GROUP 2 MONITORING SYSTEM

1. OUTLINE

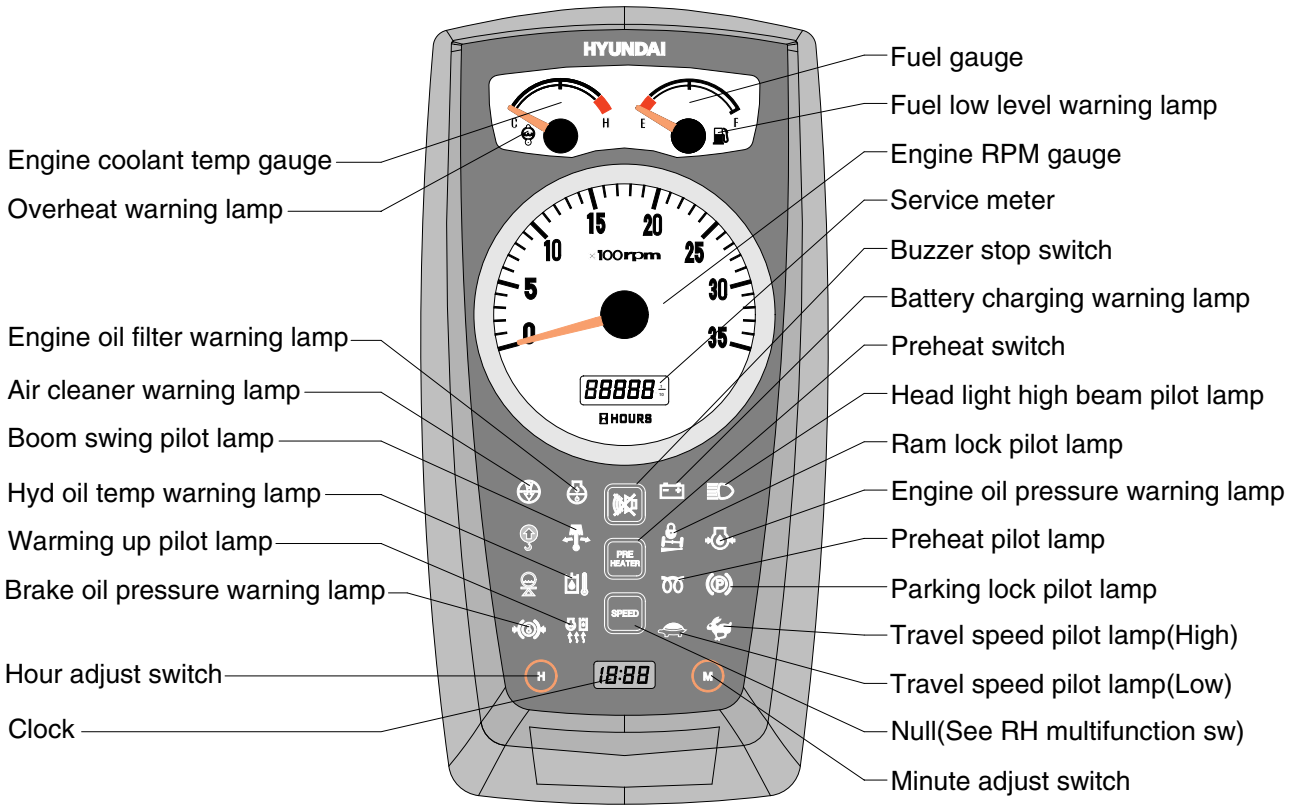
Monitoring system consists of the monitor part and switch part.

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

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

2. CLUSTER

1) MONITOR PANEL



55W73CD02

2) CLUSTER CHECK PROCEDURE

(1) Start key : ON

① Check monitor initial 6 seconds

a. All lamps light up.

b. Buzzer sound.

② Check monitor after 3 seconds : Indicate machine condition

a. Tachometer : 0 rpm

b. Fuel gauge : Pointed at appropriate level

c. Engine coolant temperature gauge : Pointed at appropriate level

d. Warning lamp

※ During start key **ON** the engine oil pressure lamp and battery charging lamp go ON, but it is not abnormal.

※ When engine coolant temperature below 30°C, the warming up lamp lights up and then operating the preheat switch.

(2) Start of engine

① Check machine condition

a. Tachometer pointed at present rpm

b. Gauge and warning lamp : Indicate at present condition.

※ When normal condition : All warning lamp OFF

c. Travel speed pilot lamp : Low(Turtle)

② When abnormal condition

a. The lamp lights up and the buzzer sounds.

b. If **BUZZER STOP** switch is pressed, buzzer sound is canceled but the lamp lights up until normal condition.

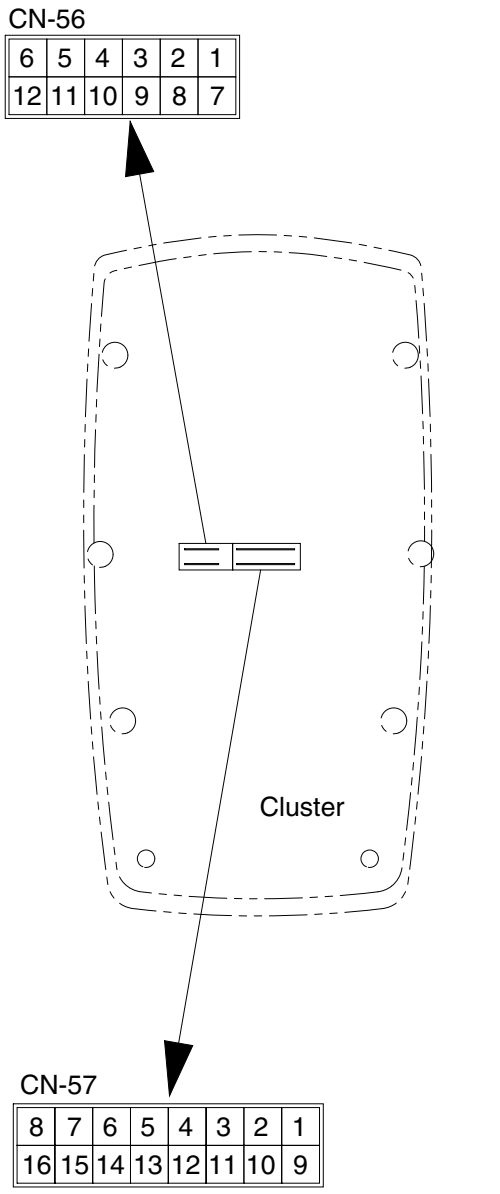
3. CLUSTER CONNECTOR

1) CN-56 CONNECTOR

No.	Signal	Input/ Output
1	Power IG 12V	-
2	Power 12V	-
3	Fuel level sender	Input
4	Water temp sender	Input
5	Tacho signal	Input
6	GND	-
7	GND	-
8	GND	-
9	Travel signal	Output
10	Pre-heat signal	Output
11	Anti-restart signal	Output
12	Null	-

2) CN-57 CONNECTOR

No.	Signal	Input/ Output
1	Air cleaner signal	Input
2	Hyd oil temp signal	Input
3	Engine oil pressure	Input
4	Alt signal	Input
5	High beam signal	Input
6	Water level signal	Input
7	Engine oil filter	Input
8	Overload signal	Input
9	Brake fail ps	Input
10	Boom swing signal	Input
11	Travel signal	Input
12	Parking signal	Input
13	Ramlock signal	Input
14	Illumination	Input
15	Null	-
16	GND	-



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4. CLUSTER FUNCTION

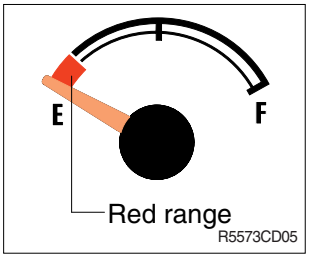
1) GAUGES AND DISPLAYS

(1) Service 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 haurs as indicated in chapter 6, **maintemance**.

