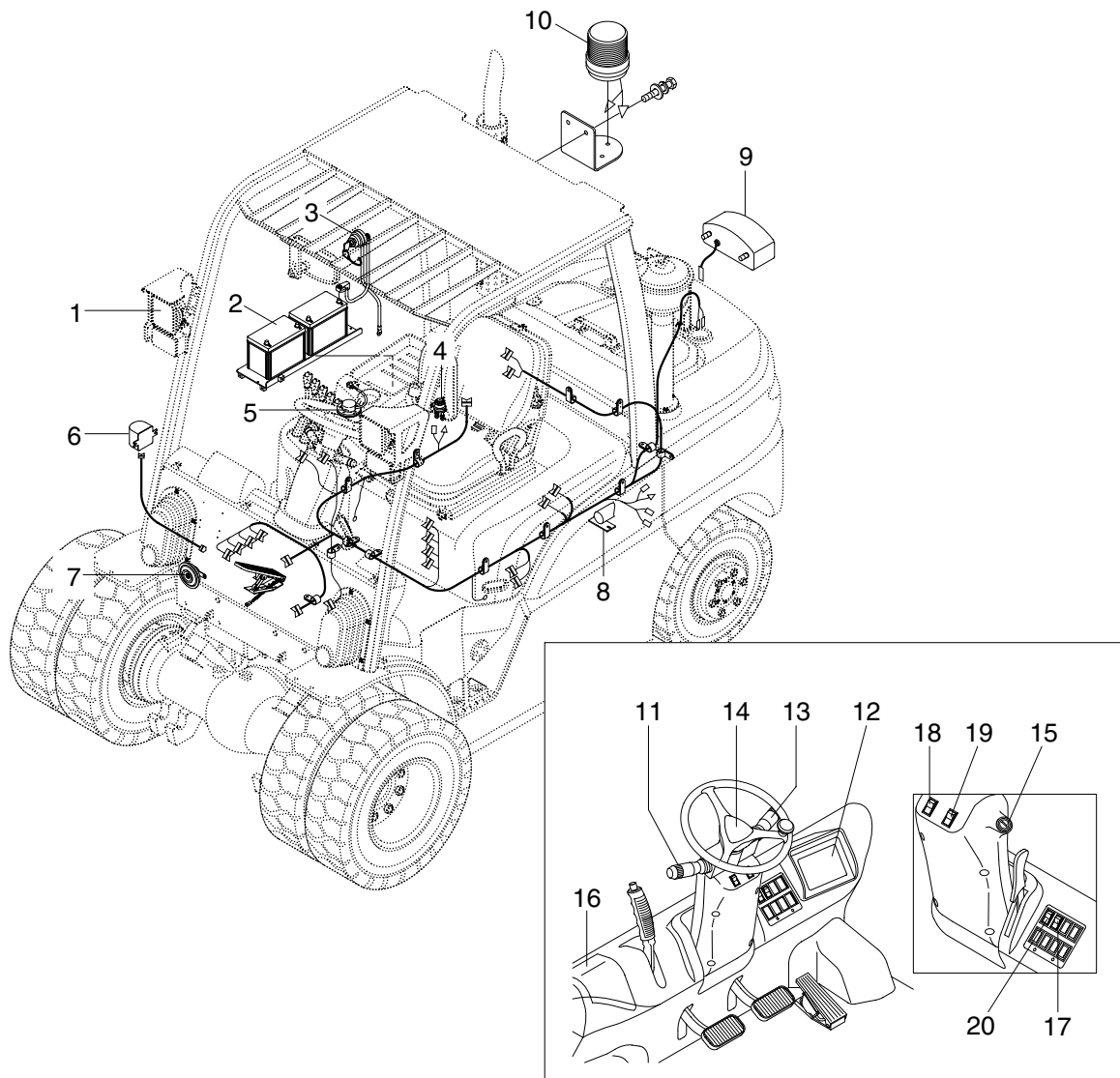


SECTION 7 ELECTRICAL SYSTEM

Group 1	Component location	7-1
Group 2	Electrical circuit	7-2
Group 3	Component specification	7-14
Group 4	Connector destination	7-15
Group 5	Troubleshooting	7-18

