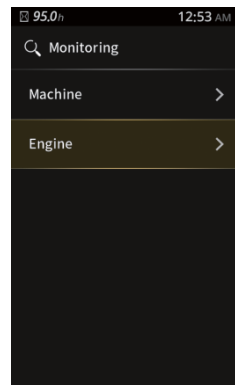


35AZ3CD117

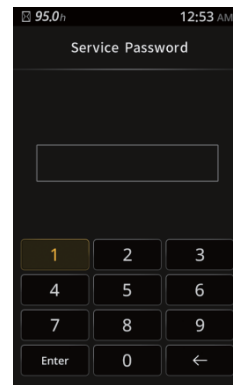
- The logged DTC of the machine and engine can be deleted by this menu. (It is possible under the engine stop conditions)



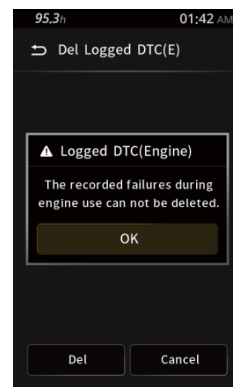
35AZ3CD116



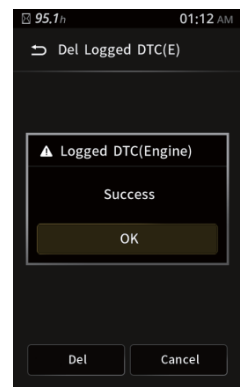
35AZ3CD109



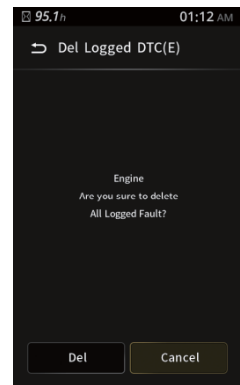
35AZ3CD113



35AZ3CD122

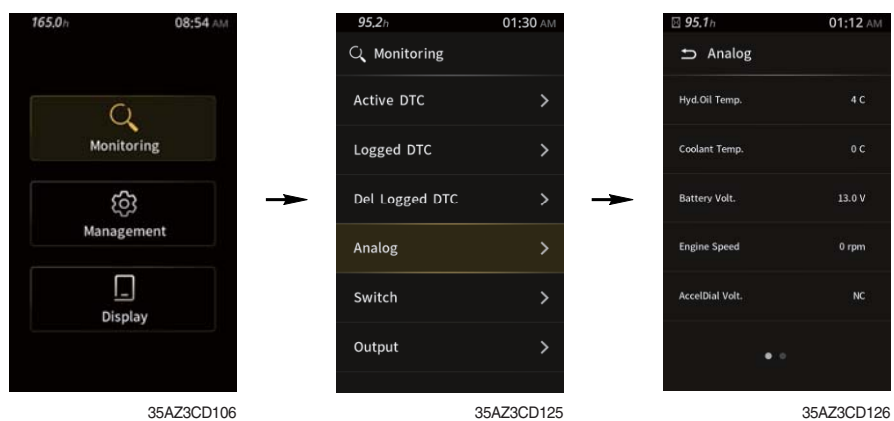


35AZ3CD123

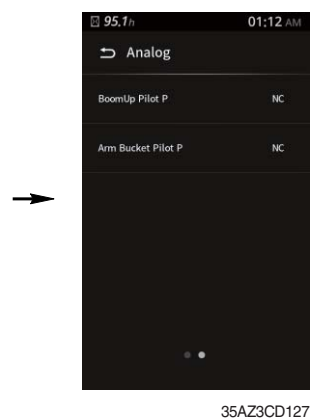


35AZ3CD124

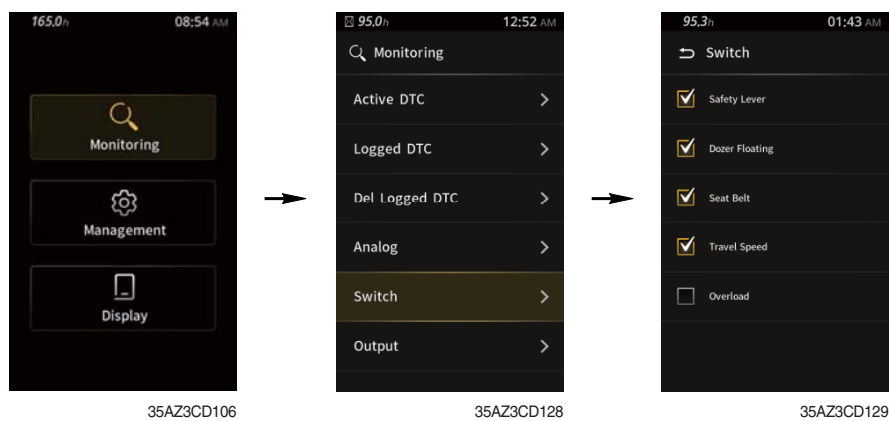
④ Analog



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

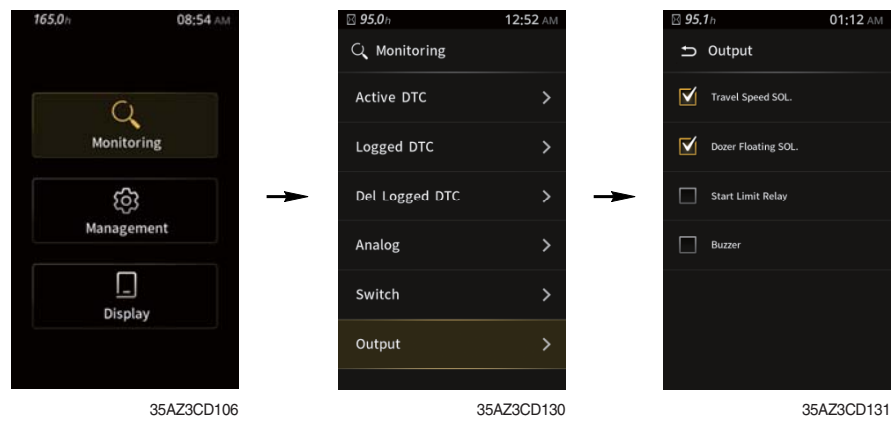


⑤ Switch



- You can select to display the lamps of the switches on the cluster by this menu.

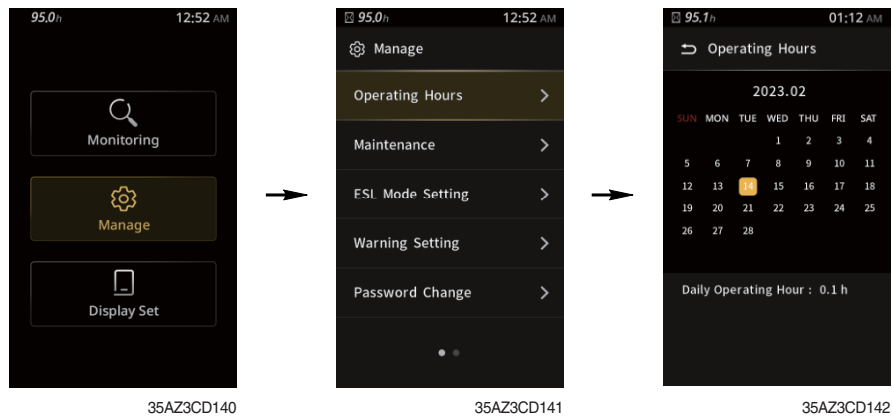
⑥ Output



- The output status can be confirmed by this menu.

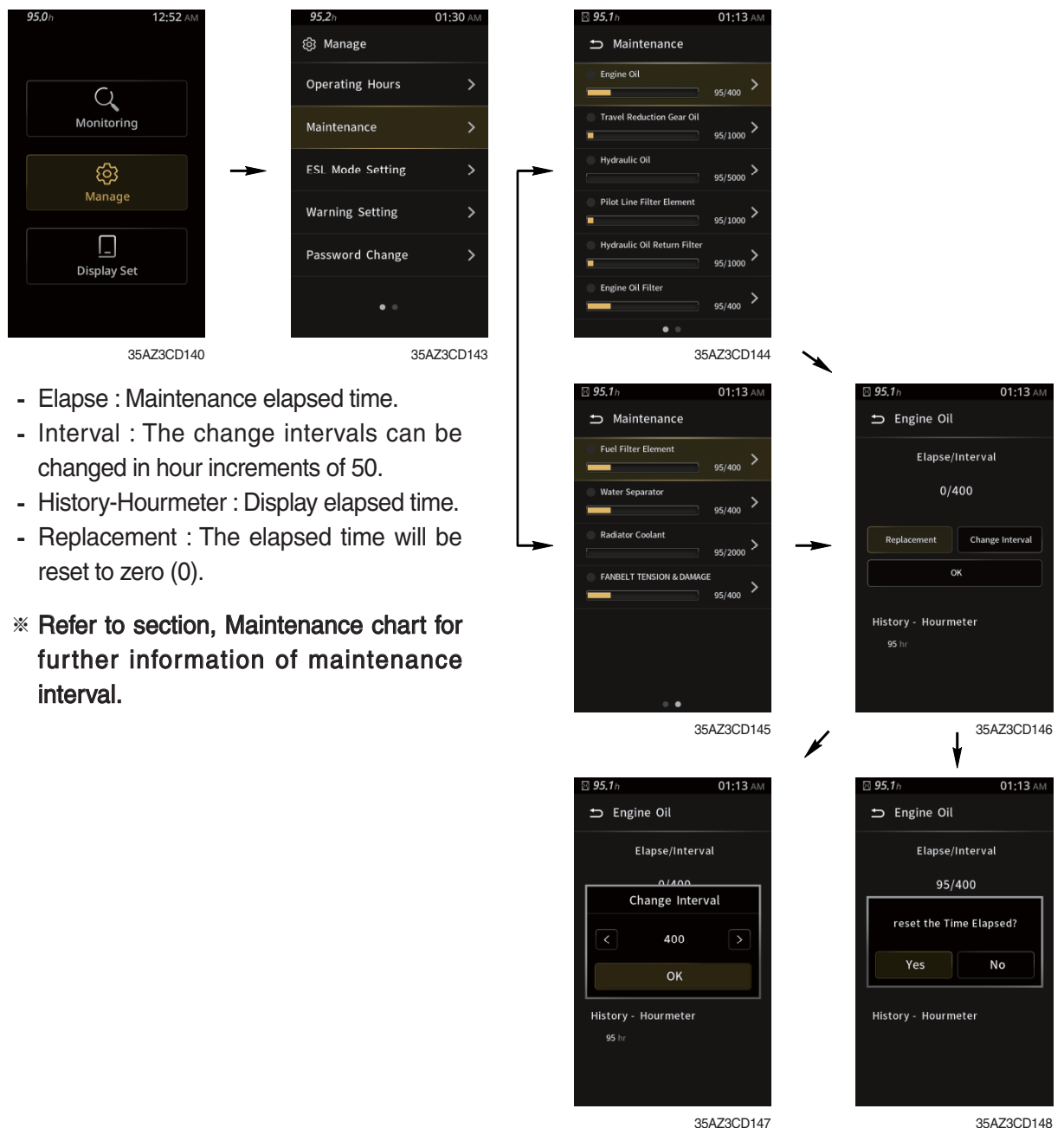
(3) Manage

① Operating hours



- You can check the operating hours by this menu.

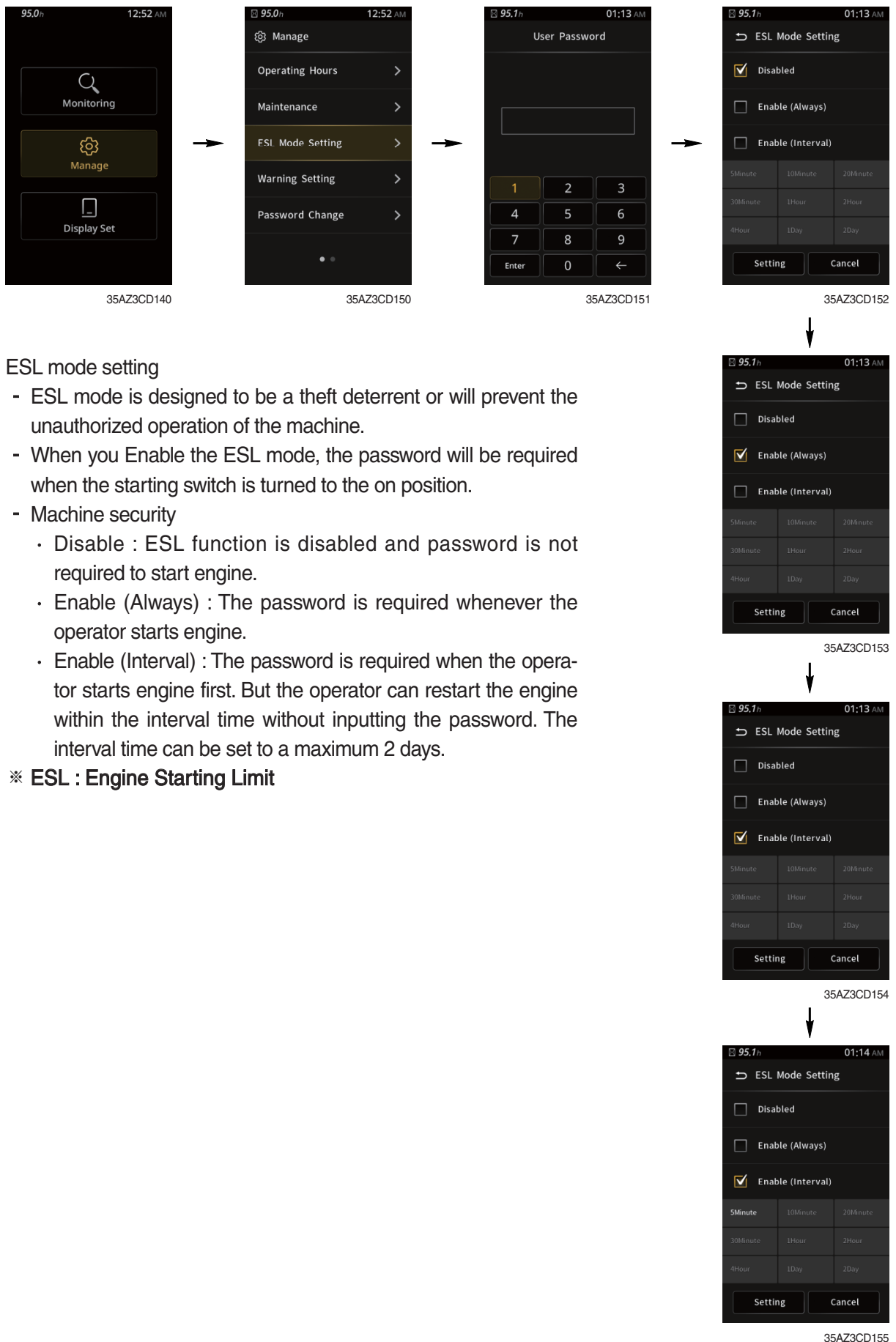
② Maintenance



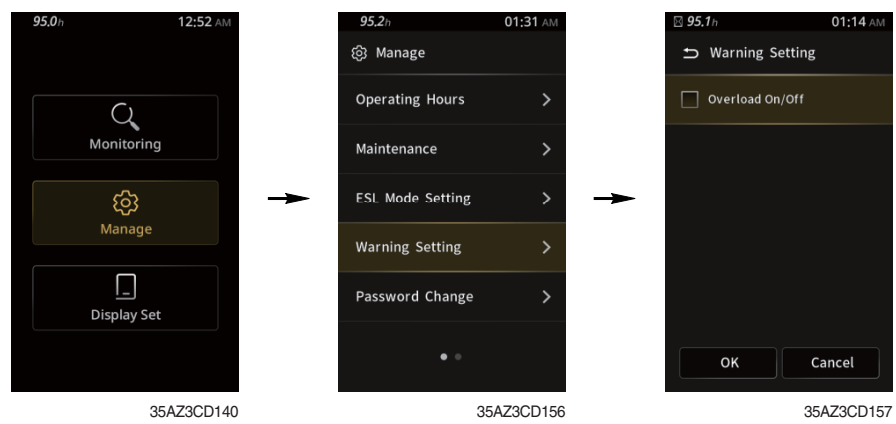
- Elapse : Maintenance elapsed time.
- Interval : The change intervals can be changed in hour increments of 50.
- History-Hourmeter : Display elapsed time.
- Replacement : The elapsed time will be reset to zero (0).

※ Refer to section, Maintenance chart for further information of maintenance interval.

③ ESL mode

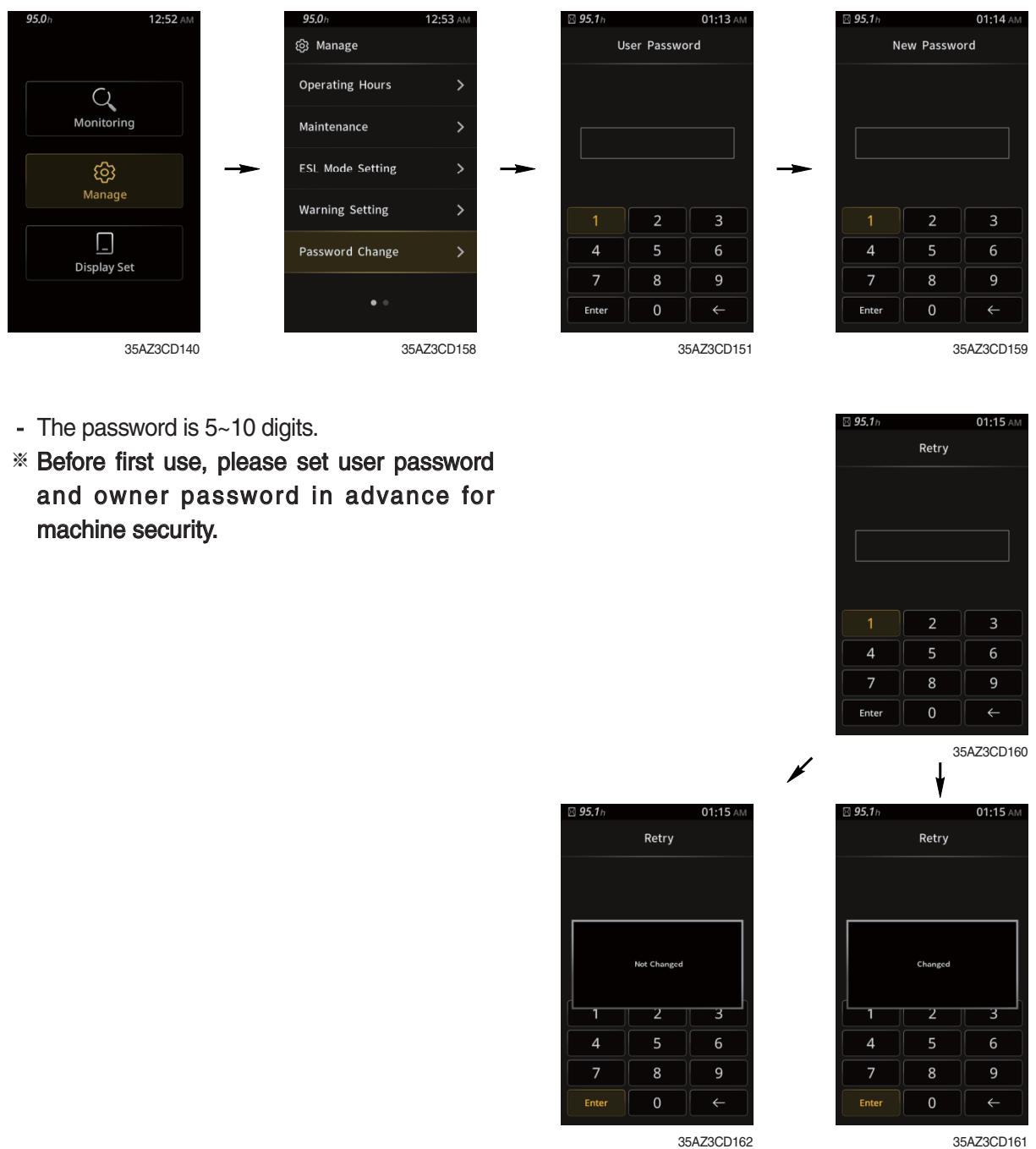


④ Warning setting

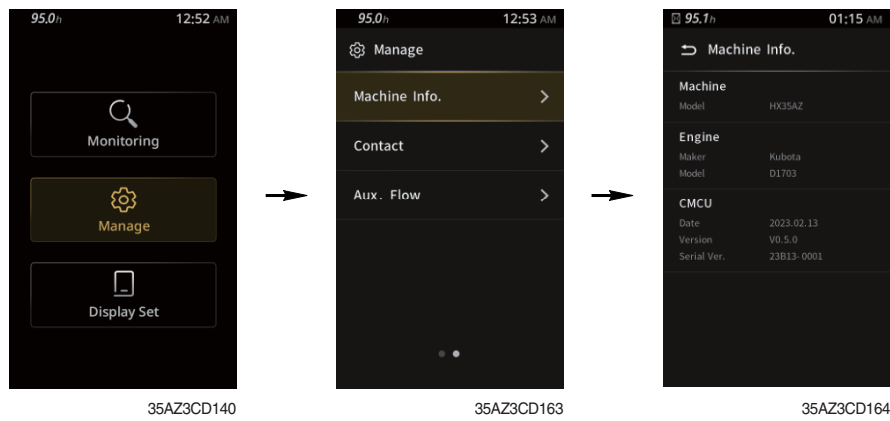


- You can set the warning items by this menu.

⑤ Password change

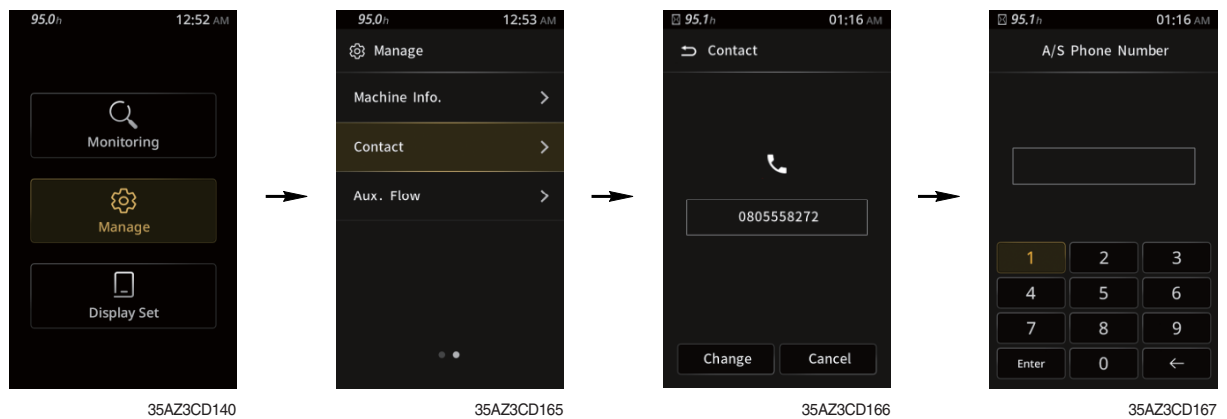


⑥ Machine information



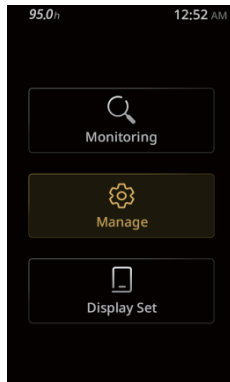
- This can confirm the identification of the machine, engine and cluster.

⑦ Contact

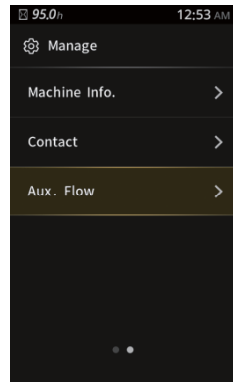


- The A/S phone number can be checked and changed.

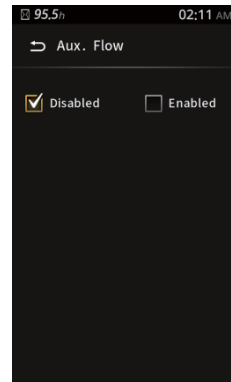
⑧ Aux. Flow



35AZ3CD140

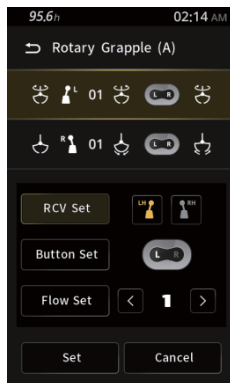


35AZ3CD170

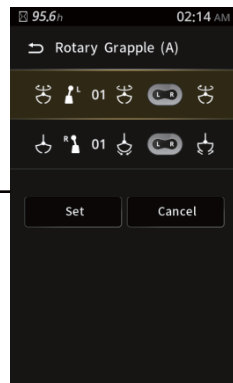


35AZ3CD171

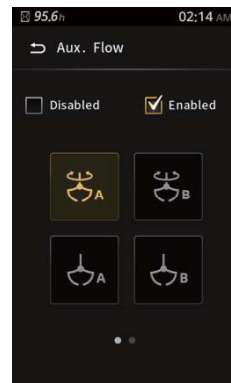
- 3 kinds of option attachment can be selected by this menu.
 - a. Rotary grapple (4-way)
 - b. Grapple (2-way)
 - c. Auger (2-way)
- There are two user modes (type A or B) in each option attachment.



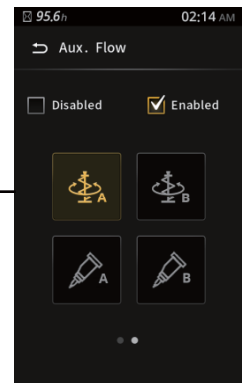
35AZ3CD177



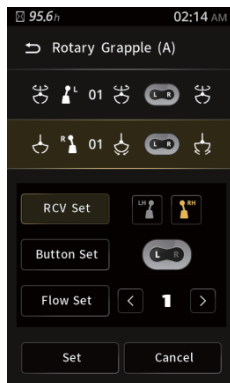
35AZ3CD176



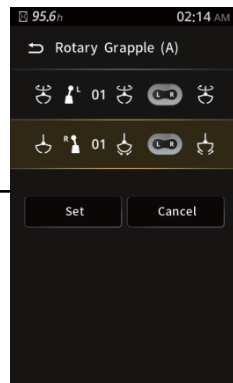
35AZ3CD172



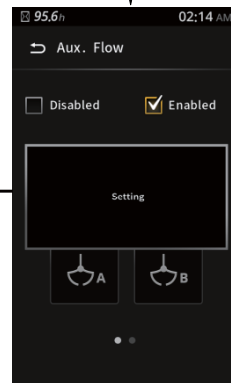
35AZ3CD173



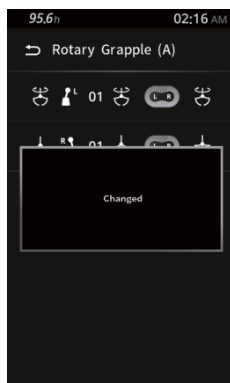
35AZ3CD179



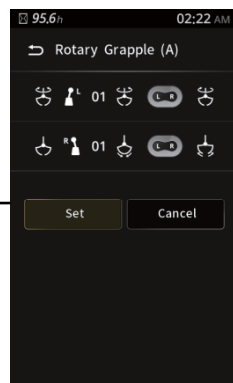
35AZ3CD178



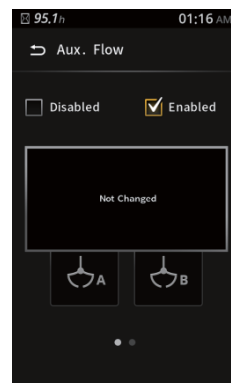
35AZ3CD174



35AZ3CD181



35AZ3CD180



35AZ3CD175

(4) Display set

① Clock



- Set the time (12 hours or 24 hours)

② Brightness



- Manual : Manual setting for LCD brightness.
- Automatic : Automatic control of LCD brightness as set level of Day/Night.
- Setting day time : Set the time for daylight.

(in figure, black area represents night time while orange shows day time)

③ Unit



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

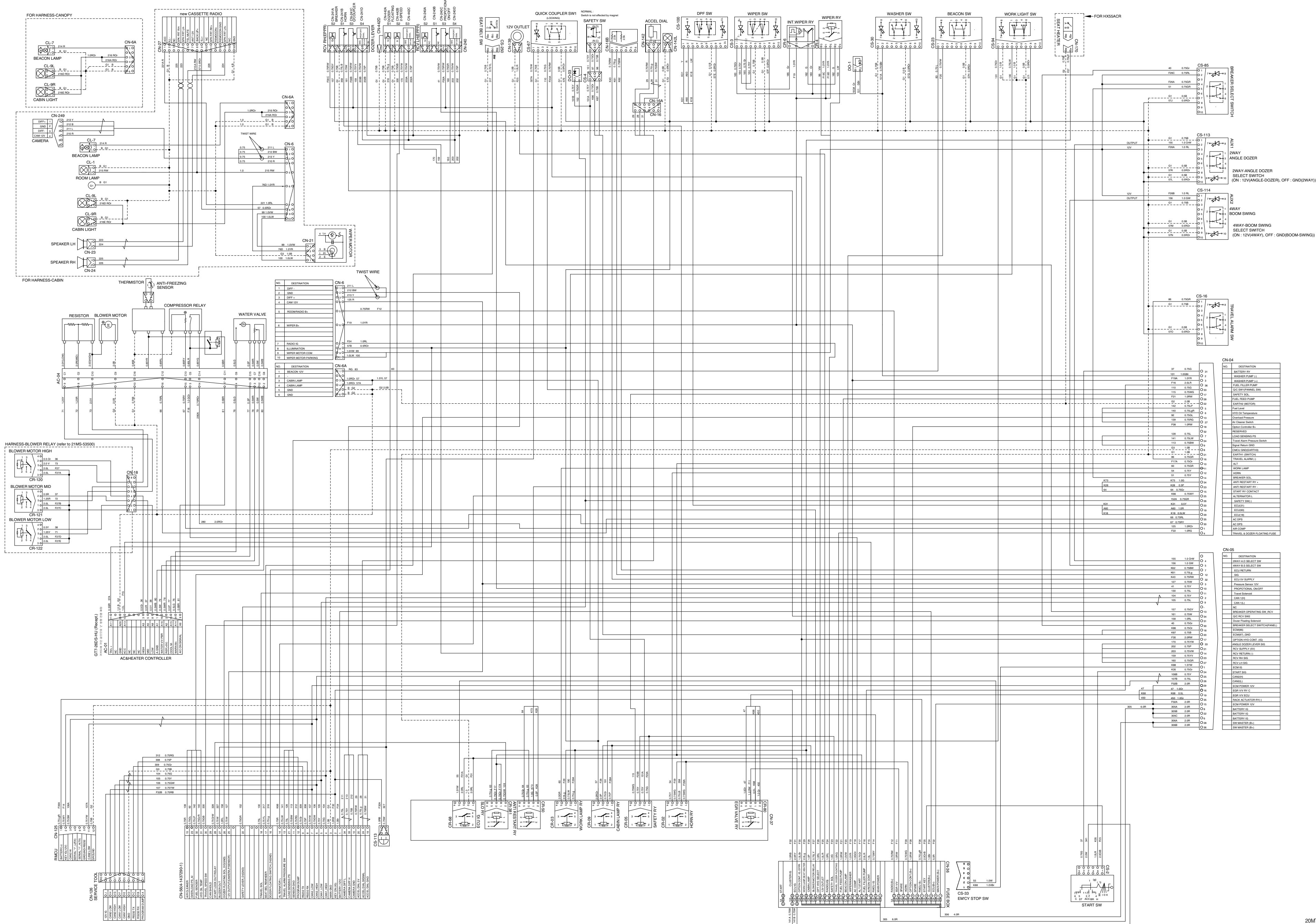
④ Language



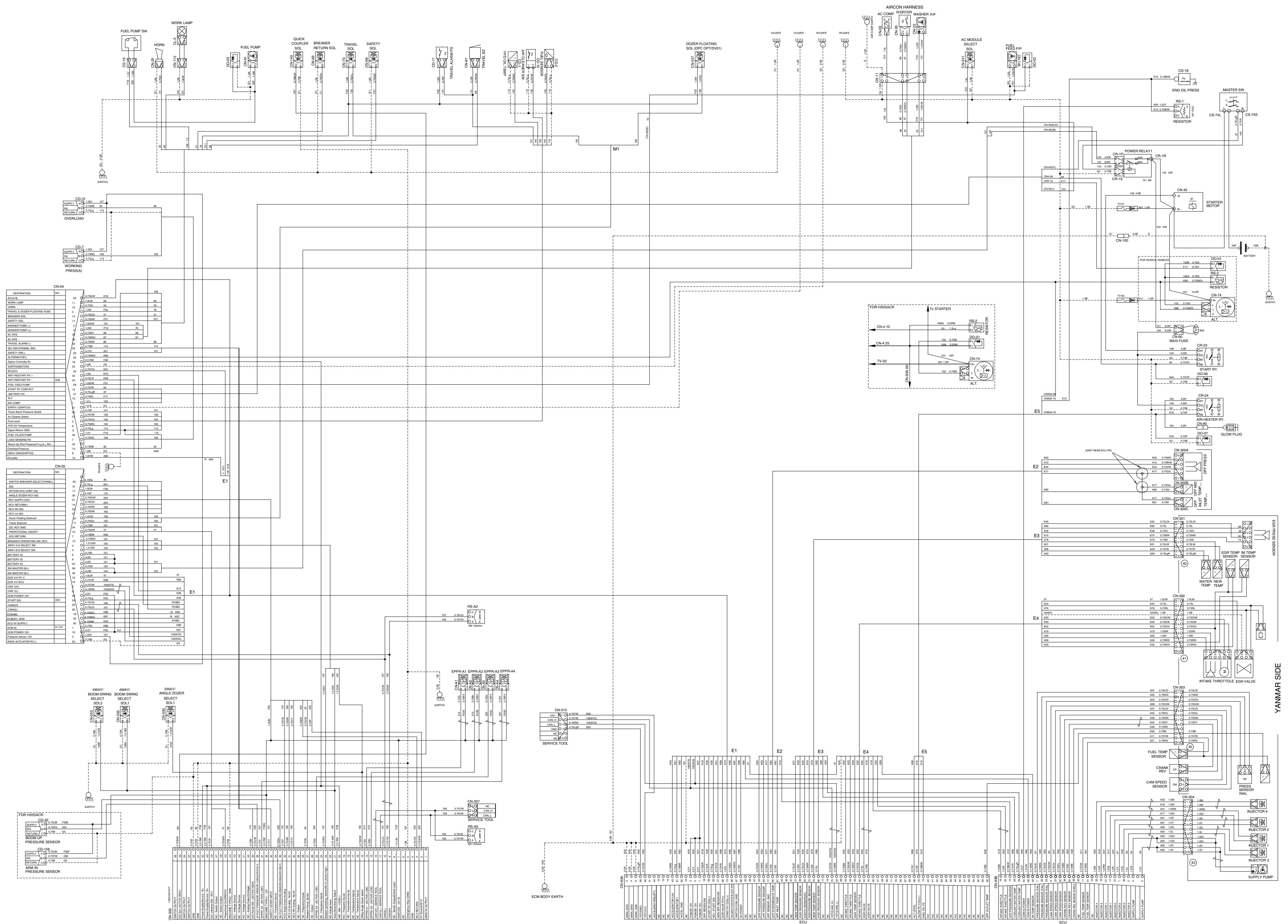
- User can select preferable language and all displays are changed to the selected language (한국어, English or Turkish).