(2) Fuel gauge

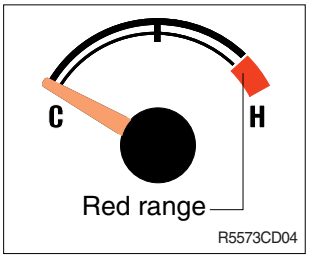


① This gauge indicates the amount of fuel in the fuel tank.

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

※ **If the gauge illuminates the red range or warning lamp on even though the machine is on the normal condition, check the electric device as that can be caused by the poor connection of electricity or sensor.**

(3) Engine coolant temperature gauge

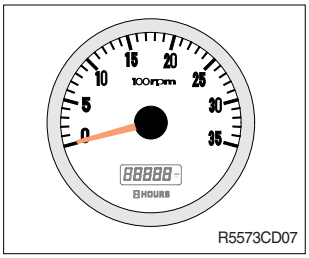


① This indicates the temperature of coolant.
· Red range : Above 105°C(221°F)

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.**

(4) Engine rpm gauge



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

(5) Clock

① This displays the current time.

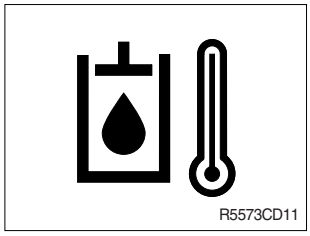
② Refer to the hour/minute adjust switch for adjusting time.

2) WARNING AND PILOT LAMPS

(1) Fuel low level warning lamp

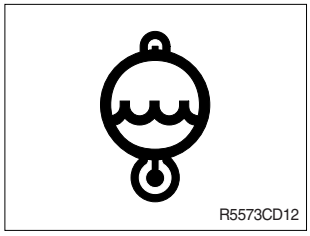
① This lamp blinks and the buzzer sounds when the level of fuel is below 13 ℓ (3.4U.S. gal).
② Fill the fuel immediately when the lamp blinks.

(2) Hydraulic oil temperature warning lamp



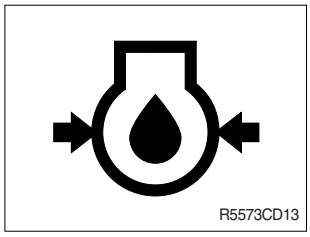
① This warning lamp operates and the buzzer sounds when the temperature of hydraulic oil is over 105 ℃(221 ℉) .
② Check the hydraulic oil level when the lamp blinks.
③ Check for debris between oil cooler and radiator.

(3) Overheat warning lamp



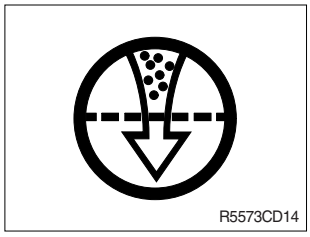
① This lamp blinks and the buzzer sounds when the temperature of coolant is over the normal temperature 110℃(230℉) .
② Check the cooling system when the lamp blinks.

(4) Engine oil pressure warning lamp



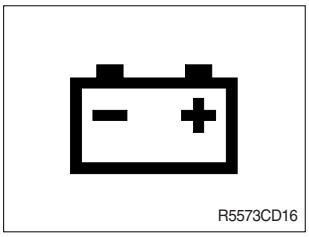
① This lamp blinks and the buzzer sounds after starting the engine because of the low oil pressure.
② If the lamp blinks during engine operation, shut OFF engine immediately. Check oil level.

(5) Air cleaner warning lamp



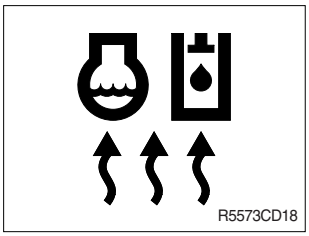
① This lamp blinks and the buzzer sounds when the filter of air cleaner is clogged.
② Check the filter and clean or replace it.

(6) Battery charging warning lamp



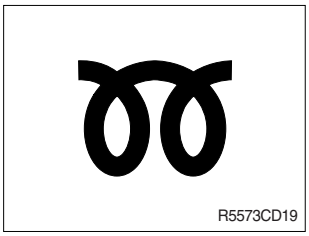
① This lamp blinks and the buzzer sounds when the starting switch is ON, it is turned OFF after starting the engine.
② Check the battery charging circuit when this lamp blinks during engine operation.

(7) Warming up pilot lamp



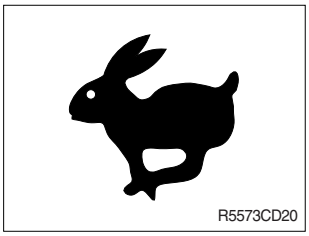
① This lamp is turned ON when the coolant temperature is below 30°C(86 °F).
② Warming up operation needed until this lamp OFF.

(8) Preheat pilot lamp



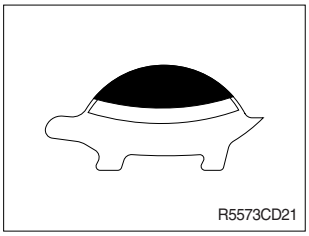
① When engine preheating switch is turned ON, pilot lamp cames ON.
② Refer to the preheating switch for details.

(9) Travel speed pilot lamp(High)



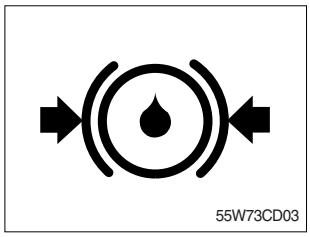
① When this lamp turned ON, the machine travel high speed.
② Refer to the travel speed select switch for details.

(10) Travel speed pilot lamp(Low)



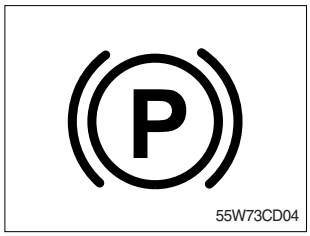
① When this lamp turned ON, the machine travel low speed.
② Refer to the travel speed select switch for details.