SECTION 7 ELECTRICAL SYSTEM

GROUP 1 COMPONENT LOCATION

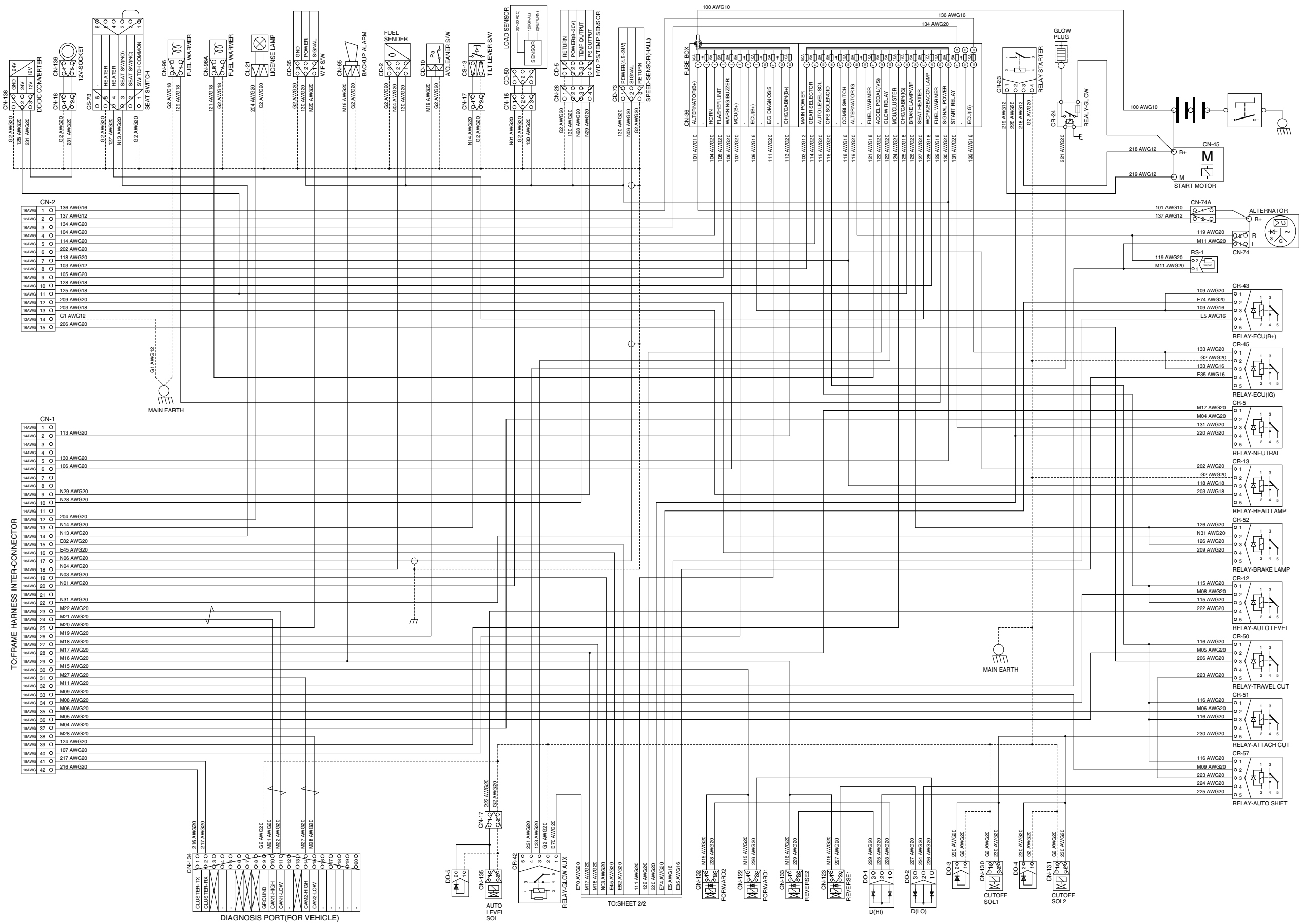


35D9SEL01

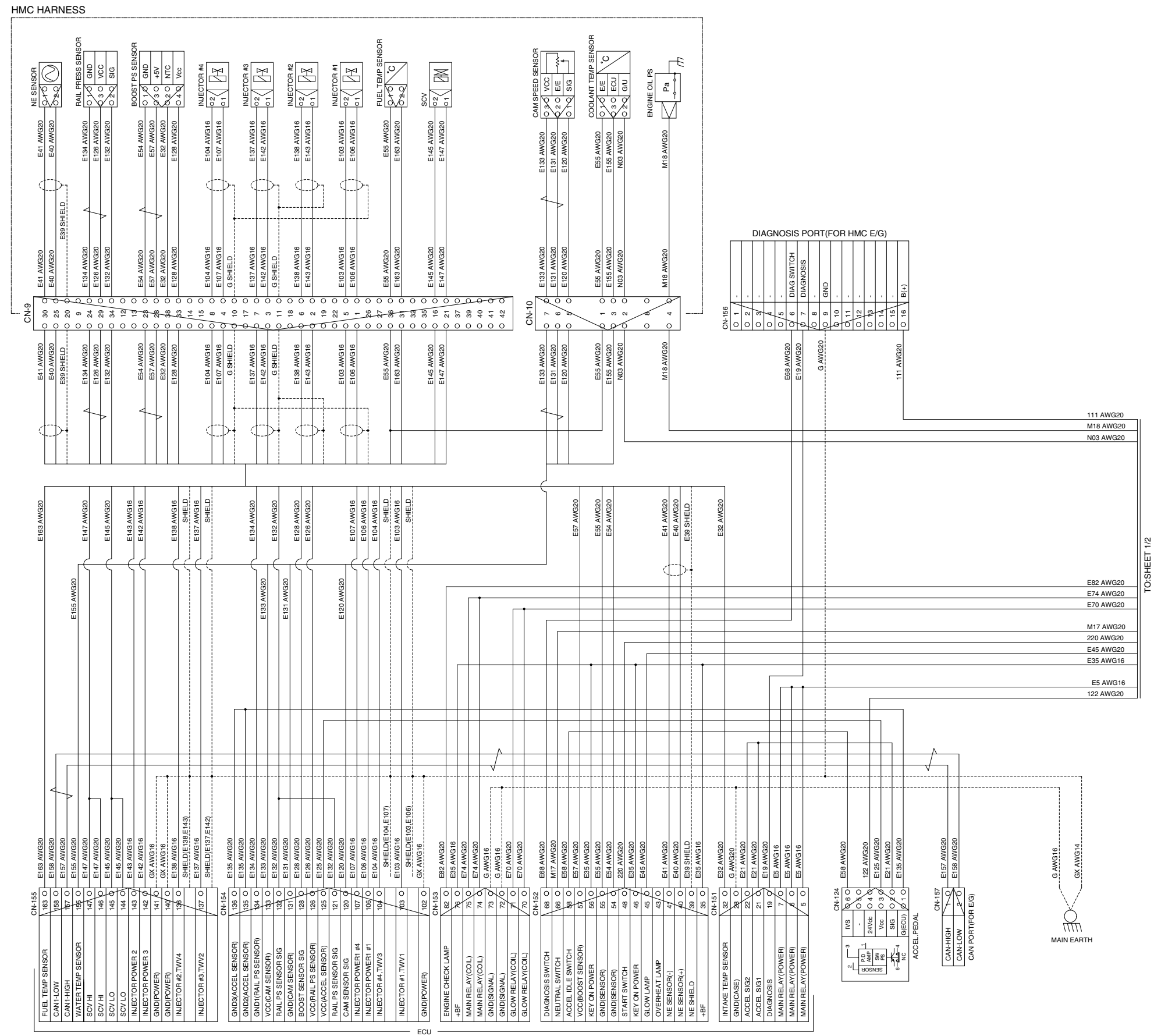
- | | | |
|-----------------|--------------------------|-----------------------------|
| 1 Work lamp | 9 Combination lamp | 15 Start switch |
| 2 Battery | 10 Beacon lamp | 16 Fuse box |
| 3 Master switch | 11 Forward-reverse lever | 17 Work lamp switch (opt) |
| 4 Start relay | 12 Cluster | 18 Hazard lamp switch (opt) |
| 5 Fuel sender | 13 Head lamp switch | 19 Parking switch |
| 6 Glow relay | Illumination lamp | 20 Auto shift switch |
| 7 High horn | Turn signal switch | |
| 8 Back buzzer | 14 Horn button | |