GROUP 3 ELECTRICAL CIRCUIT

· ELECTRICAL CIRCUIT (1/2)



· ELECTRICAL CIRCUIT (2/2)



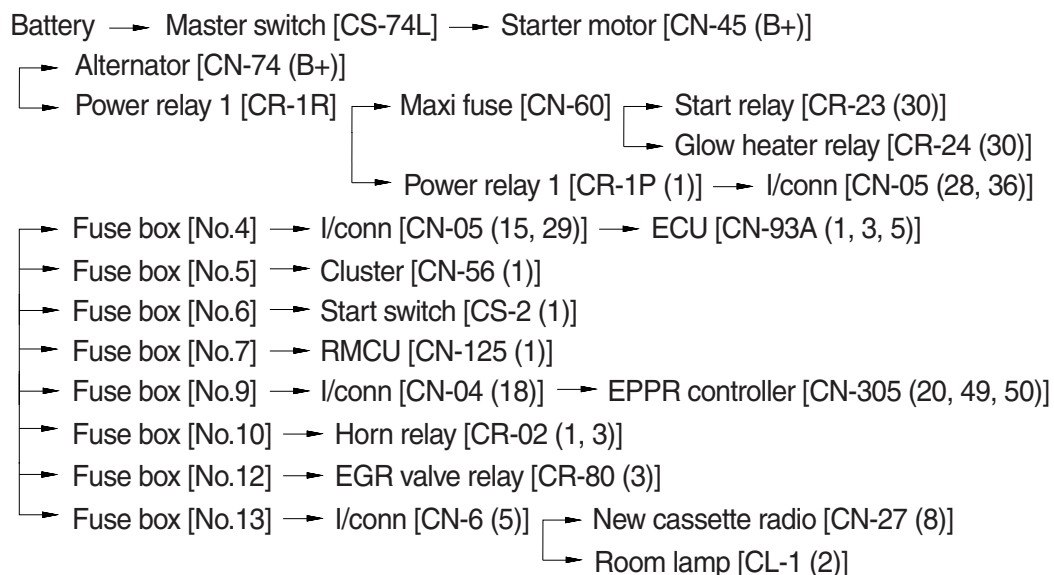
MEMORANDUM

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



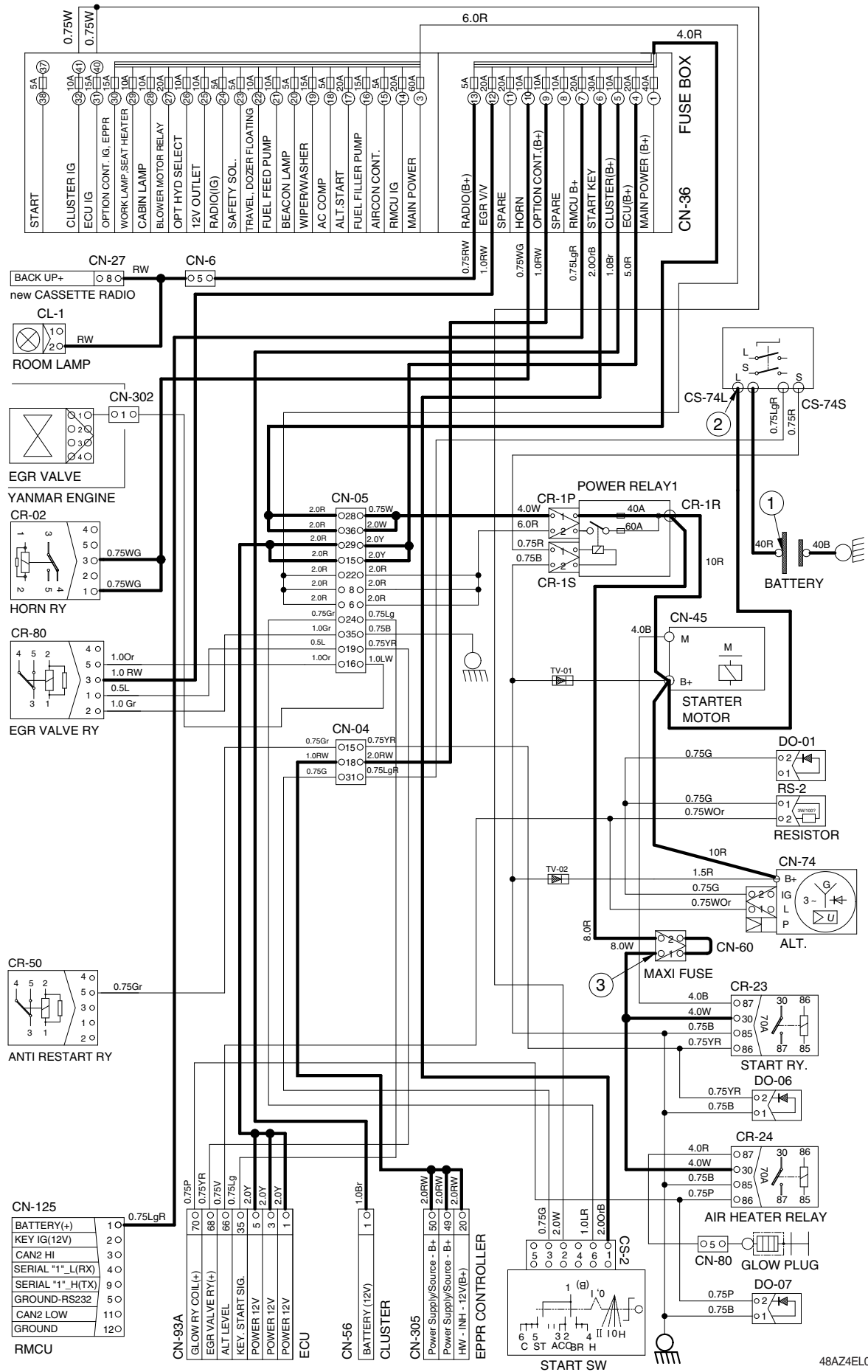
※ I/conn : Intermediate connector

2) CHECK POINT

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

※ GND : Ground

POWER CIRCUIT



48A4ZEL04

2. STARTING CIRCUIT

1) OPERATING FLOW

Battery (+) terminal → Master switch [CS-74L] → Starter motor [CN-45 (B+)] → Power relay 1 [CR-1P (1)]
 → I/conn [CN-05 (28, 36)] → Fuse box No.5 → Start switch [CS-2 (1)]

(1) Start switch : ON

Start switch ON [CS-2 (2)] → Fuse box [No. 40 → 31] → ECU IG relay [CR-68 (1, 3) → (5)]
 → Emergency stop switch [CS-33 (2) → (1)] → I/conn [CN-05 (1)]
 → ECU [CN-93A (88)]
 → Fuse box [No. 41 → 32] → Cluster [CN-56 (2)]

Start switch ON [CS-2 (3)] → I/conn [CN-04 (31)] → Master switch [CS-74S] → Power relay 1 [CR-1S (1)]
 → Power relay 1 [CR-1P (2)] → I/conn [CN-05 (6, 8, 22)]

→ Fuse box [No.23] → Safety relay [CR-05 (1, 3)]
 → Fuse box [No.17] → SLO relay [CR-381 (1, 3) → (2)] → Cluster [CS-56 (2)]

(2) Start switch : START

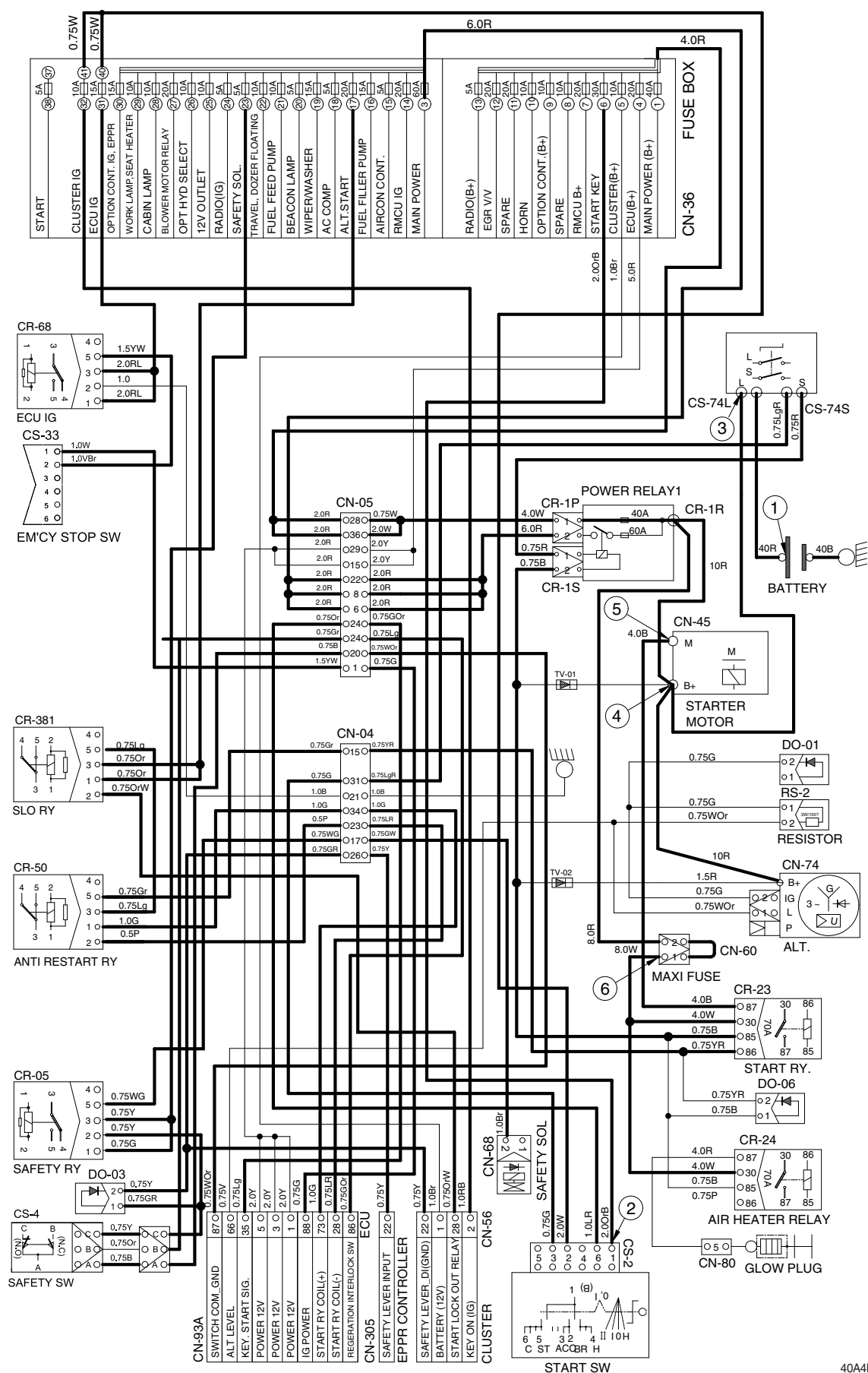
Start switch START [CS-2 (6)] → I/conn [CN-05 (24)] → ECU [CN-93A (35) → (73, 88)]
 → I/conn [CN-05 (23, 34)] → Anti restart relay [CR-50 (1, 2) → (5)] → I/conn [CN-04 (15)]
 → Start relay [CR-23 (86) → (87)] → Start motor [CN-45 (M)] → Starter operating

2) CHECK POINT

Engine	Start switch	Check point	Voltage
Operating	START	① - GND (battery) ② - GND (start key) ③ - GND (master switch) ④ - GND (starter B+) ⑤ - GND (starter M) ⑥ - GND (maxi fuse)	10~12.5 V

※ GND : Ground

STARTING CIRCUIT



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 master switch (CS-74).

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

1) OPERATING FLOW

(1) Warning flow

Alternator [CN-74 (1)] → I/conn [CN-04 (25)] → Cluster [CN-56 (14)] → Cluster warning lamp
→ ECU [CN-93A (66)]

(2) Charging flow

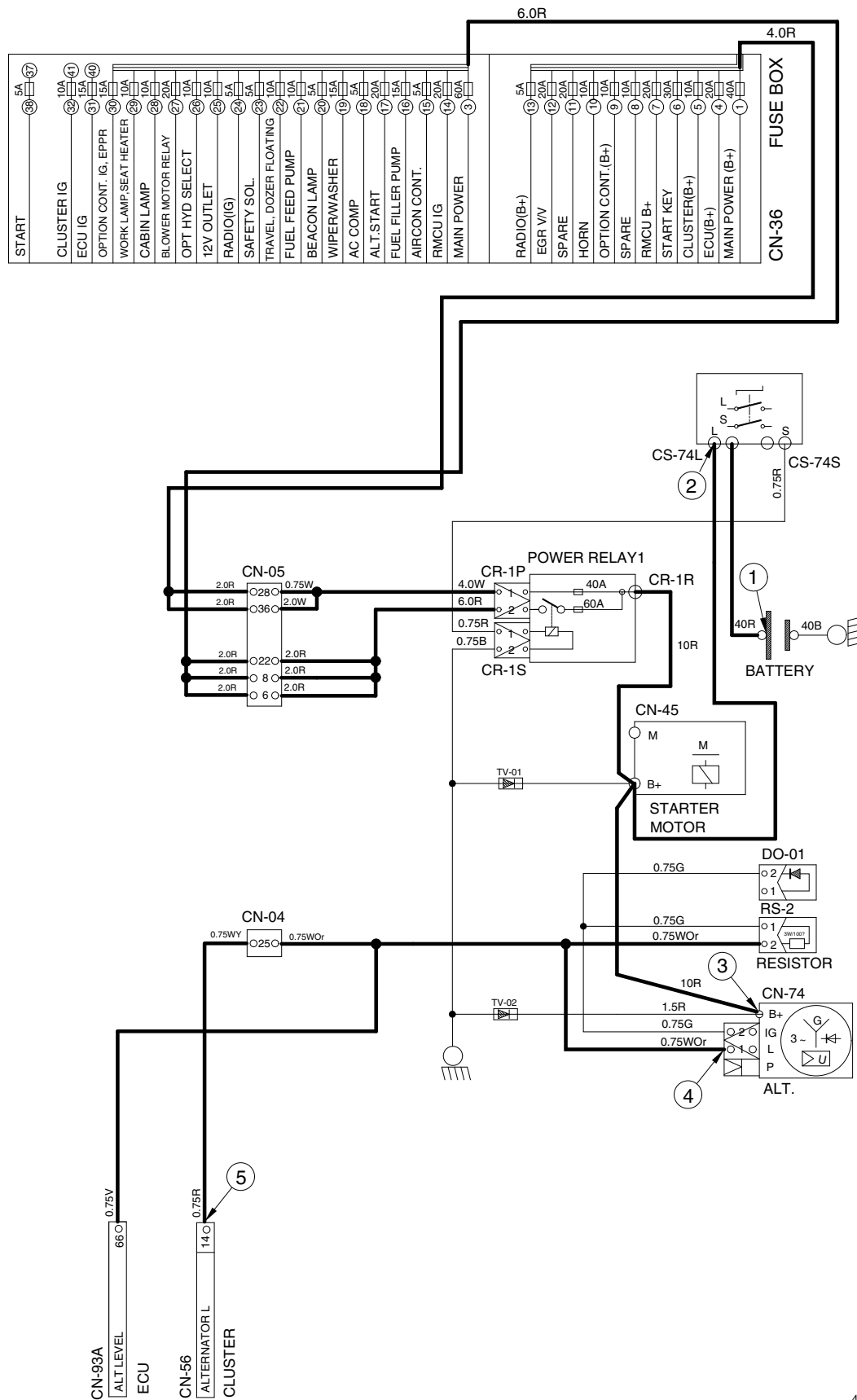
Alternator [CN-74 (B+)] → Start motor [CN-45 (B+)]
→ Master switch [CS-74L] → Battery (+) terminal → Battery charging
→ Power relay 1 [CR-1P (1)] → I/conn [CN-05 (28, 36)] → Fuse box [No.1, 4~13]
→ Power relay 1 [CR-1P (2)] → I/conn [CN-05 (6, 8, 22)] → Fuse box [No.3, 14~30]

2) CHECK POINT

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

※ GND : Ground

CHARGING CIRCUIT



48AZ4EL06

4. CABIN AND WORK LAMP CIRCUIT

1) OPERATING FLOW

Fuse box (No.28) → Cabin lamp relay [CR-09 (1, 3)]

Fuse box (No.29) → Work lamp relay [CR-03 (1, 3)]

(1) Work lamp switch ON : 1st step

Work lamp switch ON [CS-94 (1)] → Cabin lamp relay [CR-09 (2) → (5)]

- I/conn [CN-6A (3, 4)]
 - LH cabin lamp ON [CL-9L (2)]
 - RH cabin lamp ON [CL-9R (2)]
- I/conn [CN-6 (8)] → New cassette radio illumination lamp ON [CN-27 (9)]
- AC/Heater controller illumination lamp ON [AC-01 (16)]
- Quick coupler switch illumination lamp ON [CS-67 (8)]
- Wiper switch illumination lamp ON [CS-3 (8)]
- Washer switch illumination lamp ON [CS-30 (8)]
- Travel alarm switch illumination lamp ON [CS-16 (8)]
- Work lamp switch illumination lamp ON [CS-94 (8)]
- Breaker select switch illumination lamp ON [CS-85 (8)]
- Aux 1 switch illumination lamp ON [CS-113 (8, 10)]
- Aux 2 switch illumination lamp ON [CS-114 (8, 10)]
- Beacon lamp switch illumination lamp ON [CS-23 (8)]
- Accel dial illumination lamp [CN-142L (2)]
- DPF switch illumination lamp [CS-100 (8)]

(2) Work lamp switch ON : 2st step

Work lamp switch ON [CS-94 (4)] → Work lamp relay [CR-03 (1) → (5)] → I/conn [CN-04 (11)]

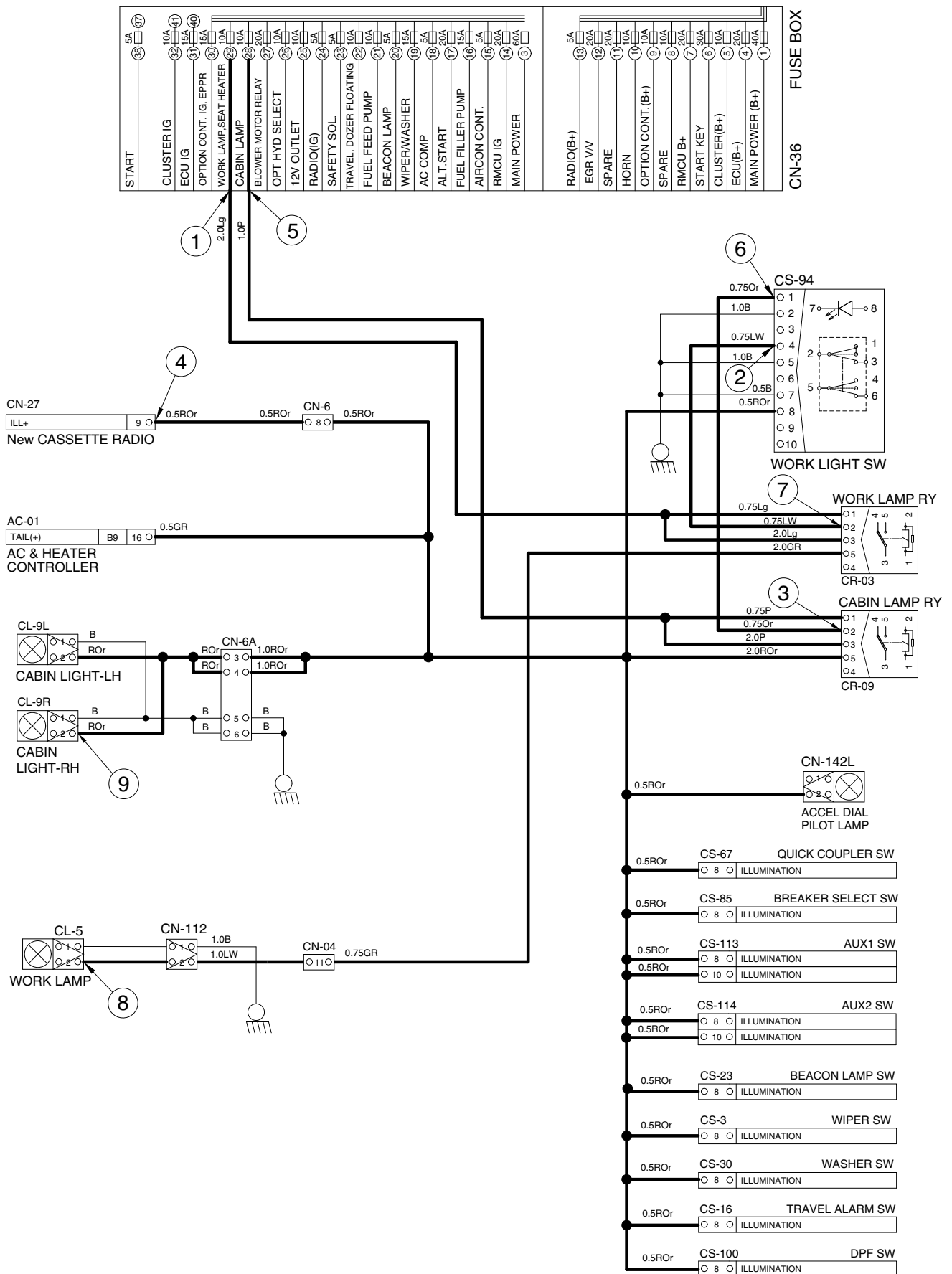
→ I/conn [CN-112 (2)] → Work lamp ON [CL-5 (2)]

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 (illumination lamp) ⑤ - GND (fuse box) ⑥ - GND (switch power input) ⑦ - GND (switch power output) ⑧ - GND (work light) ⑨ - GND (cabin light)	10~12.5 V

※ GND : Ground

CABIN AND WORK LAMP CIRCUIT



48AZ4EL07

5. BEACON LAMP CIRCUIT

1) OPERATING FLOW

Fuse box (No.20) → Beacon lamp switch [CS-23 (2)]

(1) Beacon lamp switch ON

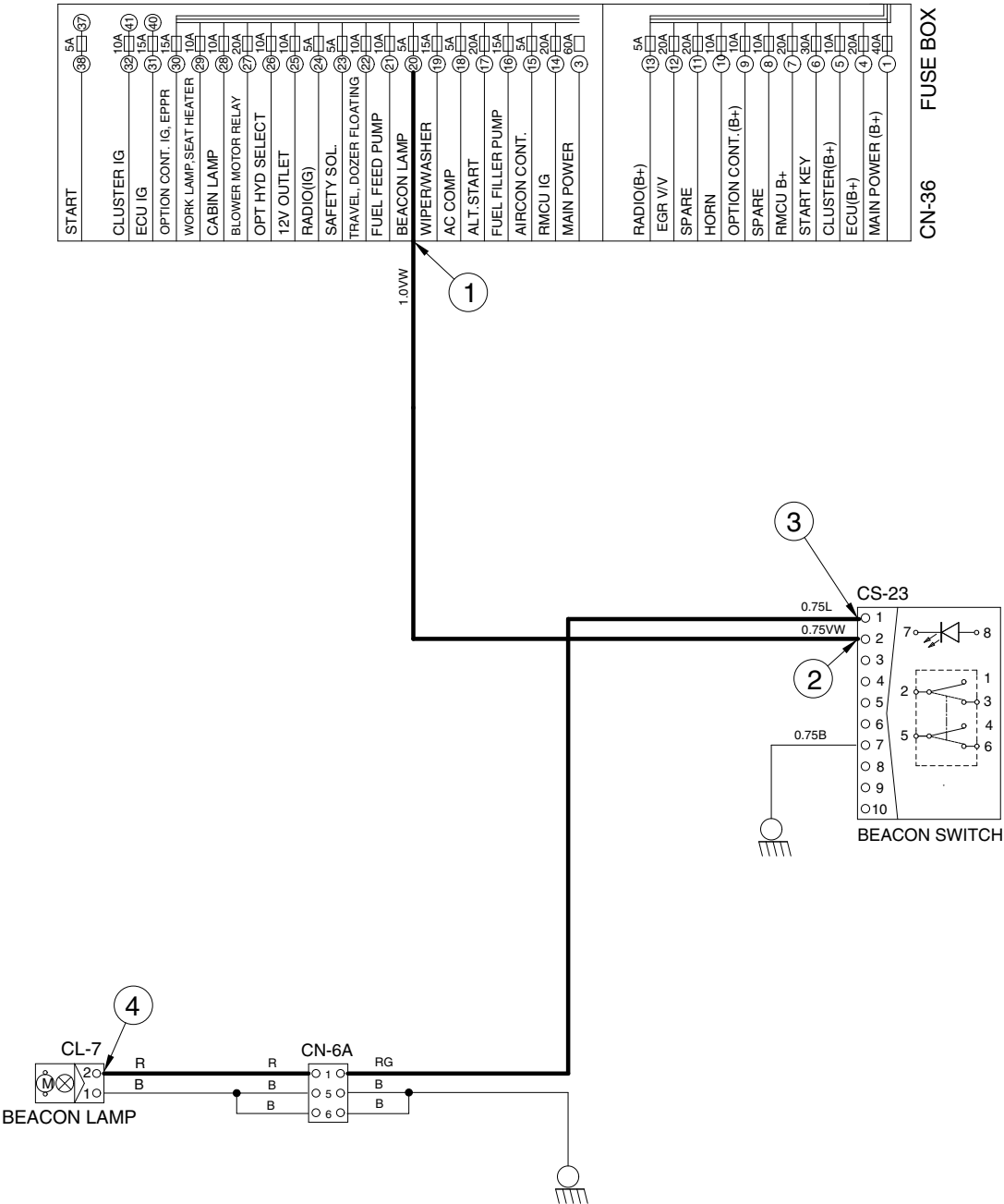
Beacon lamp switch ON [CS-23 (1)] → I/conn [CN-6A (1)] → Beacon lamp ON [CL-7 (2)]

2) CHECK POINT

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

※ GND : Ground

BEACON LAMP CIRCUIT



6. WIPER AND WASHER CIRCUIT

1) OPERATING FLOW

(1) Start switch ON

Fuse box (No.19) → Wiper relay [CR-4 (1, 5)]
→ Int wiper relay [CR-6 (3)]
→ I/conn [CN-6 (6)] → Wiper motor [CN-21 (3)]

(2) Wiper switch ON : 1st step (low speed)

Wiper switch ON [CS-3 (3)] → Int wiper relay [CR-6 (4) → (2)]
→ Wiper relay [CR-4 (2) → (3)] → I/conn [CN-6 (9)]
→ Washer motor operating [CN-21 (4)]

(3) Wiper switch ON : 2nd step (washer)

Wiper switch ON [CS-3 (4)] → Int wiper relay [CR-6 (1)]
→ Washer switch [CS-30 (2)]
→ Wiper relay [CR-4 (2) → (4)] → I/conn [CN-6 (10)] → Wiper motor operating [CN-21 (1)]
Washer switch ON [CS-30 (2)] → I/conn [CN-04 (2)] → Washer pump operating [CN-22 (1)]
→ I/conn [CN-11 (6)]

(4) Auto parking (when switch OFF)

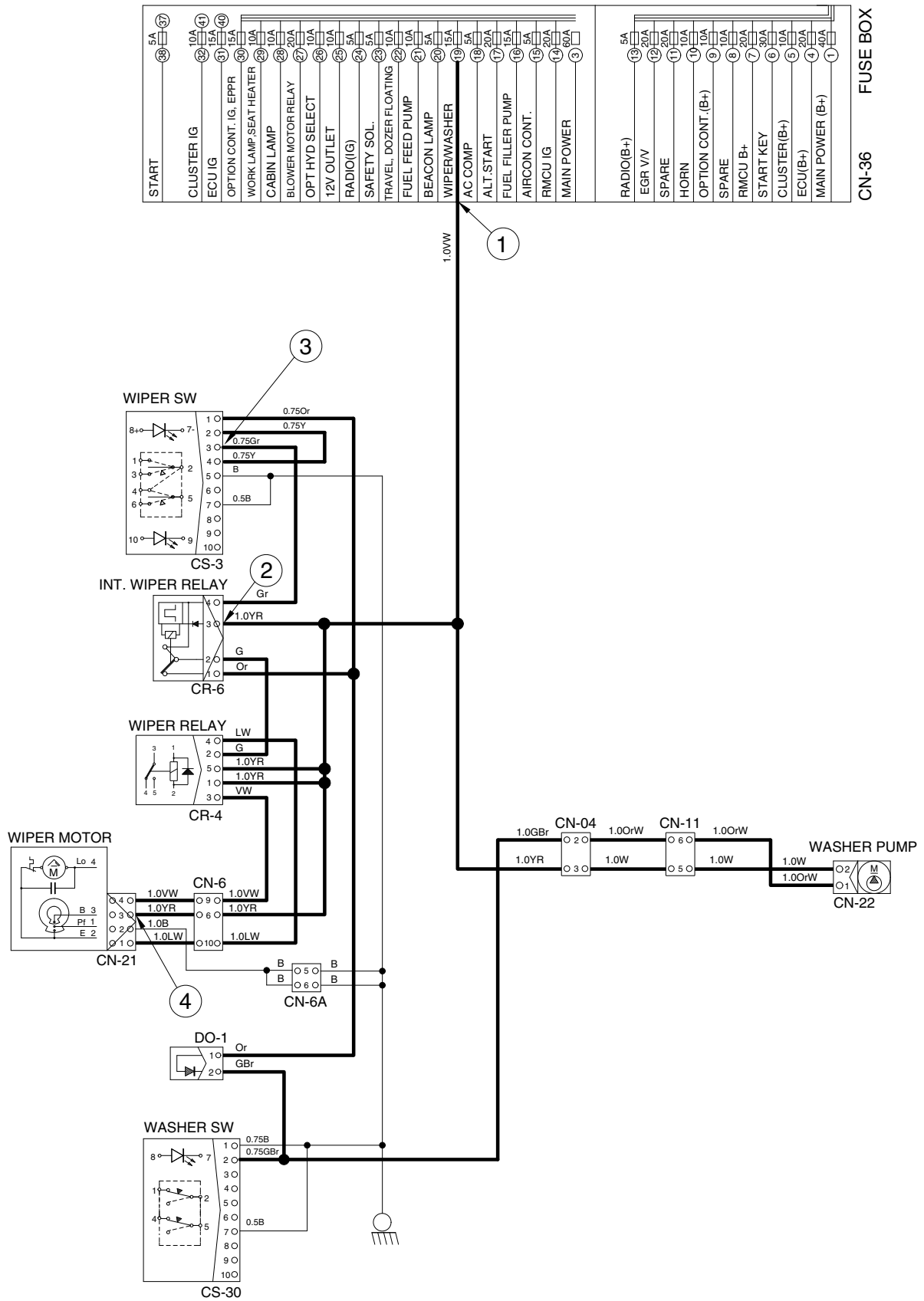
Switch OFF → Wiper relay [CN-21 (1)] → Wiper switch [CS-3]
→ Int wiper relay [CR-6 (4) → (2)] → Wiper relay [CR-4 (2) → (3)] → I/conn [CN-6 (9)]
→ Wiper motor [CN-21 (4)] → Wiper motor parking position by wiper motor controller

2) CHECK POINT

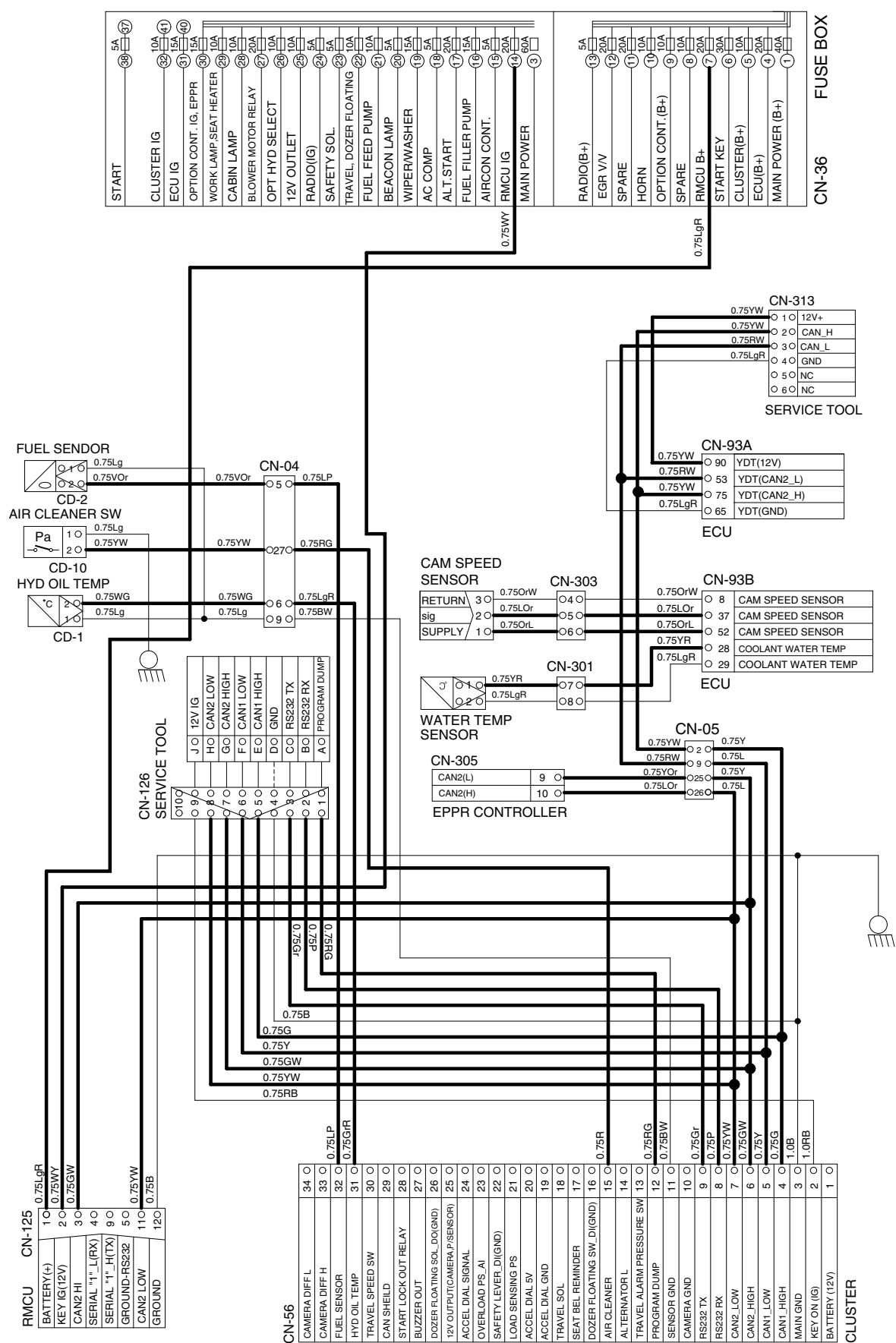
Engine	Start switch	Check point	Voltage
STOP	ON	① - GND (fuse box) ② - GND (int relay power input) ③ - GND (switch power output) ④ - GND (wiper motor)	10~12.5 V