(11) Brake oil pressure warning lamp



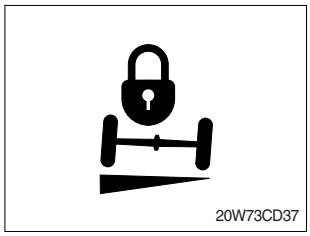
① The lamp lights ON when the oil pressure of service brake drops below the normal range.
② When the lamp is ON, stop the engine and check for its cause.
※ **Do not operate until any problems are corrected.**

(12) Parking lock pilot lamp



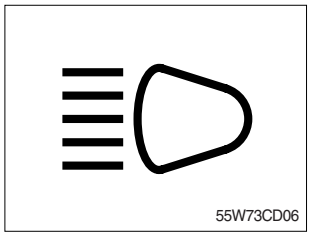
① When the parking brake is actuated, the lamp lights ON.
※ **Check the lamp is OFF before driving.**

(13) Ram lock pilot lamp



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

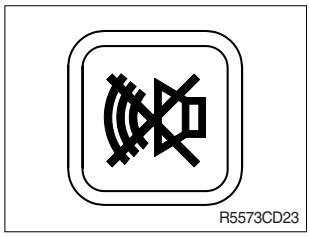
(14) Head light high beam pilot lamp



① This lamp is ON when the head light switch is high beam position or passing function.
② When passing other machines ahead, this lamp must be used for a few seconds to give other machines warning for a few seconds.

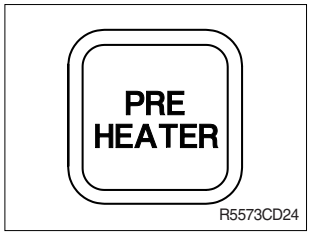
3) SWITCHS

(1) Buzzer stop switch



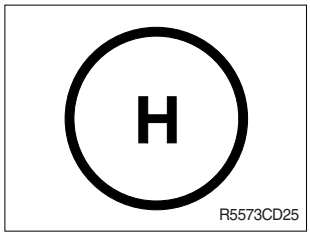
① When the starting switch is turned ON first, normally the alarm buzzer sounds for 6 seconds during lamp check operation.
② The red lamp lights ON and the buzzer sounds when the machine has a problem.
In this case, press this switch and buzzer stops, but the red lamp lights until the problem is cleared.

(2) Preheat switch



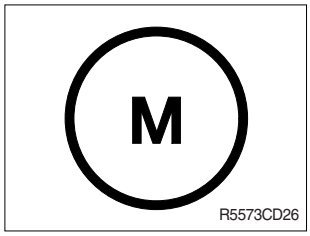
① In case of severe cold weather, this switch is used to preheat engine before starting.
② When this switch is pressed, the preheat pilot lamp is turned ON for 15 seconds in sequence and lamp OFF when the time is completed.
③ When the start key move to ON position, the preheat function is activated automatically under the coolant temperature is below 10° C(50° F).

(3) Hour adjust switch



① This switch is used to adjust hour.
② The switch is pressed, hour is increased.

(4) Minute adjust switch



① This switch is used to adjust minute.
② The switch is pressed, minute is increased.

1. POWER CIRCUIT

The negative terminal of battery is grounded to the machine chassis through master switch.
When the start switch is in the OFF position, the current flows from the positive battery terminal as shown below.

1) OPERATING FLOW

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

- → Fuse box [No.1] → Start switch[CS-2(1)]
- → Fuse box [No.2]
  - → Cassette radio[CN-27(11)]
  - → I/conn[CN-6(3)] → Room lamp[CL-1(2)]
  - → I/conn[CN-5(11)] → I/conn[CN-7(5)] → 12V socket[CN-139(2)]
- → Fuse box [No.3] → Cluster[CN-56(2)]