GROUP 2 ELECTRICAL CIRCUIT

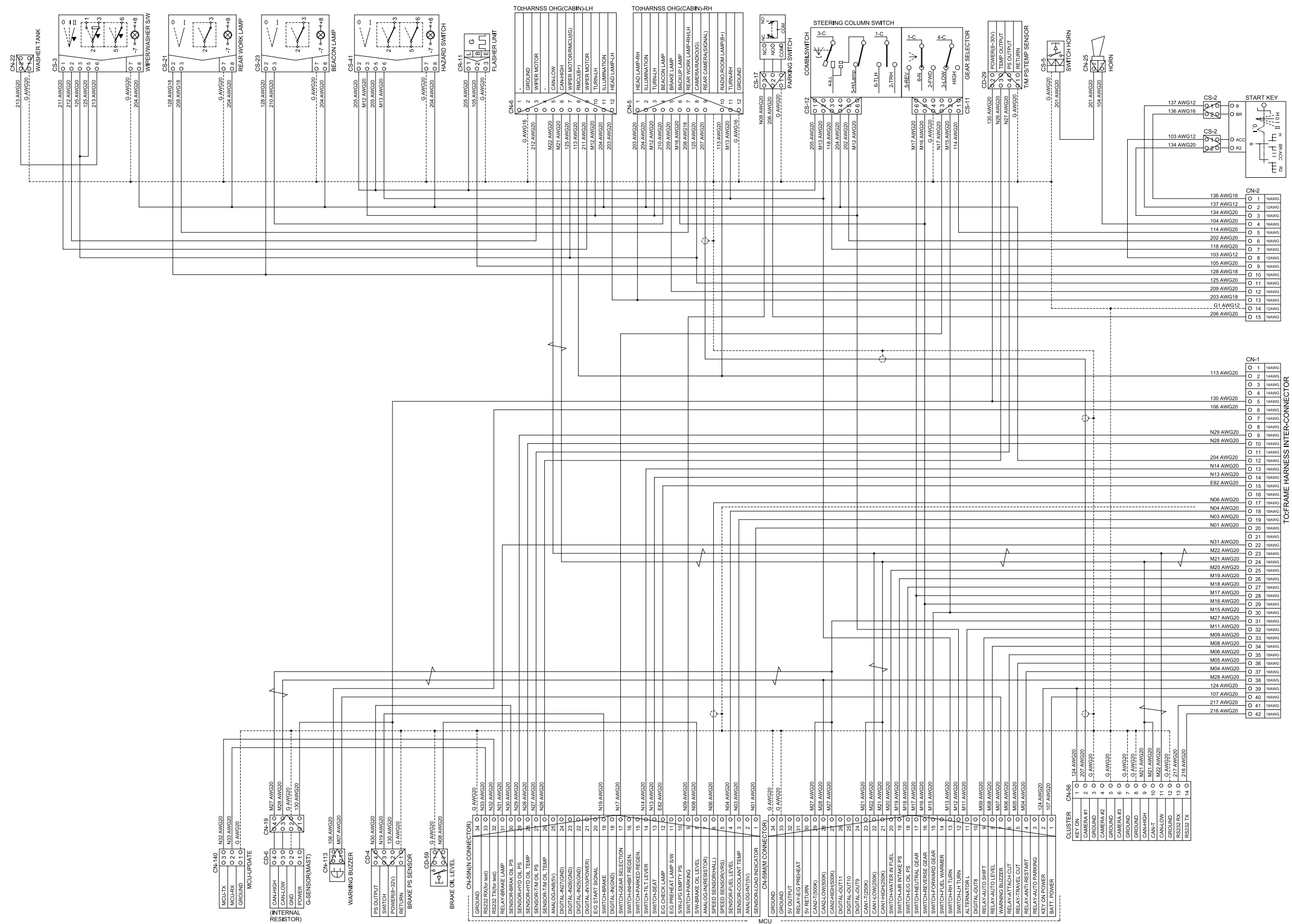
· ELECTRICAL CIRCUIT (1/4)



• ELECTRICAL CIRCUIT (2/4)