※ GND : Ground

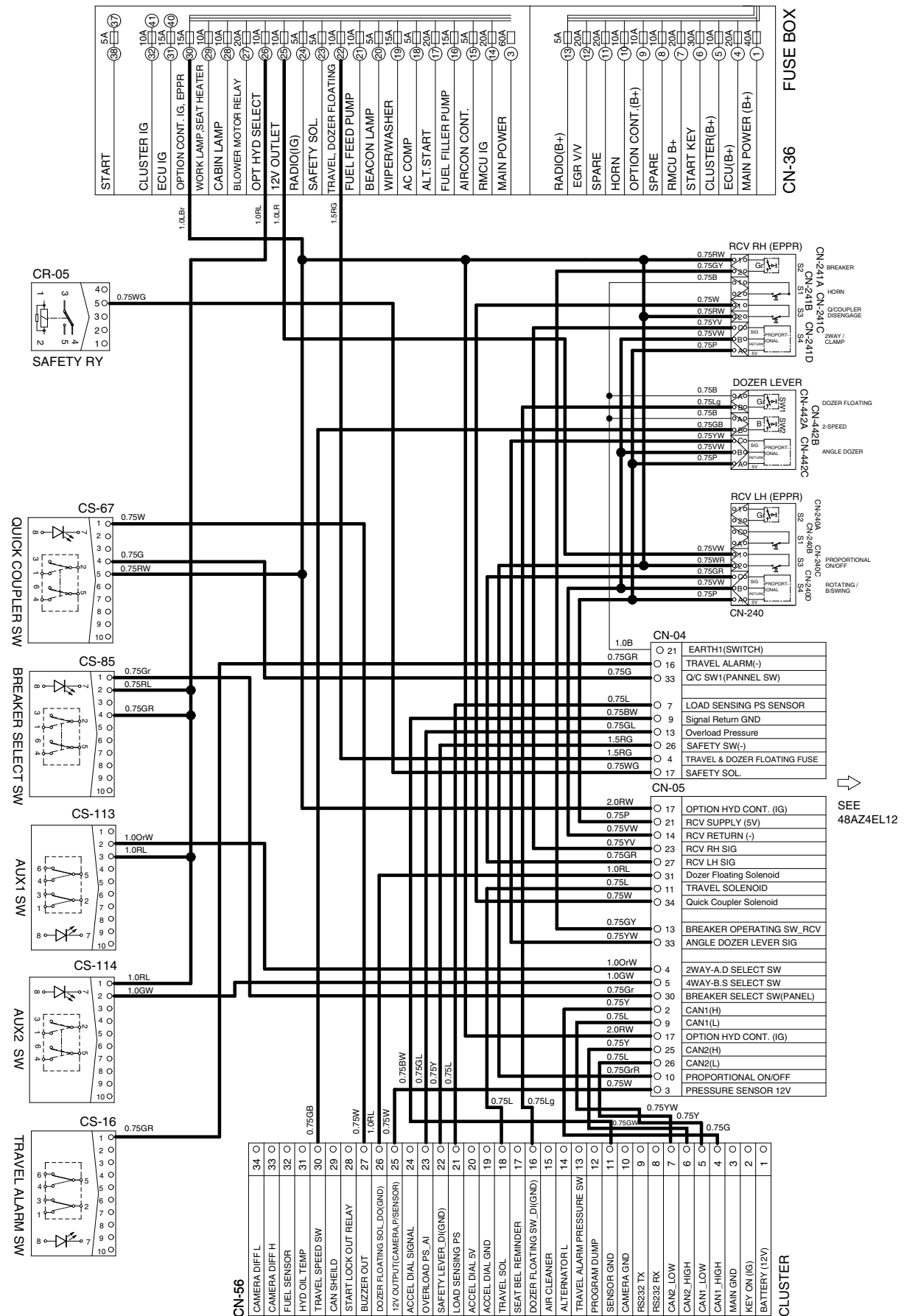
WIPER AND WASHER CIRCUIT



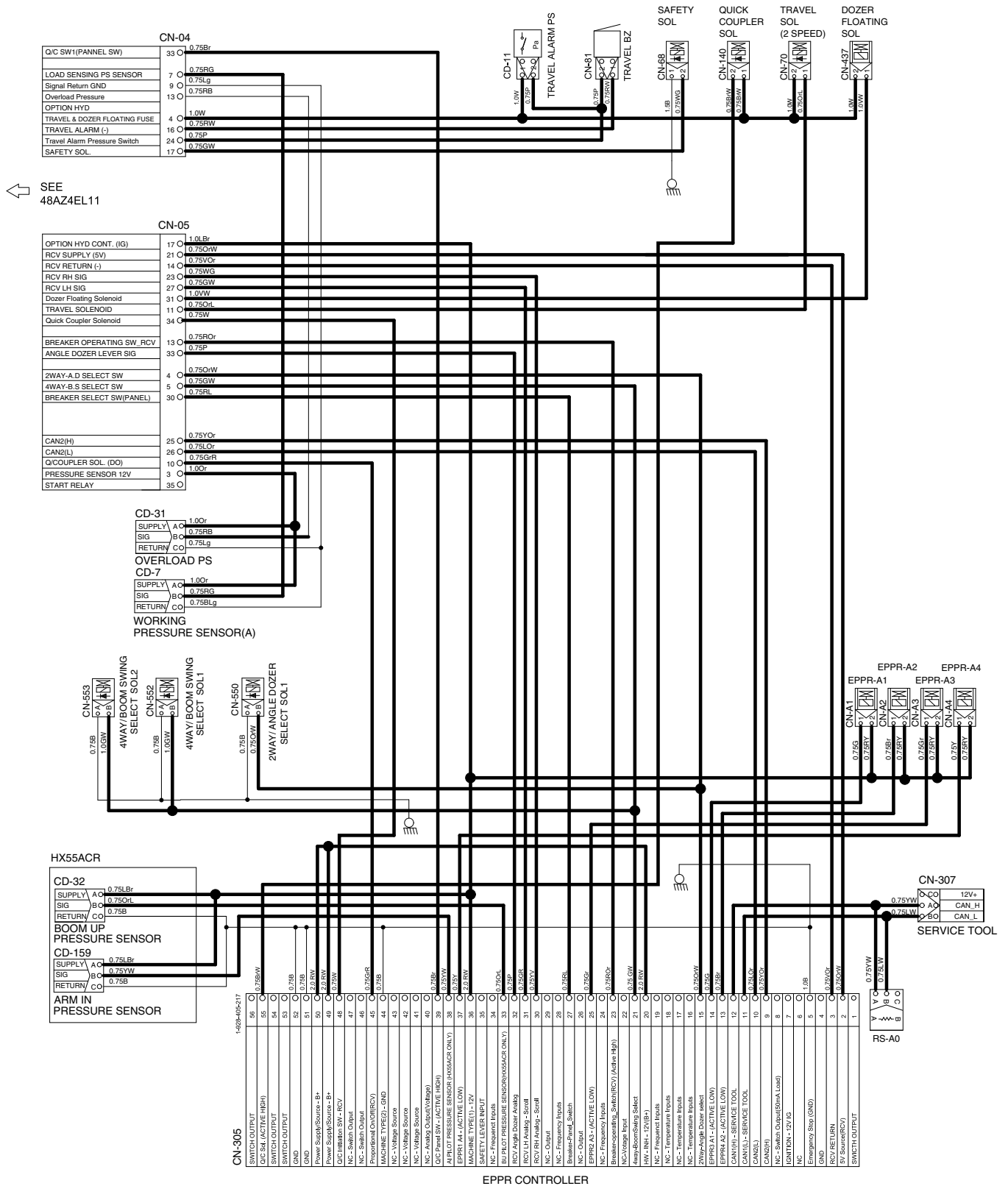
MONITORING CIRCUIT



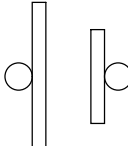
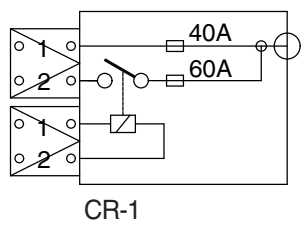
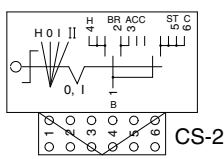
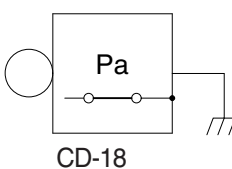
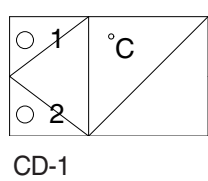
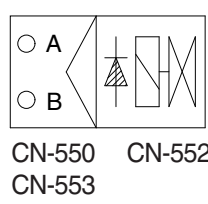
ELECTRIC CIRCUIT FOR HYDRAULIC (1/2)

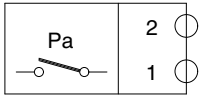
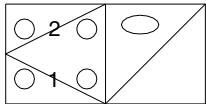
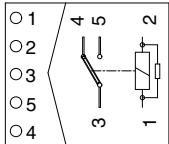
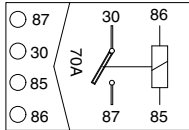
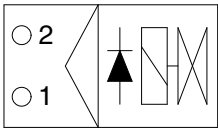
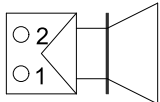


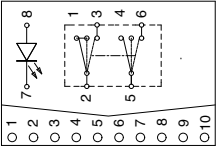
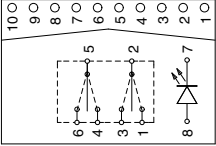
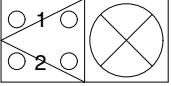
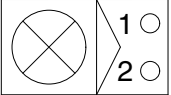
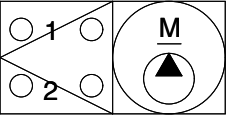
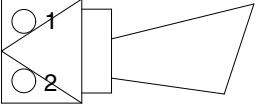
ELECTRIC CIRCUIT FOR HYDRAULIC (2/2)

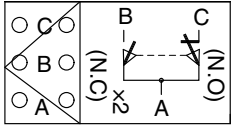
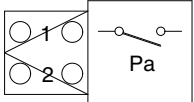
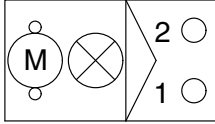
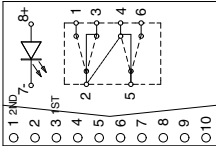
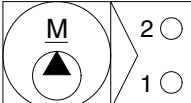
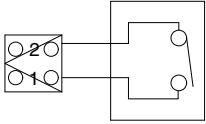


GROUP 4 ELECTRICAL COMPONENT SPECIFICATION

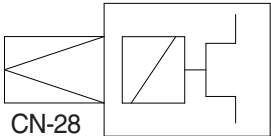
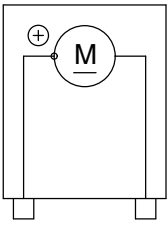
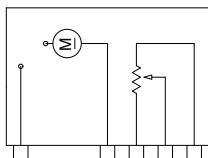
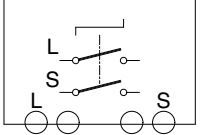
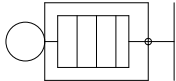
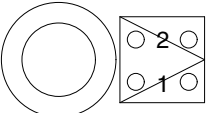
Part name	Symbol	Specification	Check
Battery		12V × 100Ah	※ Check specific gravity 1.280 over : over charged 1.280 ~ 1.250 : normal 1.250 below : recharging
Power relay 1		Rated load : 12V 100A (continuity) 1000A (30 second)	※ Check coil resistance Normal : about 12Ω ※ Check contact Normal : ∞Ω
Start switch		12V	※ Check contact OFF : ∞Ω (for each terminal) ON : 0Ω (for terminal 1-3 and 1-2) START : 0Ω (for terminal 1-6)
Pressure switch (for engine oil)		0.5 kgf/cm ² (N.C TYPE)	※ Check resistance Normal : 0Ω (CLOSE)
Hydraulic oil temperature sensor		0.5 kgf/cm ² (N.C TYPE)	※ Check resistance 50°C : 804Ω 80°C : 310Ω 100°C : 180Ω
Solenoid valve		12V 1A	※ Check resistance Normal : 15~25Ω (for terminal 1-2)

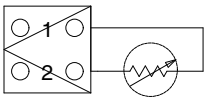
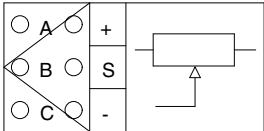
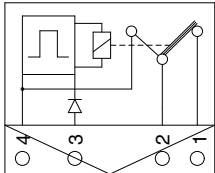
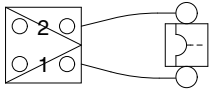
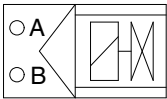
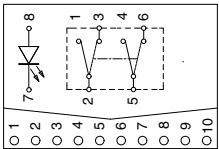
Part name	Symbol	Specification	Check
Air cleaner pressure switch	 CD-10	Pressure: 635mmH ₂ O (N.O TYPE)	※ Check contact Normal : $\infty \Omega$ (for terminal 1-2)
Fuel sender	 CD-2	-	※ Check resistance Full : 100Ω Low : 500Ω Empty warning : 700Ω
Relay	 CR-02 CR-03 CR-04 CR-05 CR-09 CR-50 CR-68 CR-80 CR-120 CR-121 CR-122 CR-381	12V 20A	※ Check resistance Normal : about 200Ω (for terminal 2-4) : 0Ω (for terminal 1-5) : $\infty \Omega$ (for terminal 1-3)
Relay	 CR-23 CR-24	12V 60A	※ Rated coil current $1.2 \pm 0.3A$
Solenoid valve	 CN-66 CN-68 CN-70 CN-140 CN-437 CN-441	12V 1A	※ Check resistance Normal : $15 \sim 25 \Omega$ (for terminal 1-2)
Speaker	 CN-23(LH) CN-24(RH)	4Ω 20W	※ Check resistance Normal : 4Ω

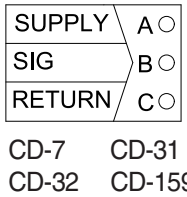
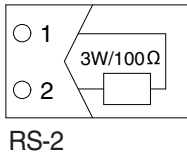
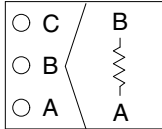
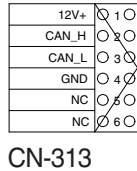
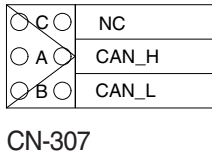
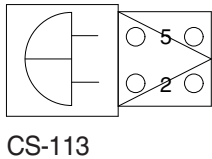
Part name	Symbol	Specification	Check
Work lamp switch	 CS-94	12V 16A	※ Check contact Normal OFF - $\infty \Omega$ (for terminal 2-1, 5-4) - 0Ω (for terminal 2-3, 5-6)
Quick coupler switch 1	 CS-67	12V 16A	※ Check contact Normal OFF - $\infty \Omega$ (for terminal 2-3, 5-6)
Lamp	 CL-5 CL-9L CL-9R	12V LED	※ Check disconnection Normal : 1.2Ω
Room lamp	 CL-1	12V 10W	※ Check disconnection Normal : a few Ω
Fuel filler pump	 CN-61	12V 35 ℓ /min	※ Check operation Supply power (for terminal 1-2) : 12V
Horn	 CN-20 CN-25	12V	132±5dB

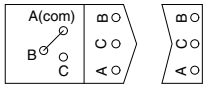
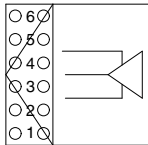
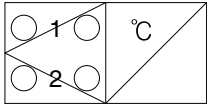
Part name	Symbol	Specification	Check
Safety switch	 CS-4	Micro	※ Check contact Normal : $0\ \Omega$ (for terminal A-B) : $\infty\ \Omega$ (for terminal A-C) Operating : $\infty\ \Omega$ (for terminal A-B) : $0\ \Omega$ (for terminal A-C)
Pressure switch	 CD-11	10bar (N.C type)	※ Check contact Normal : $0.1\ \Omega$
Beacon lamp	 CL-7	12V LED (Strobe type)	※ Check disconnection Normal : a few Ω
Wiper switch	 CS-3	12V 16A	※ Check contact Normal : $\infty\ \Omega$ (for terminal 2-1, 5-6)
Washer pump	 CN-22	12V 3.8A	※ Check contact Normal : $3\ \Omega$ (for terminal 1-2)
Fuel pump switch	 CS-16	12V	-

Part name	Symbol	Specification	Check
Wiper motor	CN-21	12V 3A	※ Check contact Normal : 6Ω (for terminal 2-4)
Radio & USB player	CN-27	12V 2A	※ Check voltage 10 ~ 12.5V (for terminal 1-3, 3-8)
Receiver dryer	CN-29	12V	※ Check contact Normal : 0Ω
Starter	CN-45	12V 2.3kW	※ Check contact Normal : 0.1Ω
Alternator	CN-74	12V 55A	※ Check contact Normal : 10 ~ 12.5V
Travel buzzer	CN-81	12V 600mA	※ Check contact Normal : 5.2Ω

Part name	Symbol	Specification	Check
Compressor	 CN-28	12V 79W	-
Blower motor		12V 9.5A	※ Check resistance 2.5Ω (for terminal 1-2)
Water valve		12V	-
Master switch	 CS-74	12V 1000A	-
Preheater	 CN-80	12V 42A 500W	-
12V outlet	 CN-139	12V 120W	-

Part name	Symbol	Specification	Check
Anti-freezing		-	-
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		12V 12A	-
Maxi fuse	 CN-60	12V 80A	-
EPPR valve	 CN-A1 CN-A2 CN-A3 CN-A4	-	-
Switch	 CS-16 CS-23 CS-30 CS-85 CS-113 CS-114	-	※ Check contact Normal OFF - $\infty\Omega$ (for terminal 2-1, 5-4) 0 Ω (for terminal 2-3, 5-6)

Part name	Symbol	Specification	Check
Pressure sensor	 CD-7 CD-31 CD-32 CD-159	12V	-
Resistor	 RS-2	3W 100Ω	-
Resistor	 RS-A0 RS-1 RS-A2	3W 120Ω	-
Service tool	 CN-313	-	-
Service tool	 CN-307	-	-
Buzzer	 CS-113	12V	-

Part name	Symbol	Specification	Check
Seat belt switch	 CS-250	12V	-
DPF press switch	 CN-300A	-	-
DPF temp sensor	 CN-300B CN-300C	-	-

GROUP 5 CONNECTORS

1. CONNECTOR DESTINATION

Connector number	Type	No. of pin	Destination	Connector part No.	
				Female	Male
CN-04	AMP	36	Main harness - Seat base harness	1743059-2	1743062-2
CN-05	AMP	36	Main harness - Seat base harness	1743632-2	1743636-2
CN-6	AMP	10	Seat base harness - Cab harness	174655-2	174657-2
CN-6A	AMP	6	Seat base harness	174262-2	174264-2
CN-11	AMP	6	Main harness-A/C harness	174262-2	174264-2
CN-16	AMP	6	Accel dial	-	174264-2
CN-16A	AMP	6	Accel dial	174262-2	-
CN-16B	AMP	6	Emergency rpm dial connector	174262-2	21NB-10710
CN-18	AMP/KET	8	Blower relay harness	178982-2	178984-2
CN-21	KET	4	Wiper motor	MG610047	-
CN-22	KET	2	Washer tank	MG640650	-
CN-23	YAZAKI	2	Speaker-LH	7123-1520	-
CN-24	YAZAKI	2	Speaker-RH	7123-1520	-
CN-25	DEUTSCH	2	Horn	DT06-2S-EP06	-
CN-27	-	16	New cassette radio	PK145-16017	-
CN-28	YAZAKI	1	Air conditioner compressor	1723-2815	-
CN-28	KET	2	Washer pump	MG640605	-
CN-29	KET	2	Receiver dryer	MG640795	-
CN-36	-	-	Fuse box	21HN-55010	-
CN-37	-	-	Relay box	21HN-55110	-
CN-45B+	RING TERM	-	Start motor B+	JOCP25-8-2	-
CN-45M	RING TERM	-	Start motor M	S820-304000	-
CN-56	AMP	34	Cluster	4-1437290-0	-
CN-60	MTA	-	Maxi fuse	03. 01080	-
CN-61	DEUTSCH	2	Fuel filler pump	DT06-2S-EP06	DT04-2P-E005
CN-66	DEUTSCH	2	Breaker return solenoid	DT06-2S-EP06	-
CN-68	DEUTSCH	2	Safety solenoid	DT06-2S-EP06	-
CN-70	DEUTSCH	2	Travel solenoid	DT06-2S-EP06	-
CN-74	YAZAKI	2	Alternator	7223-6224-40	-
CN-74	RING TERM	-	Alternator B+	S820-108000	-
CN-80	YAZAKI	1	Glow plug	7323-3010	-
CN-81	KET	2	Buzzer	MG610320	-
CN-93A	AMP	94	ECU	3-1355136-3	-
CN-93B	AMP	60	ECU	1897635-2	-
CN-100	KET	1	ECU earth	MG640944-5	-
CN-112	DEUTSCH	2	Main harness-Boom harness	DT06-2S-EP06	DT04-2P-E003

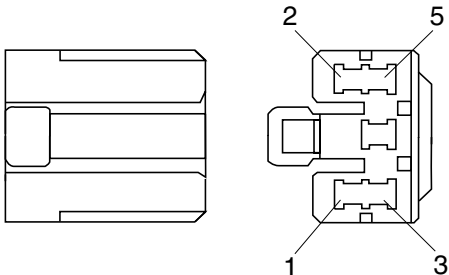
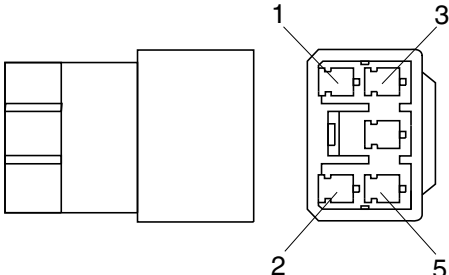
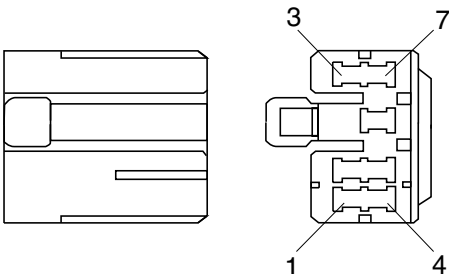
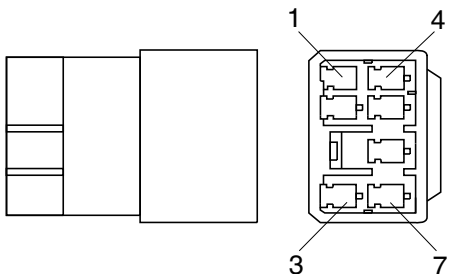
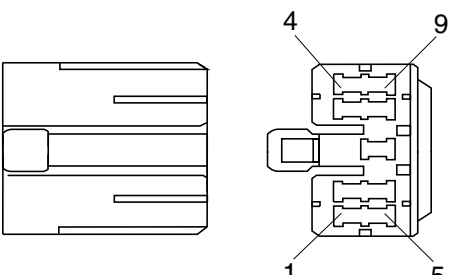
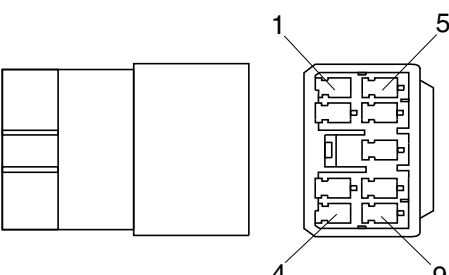
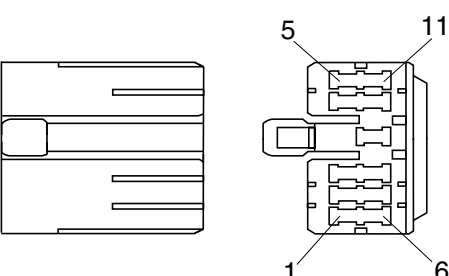
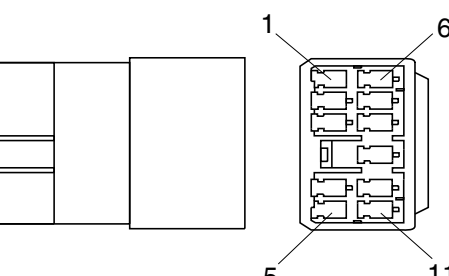
Connector number	Type	No. of pin	Destination	Connector part No.	
				Female	Male
CN-113	KET	6	Buzzer	MG614354	-
CN-125	DEUTSCH	12	RMCU	DT06-12S-BE02	DT04-12P-BE02
CN-126	DEUTSCH	9	Service tool	-	HD10-9-96P
CN-126	AMP	10	Service tool	174655-2	S816-110002
CN-126	AMP	10	Service tool	174655-2	-
CN-139	AMP	2	Power socket	172434-2	-
CN-140	DEUTSCH	2	Quick coupler solenoid	DT06-2S-EP06	DT04-2P-E005
CN-142	DEUTSCH	3	Accel dial	DT06-3S-EP06	-
CN-142L	AMP	2	Accel dial pilot lamp	174352-2	-
CN-145	YAZAKI	2	Fuel feed pump	7123-6423-30	-
CN-170	DELPHI	2	Seat heater	12052641	-
CN-240C	-	1	Proportional ON/OFF	-	CA104
CN-240D	DEUTSCH	3	LH RCV EPPR	DT06-3S-EP06	-
CN-241A	DEUTSCH	2	Breaker sw	DT06-2S-EP06	-
CN-241B	DEUTSCH	2	Horn sw	-	DT04-2P-E005
CN-241C	-	1	Quick coupler sw	-	CA104
CN-241D	DEUTSCH	3	EPPR sw	DT06-3S-EP06	-
CN-249	DEUTSCH	6	Rear camera	DT06-6S-EP06	DT04-6P-E005
CN-250	DEUTSCH	3	Seat belt warning	DT06-3S-EP06	-
CN-300A	AMP	6	DPF pressure switch	1438153-5	-
CN-300B	FCI	2	DPF mid temp sensor	54200206	-
CN-300C	FCI	2	DPF inlet temp sensor	50200208	-
CN-301	AMP	8	EGR sensor	776532-1	-
CN-302	AMP	12	EGR valve	776533-1	-
CN-303	AMP	12	E/sensor	776533-2	-
CN-304	AMP	12	C/rail	776533-3	-
CN-305	REXROTH	56	EPPR controller	1-928-405-161	-
CN-307	DEUTSCH	3	EPPR service tool	DT06-3S-E006	DT04-3P-E005
CN-313	DEUTSCH	6	Service tool	DTM06-6S	DTM04-6P
CN-437	DEUTSCH	2	Dozer float switch	DT06-2S-EP06	DT04-2P-E005
CN-441	DEUTSCH	2	AC mode solenoid	DT06-2S-EP06	DT04-2P-E005
CN-442A	DEUTSCH	2	Dozer floating switch	DT06-2S-EP06	-
CN-442B	DEUTSCH	2	2-speed switch	-	DT04-2P-E005
CN-442C	DEUTSCH	3	Angle dozer	DT06-3S-EP06	DT04-3P-E005
CN-442D	-	1	GND	CB104	-
CN-550	DEUTSCH	2	Option solenoid 1 (2way/angle dozer sel)	DT06-2S-EP06	DT04-2P-E005
CN-552	DEUTSCH	2	Option solenoid 1 (4way/boom swing)	DT06-2S-EP06	DT04-2P-E005
CN-553	DEUTSCH	2	Option solenoid 2 (4way/boom swing)	DT06-2S-EP06	DT04-2P-E005

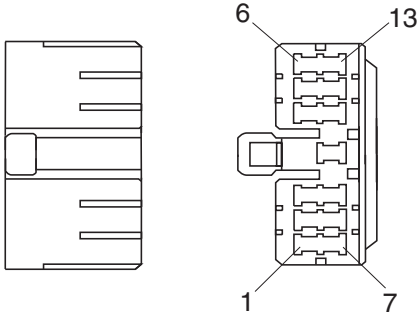
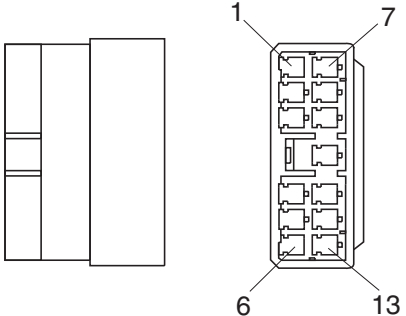
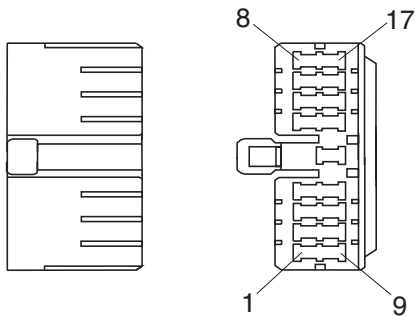
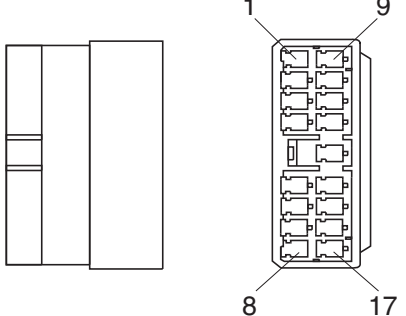
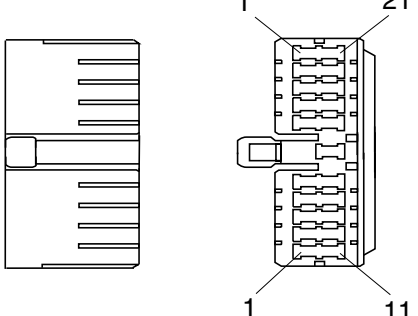
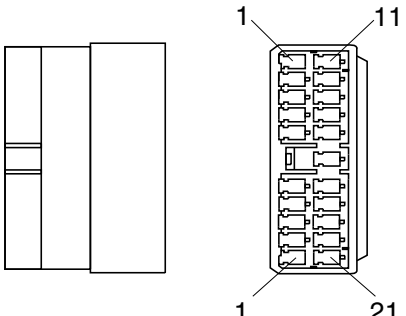
Connector number	Type	No. of pin	Destination	Connector part No.	
				Female	Male
CN-A1	DEUTSCH	2	EPPR-A1	DT06-2S-EP06	-
CN-A2	DEUTSCH	2	EPPR-A2	DT06-2S-EP06	-
CN-A3	DEUTSCH	2	EPPR-A3	DT06-2S-EP06	-
CN-A4	DEUTSCH	2	EPPR-A4	DT06-2S-EP06	-
AC-01	KET	16	HAVC controller	MG655666	-
AC-04	AMP	18	HAVC unit	936204-1	-
· LAMP					
CL-1	KET	2	Room lamp	MG610392	-
CL-5	DEUTSCH	2	Work lamp	DT06-2S-E003	-
CL-7	DEUTSCH	2	Beacon lamp	DT06-2S-EP06	DT04-2P-E005
CL-9L	DEUTSCH	2	Work lamp - LH	DT06-2S-EP06	DT04-2P-E005
CL-9R	DEUTSCH	2	Work lamp - RH	DT06-2S-EP06	DT04-2P-E005
· RELAY					
CR-1R	RING TERM	-	Power relay 1	S820-025008	-
CR-1P	-	2	Power relay 1	32004-A2	-
CR-1S	-	2	Power relay 1	282080-1	-
CR-02	RELAY SOC	5	Horn relay	VCFM-1002	-
CR-03	RELAY SOC	5	Work lamp relay	VCFM-1002	-
CR-04	RELAY SOC	5	Wiper motor relay	VCFM-1002	-
CR-05	RELAY SOC	5	Safety relay	VCFM-1002	-
CR-06	KET	6	Wiper int relay	MG652999	-
CR-09	RELAY SOC	5	Cab lamp relay	VCFM-1002	-
CR-23	KET	4	Start relay	MG612017-5	-
CR-24	KET	4	Air heater relay	MG612017-5	-
CR-50	RELAY SOC	5	Anti restart relay	VCFM-1002	-
CR-68	RELAY SOC	5	ECU IG relay	VCFM-1002	-
CR-80	RELAY SOC	5	EGR valve relay	VCFM-1002	-
CR-120	RELAY SOC	5	Blower motor high relay	VCFM-1002	-
CR-121	RELAY SOC	5	Blower motor mid relay	VCFM-1002	-
CR-122	RELAY SOC	5	Blower motor low relay	VCFM-1002	-
CR-381	RELAY SOC	5	SLO relay	VCFM-1002	-
· SENSOR					
CD-1	AMP	2	Hydraulic temp sender	85202-1	-
CD-2	DEUTSCH	2	Fuel sender	DT06-2S-E006	-
CD-7	DEUTSCH	3	Working pressure sensor	DT06-3S-E006	-
CD-10	AMP	2	Air cleaner switch	85202-1	-
CD-11	KET	2	Travel pressure switch	MG640795	-
CD-18	YAZAKI	1	Engine oil pressure switch	7123-5014	-