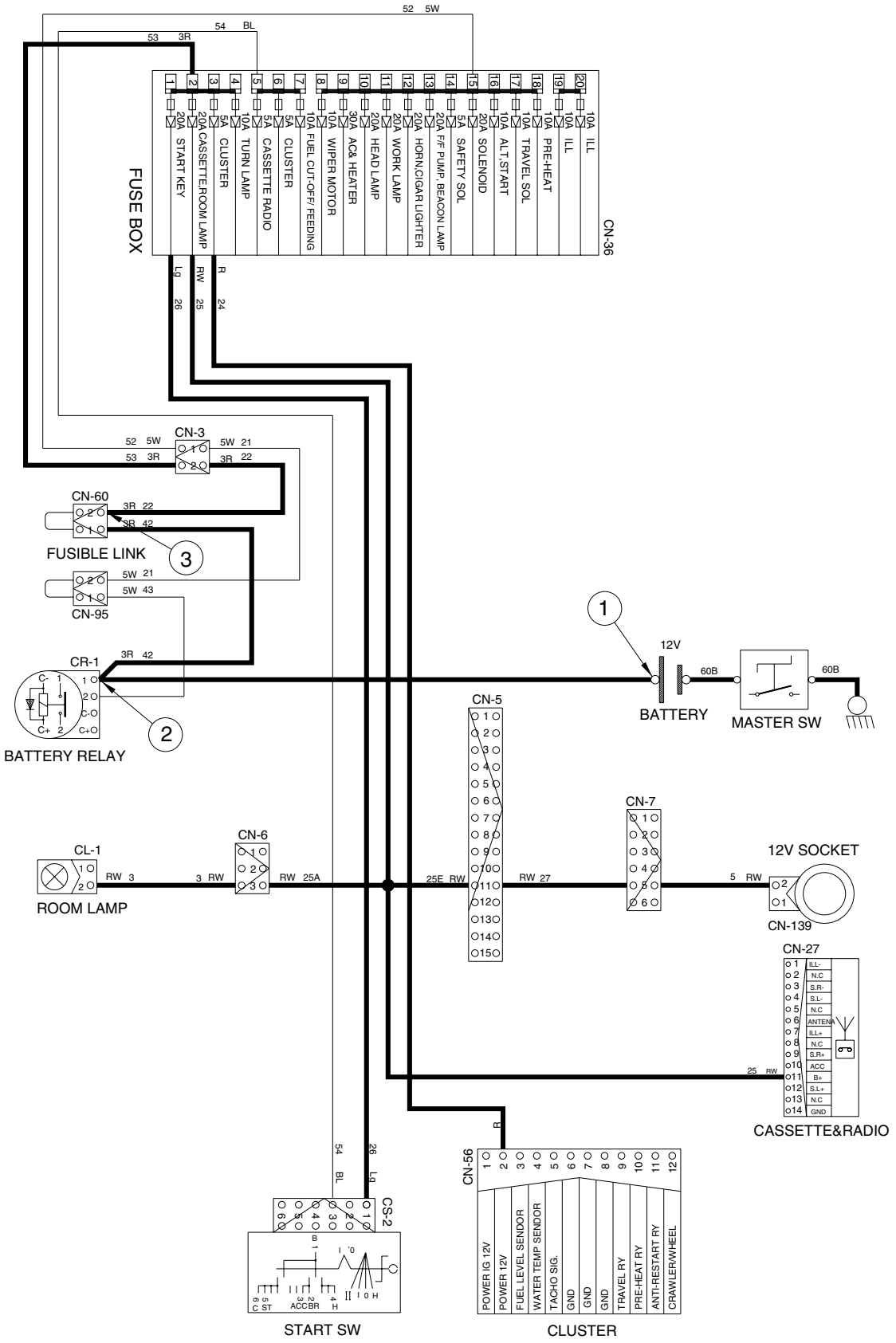
※ I/conn : Intermediate connector

2) CHECK POINT

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

※ GND : Ground

POWER CIRCUIT



55W74EL04

2. STARTING CIRCUIT

1) OPERATING FLOW

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

※ Start switch : ON

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

※ Start switch : START

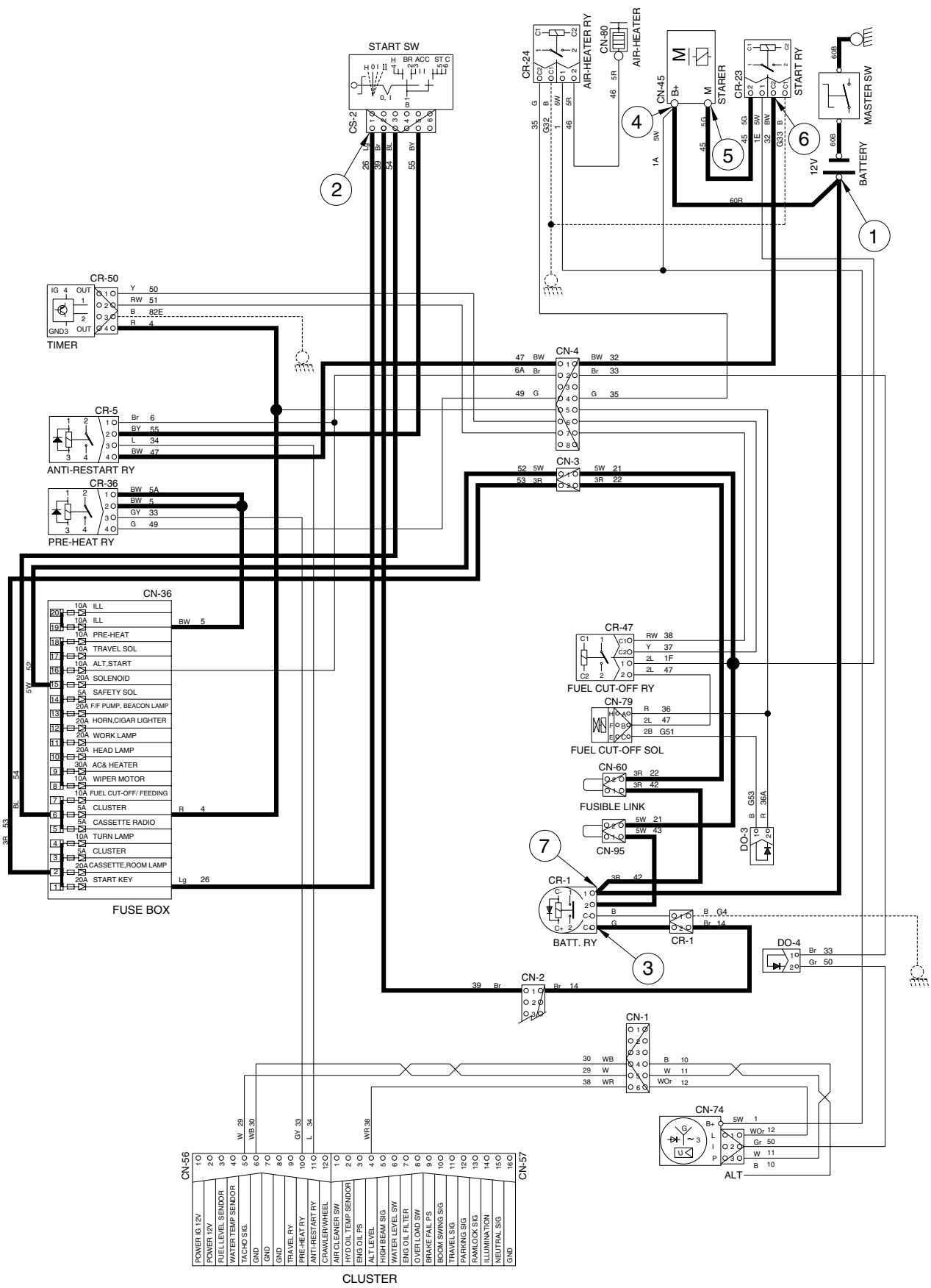
Start switch START [CS-2(5)] → Anti-restart relay [CR-5(2) → (4)] → I/conn [CN-4(1)]
→ Start relay [CR-23(C2)] → Starter motor operating

2) CHECK POINT

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

※ GND : Ground

STARTING CIRCUIT



55W74EL05

3. CHARGING CIRCUIT

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

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

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

1) OPERATING FLOW

(1) Warning flow

Alternator "L" terminal → I/conn [CN-1(6)] → Cluster [CN-57(4)] → Cluster warning lamp

(2) Charging flow

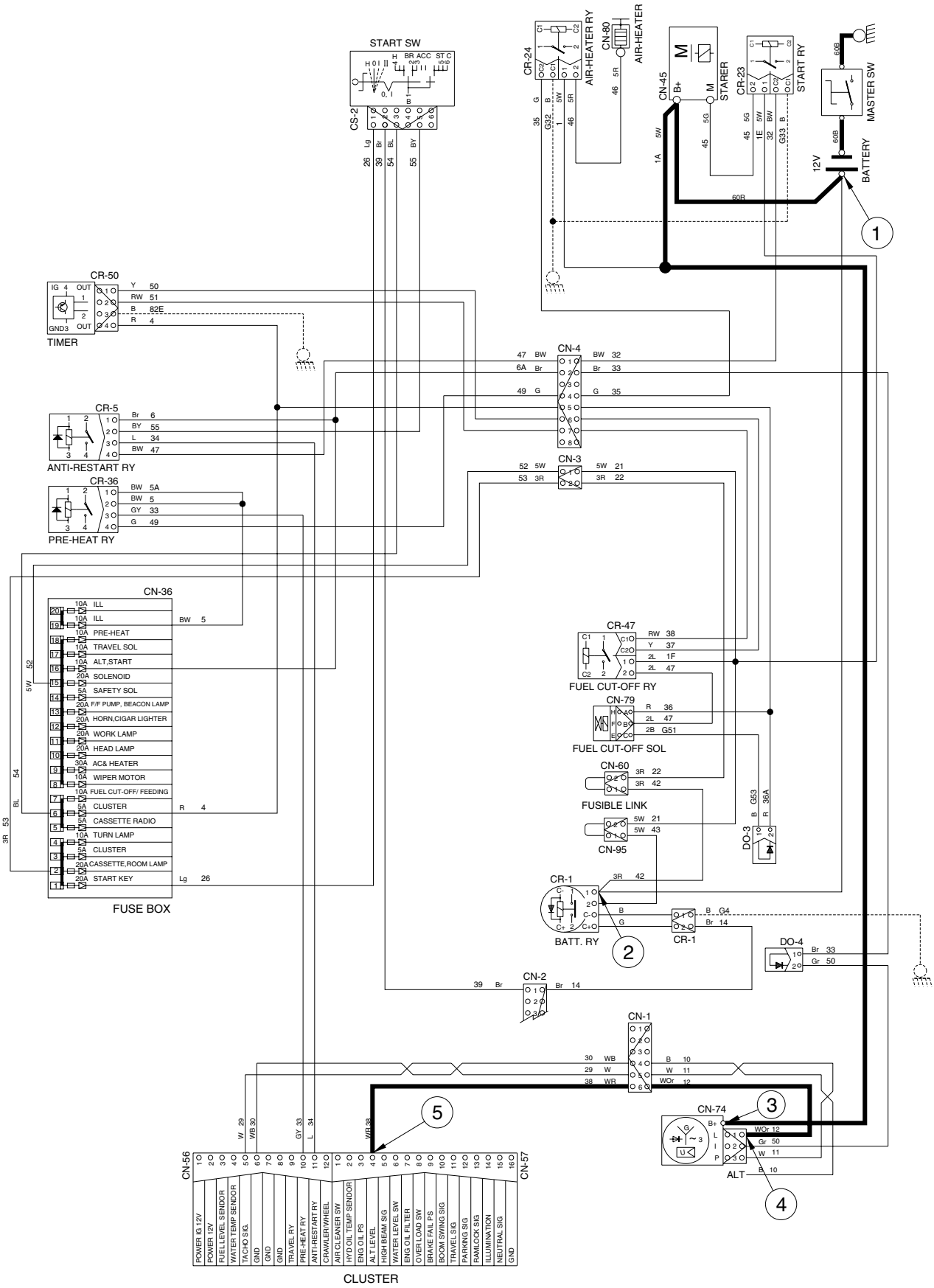
Alternator "B^+" terminal → Battery(+) terminal