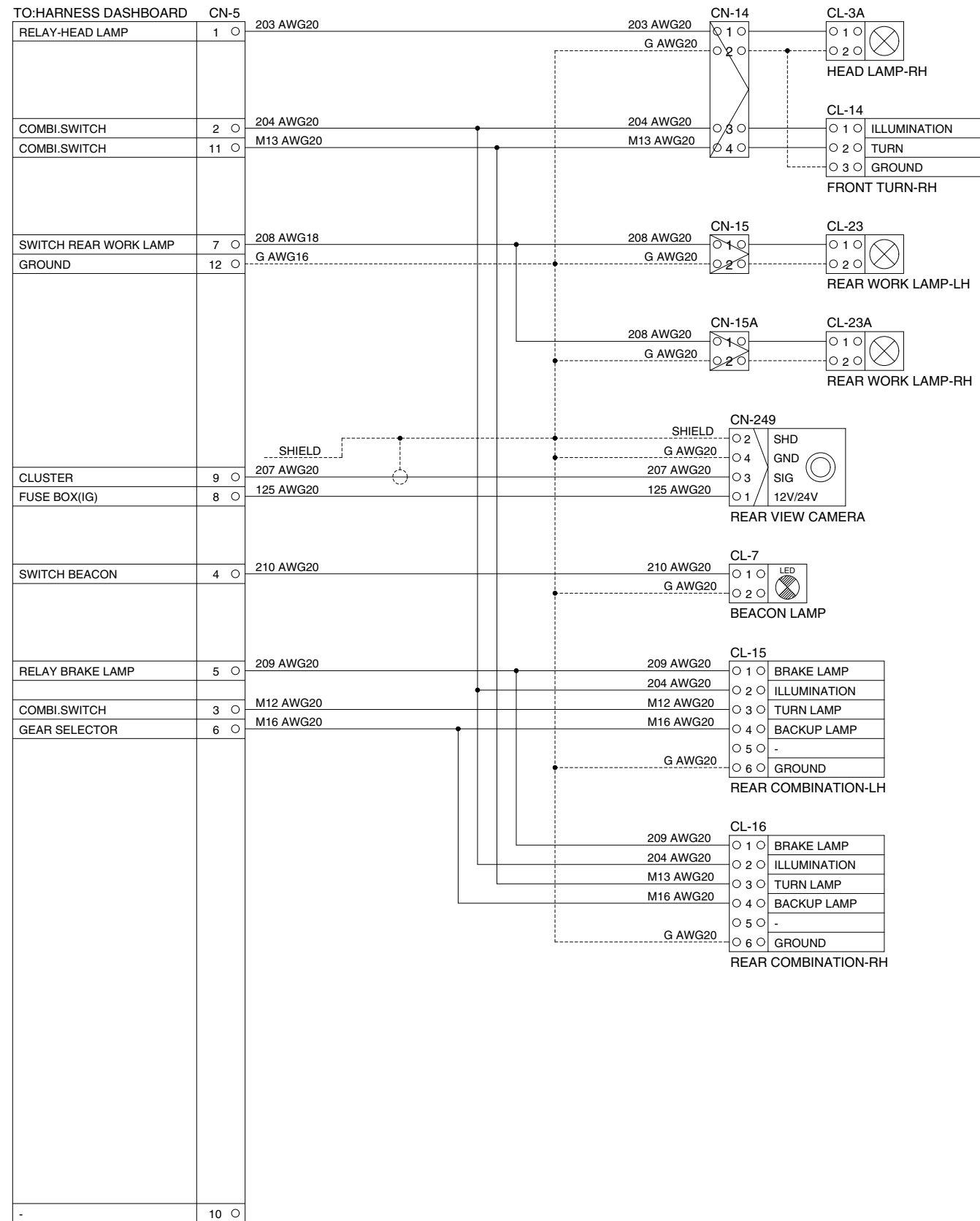


• ELECTRICAL CIRCUIT (3/4)

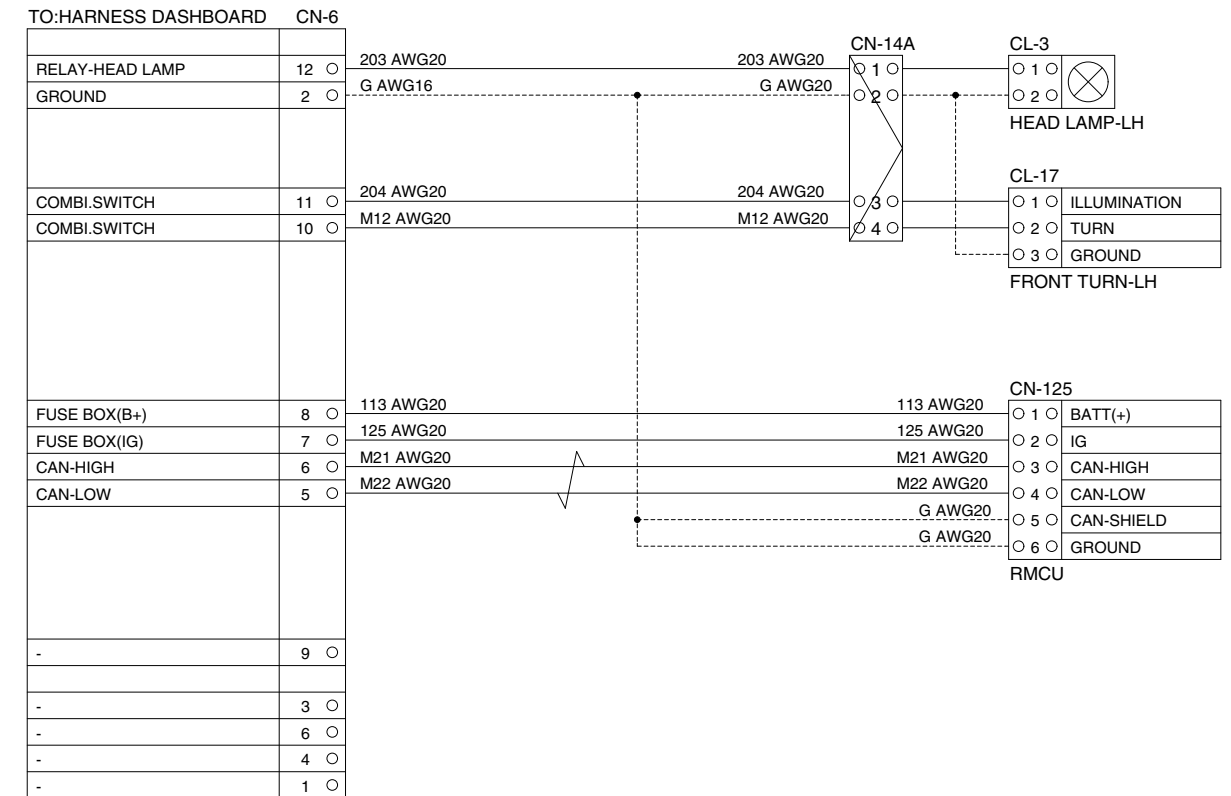


• ELECTRICAL CIRCUIT (4/4)