Connector number	Type	No. of pin	Destination	Connector part No.	
				Female	Male
CD-31	DEUTSCH	3	Overload pressure sensor	DT06-3S-EP06	DT04-3P-E005
CD-32	DEUTSCH	3	Boom up pressure sensor	DT06-3S-E006	DT04-3P-E005
CD-159	DEUTSCH	3	Arm in pressure sensor	DT06-3S-E006	DT04-3P-E005
DO-01	-	2	Diode	21EA-50550	-
DO-02	-	2	Diode	174352-2	21EA-50550
DO-06	-	2	Diode	174352-2	21EA-50550
DO-07	-	2	Diode	174352-2	21EA-50550
· SWITCH					
CS-2	KET	6	Start switch	MG610335	-
CS-3	CARLING	10	Wiper switch	21HN-56300	-
CS-4	DEUTSCH	3	Safety switch	DT06-3S-EP06	-
CS-16	CARLING	10	Travel alarm switch	21NH-56300	-
CS-16	-	2	Fuel filler pump switch	174352-2	-
CS-23	CARLING	10	Beacon switch	21HN-56300	-
CS-30	CARLING	10	Washer switch	21HN-56300	-
CS-33	AMP	6	Emergency stop switch	174262-2	-
CS-67	CARLING	10	Quick coupler switch	21HN-56300	-
CS-74L	RING TERM	-	Master switch L	S820-606000	-
CS-74S	RING TERM	-	Master switch S	S820-606000	-
CS-85	CARLING	10	Breaker select switch	21HN-56300	-
CS-94	CARLING	10	Work lamp switch	21HN-56300	-
CS-100	CARLING	10	DPF switch	21HN-56300	-
CS-113	CARLING	10	Aux 1 switch	21HN-56300	-
CS-114	CARLING	10	Aux 2 switch	21HN-56300	-
CS-250	DEUTSCH	3	Seat belt warning	DT06-3S-EP06	DT04-3P-E005

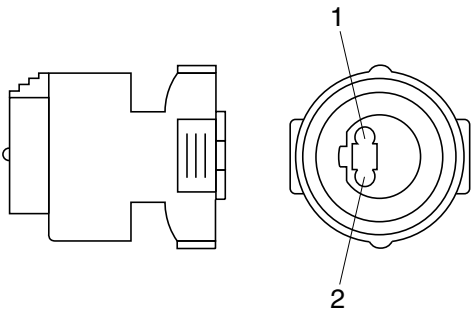
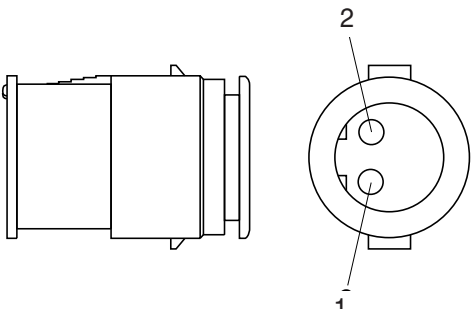
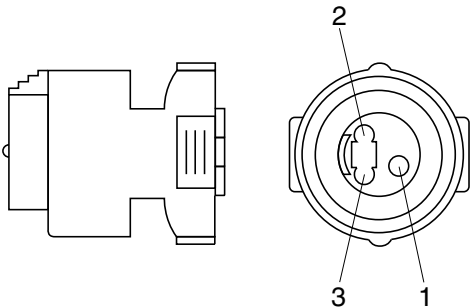
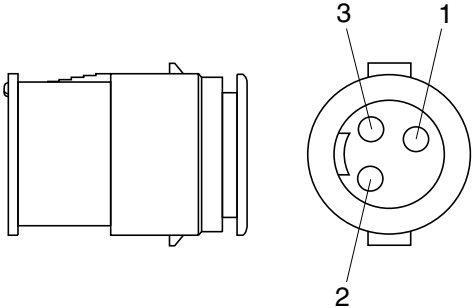
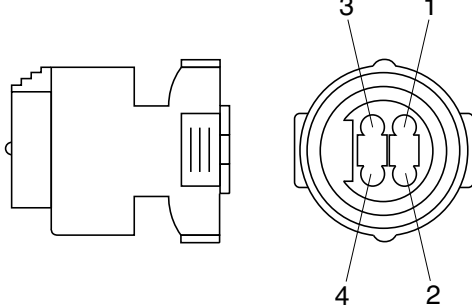
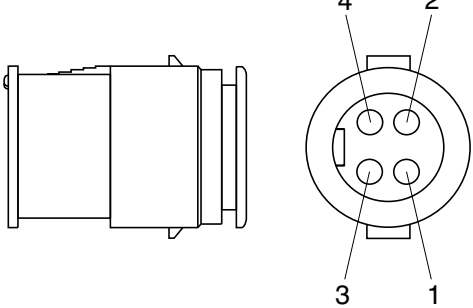
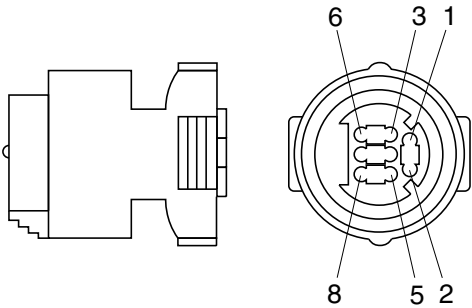
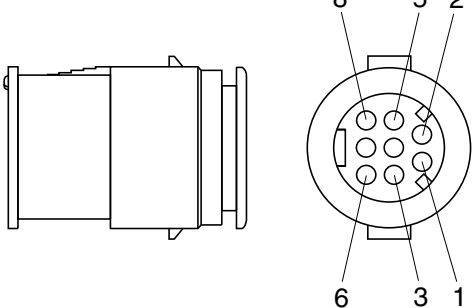
2. CONNECTION TABLE FOR CONNECTORS

1) PA TYPE CONNECTOR

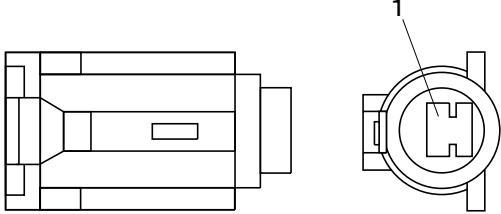
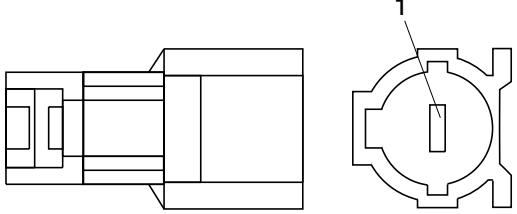
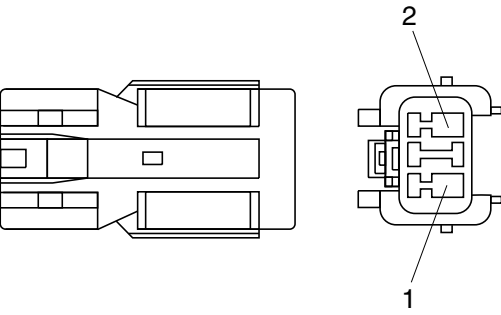
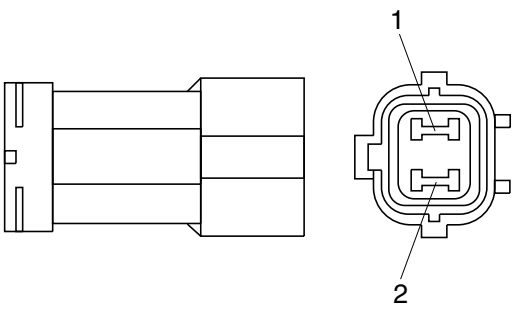
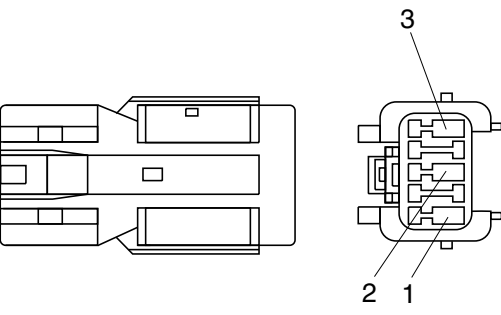
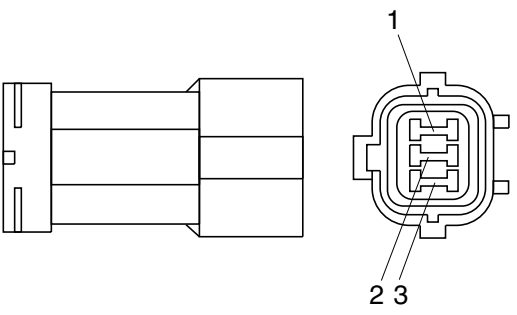
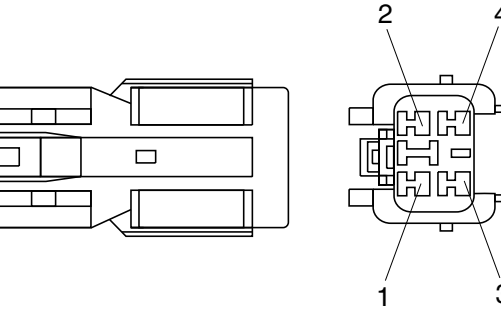
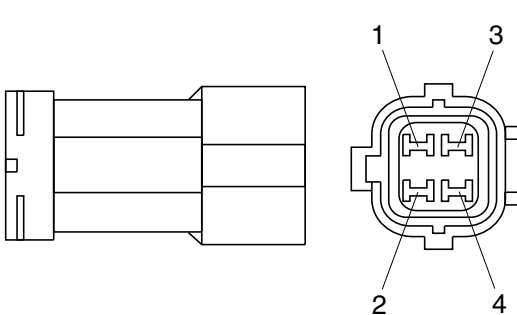
No. of pin	Receptacle connector (female)	Plug connector (male)
5	 S811-005002	 S811-105002
7	 S811-007002	 S811-107002
9	 S811-009002	 3S811-109002
11	 S811-011002	 S811-111002

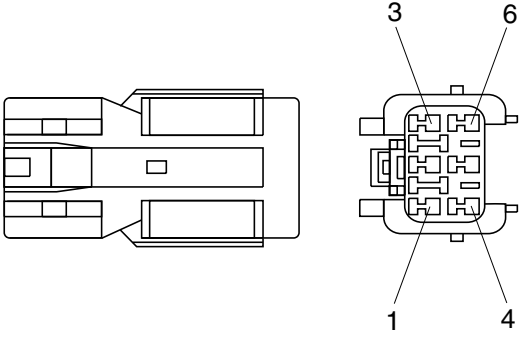
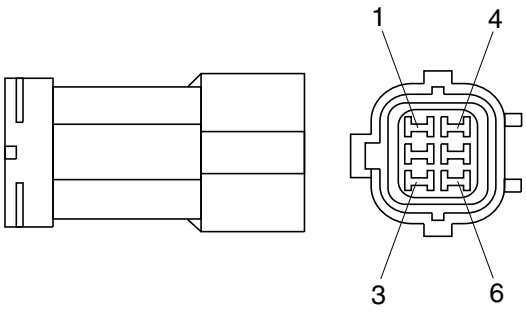
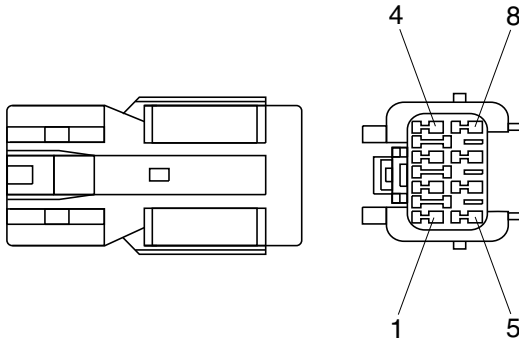
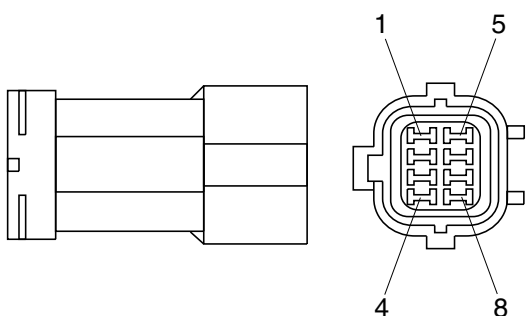
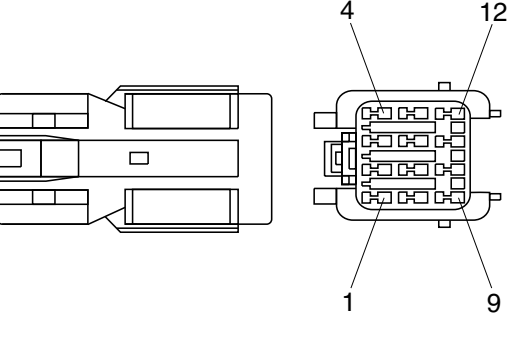
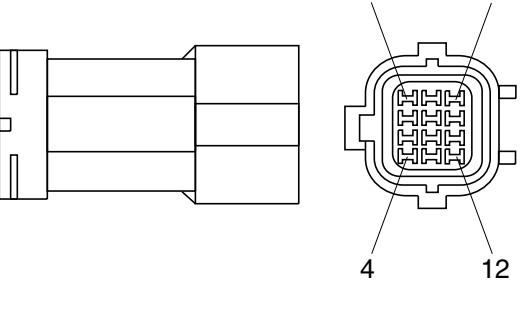
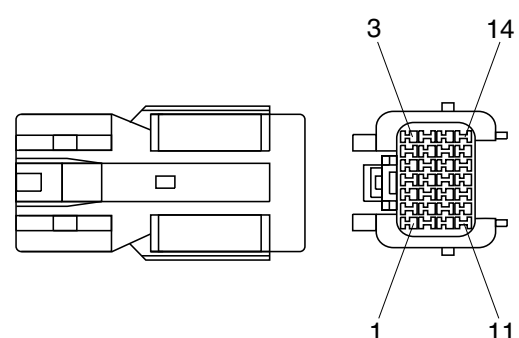
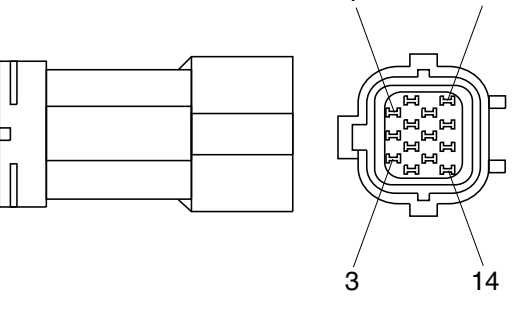
No. of pin	Receptacle connector (female)	Plug connector (male)
13	 S811-013002	 S811-113002
17	 S811-017002	 S811-117002
21	 S811-021002	 S811-121002

2) J TYPE CONNECTOR

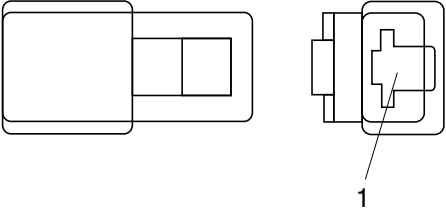
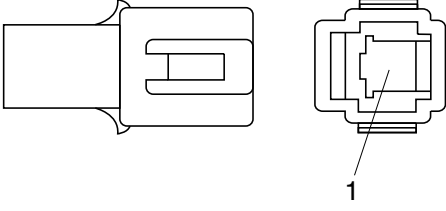
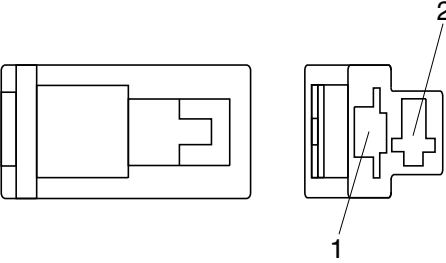
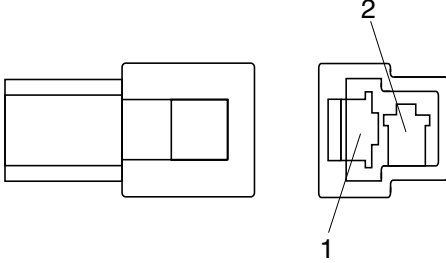
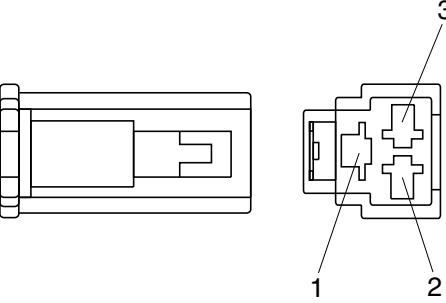
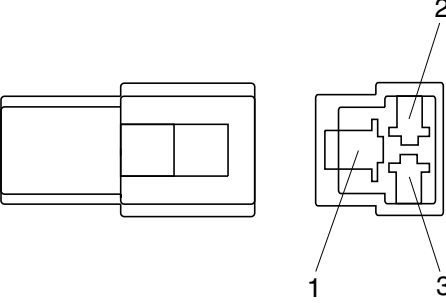
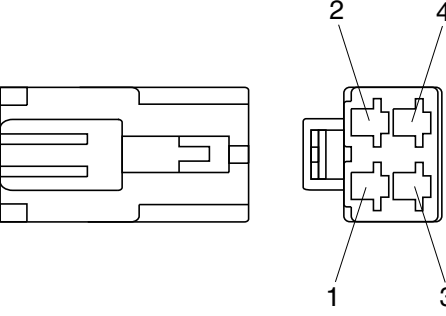
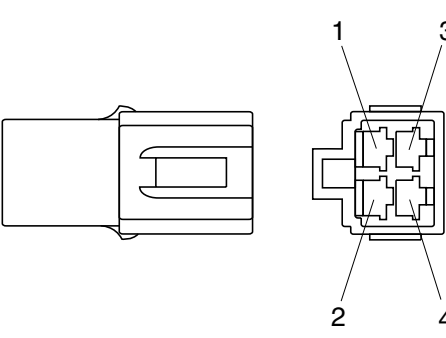
No. of pin	Receptacle connector (female)	Plug connector (male)
2	 S816-002001	 S816-102001
3	 S816-003001	 S816-103001
4	 S816-004001	 S816-104001
8	 S816-008001	 S816-108001

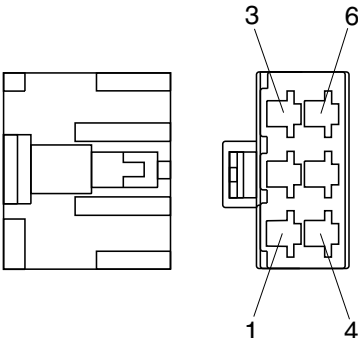
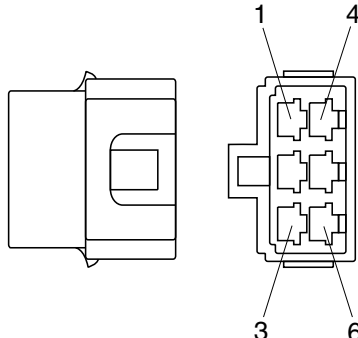
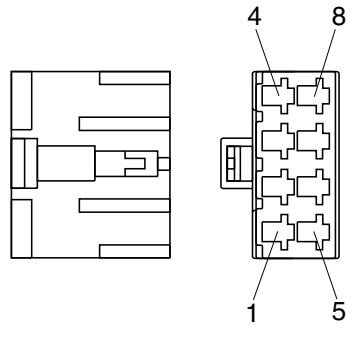
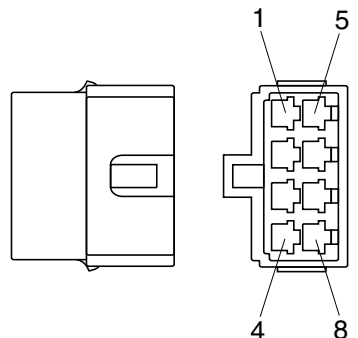
3) SWP TYPE CONNECTOR

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

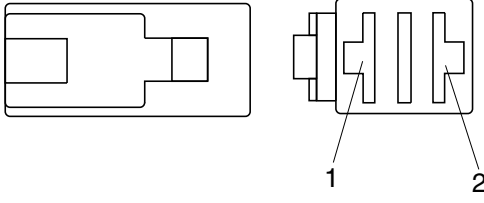
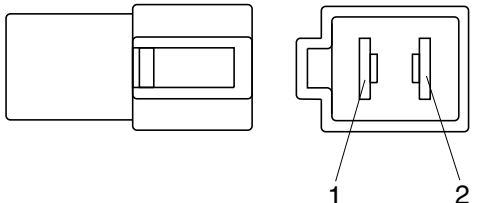
No. of pin	Receptacle connector (female)	Plug connector (male)
6	 S814-006000	 S814-106000
8	 S814-008000	 S814-108000
12	 S814-012000	 S814-112000
14	 S814-014000	 S814-114000

4) CN TYPE CONNECTOR

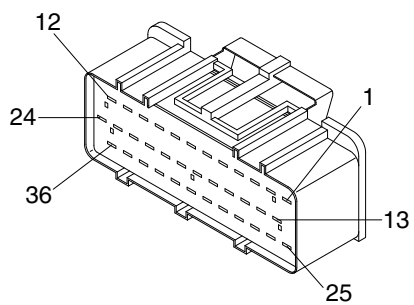
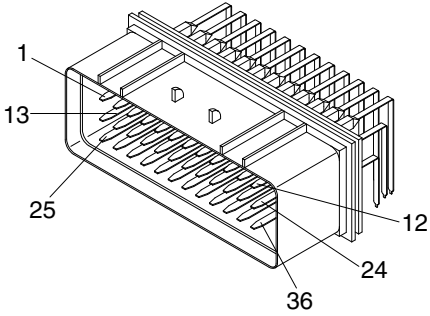
No. of pin	Receptacle connector (female)	Plug connector (male)
1	 S810-001202	 S810-101202
2	 S810-002202	 S810-102202
3	 S810-003202	 S810-103202
4	 S810-004202	 S810-104202

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

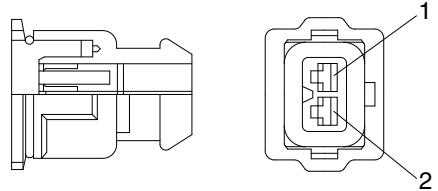
5) 375 FASTEN TYPE CONNECTOR

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

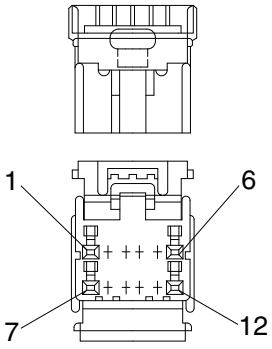
6) AMP ECONOSEAL CONNECTOR

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

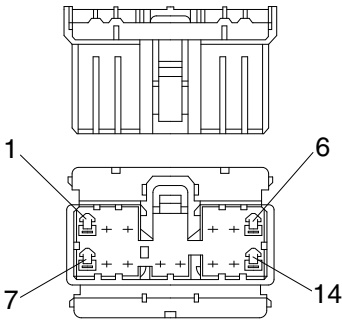
7) AMP TIMER CONNECTOR

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

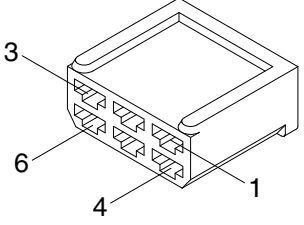
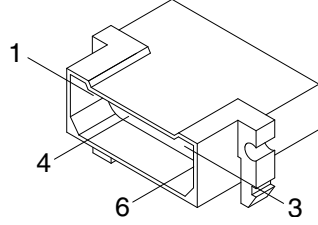
8) AMP 040 MULTILOCK CONNECTOR

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

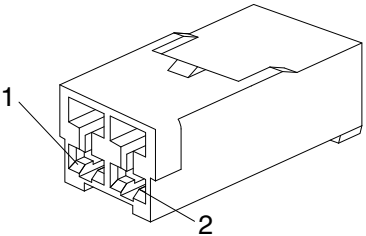
9) AMP 070 MULTILOCK CONNECTOR

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

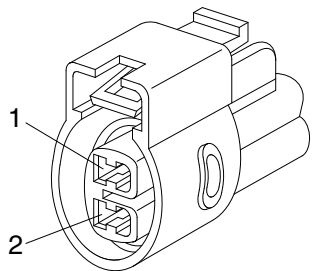
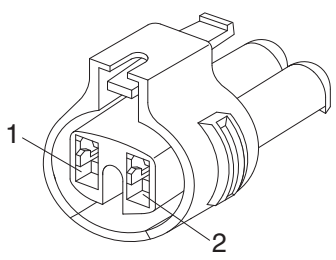
10) AMP FASTIN - FASTON CONNECTOR

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

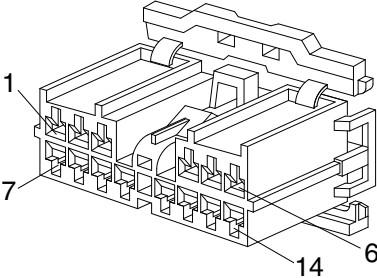
11) KET 090 CONNECTOR

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

12) KET 090 WP CONNECTORS

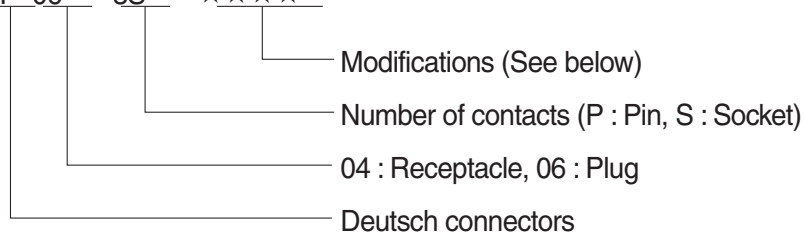
No. of pin	Receptacle connector (female)	Plug connector (male)
2	 MG640605	
2	 MG640795	

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

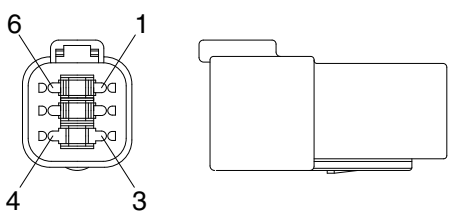
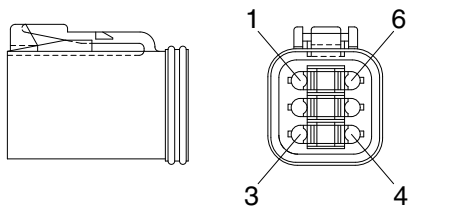
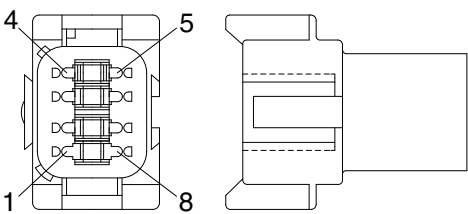
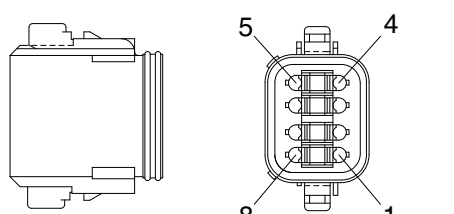
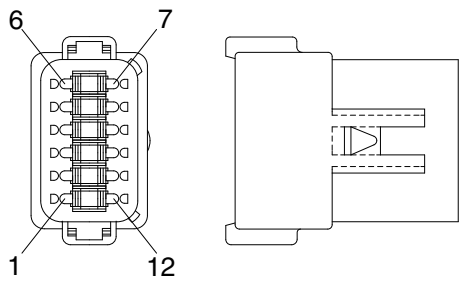
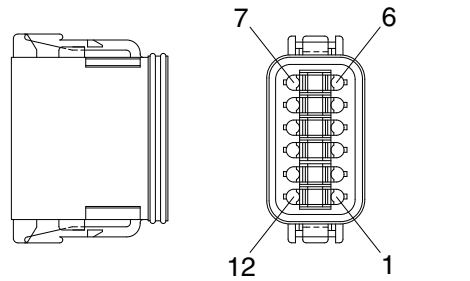
E005 : Combination - E004 & E003

EP04 : End cap

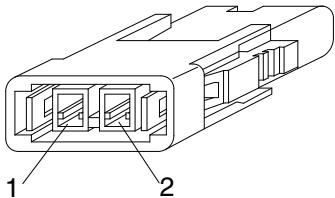
EP06 : Combination P012 & EP04

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

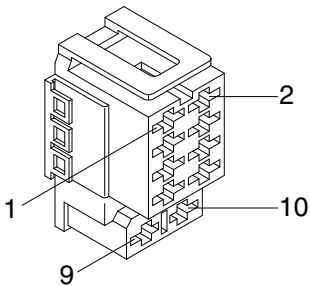
No. of pin	Receptacle connector (female)	Plug connector (male)
2		
3		
4		

No. of pin	Receptacle connector (female)	Plug connector (male)
6	 DT06-6S	 DT04-6P
8	 DT06-8S	 DT04-8P
12	 DT06-12S	 DT04-12P

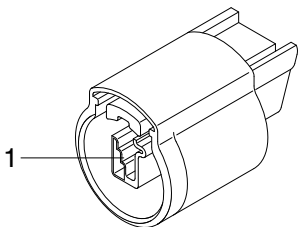
15) MOLEX 2CKTS CONNECTOR

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	

SECTION 5 TROUBLESHOOTING



Group 1 Before Troubleshooting 5-1

Group 2 Hydraulic and Mechanical System 5-4

Group 3 Electrical System 5-24

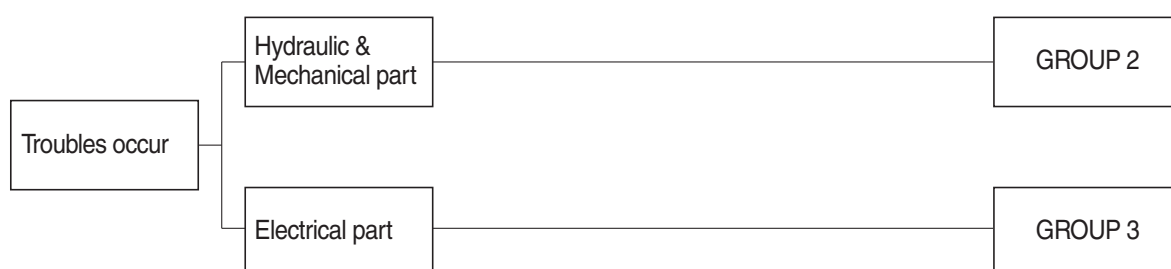
GROUP 1 BEFORE TROUBLESHOOTING

1. INTRODUCTION

When a trouble is occurred in the machine, this section will help an operator to maintain the machine with easy.

The trouble of machine is parted Hydraulic & Mechanical system and Electrical system.

At each system part, an operator can check the machine according to the troubleshooting process diagram.



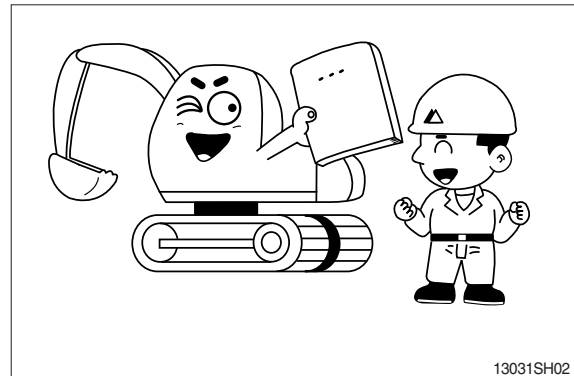
2. DIAGNOSING PROCEDURE

To carry out troubleshooting efficiently, the following steps must be observed.

STEP 1. Study the machine system

Study and know how the machine is operating, how the system is composing, what kinds of function are installed in the machine and what are specifications of the system components by the machine service manual.

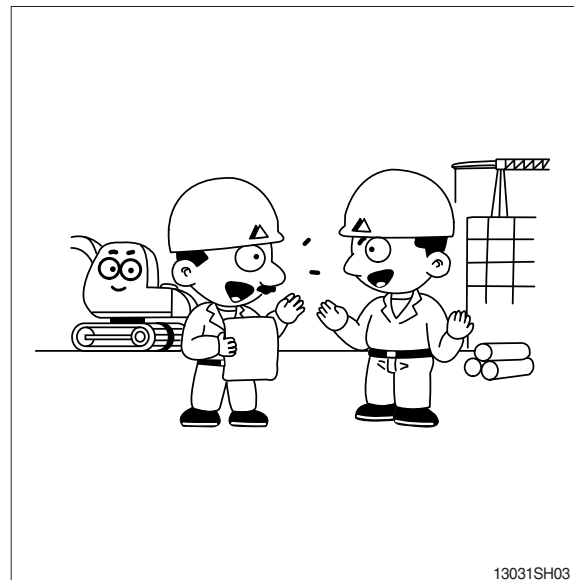
Especially, deepen the knowledge for the related parts of the trouble.



STEP 2. Ask the operator

Before inspecting, get the full story of malfunctions from a witness --- the operator.

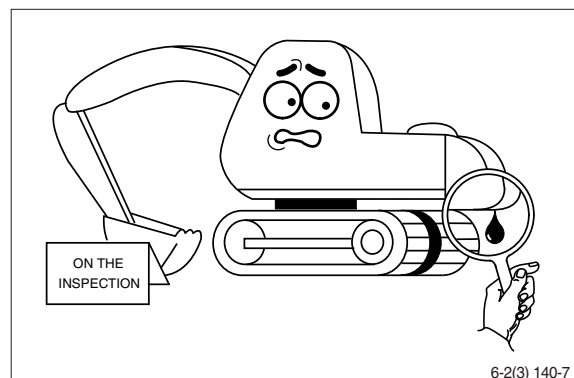
- 1) How the machine is used and when it is serviced?
- 2) When the trouble was noticed and what work the machine was doing at that time?
- 3) What is the phenomenon of the trouble?
Was the trouble getting worse, or did it come out suddenly for the first time?
- 4) Did the machine have any troubles previously? If so, which parts were repaired before.