2) CHECK POINT

Engine	Start switch	Check point	Voltage
ON	ON	① - GND (Battery voltage) ② - GND (Battery relay) ③ - GND (Alternator B^+ terminal) ④ - GND (Alternator L terminal) ⑤ - GND (Cluster)	10~12.5V

※ GND : Ground

CHARGING CIRCUIT



55W74EL06

4. HEAD AND WORK LIGHT CIRCUIT

1) OPERATING FLOW

Fuse box (No.10) → Main light switch[CS-21(4)]
Fuse box (No.11) → Work lamp switch[CS-36(6)]

(1) Main light switch ON : 1st step

Head light switch ON [CS-21(2)] → I/conn[CN-8(2)] → I/conn[CN-97(11)]
→ Multifunction sw left lever(4)→(5) → I/conn[CN-97(10)] → I/conn[CN-5(4)]
→ Head light low relay[CR-13(1),(4)] → I/conn[CN-5(14)] → Head light ON[CL-3(1), CL-4(1)]
: Head light ON

(2) Main light switch ON : 2nd step

Head light switch[CS-21(4)] → I/conn[CN-8(14)] → I/conn[CN-97(8)]
→ Multifunction sw left lever(12)→(3) → I/conn[CN-97(9)] → I/conn[CN-5(3)]
→ Head light high relay[CR-14(1),(4)] I/conn[CN-5(2)]
→ Head light ON[CL-3(2), CL-4(2)] : Head light high beam ON

(3) Work lamp switch ON :

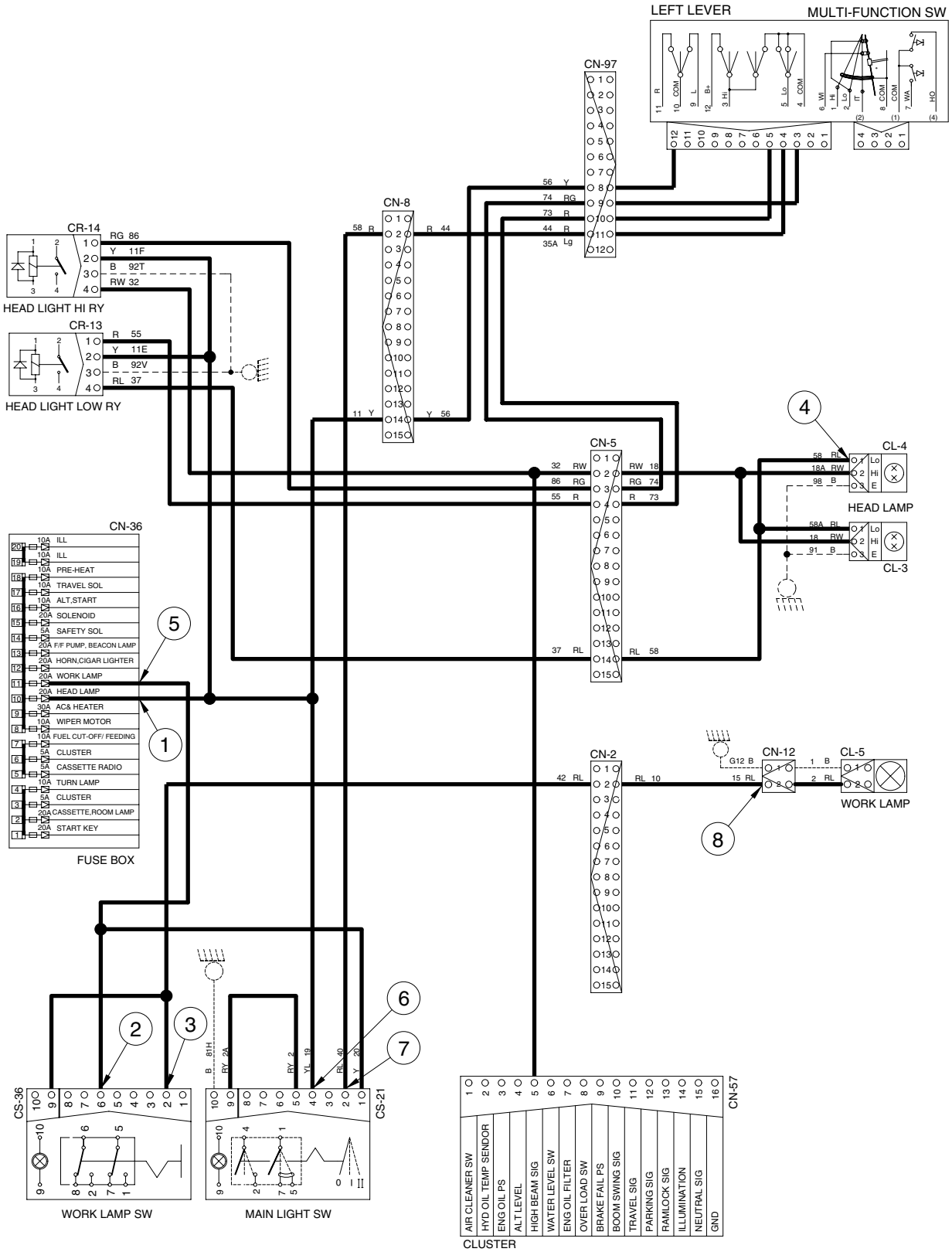
Work lamp switch ON[CS-36(2)] → I/conn[CN-2(2)] → I/conn[CN-12(2)]
→ Work lamp ON [CL-5(2)] : Work lamp ON

2) CHECK POINT

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

※ GND : Ground

HEAD AND WORK LAMP CIRCUIT



55W74EL07

5. BEACON LAMP CIRCUIT

1) OPERATING FLOW

Fuse box (No.13) → Beacon lamp switch[CS-23(5)]