*ELEC.DIAGRAM OF HARNESS CABIN-RH

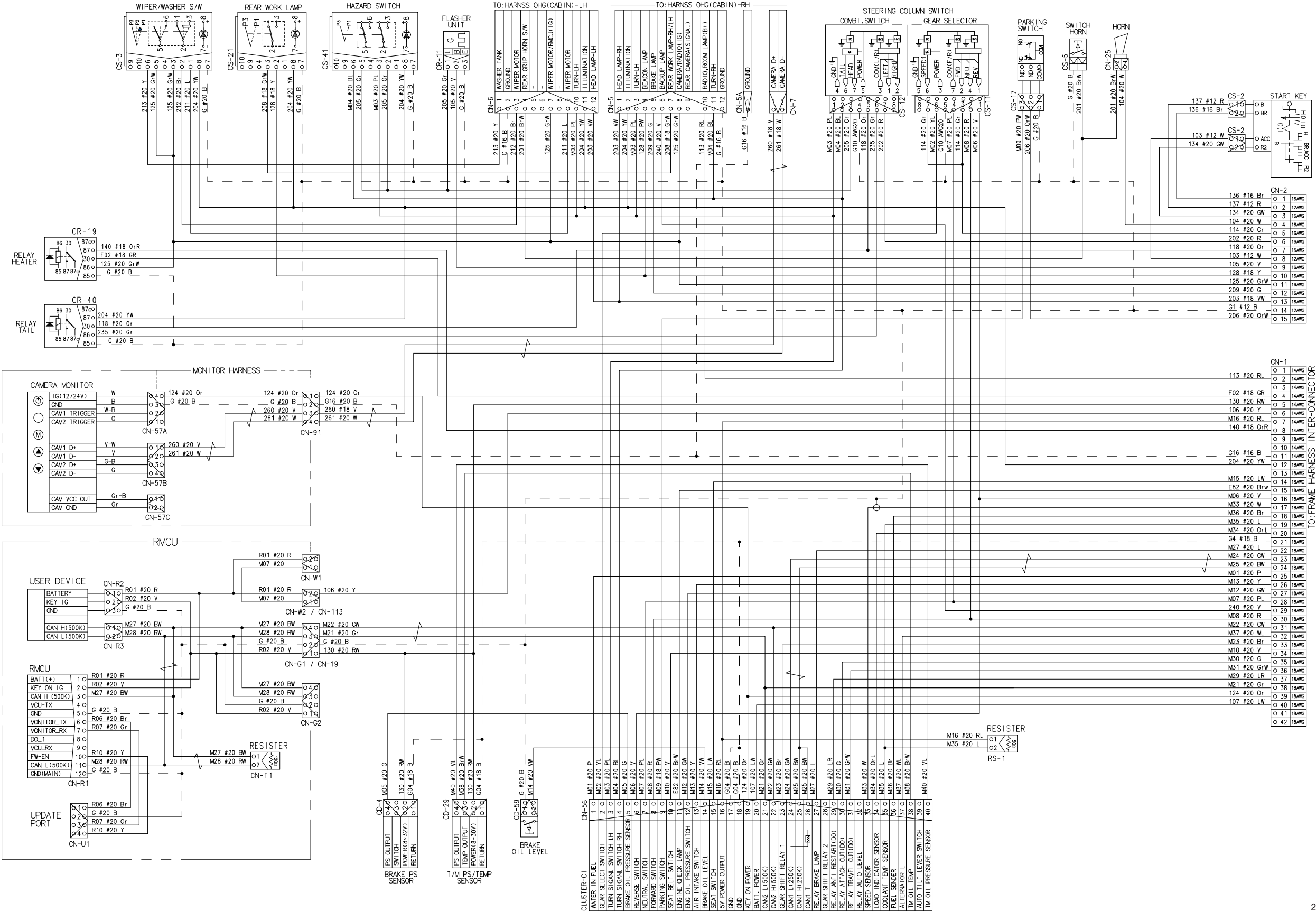


*ELEC.DIAGRAM OF HARNESS CABIN-LH

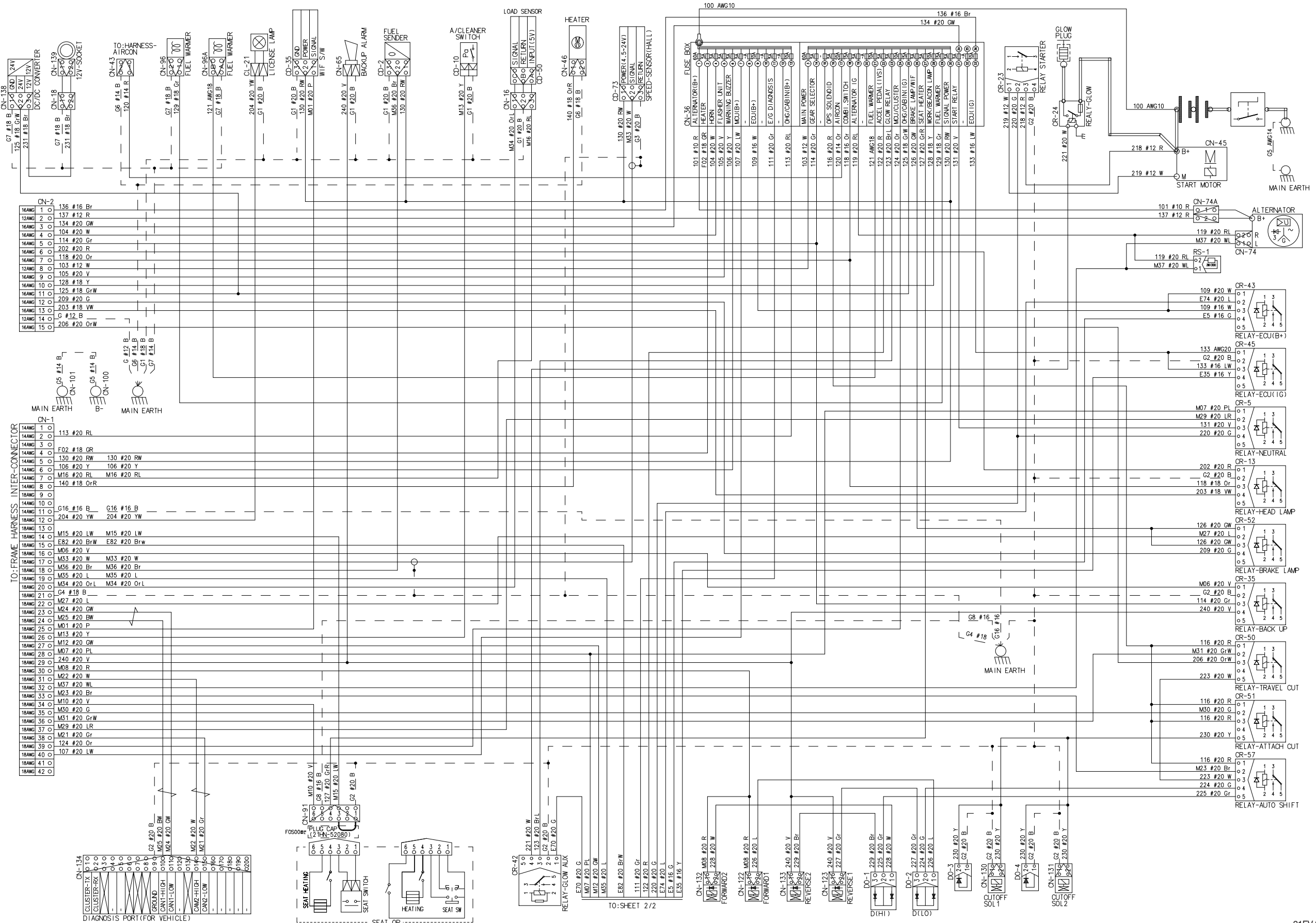


GROUP 2 ELECTRICAL CIRCUIT

· ELECTRICAL CIRCUIT (1/4, DASHBOARD)