STEP 3. Inspect the machine

Before starting troubleshooting, check the machine for the daily maintenance points as shown in the operator's manual.

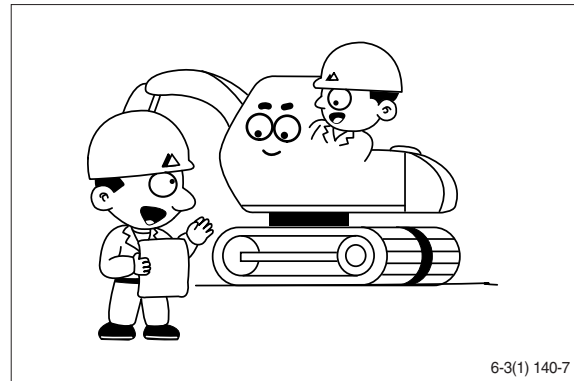
And also check the electrical system including batteries, as the troubles in the electrical system such as low battery voltage, loose connections and blown out fuses will result in malfunction of the controllers causing total operational failures of the machine.



STEP 4. Inspect the trouble actually on the machine

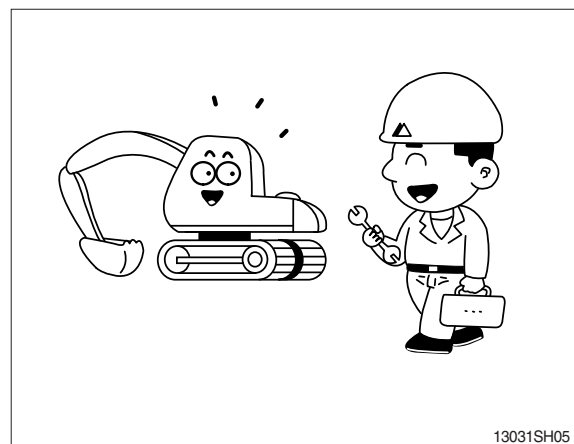
In case that some trouble cannot be confirmed, obtain the details of the malfunction from the operator.

Also, check if there are any incomplete connections of the wire harnesses or not.



STEP 5. Perform troubleshooting

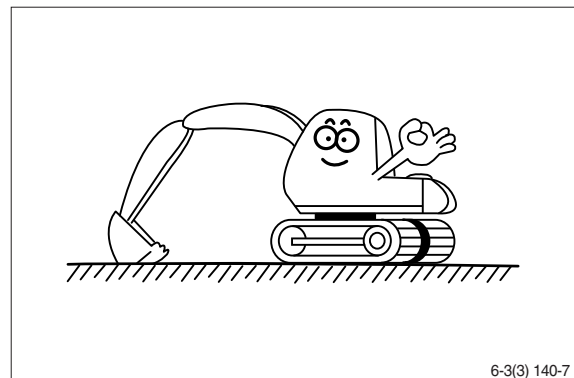
According to where the trouble parts are located, hydraulic & mechanical system part or electrical system part or mechatronics system part, perform troubleshooting the machine refer to the each system part's troubleshooting process diagram.



STEP 6. Trace a cause

Before reaching a conclusion, check the most susceptible causes again. Try to trace what the real cause of the trouble is.

Make a plan of the appropriate repairing procedure to avoid consequential malfunctions.



1. INTRODUCTION

1) MACHINE IN GENERAL

- (1) If even a minor fault is left intact and operation is continued, a fatal failure may be caused, entailing a large sum of expenses and long hours of restoration.

Therefore when even a small trouble occurs, do not rely on your intuition and experience, but look for the cause based on the troubleshooting principle and perform maintenance and adjustment to prevent major failure from occurring. Keep in mind that a fault results from a combination of different causes.

- (2) The following lists up commonly occurring faults and possible causes with this machine. For the troubleshooting of the engine, refer to the coming troubleshooting and repair.

- (3) When carrying out troubleshooting, do not hurry to disassemble the components.
It will become impossible to find the cause of the problem.

- (4) Ask user or operator the following.

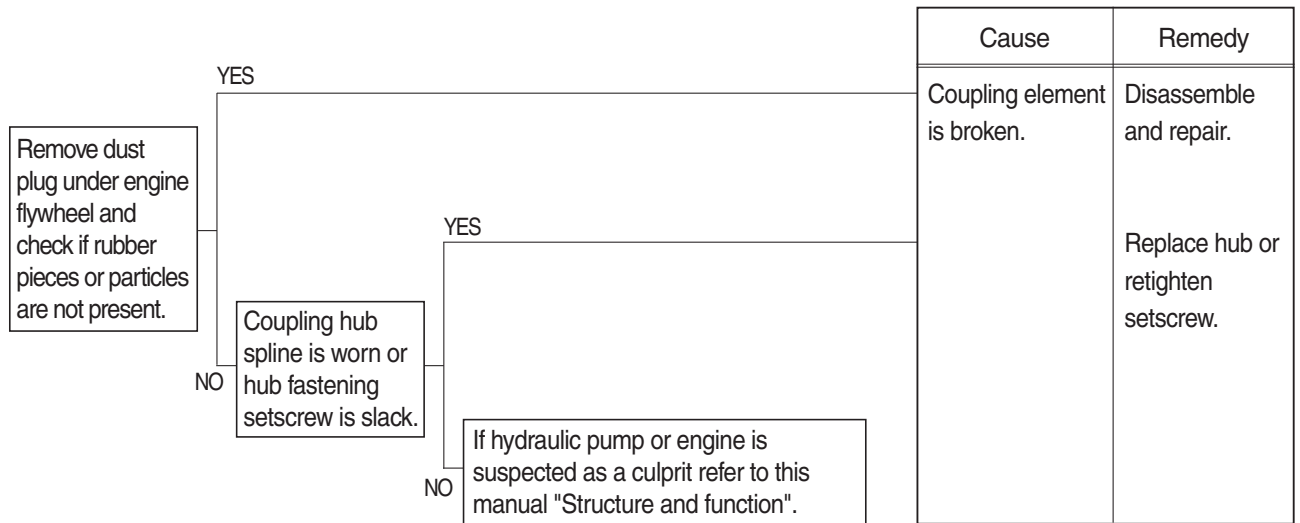
- ① Was there any strange thing about machine before failure occurred?
- ② Under what conditions did the failure occur?
- ③ Have any repairs been carried out before the failure?

- (5) Check before troubleshooting.

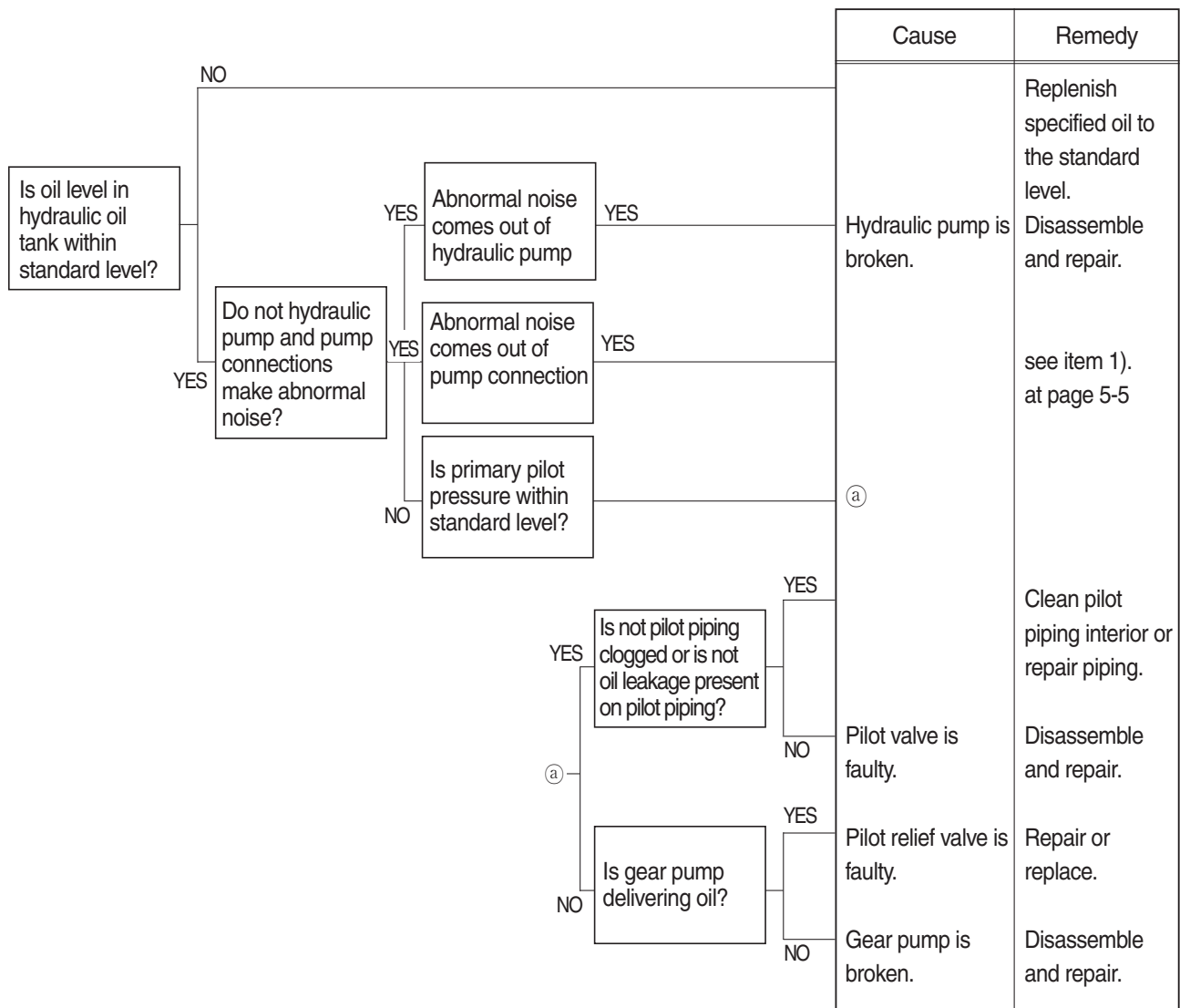
- ① Check oil and fuel level.
- ② Check for any external leakage of oil from components.
- ③ Check for loose or damage of wiring and connections.

2. DRIVE SYSTEM

1) UNUSUAL NOISE COMES OUT OF PUMP CONNECTION



2) ENGINE STARTS BUT MACHINE DOES NOT OPERATE AT ALL

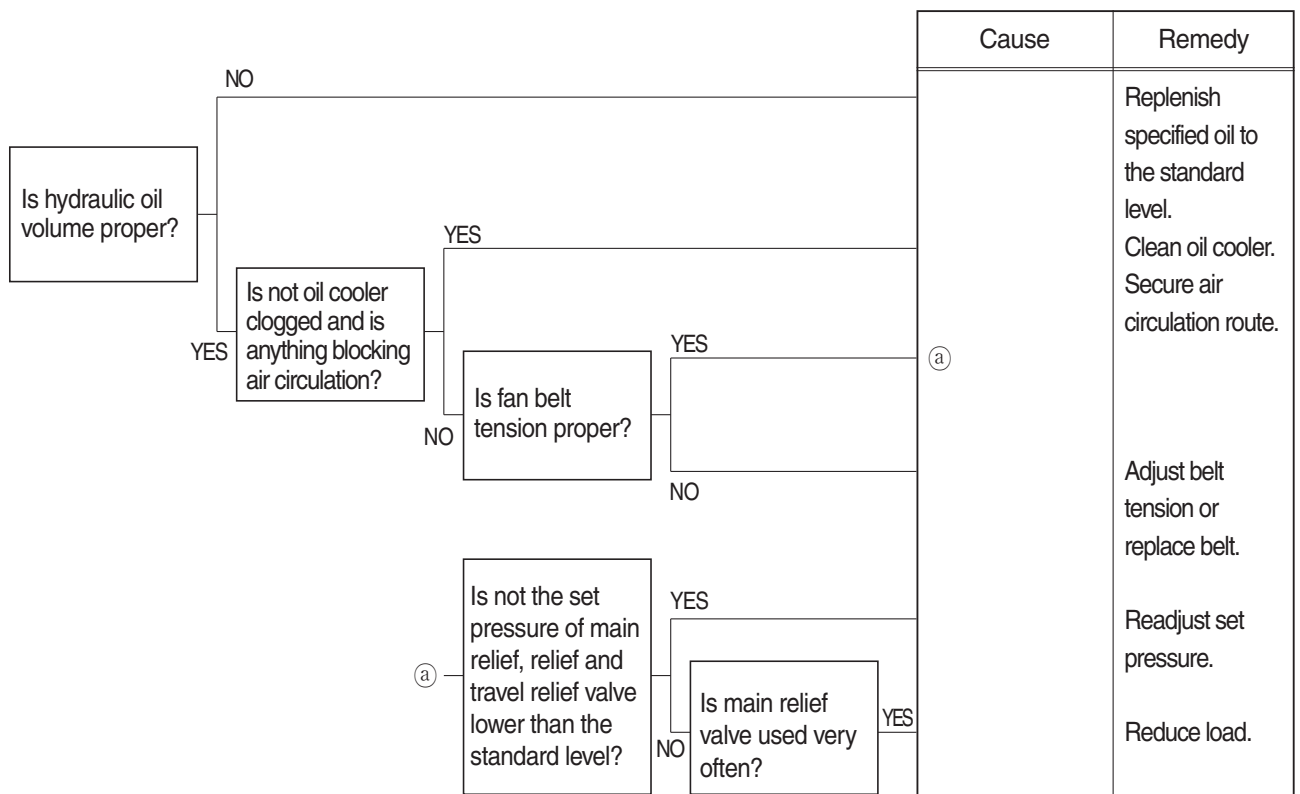


3. HYDRAULIC SYSTEM

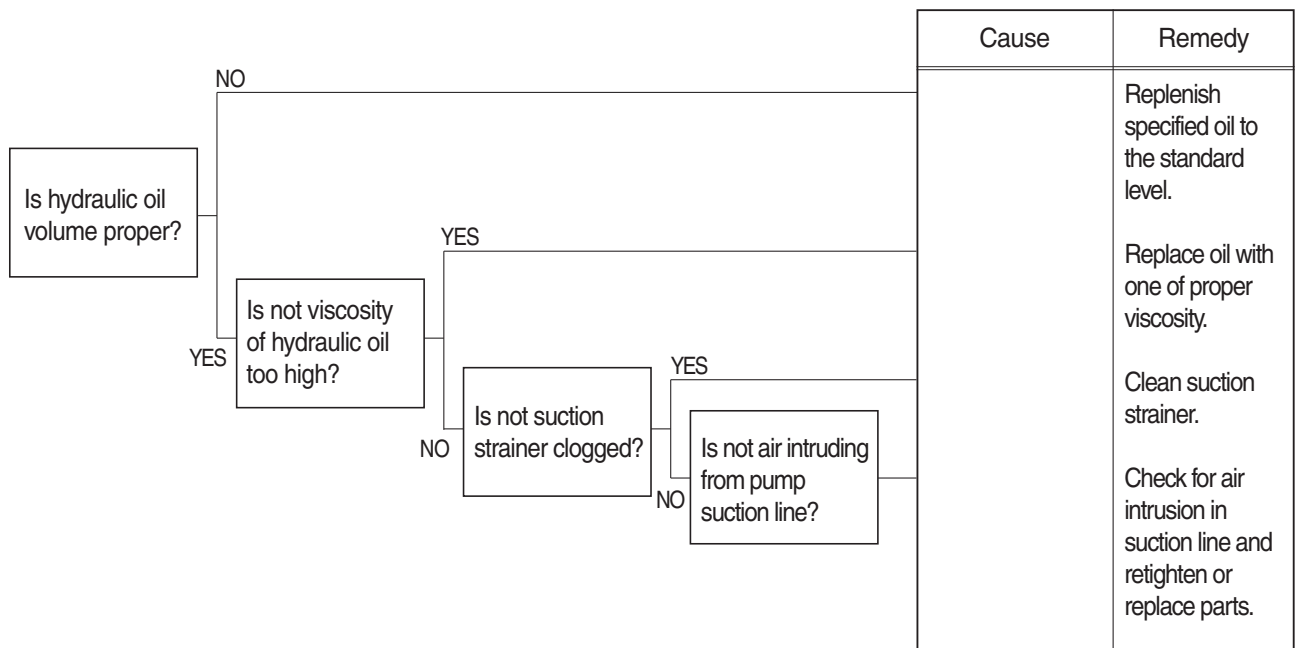
1) HYDRAULIC OIL IS CLOUDY



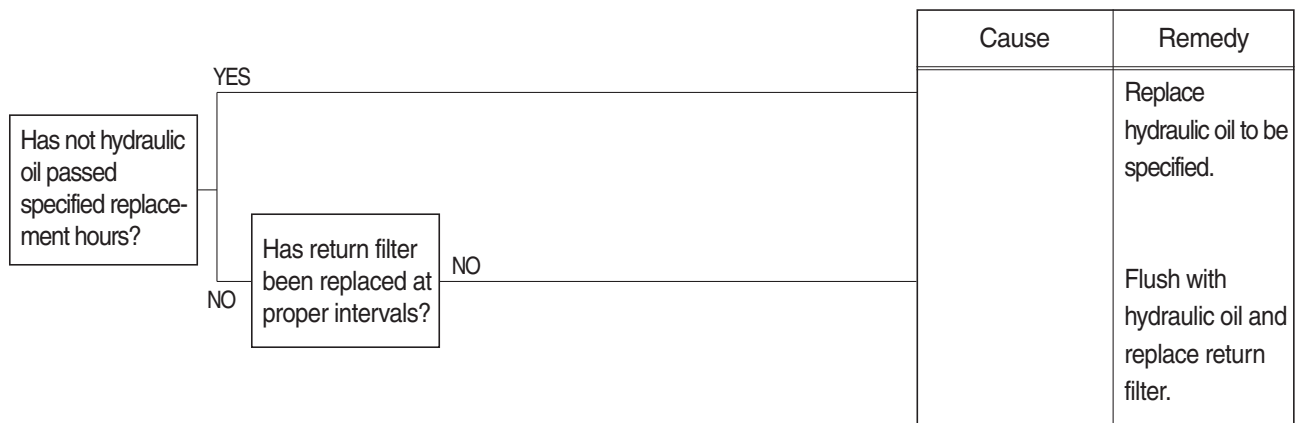
2) HYDRAULIC OIL TEMPERATURE HAS RISEN ABNORMALLY



3) CAVITATION OCCURS WITH PUMP

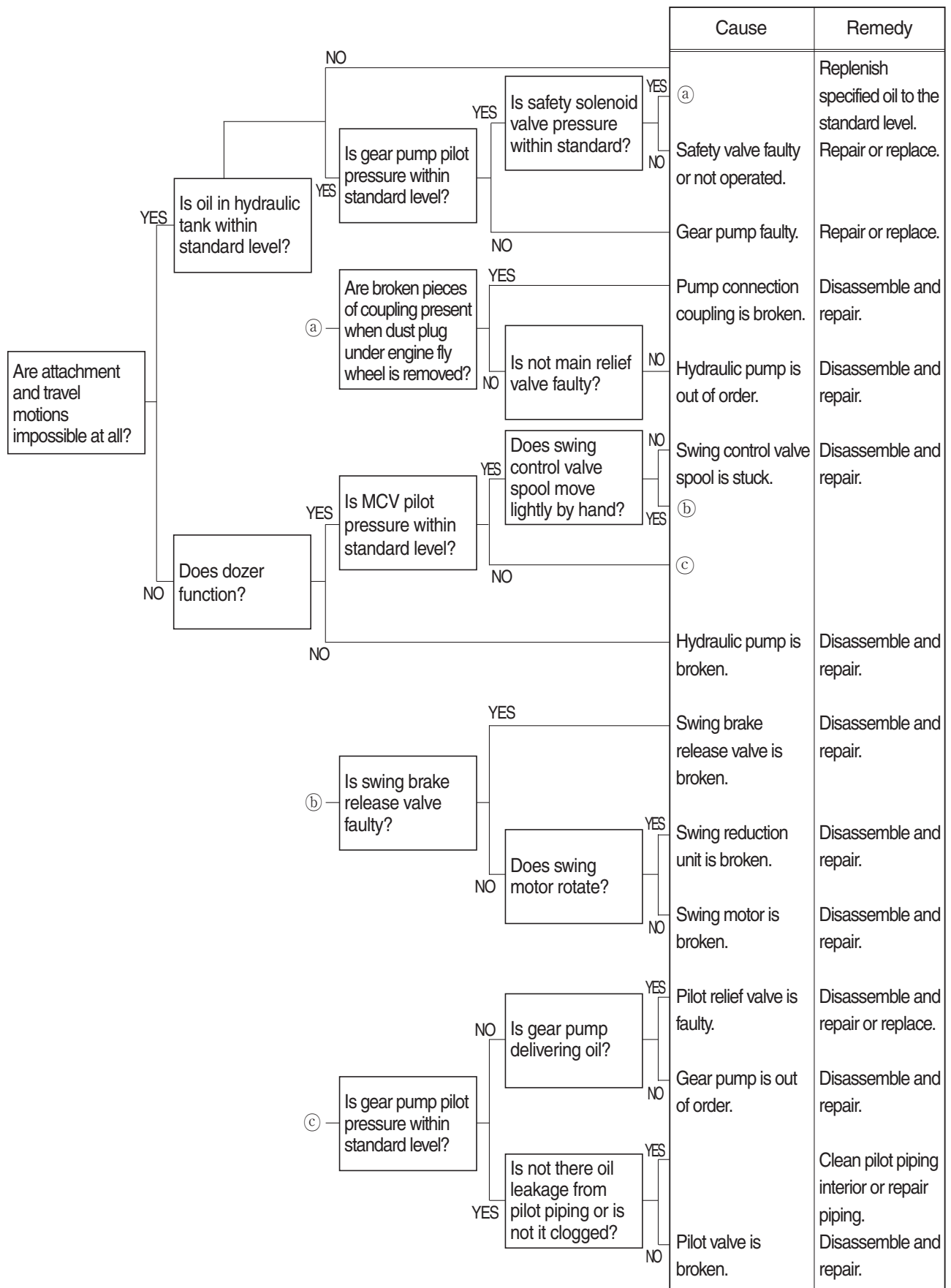


4) HYDRAULIC OIL IS CONTAMINATED

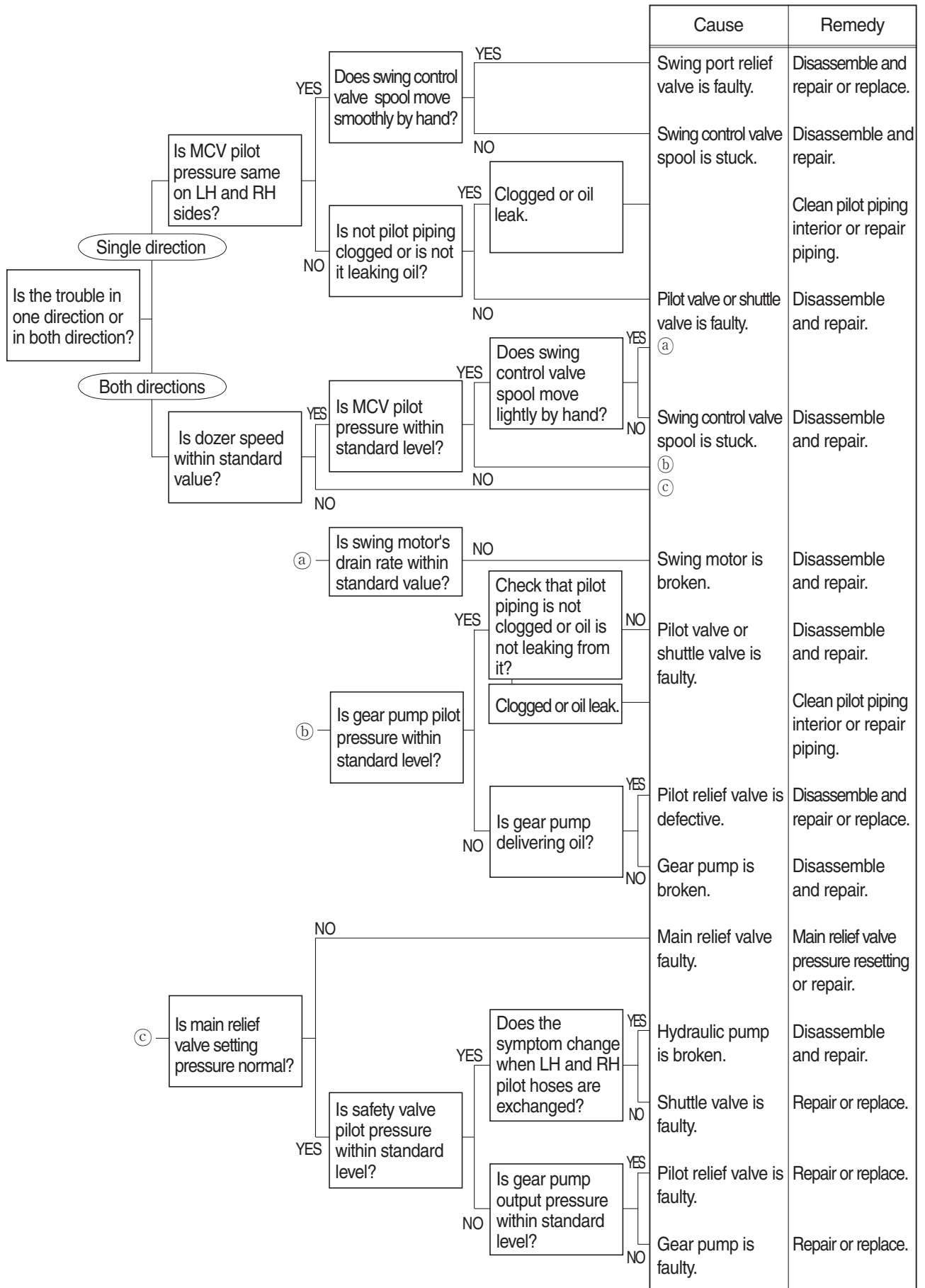


4. SWING SYSTEM

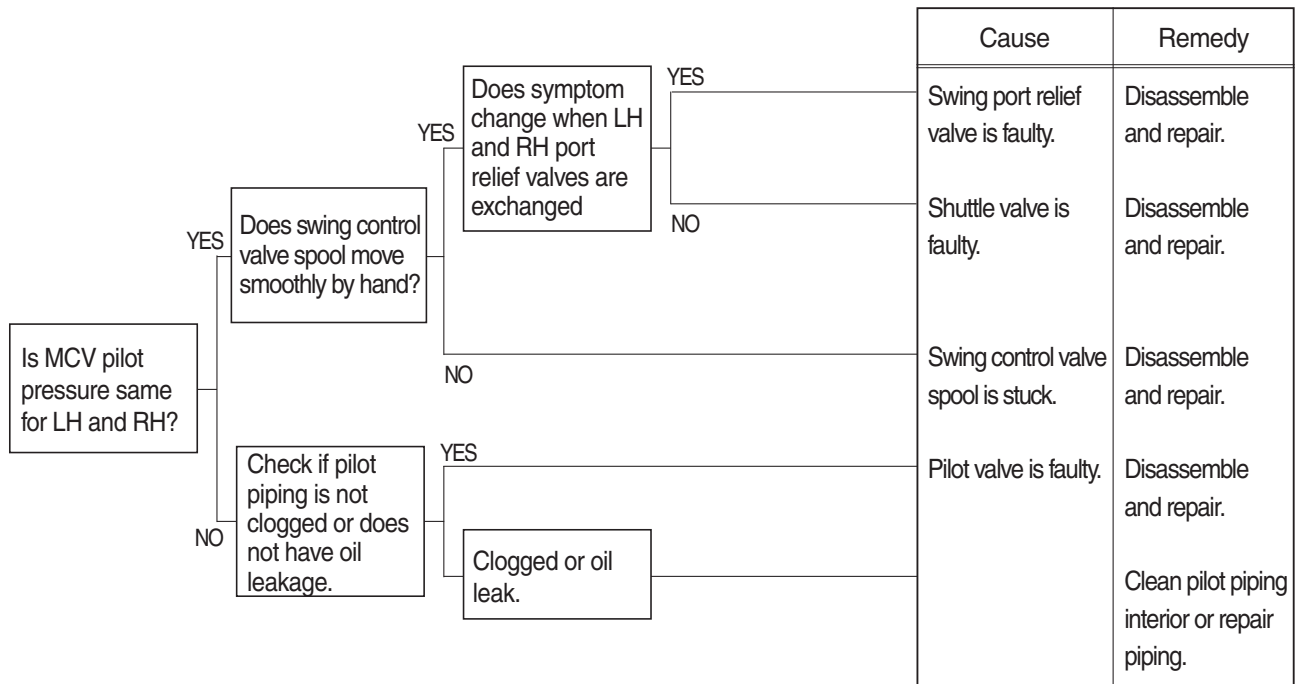
1) BOTH LH AND RH SWING ACTIONS ARE IMPOSSIBLE



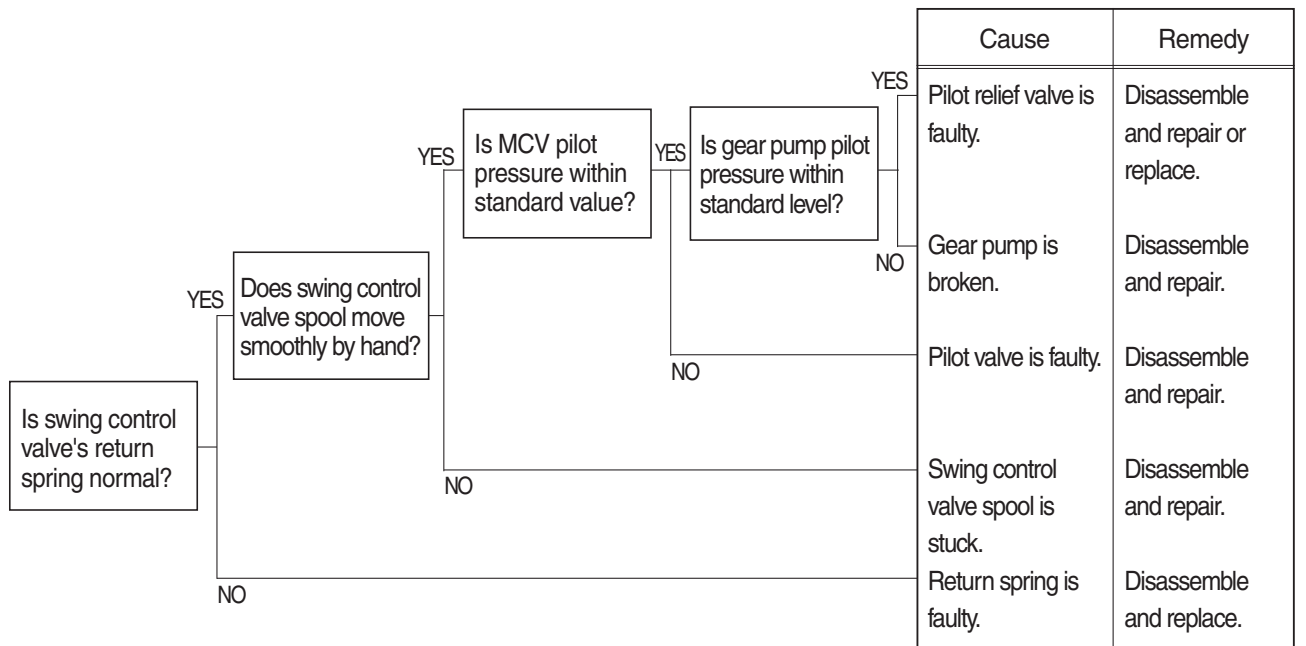
2) SWING SPEED IS LOW



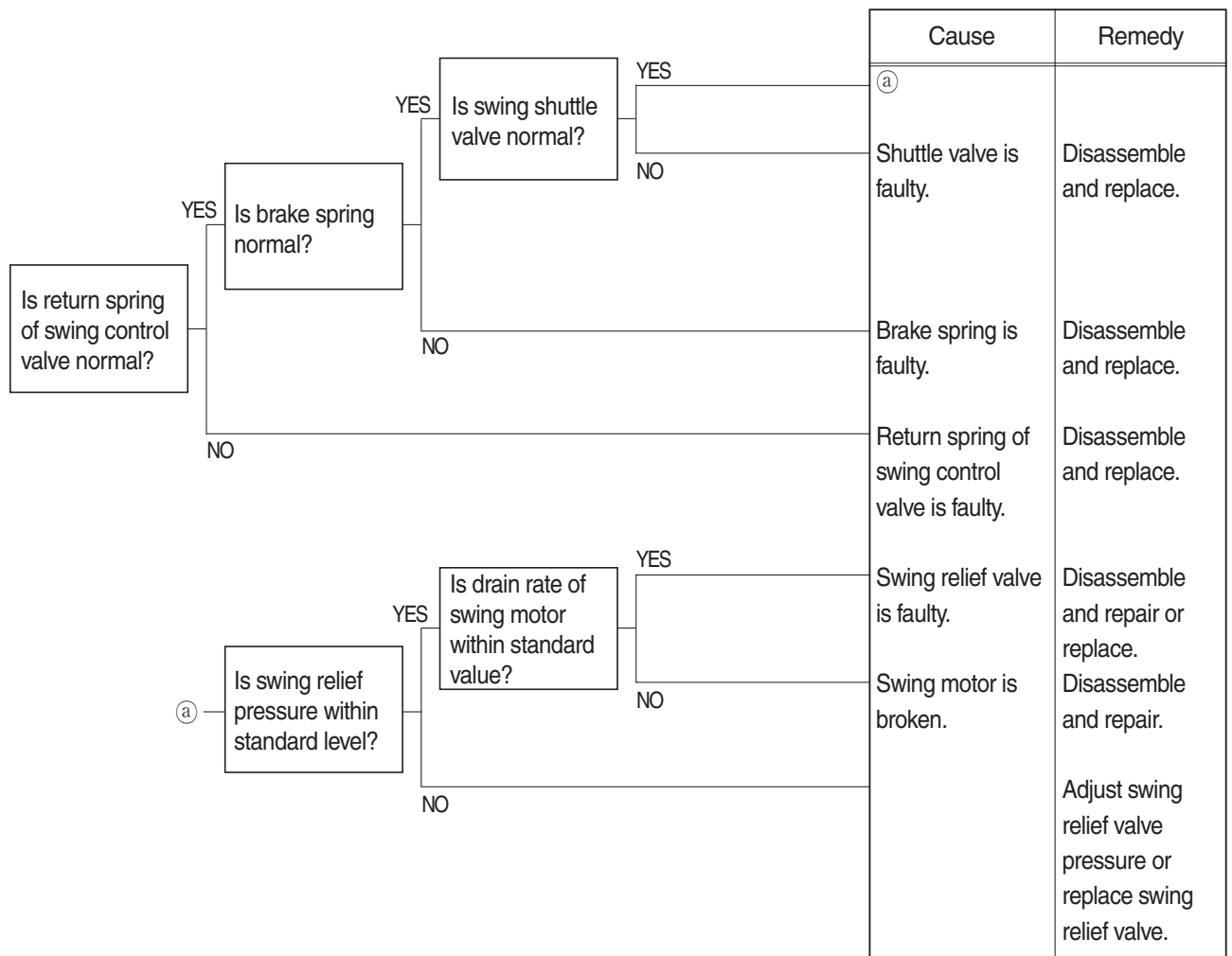
3) SWING MOTION IS IMPOSSIBLE IN ONE DIRECTION