(1) Beacon lamp switch ON

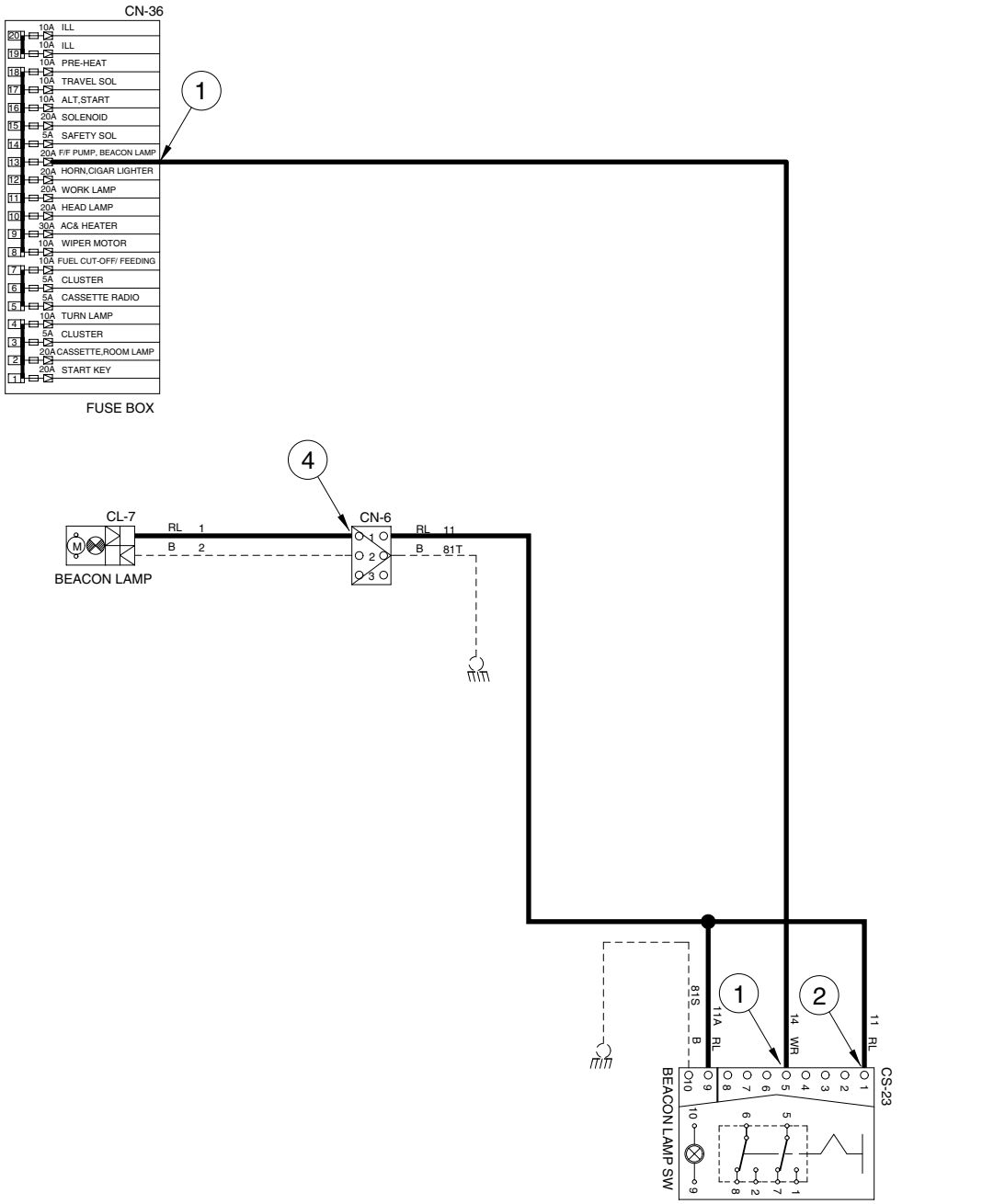
Beacon lamp switch ON [CS-23(1)] → Switch Indicator lamp ON [CS-23(9)
→ I/conn[CN-6(1) → Beacon lamp ON [CL-7]

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)	10~12.5V

※ GND : Ground

BEACON LAMP CIRCUIT



55W74EL08

6. WIPER AND WASHER CIRCUIT

1) OPERATING FLOW

(1) Key switch ON

Fuse box (No.8) → Wiper motor[CN-21(3)]
→ Int wiper relay[CR-6]
→ Wiper relay[CR-4(86)]
→ Wiper relay[CR-4(87)]

(2) Wipe switch ON : 1st step(Intermittent)

Multifunction switch left lever(2) → I/conn[CN-98(7)] → I/conn[CN-8(11)]
→ Int wiper relay[CR-6(6)] : Wiper motor intermitently operating → Int wiper relay[CR-6(3)]
→ I/conn[CN-8(12)] → I/conn[CN-98(4)] → Multifunction switch left lever(6)→(2)
→ I/conn[CN98(6)] → I/conn[CN-8(10)] → Wiper relay[CR-4(85)] : Wiper relay operating
→ Wiper relay[CR-4(87)→(30)] → Wiper motor[CN-21(1)] : Wiper motor operating

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

Multifunction switch left lever(2) → I/conn[CN-98(6)] → I/conn[CN-8(10)]
→ Wiper relay[CR-4(85)] : Wiper relay operating → Wiper relay[CR-4(87)→(30)]
→ Wiper motor opreating[CN-21(1)] : Wiper motor operating

(4) Auto parking(When switch OFF)

Wiper switch OFF → Wiper relay OFF
→ Int wiper relay OFF
→ Wiper motor[CN-21(3)→(1)] → Wiper relay[CR4(87a)→(30)]
→ Wiper mator[CN-21(4)] : Wiper motor parking position