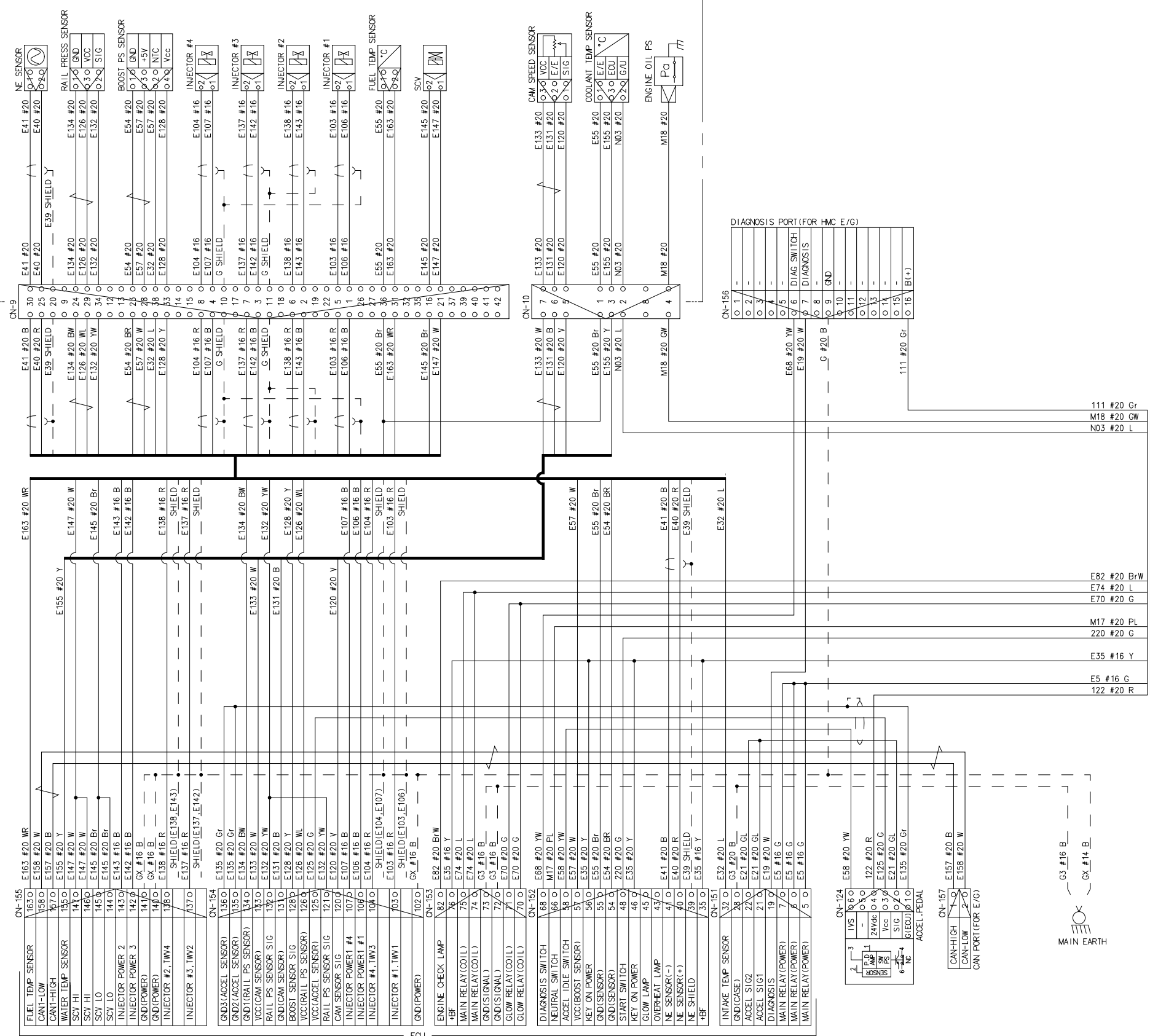


· ELECTRICAL CIRCUIT (2/4, FRAME 1 OF 2)



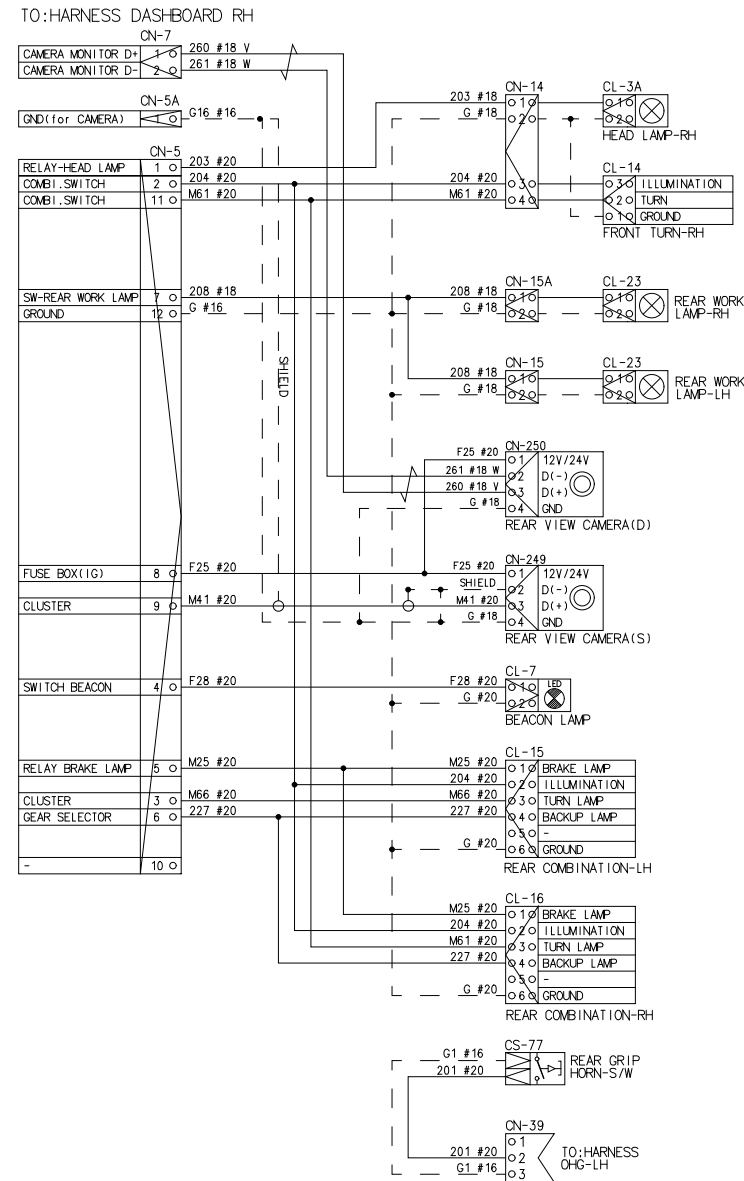
ELECTRICAL CIRCUIT (3/4, FRAME 2 OF 2)