4) MACHINE SWINGS BUT DOES NOT STOP

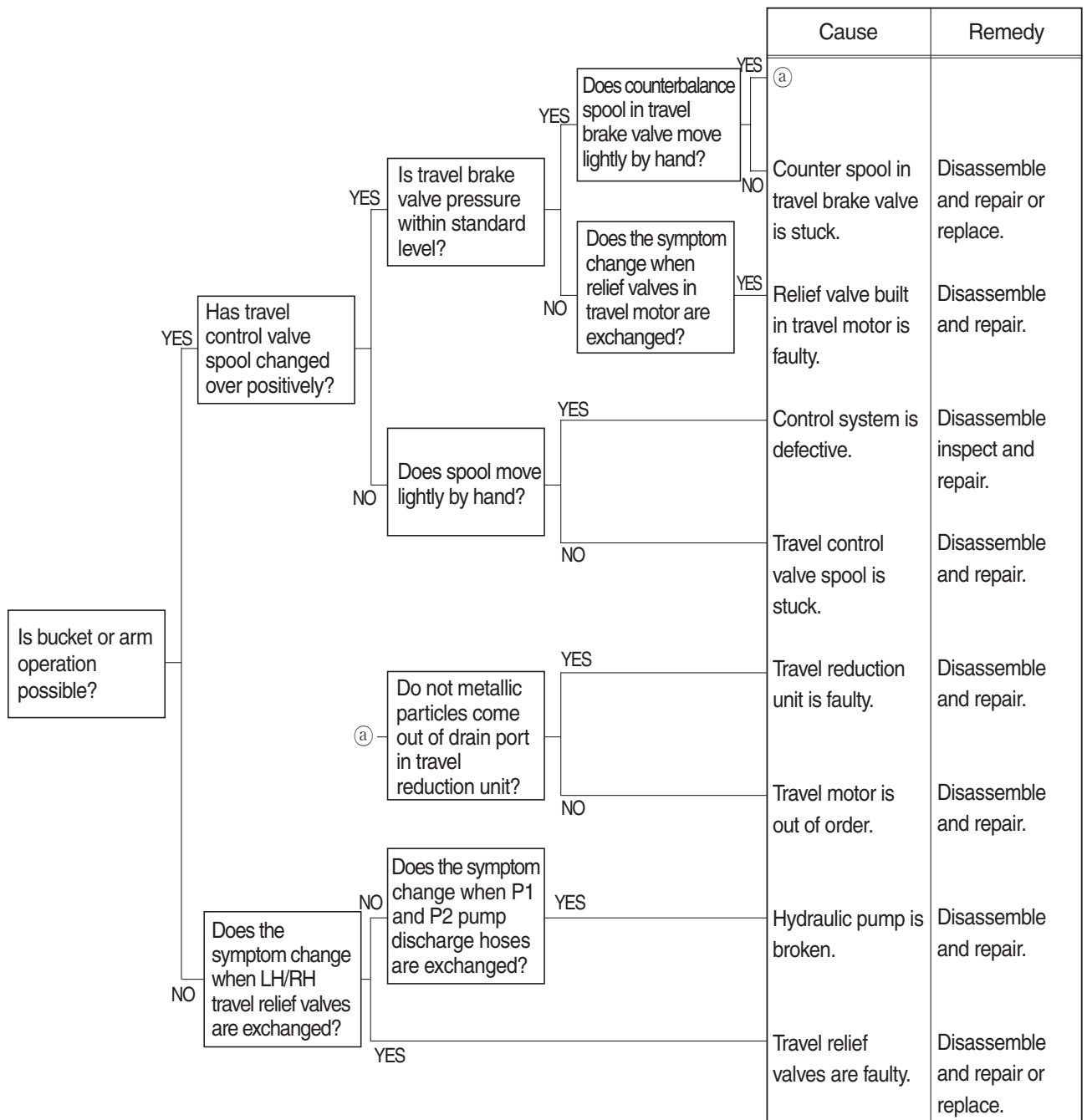


5) THE SWING UNIT DRIFTS WHEN THE MACHINE IS AT REST ON A SLOPE

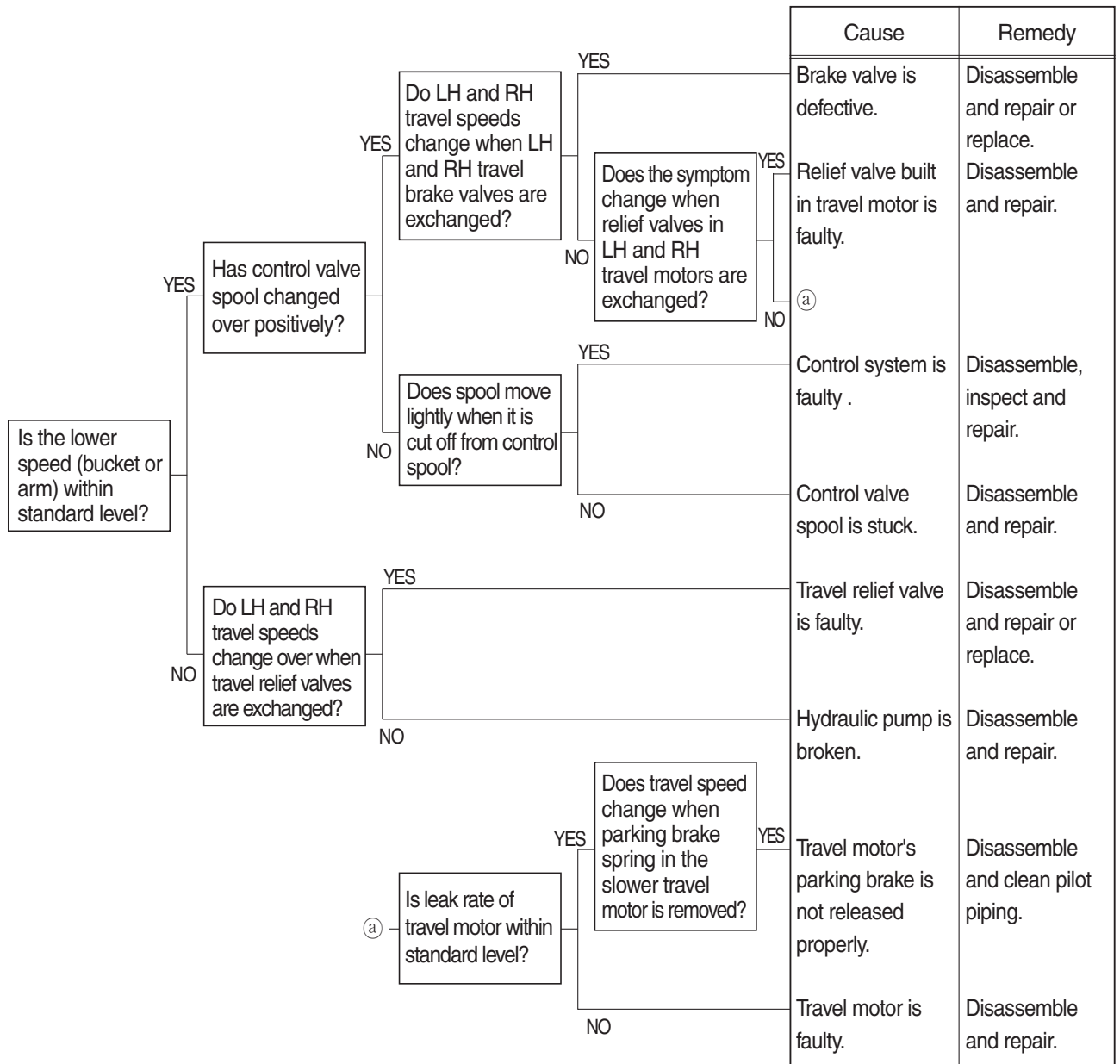


5. TRAVEL SYSTEM

1) TRAVEL DOES NOT FUNCTION AT ALL ON ONE SIDE

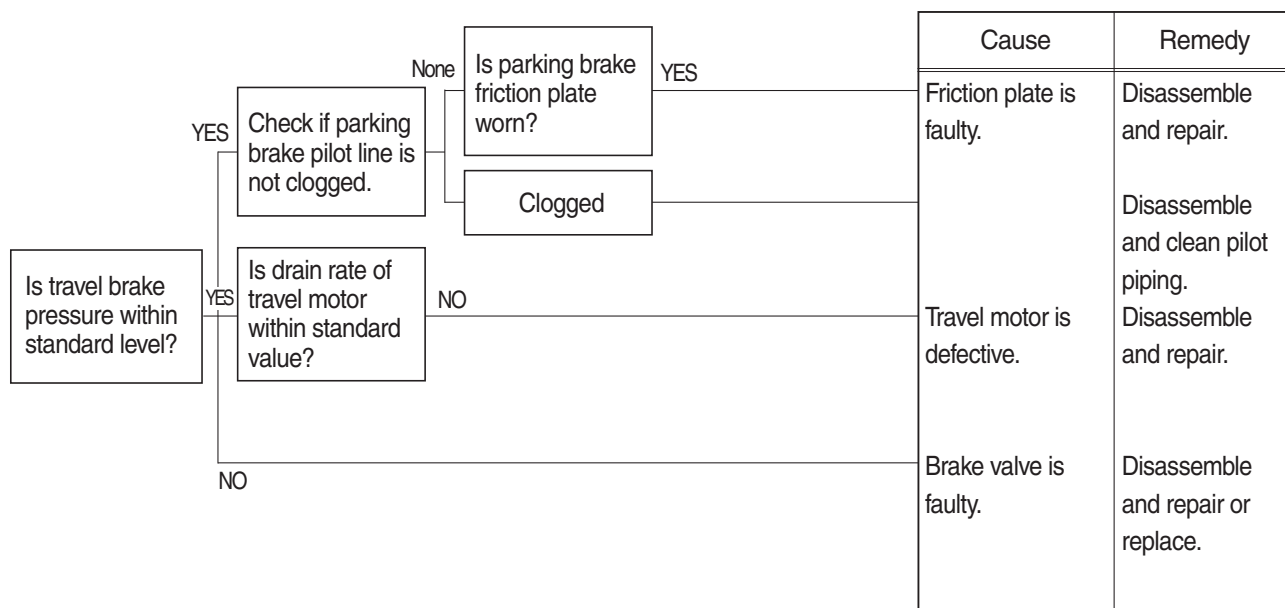


2) SPEED ON ONE SIDE FALLS AND THE MACHINE CURVES

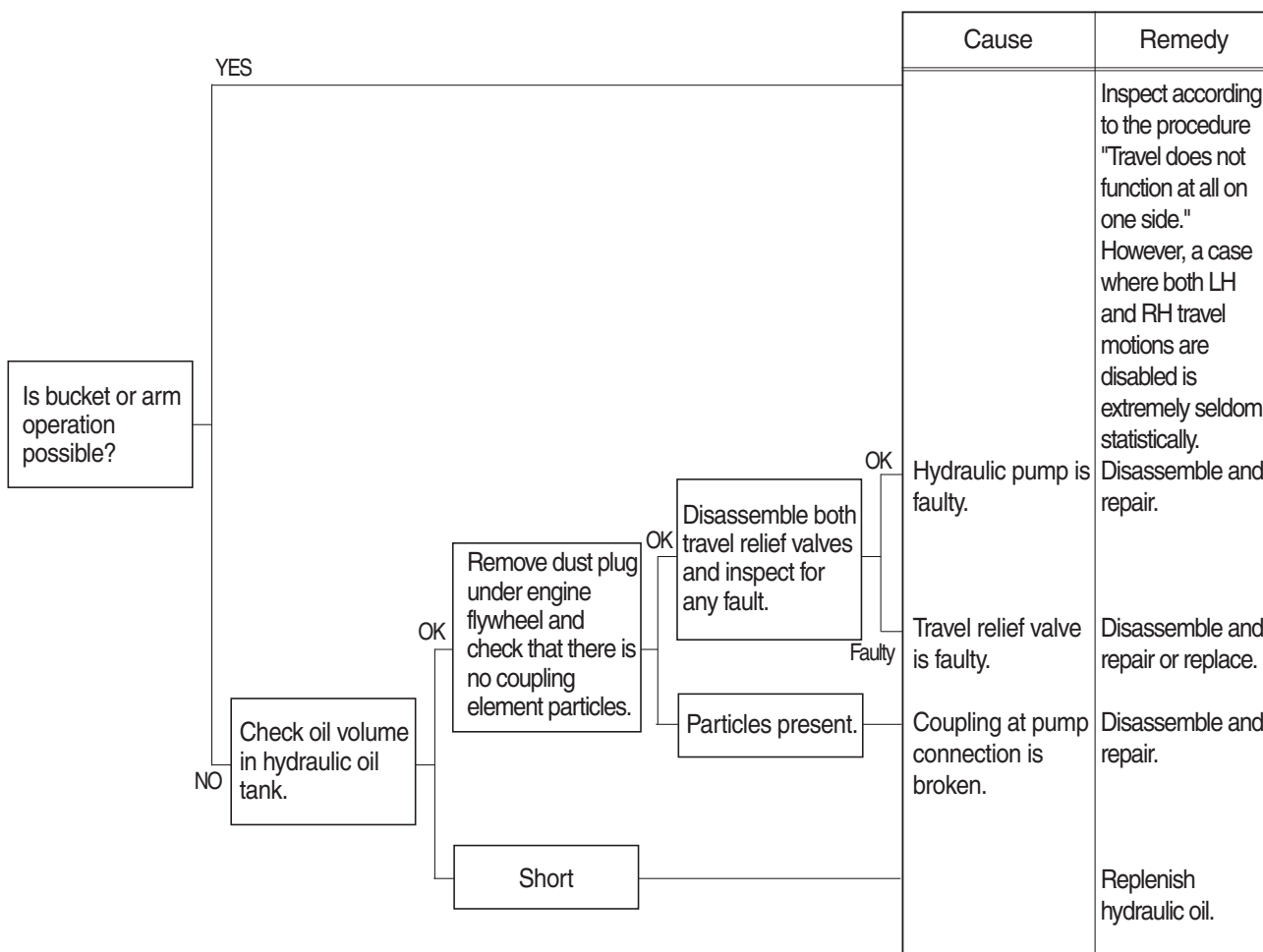


3) MACHINE DOES NOT STOP ON A SLOPE

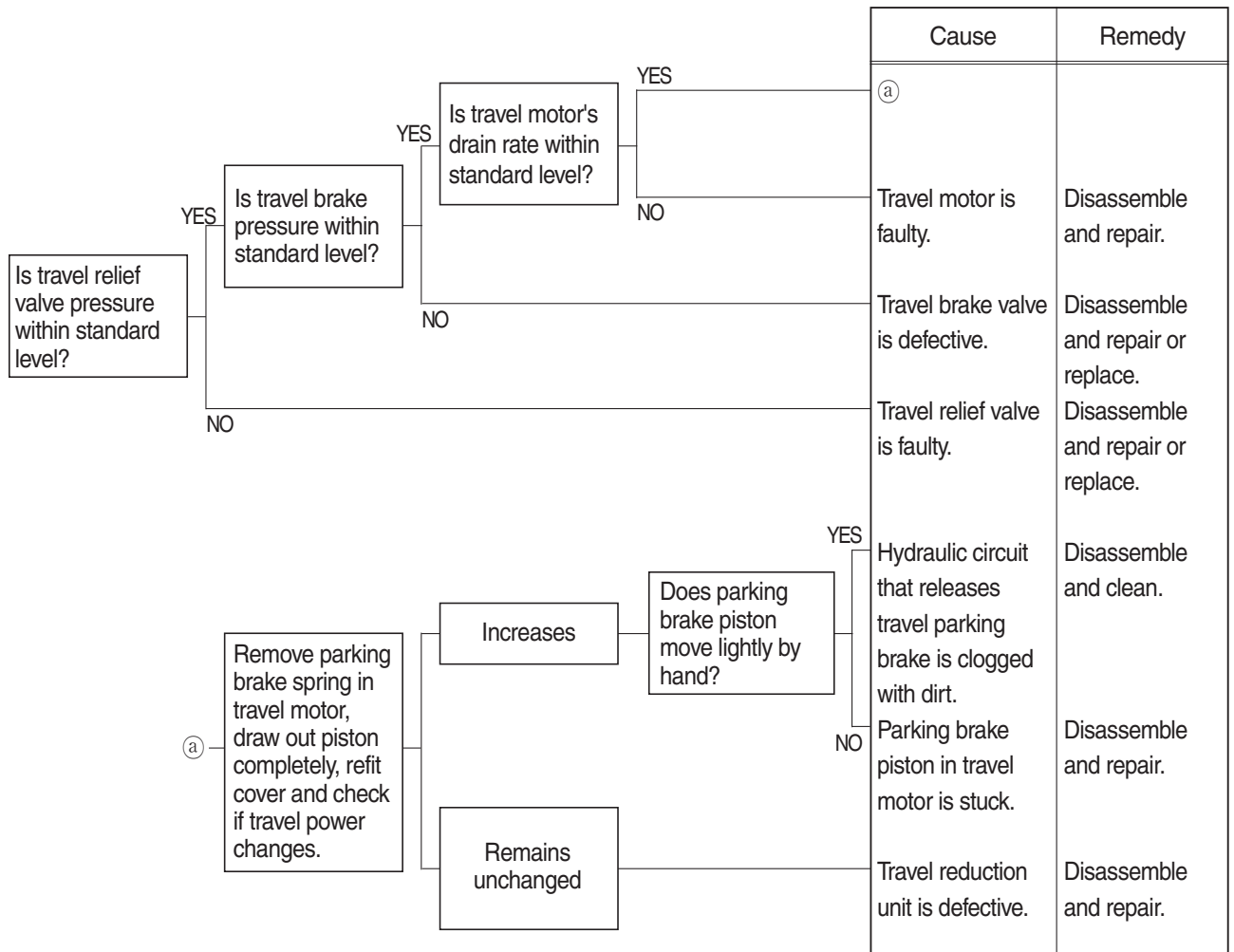
Machine is pulled forward as sprocket rotates during digging operation.



4) LH AND RH TRAVEL MOTIONS ARE IMPOSSIBLE



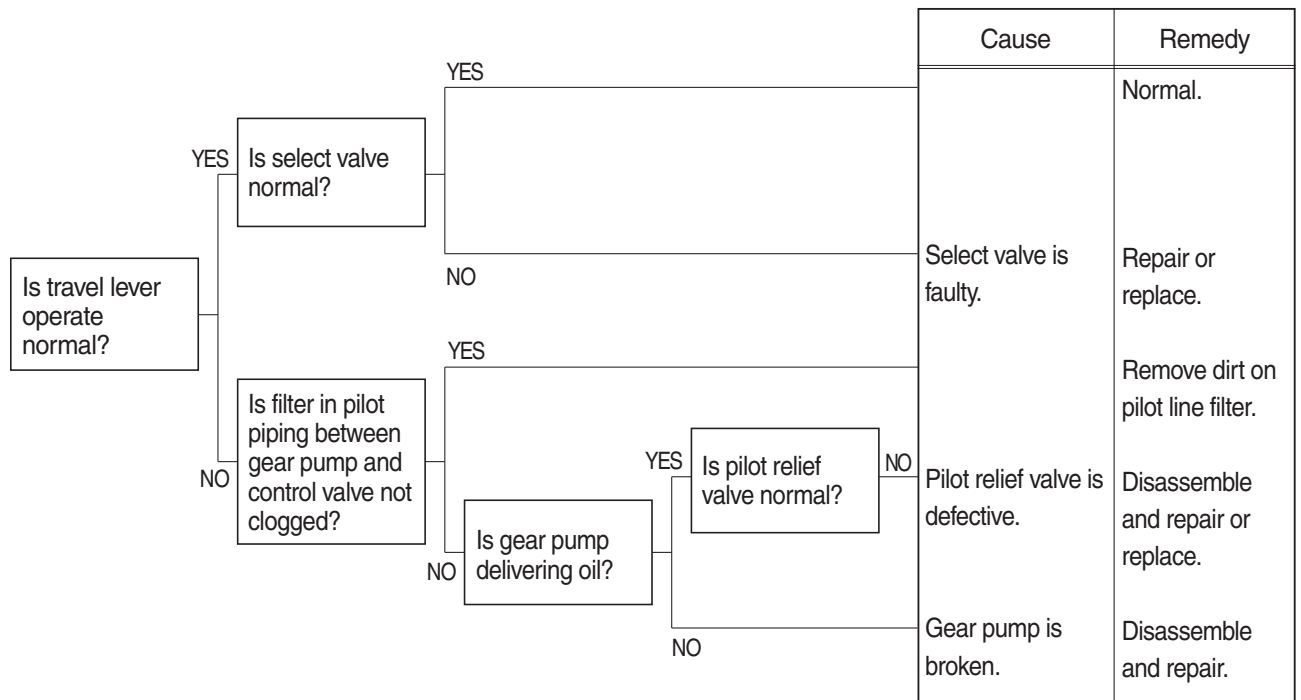
5) TRAVEL ACTION IS POWERLESS (travel only)



6) MACHINE RUNS RECKLESSLY ON A SLOPE

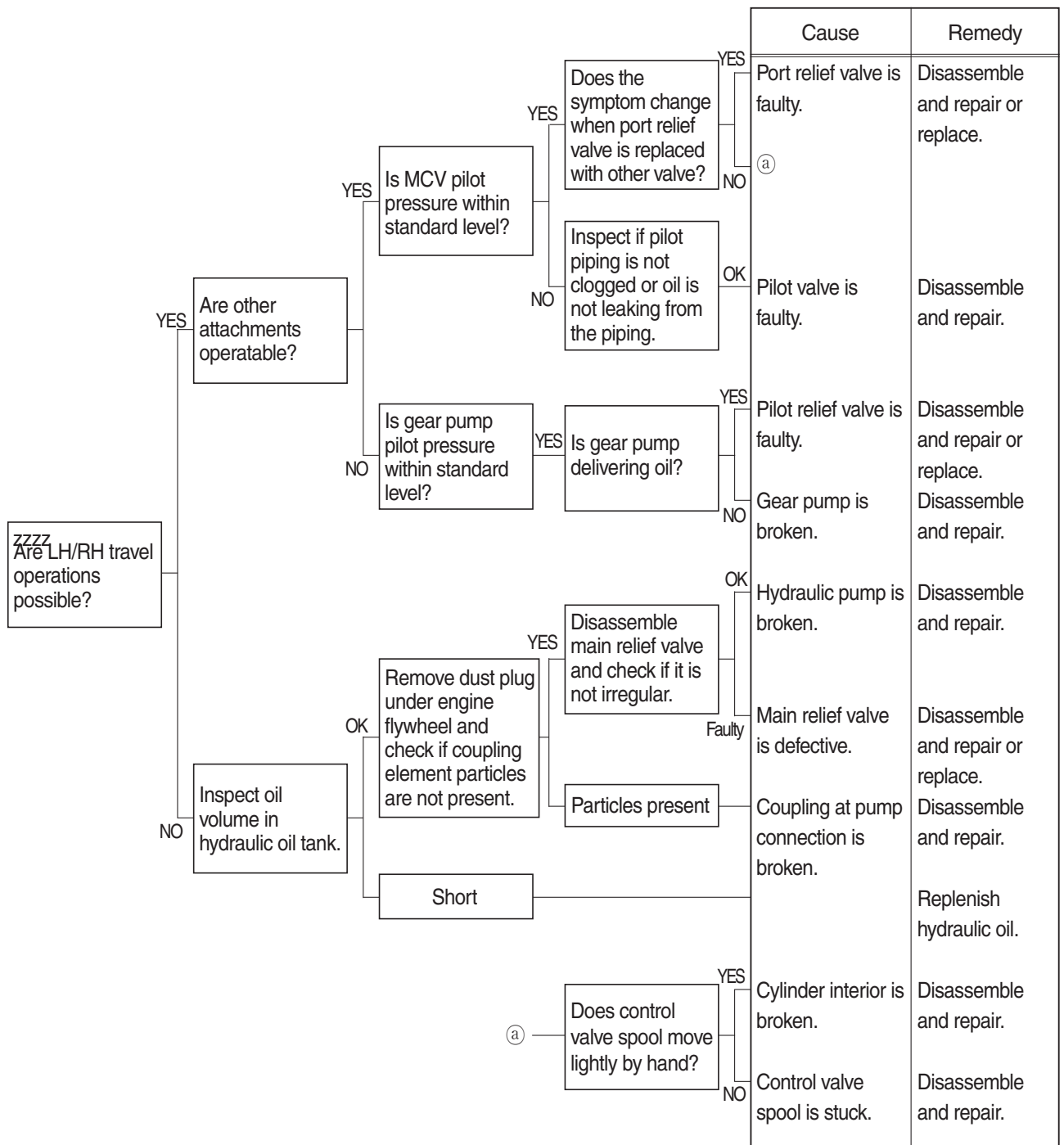


7) MACHINE MAKES A CURVED TRAVEL OR DOES NOT TRAVEL AT ALL WHEN TRAVEL AND ATTACHMENT OPERATIONS ARE EXECUTED AT THE SAME TIME

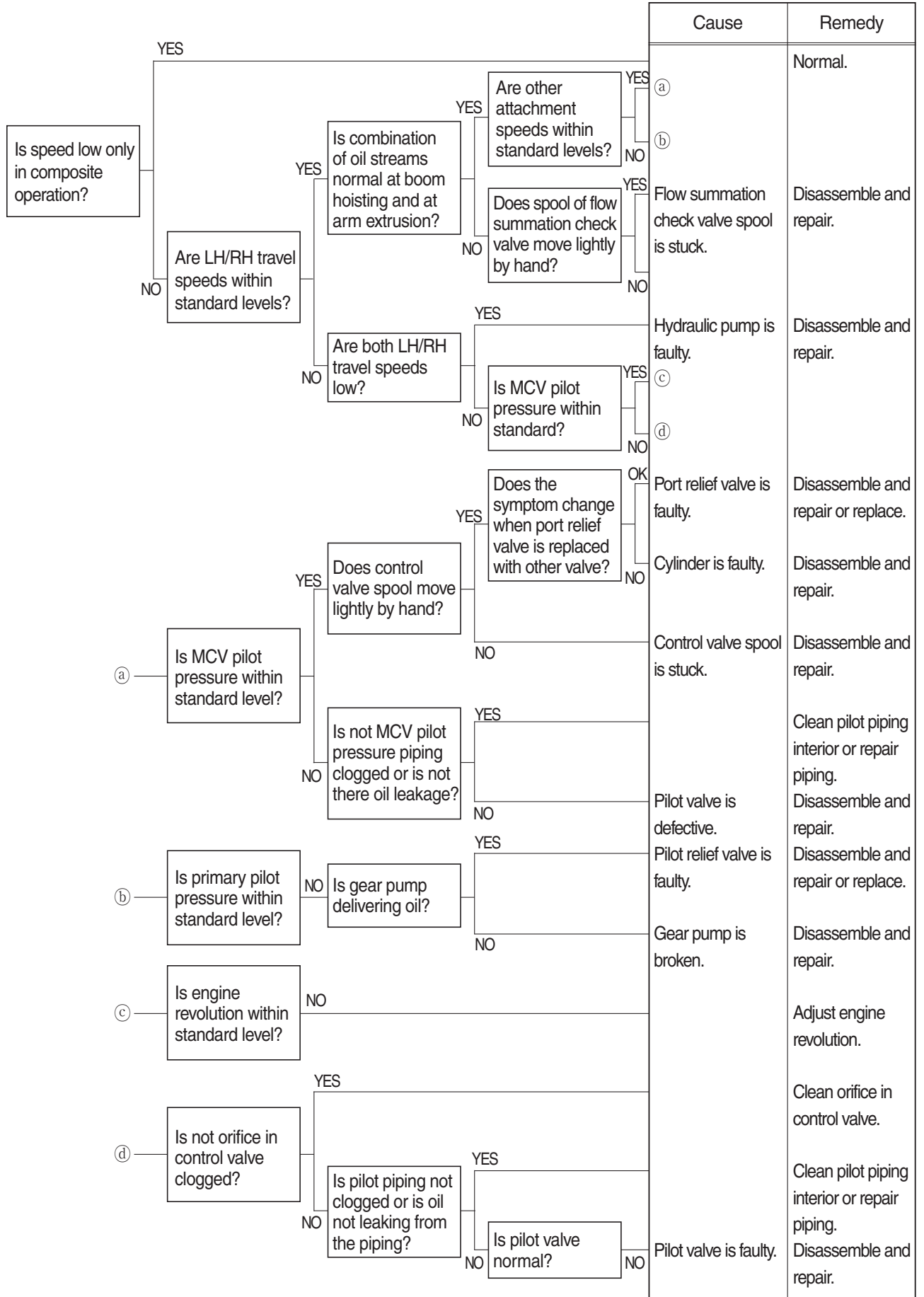


6. ATTACHMENT SYSTEM

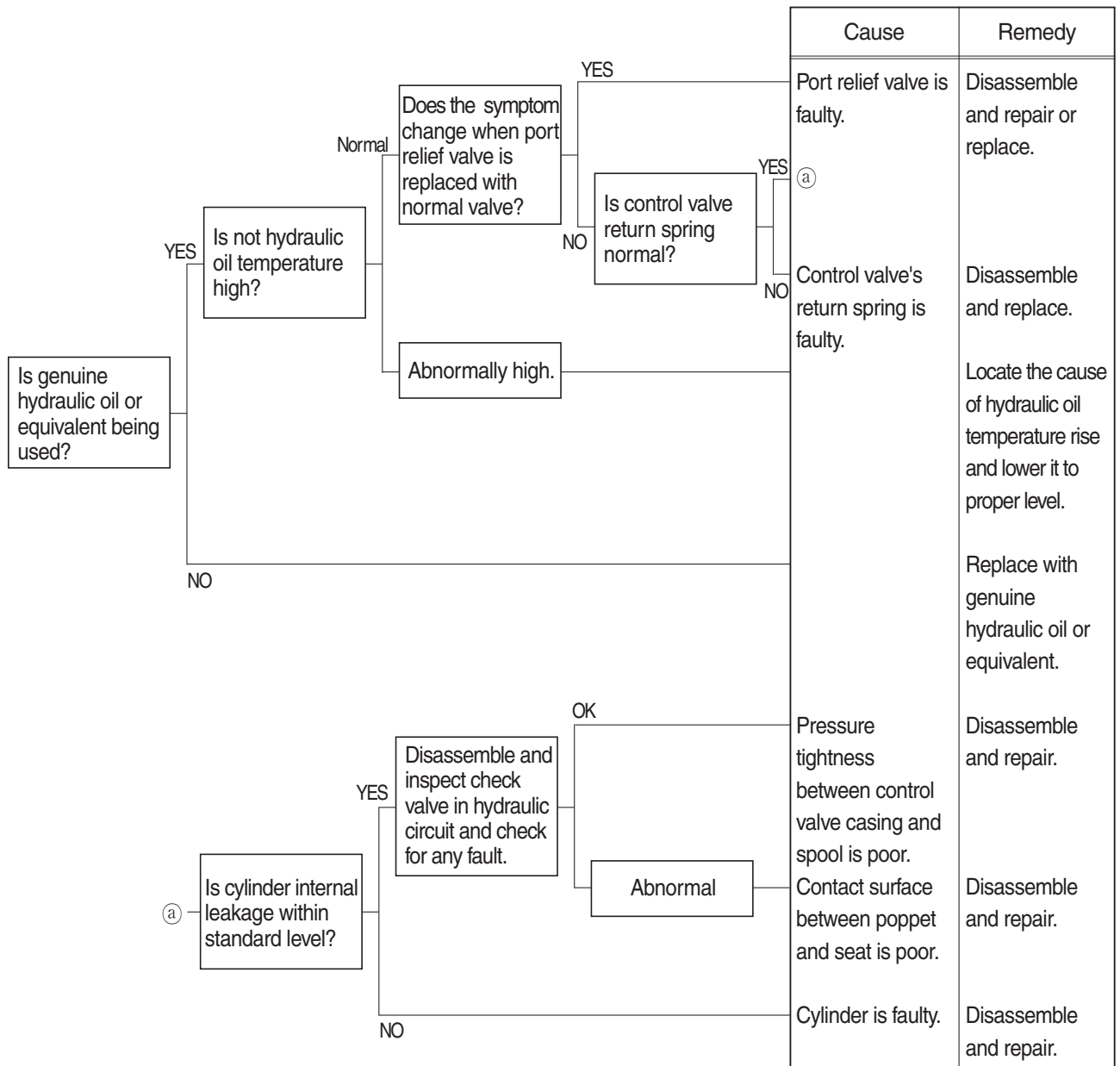
1) BOOM OR ARM ACTION IS IMPOSSIBLE AT ALL