(5) Washer switch ON

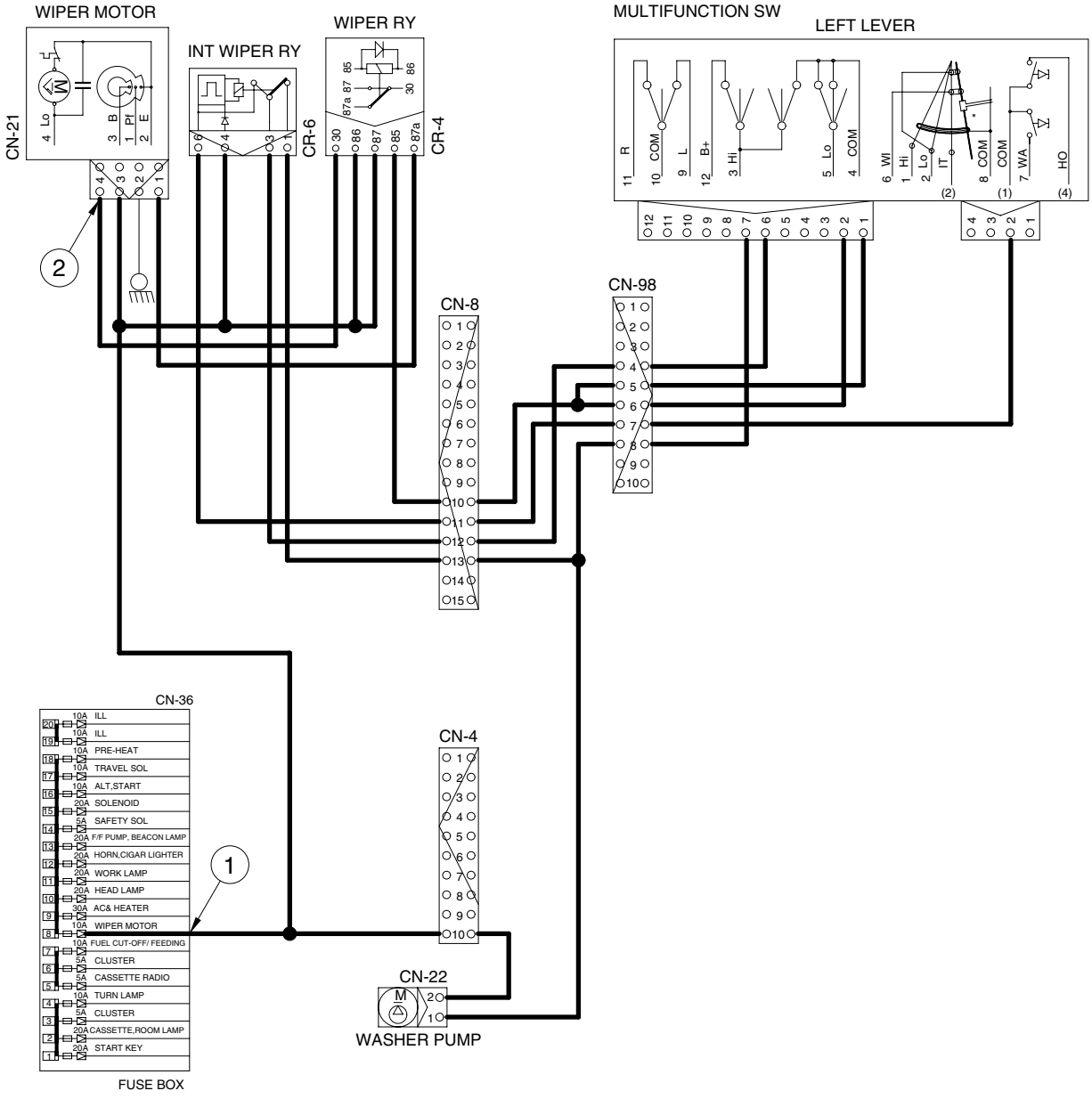
Multifunction sw left lever(7) → I/conn[CN-98(8)] → Washer pump[CN-22(1)] : Washer pump operating

2) CHECK POINT

Engine	Start switch	Check point	Voltage
STOP	ON	① - GND(Fuse box) ② - GND(Wiper motor)	10~12.5V