HMC HARNESS

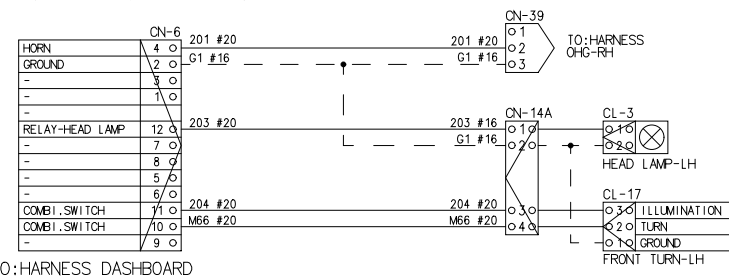


· ELECTRICAL CIRCUIT (4/4, OHG AND CABIN)

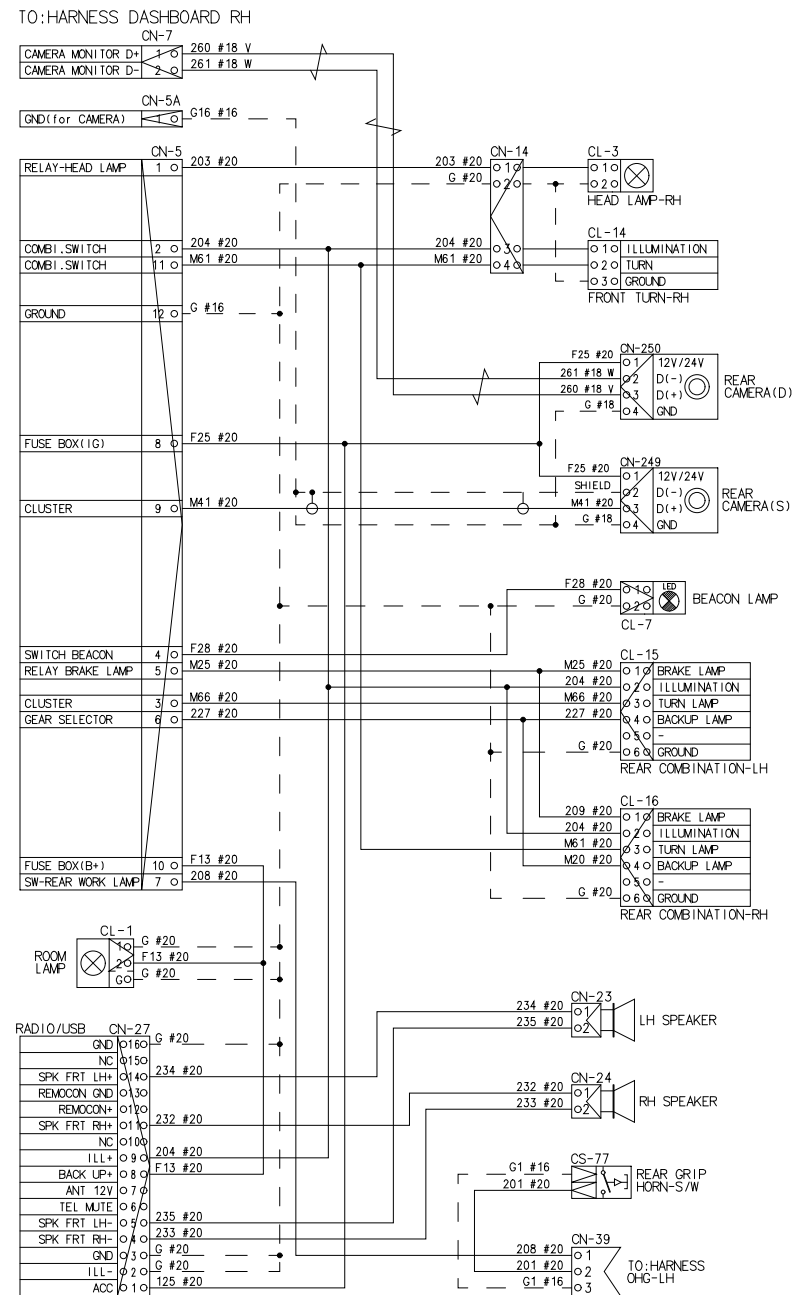
*ELEC.DIAGRAM OF HARNESS OHG-RH(PATIAL CABN-RH)