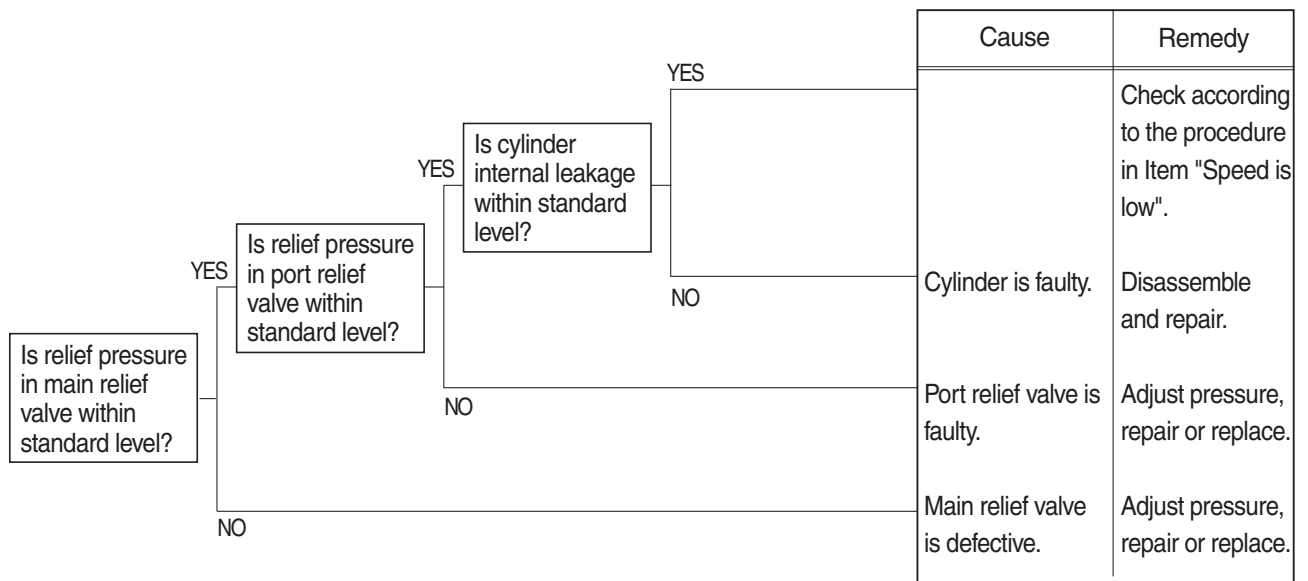
2) BOOM, ARM OR BUCKET SPEED IS LOW



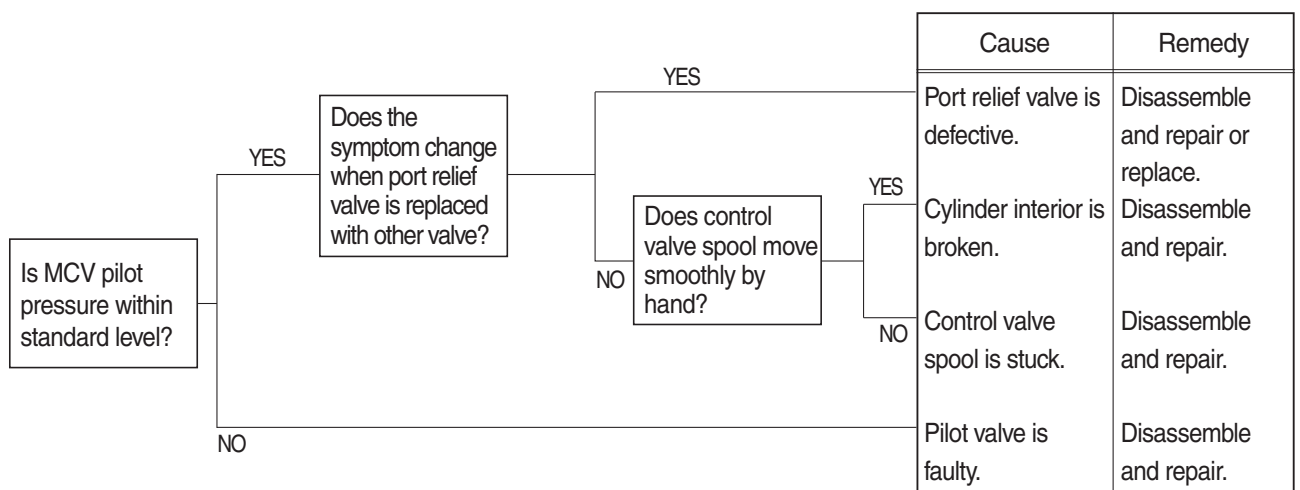
3) BOOM, ARM OR BUCKET CYLINDER EXTENDS OR CONTRACTS ITSELF AND ATTACHMENT FALLS



4) BOOM, ARM OR BUCKET POWER IS WEAK



5) ONLY BUCKET OPERATION IS TOTALLY IMPOSSIBLE

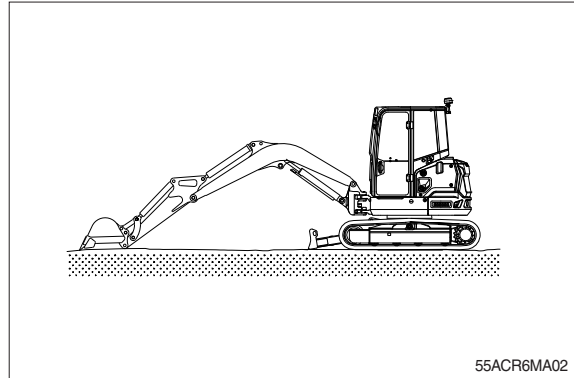


6) BOOM MAKES A SQUEAKING NOISE WHEN BOOM IS OPERATED

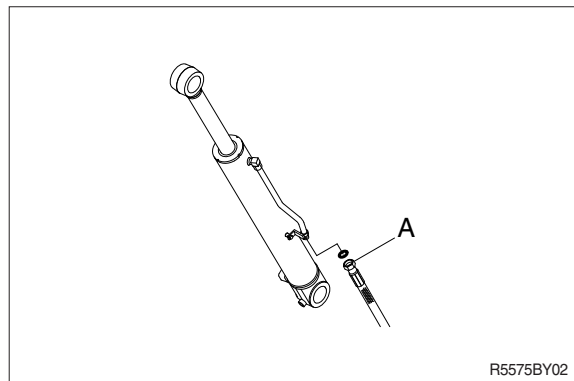
Is boom foot pin greased sufficiently? YES NO		Cause	Remedy
			Frictional noise occurs between the sliding faces of boom cylinder's oil seal and boom proper. ※ Frictional noise will disappear if they are kept used.
		Boom foot pin has run out of grease.	Supply grease to it. ※ If seizure is in an initial stage, supply sufficient grease. If seizure is in a grown state, correct it by paper lapping or with an oil stone.

※ HOW TO CHECK INTERNAL BOOM CYLINDER LEAKAGE

1. Lower the bucket teeth to the ground with bucket cylinder fully retracted and arm cylinder rod retracted almost in full.



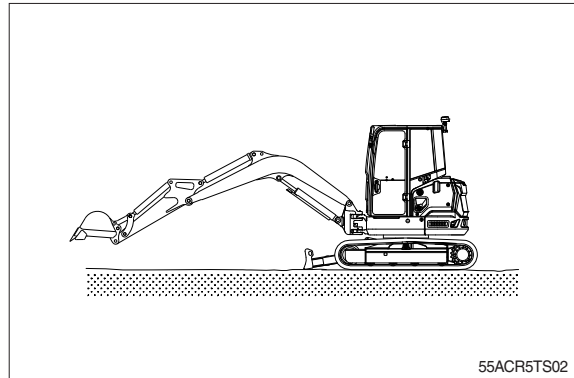
2. Disconnect hose (A) from rod side of boom cylinder and drain oil from cylinders and hose. (put cups on piping and hose ends)



3. Raise bucket OFF the ground by retracting the arm cylinder rod.

If oil leaks from piping side and boom cylinder rod is retracted there is an internal leak in the cylinder.

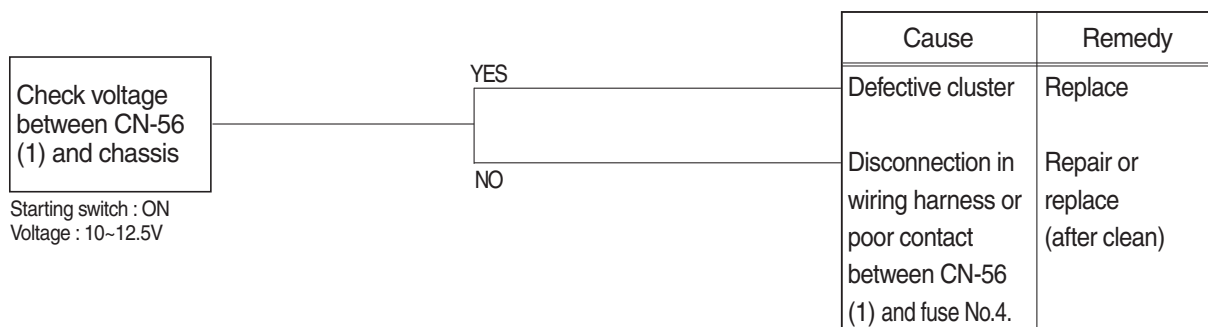
If no oil leaks from piping side and boom cylinder rod is retracted, there is an internal leak in the control valve.



GROUP 3 ELECTRICAL SYSTEM

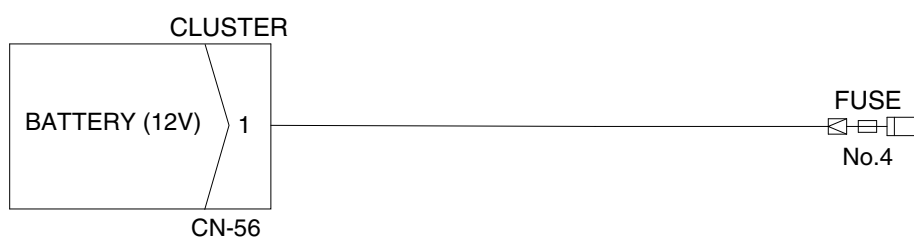
1. WHEN STARTING SWITCH IS TURNED ON, MONITOR PANEL DISPLAY DOES NOT APPEAR

- Before disconnecting the connector, always turn the starting switch OFF.
- Before carrying out below procedure, check all the related connectors are properly inserted and short of fuse No. 4.
- After checking, insert the disconnected connectors again immediately unless otherwise specified.



Check voltage

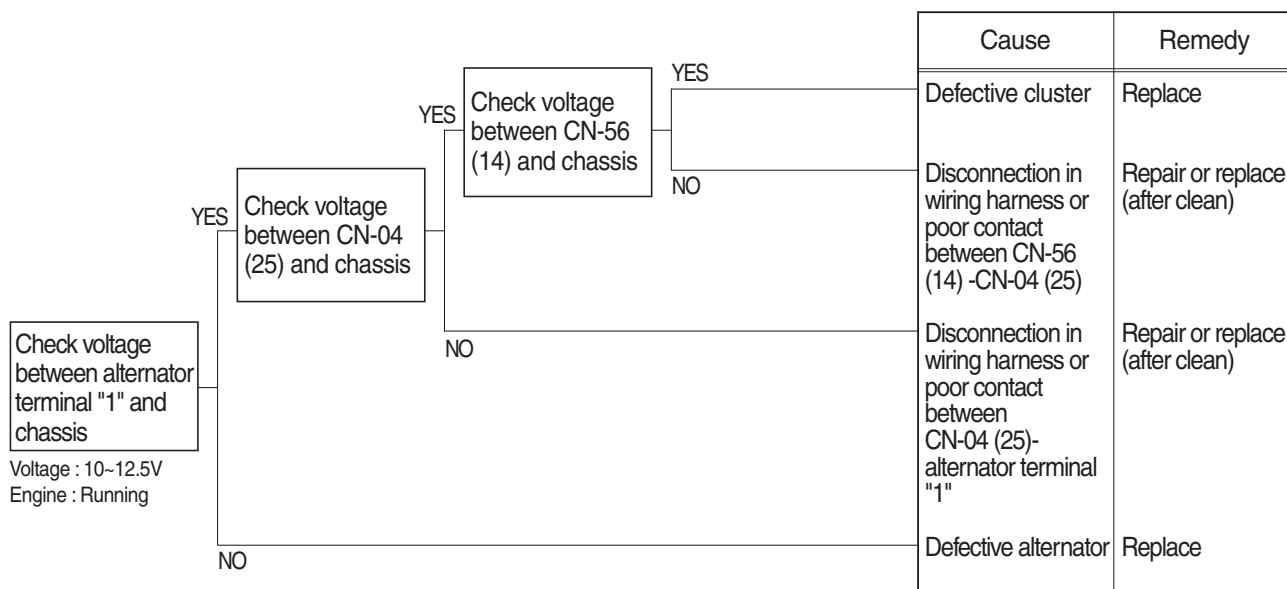
YES	10 ~ 12.5V
NO	0V



35AZ5TS10

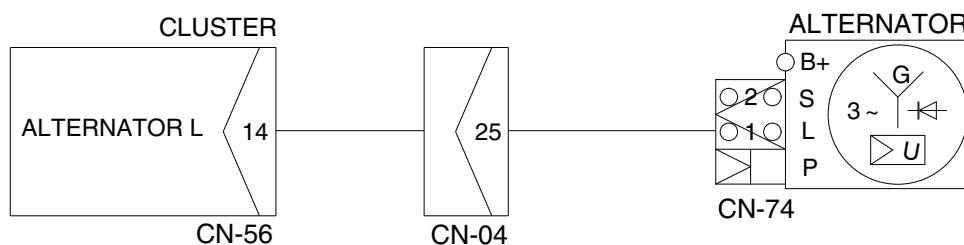
2. BATTERY CHARGING WARNING LAMP LIGHTS UP (starting switch : ON)

- Before disconnecting the connector, always turn the starting switch OFF.
- Before carrying out below procedure, check all the related connectors are properly inserted.
- After checking, insert the disconnected connectors again immediately unless otherwise specified.



Check voltage

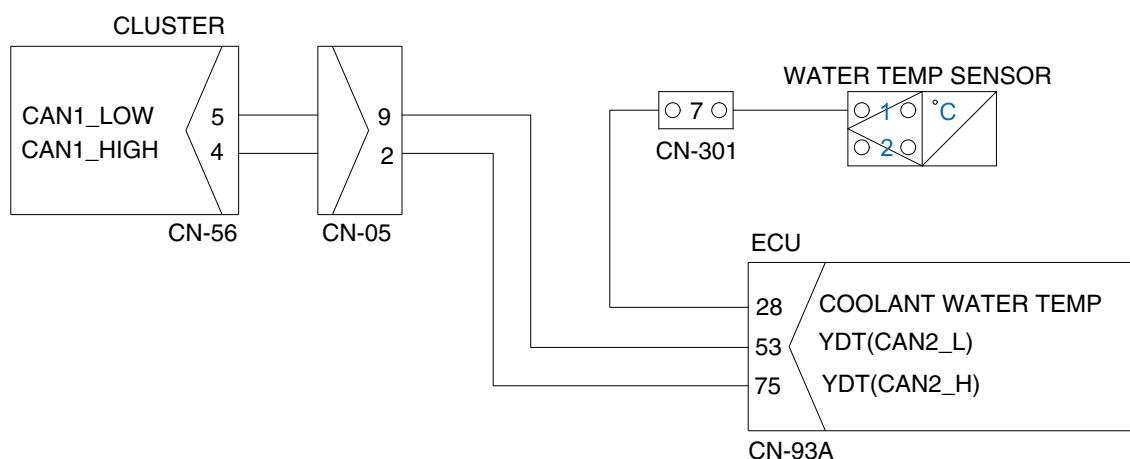
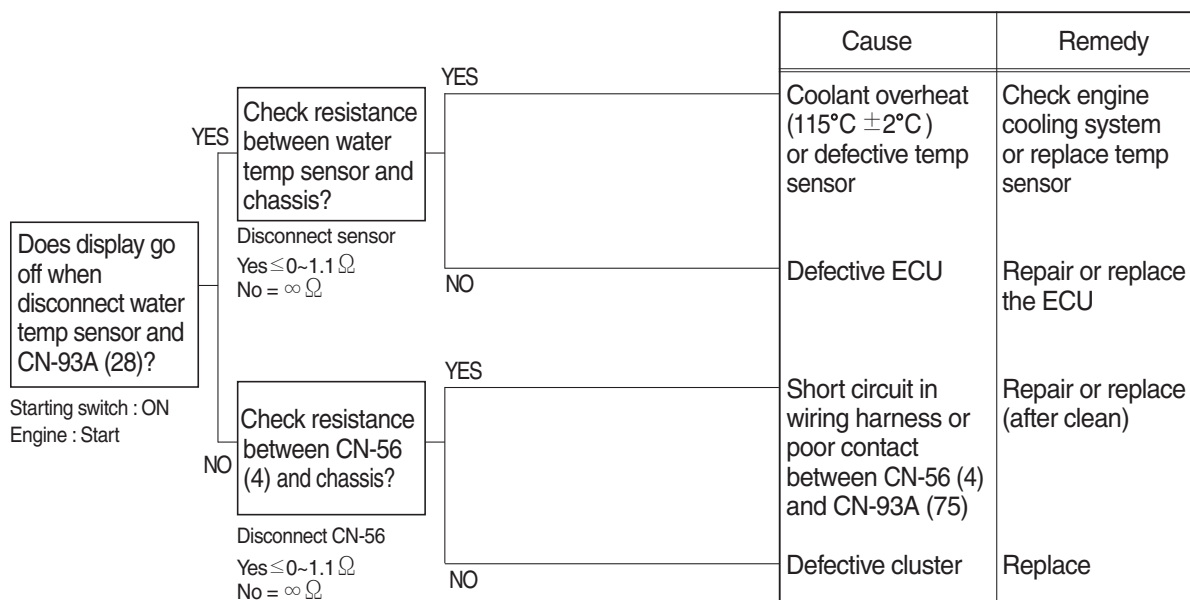
YES	10 ~ 12.5V
NO	0V



48AZ5TS11

3. WHEN COOLANT OVERHEAT WARNING LAMP LIGHTS UP (engine is started)

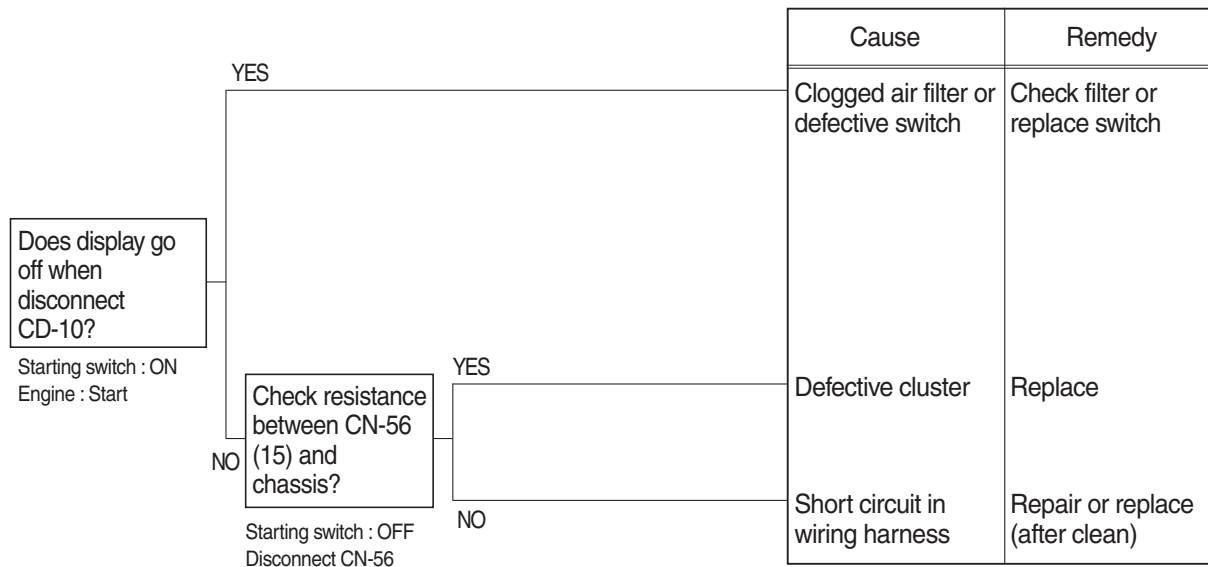
- Before disconnecting the connector, always turn the starting switch OFF.
- Before carrying out below procedure, check all the related connectors are properly inserted.
- After checking, insert the disconnected connectors again immediately unless otherwise specified.



48AZ5TS12

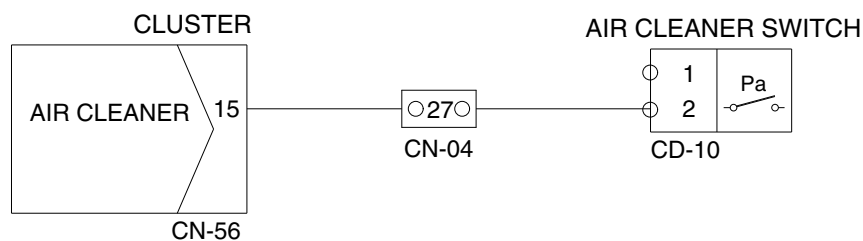
4. WHEN AIR CLEANER WARNING LAMP LIGHTS UP (engine is started)

- Before disconnecting the connector, always turn the starting switch OFF.
- Before carrying out below procedure, check all the related connectors are properly inserted.
- After checking, insert the disconnected connectors again immediately unless otherwise specified.



Check resistance

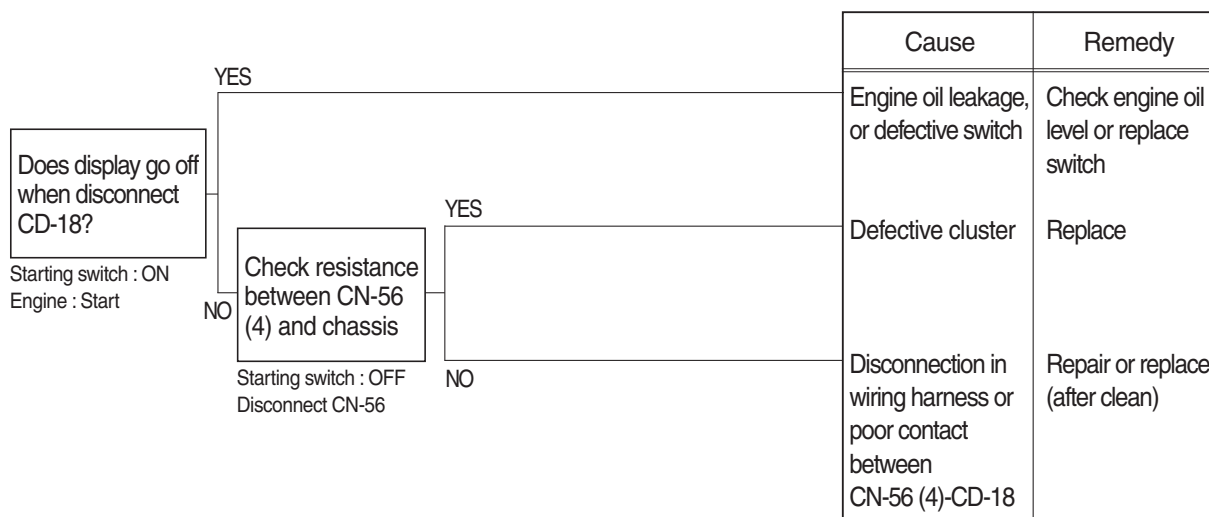
YES	MAX 1Ω
NO	MIN 1MΩ



48AZ5TS13

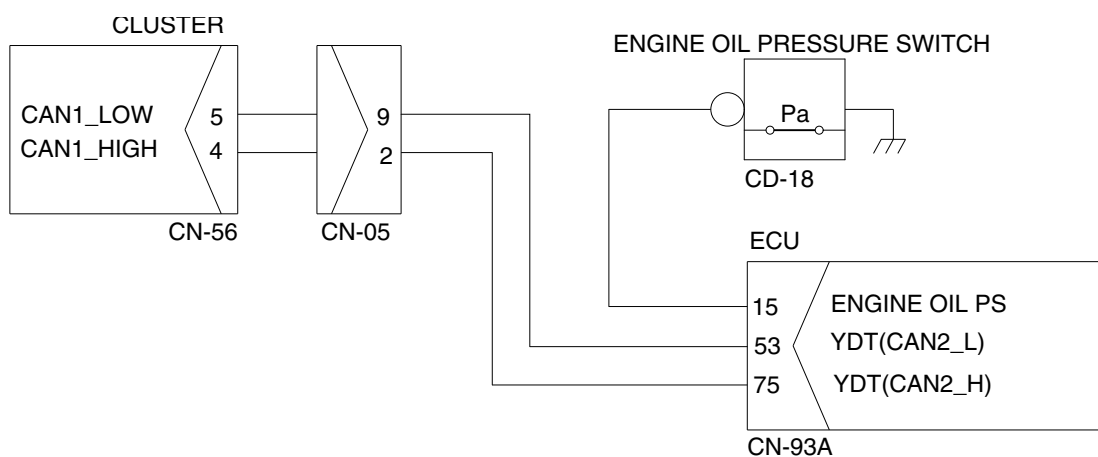
5. WHEN ENGINE OIL PRESSURE WARNING LAMP LIGHTS UP (engine is started)

- Before disconnecting the connector, always turn the starting switch OFF.
- Before carrying out below procedure, check all the related connectors are properly inserted.
- After checking, insert the disconnected connectors again immediately unless otherwise specified.



Check resistance

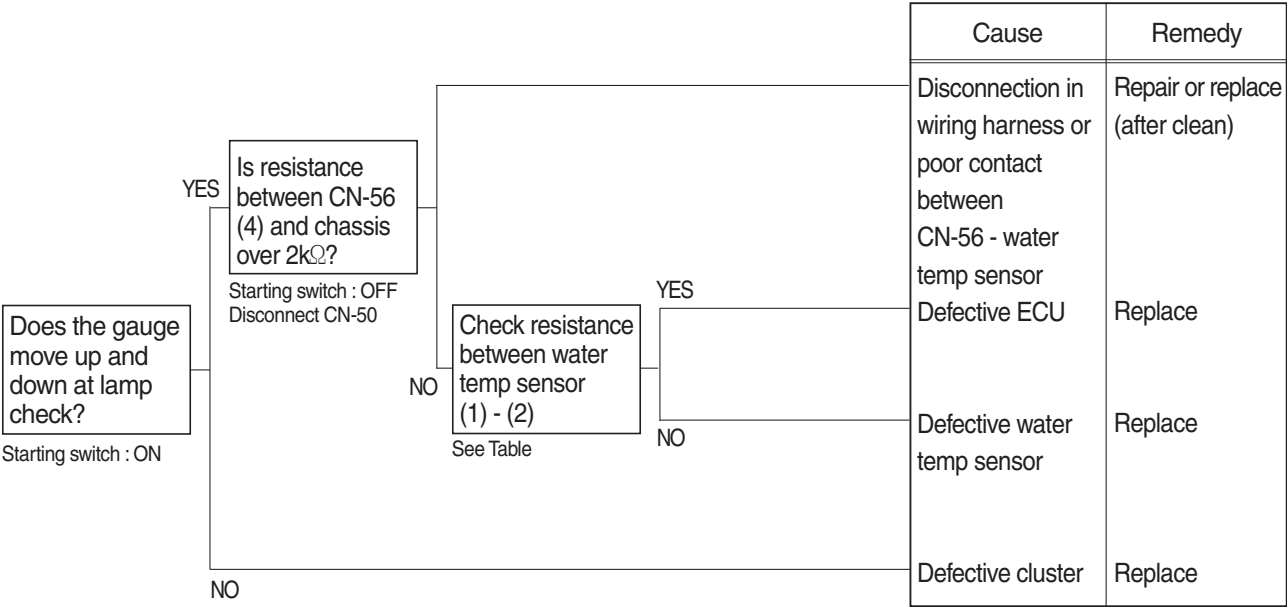
YES	MAX 1Ω
NO	MIN 1MΩ



48AZ5TS14

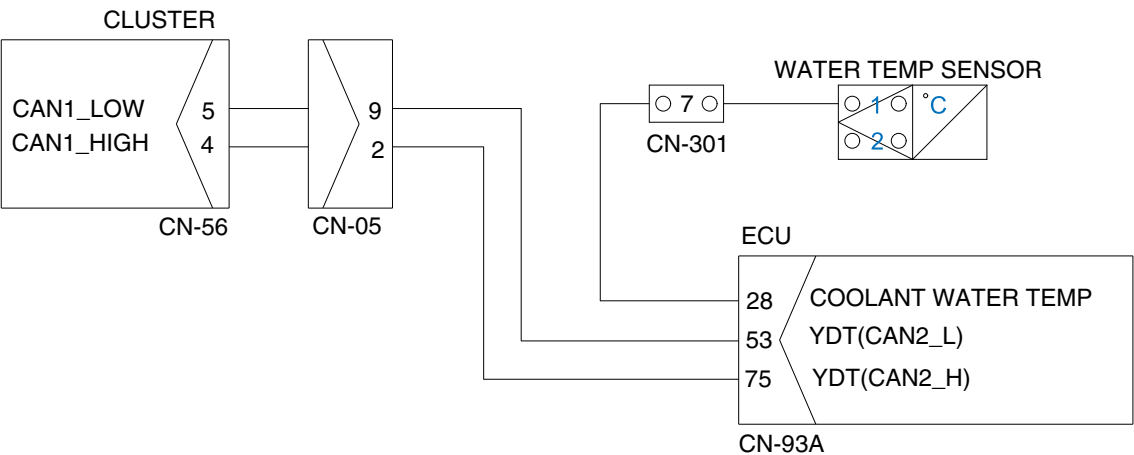
6. WHEN COOLANT TEMPERATURE GAUGE DOES NOT OPERATE

- Before disconnecting the connector, always turn the starting switch OFF.
- Before carrying out below procedure, check all the related connectors are properly inserted.
- After checking, insert the disconnected connectors again immediately unless otherwise specified.



Check Table

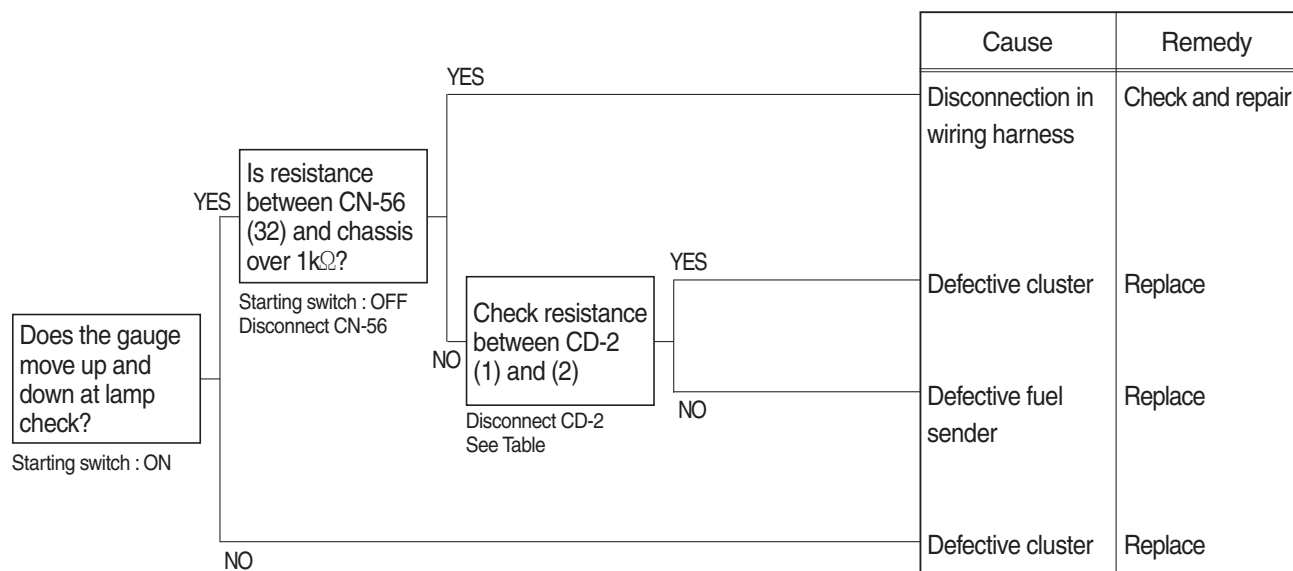
Temperature \ Item	50°C	80°C	100°C	115°C (red range)
Ω	350	118	63.5	36.2



48AZ5TS12

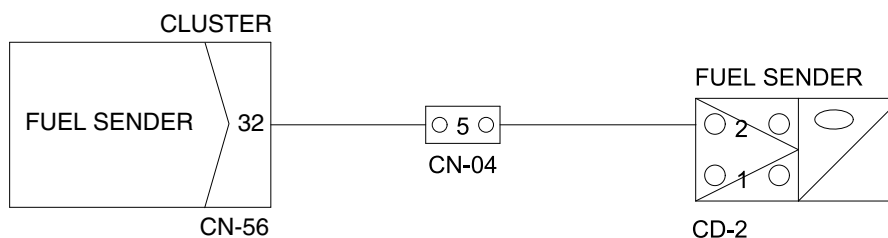
7. WHEN FUEL GAUGE DOES NOT OPERATE (check warning lamp ON/OFF)

- Before disconnecting the connector, always turn the starting switch OFF.
- Before carrying out below procedure, check all the related connectors are properly inserted.
- After checking, insert the disconnected connectors again immediately unless otherwise specified.