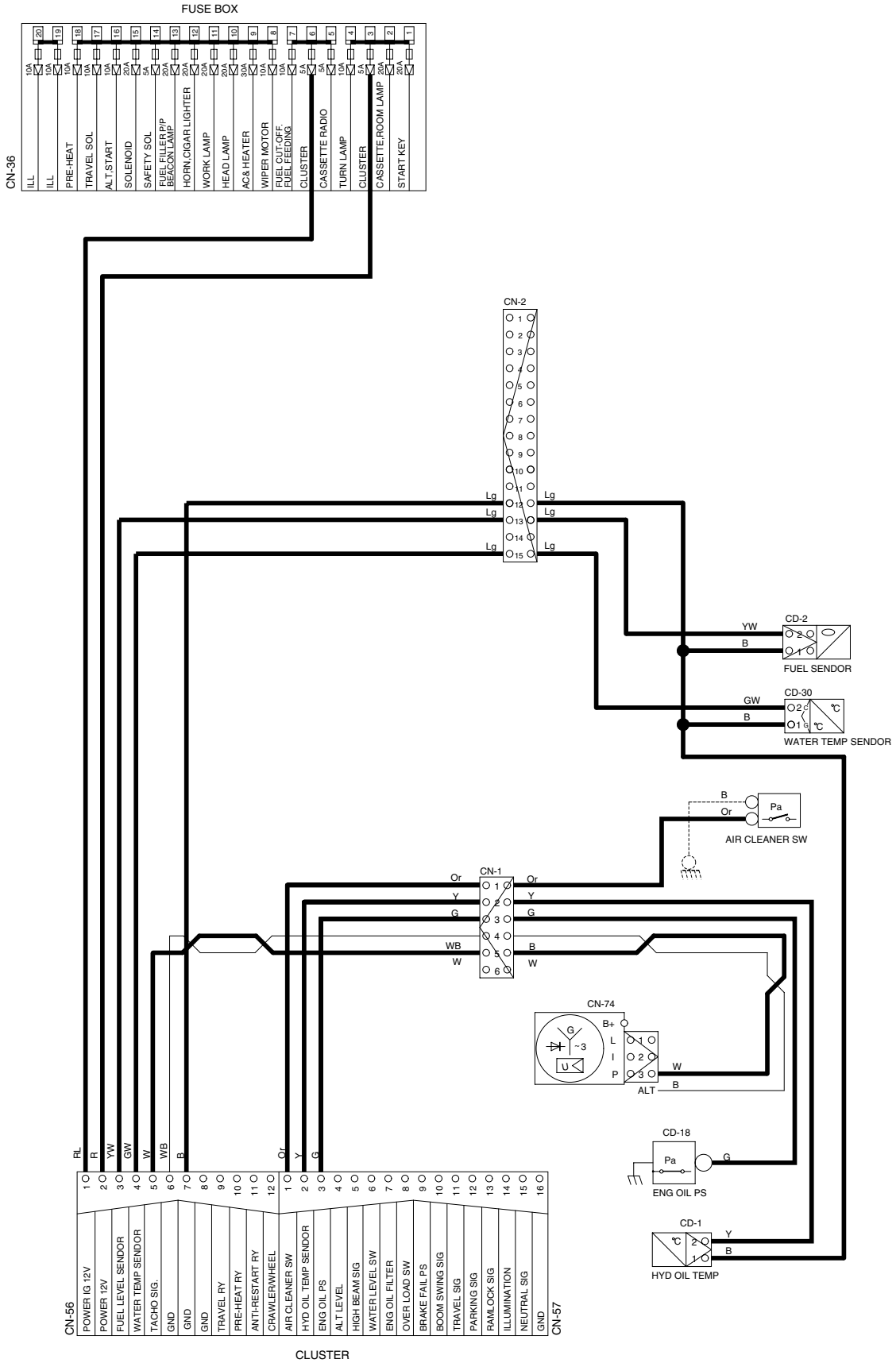
※ GND : Ground

WASHER CONTROL CIRCUIT



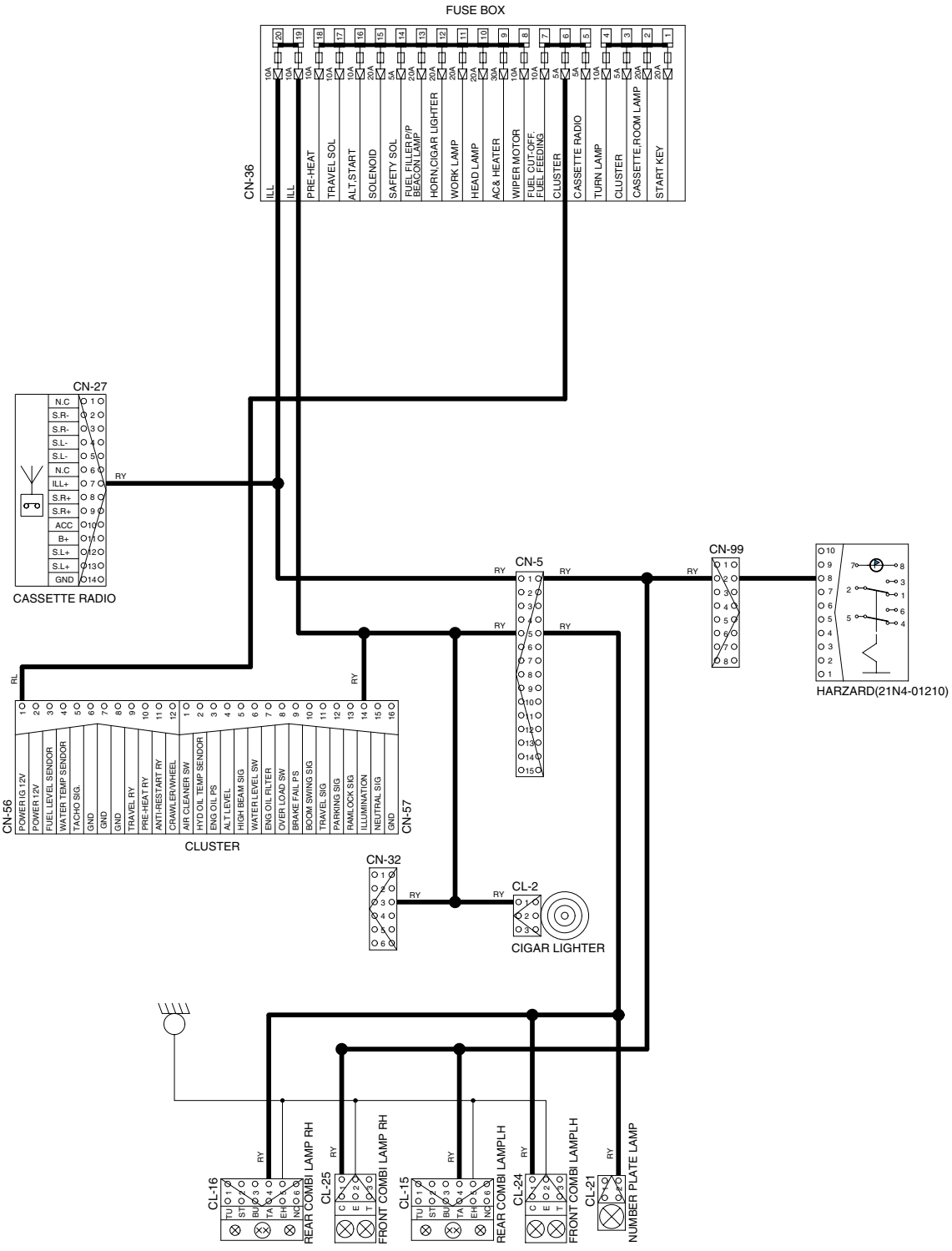
55W74EL09

MONITORING CIRCUIT



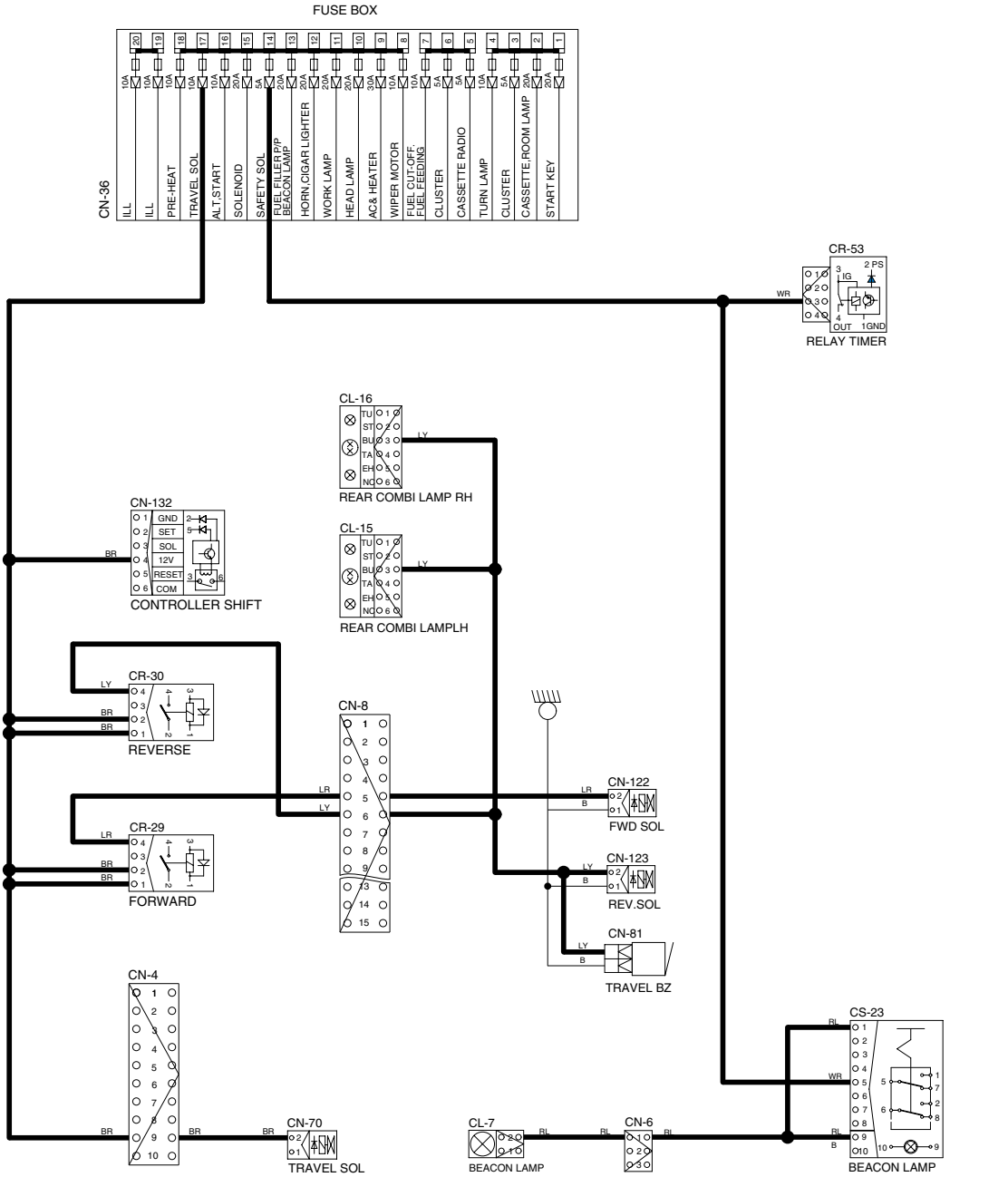
55W74EL10

ILLUMINATION CIRCUIT



55W74EL11

COMBINATION LAMP CIRCUIT



55W74EL12

ELECTRIC CIRCUIT FOR HYDRAULIC