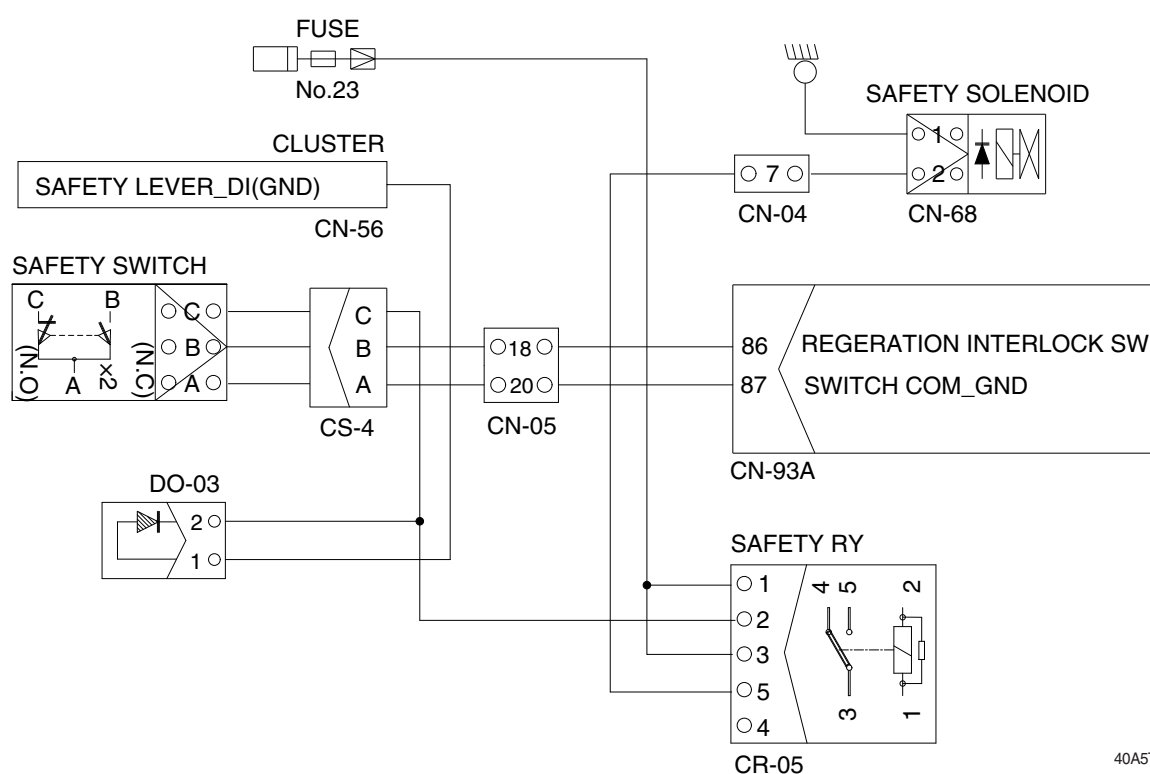
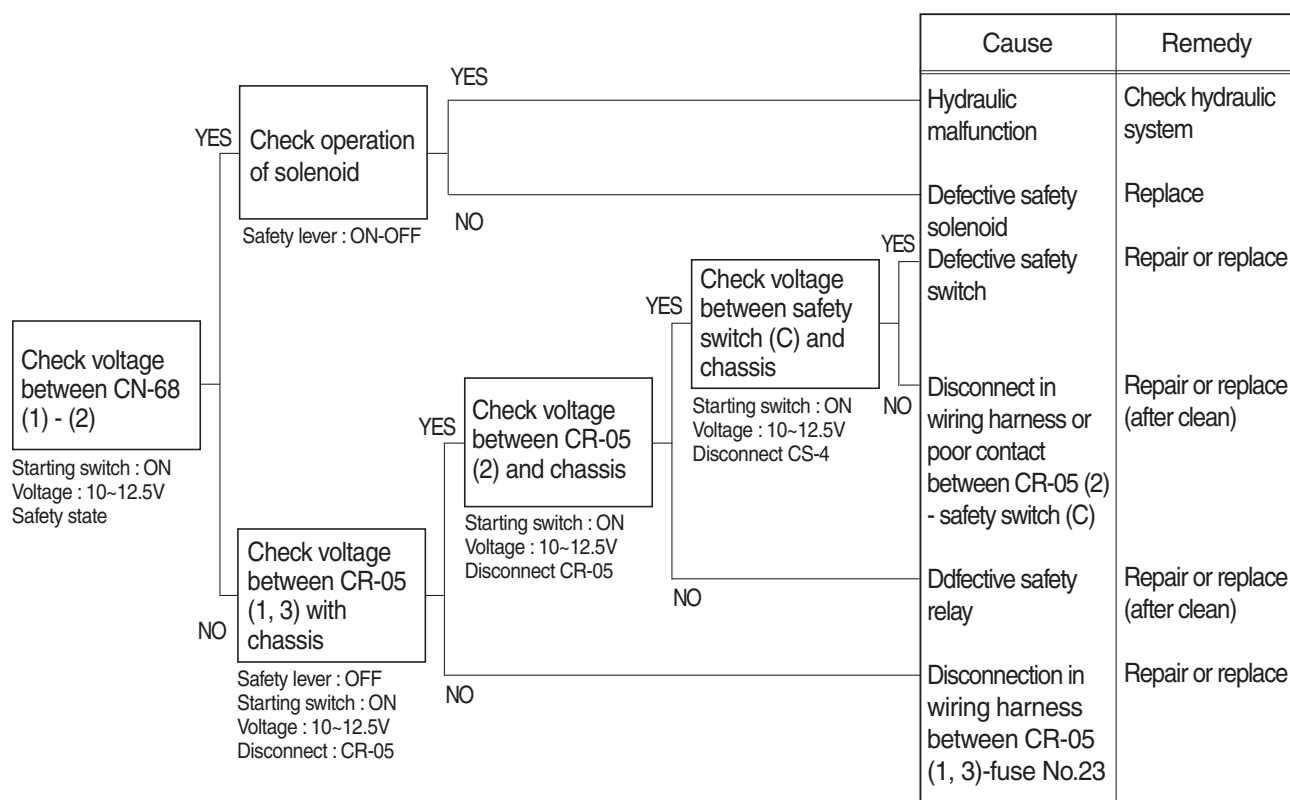
Check Table

Item	Temperature		
	Empty	1/2	Full
Unit resistance (Ω)	90	38	10



8. WHEN SAFETY SOLENOID DOES NOT OPERATE

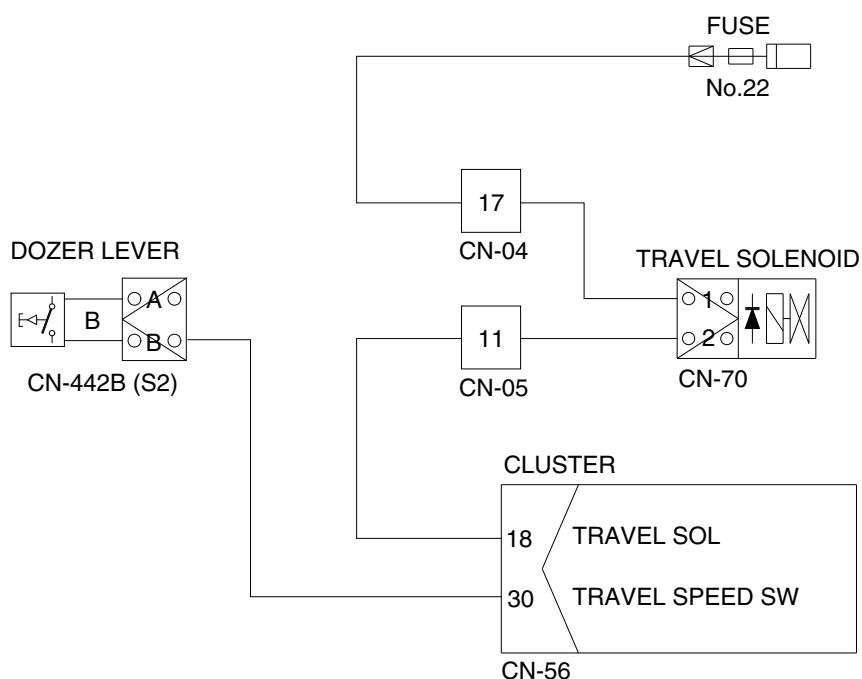
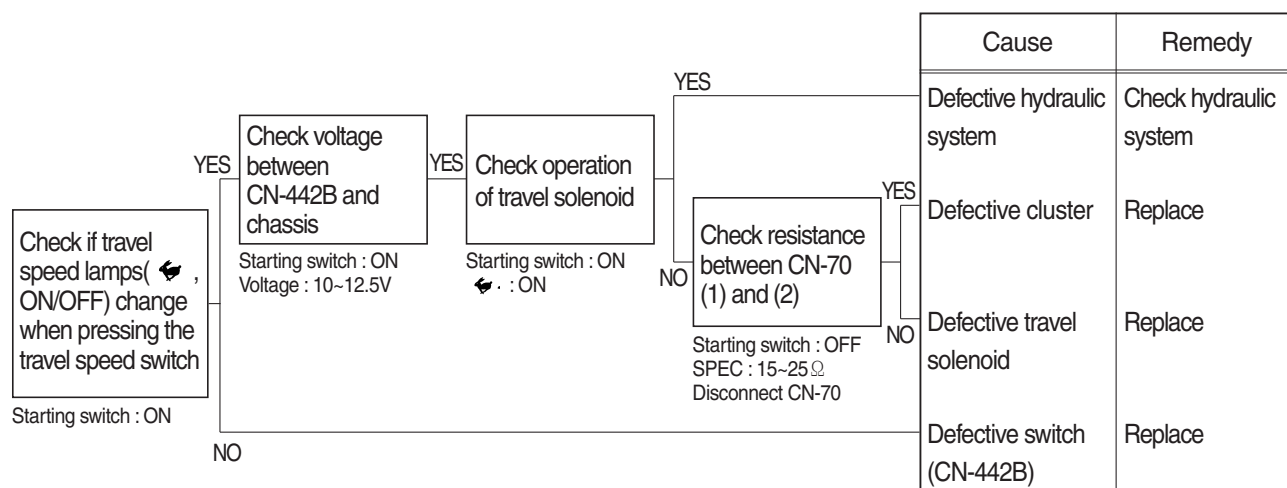
- Before disconnecting the connector, always turn the starting switch OFF.
- Before carrying out below procedure, check all the related connectors are properly inserted and short of fuse No.23.
- After checking, insert the disconnected connectors again immediately unless otherwise specified.



40A5TS17

9. WHEN TRAVEL SPEED 1, 2 DOES NOT OPERATE

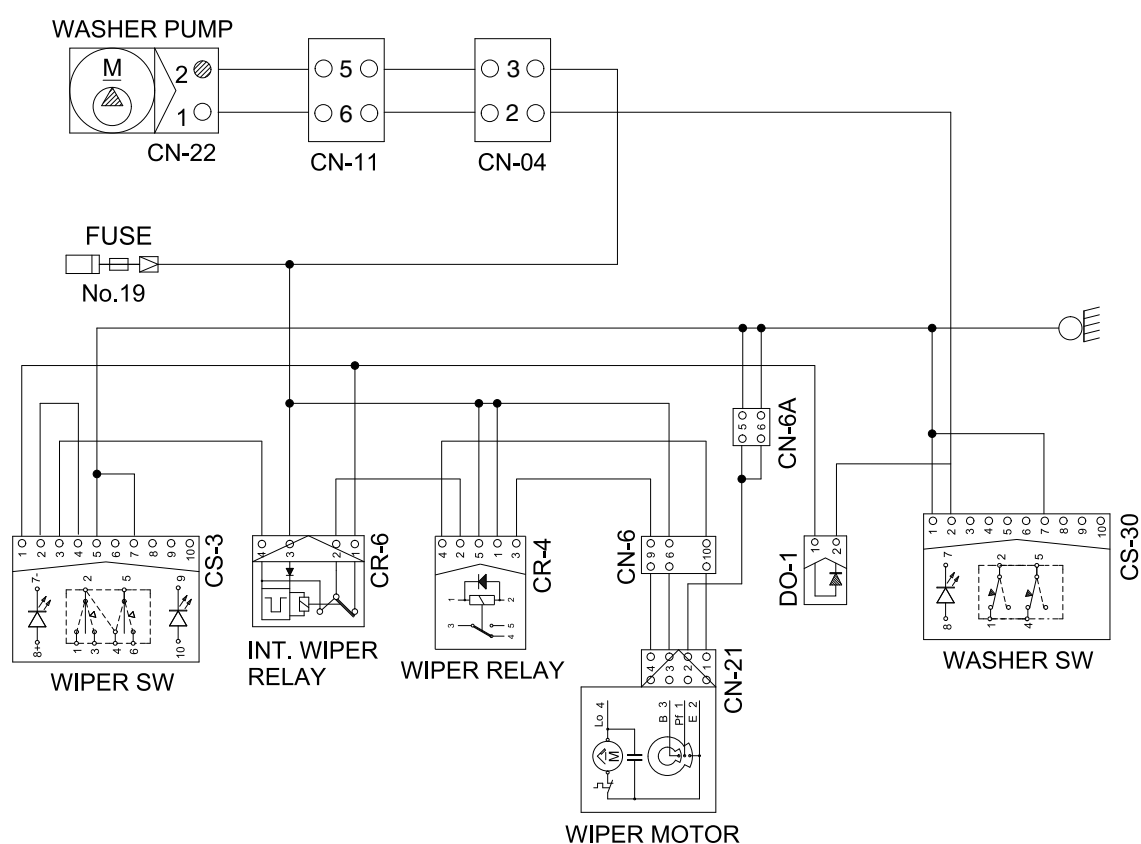
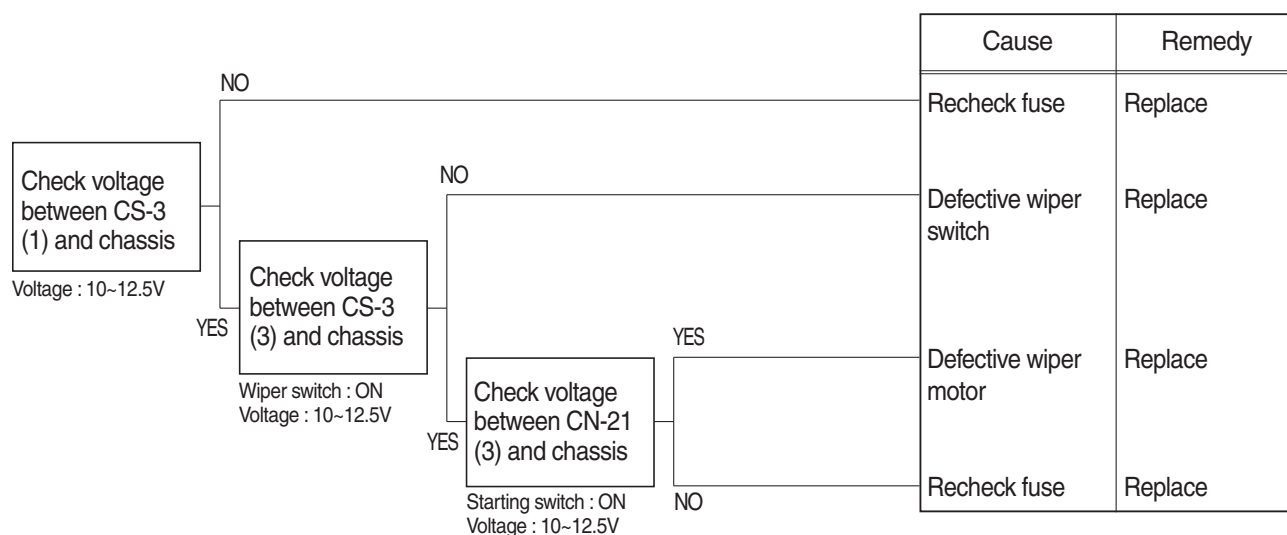
- Before disconnecting the connector, always turn the starting switch OFF.
- Before carrying out below procedure, check all the related connectors are properly inserted and short of fuse No.22 .
- After checking, insert the disconnected connectors again immediately unless otherwise specified.



48AZ5TS18

10. WHEN STARTING SWITCH IS TURNED ON, WIPER MOTOR DOES NOT OPERATE

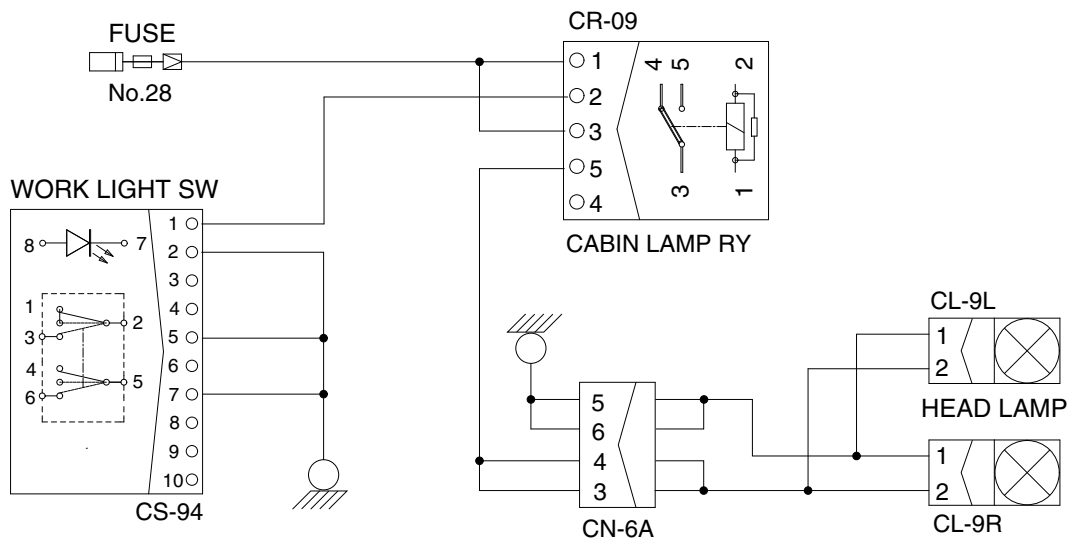
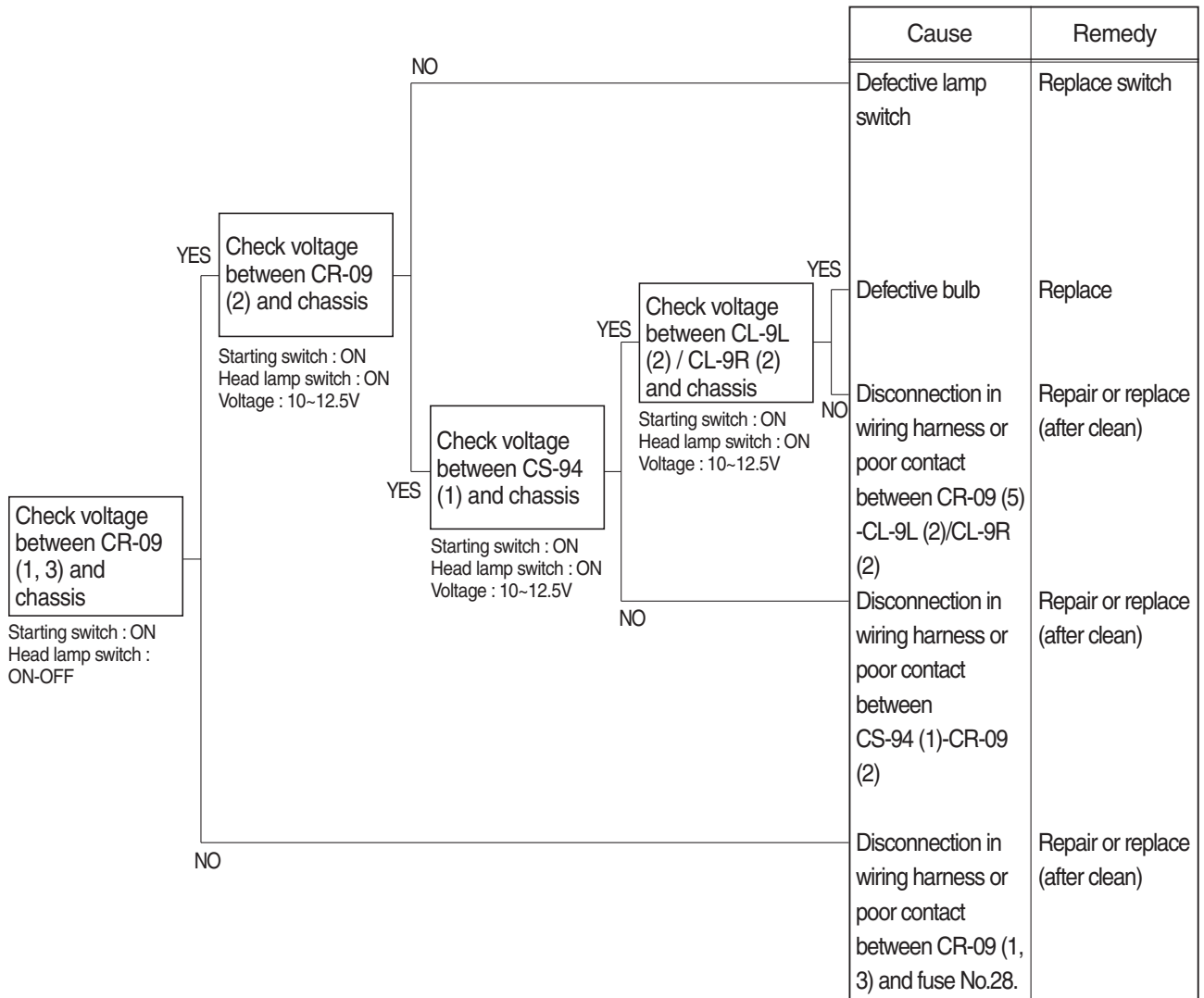
- Before disconnecting the connector, always turn the starting switch OFF.
- Before carrying out below procedure, check all the related connectors are properly inserted and the fuse No.19 is not blown out.
- After checking, insert the disconnected connectors again immediately unless otherwise specified.



48AZ5TS19

11. WHEN STARTING SWITCH IS TURNED ON, CABIN LAMP DOES NOT LIGHTS UP

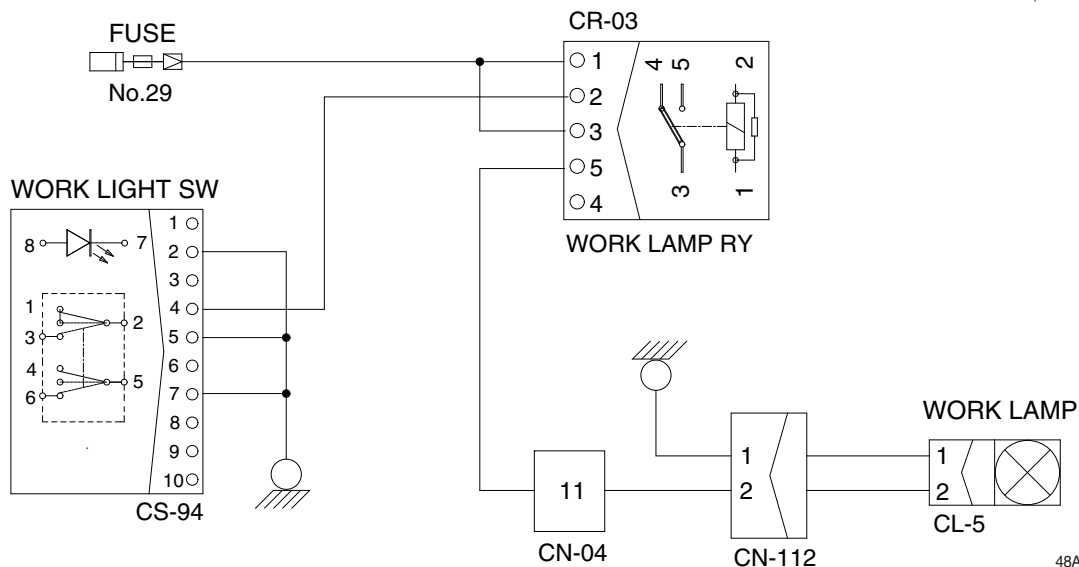
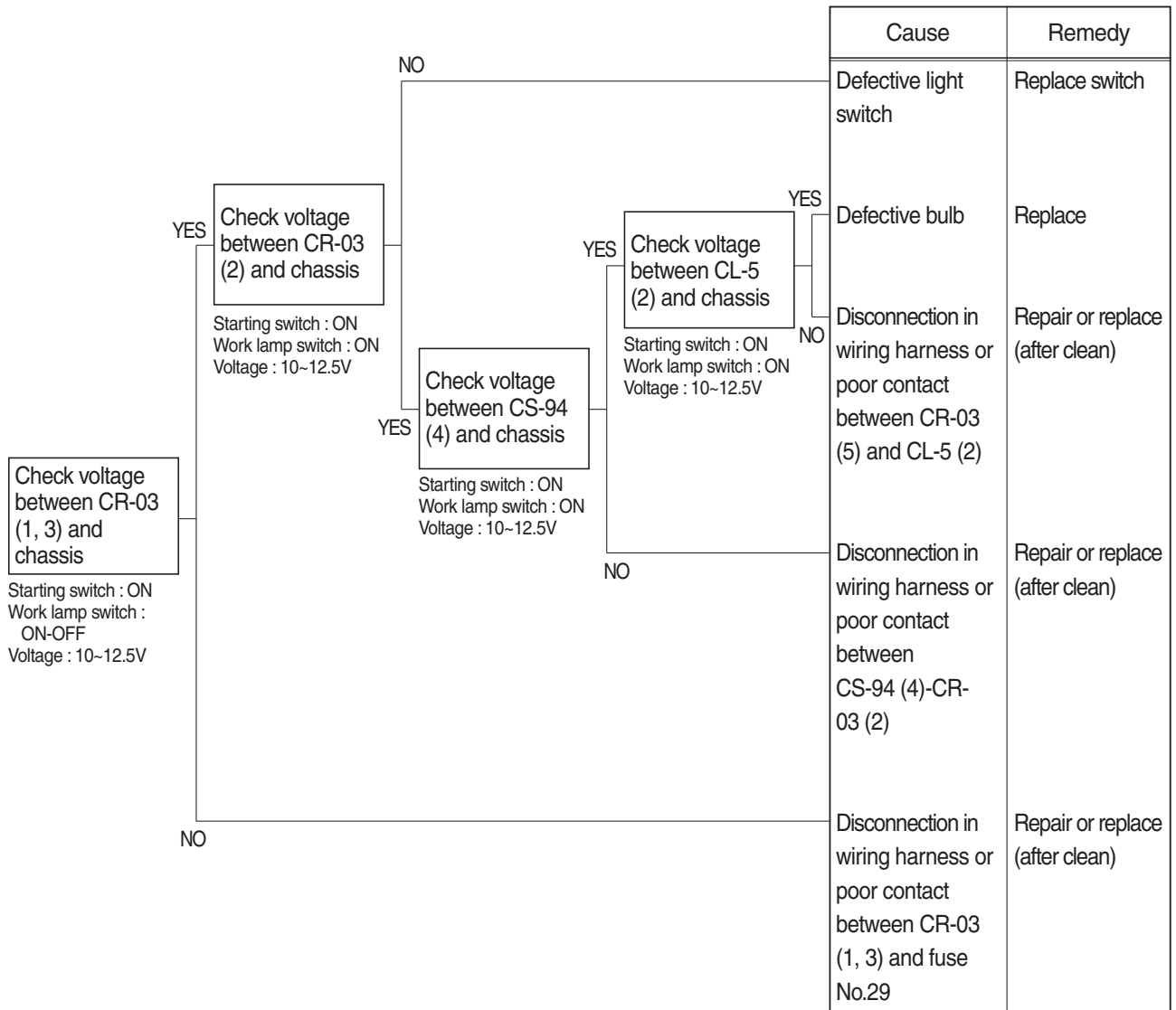
- Before disconnecting the connector, always turn the starting switch OFF.
- Before carrying out below procedure, check all the related connectors are properly inserted and short of fuse No.28.
- After checking, insert the disconnected connectors again immediately unless otherwise specified.



48AZ5TS20

12. WHEN STARTING SWITCH IS TURNED ON, WORK LAMP DOES NOT LIGHTS UP

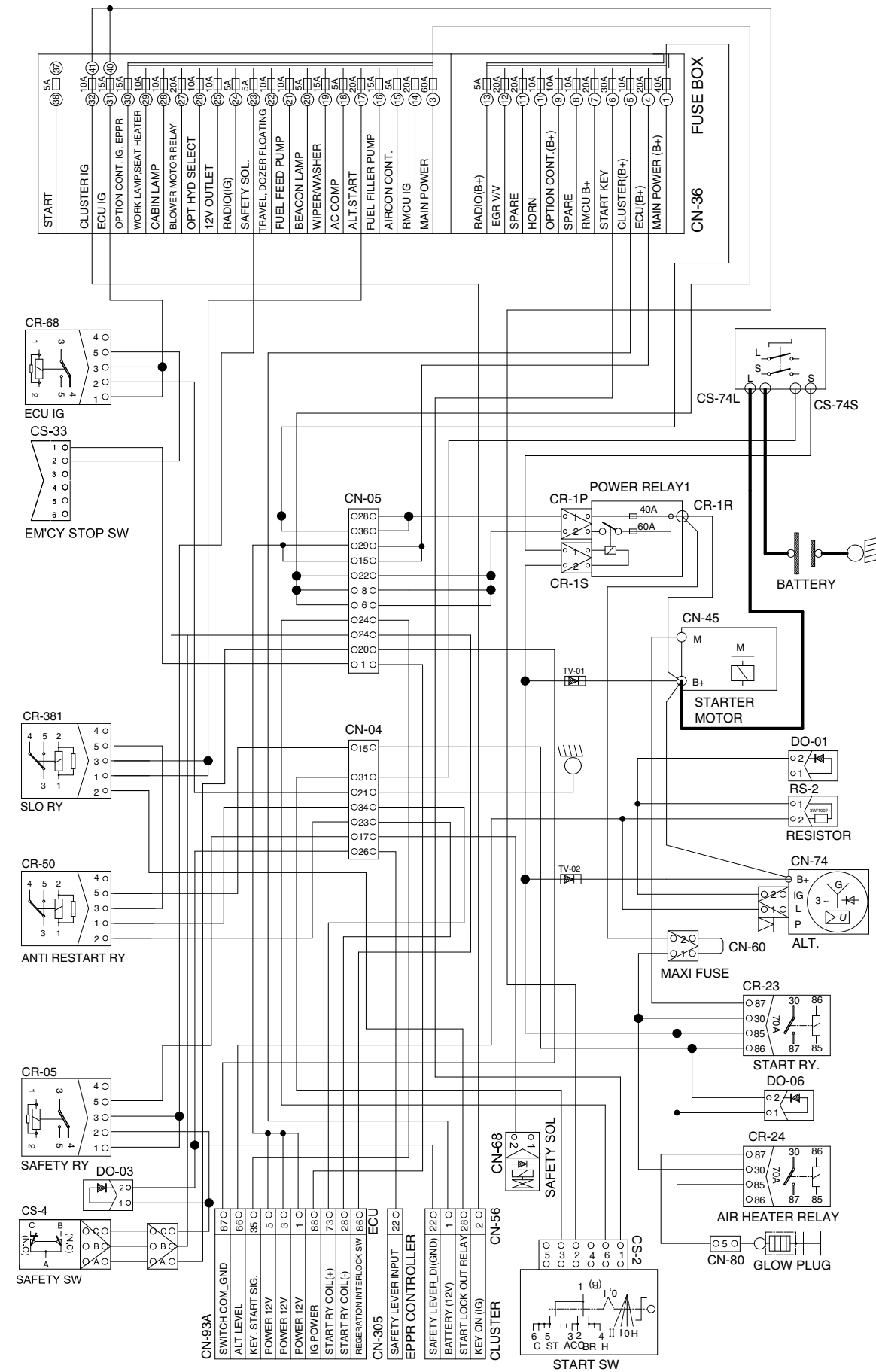
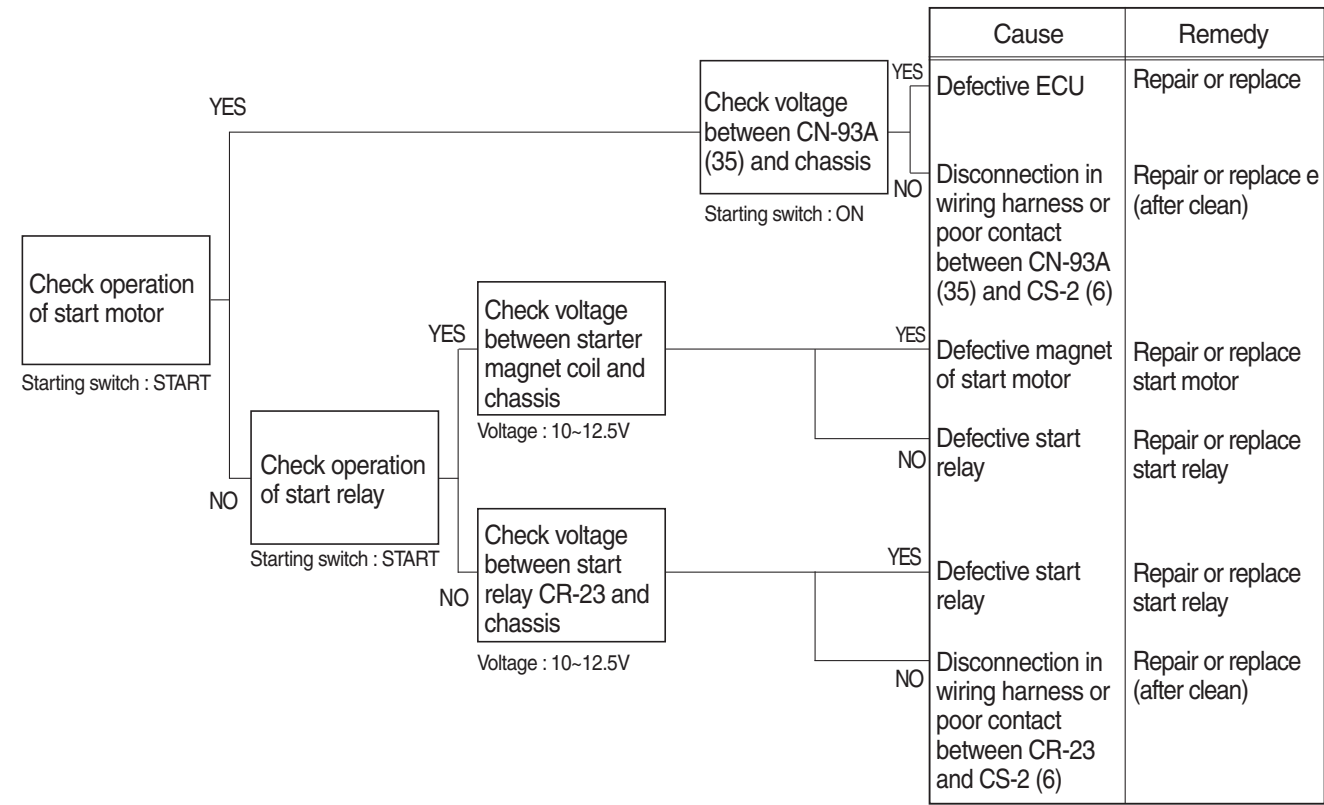
- Before disconnecting the connector, always turn the starting switch OFF.
- Before carrying out below procedure, check all the related connectors are properly inserted and short of fuse No.29.
- After checking, insert the disconnected connectors again immediately unless otherwise specified.



48AZ5TS21

13. WHEN ENGINE DOES NOT START

- Before disconnecting the connector, always turn the starting switch OFF.
- Before carrying out below procedure, check all the related connectors are properly inserted.
- After checking, insert the disconnected connectors again immediately unless otherwise specified.



14. WHEN STARTING SWITCH ON DOES NOT OPERATE

- Before disconnecting the connector, always turn the starting switch OFF.
- Before carrying out below procedure, check all the related connectors are properly inserted and master switch ON.
- After checking, insert the disconnected connectors again immediately unless otherwise specified.