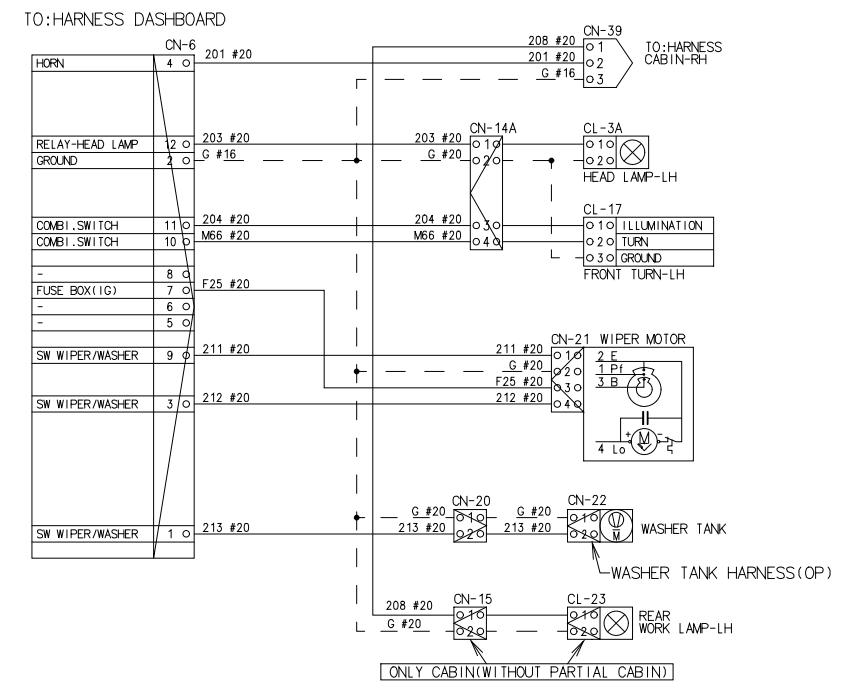
*ELEC.DIAGRAM OF HARNESS OHG-LH



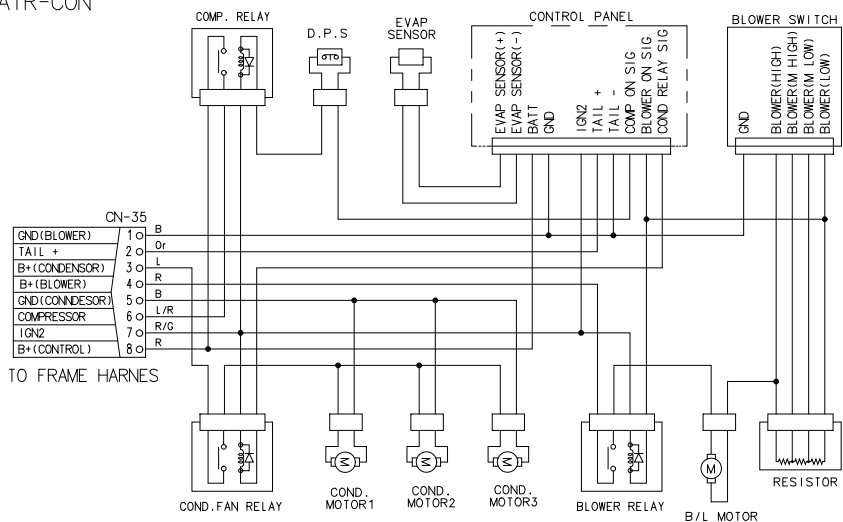
*ELEC.DIAGRAM OF HARNESS CABIN-RH



*ELEC.DIAGRAM OF HARNESS CABIN-LH(PATIAL CABIN-LH)



*AIR-CON

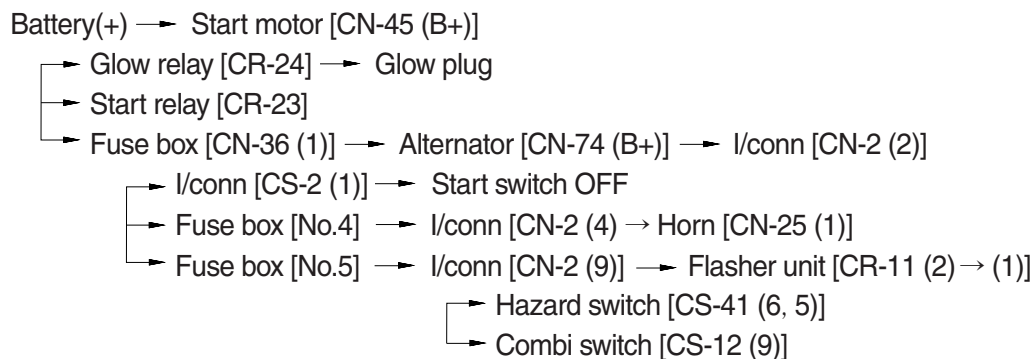


1. POWER CIRCUIT

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

When the start switch is in the off position, the current flows from the positive battery terminal.

1) OPERATING FLOW



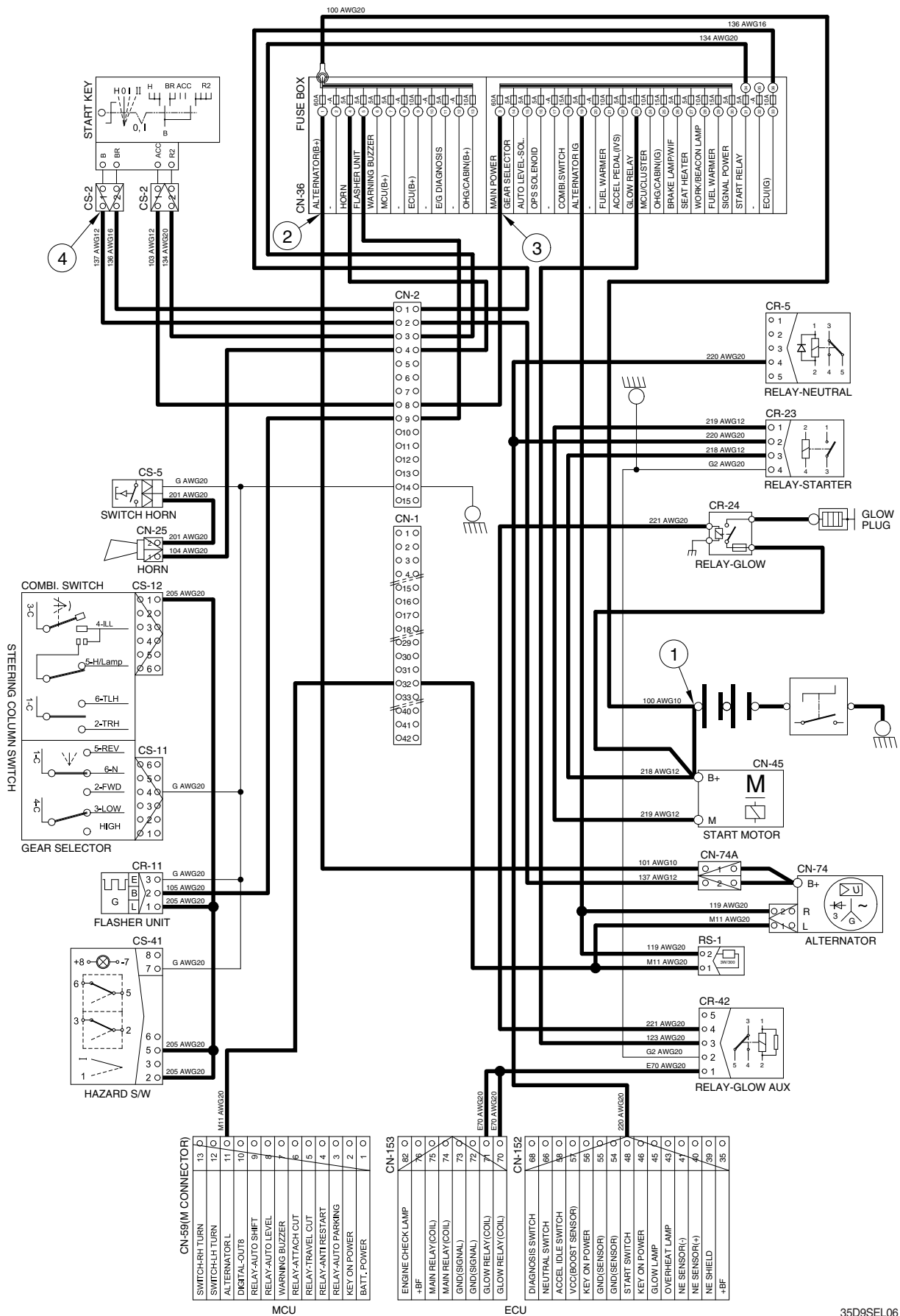
2) CHECK POINT

Engine	Key switch	Check point	Voltage
OFF	OFF	① - GND (Battery(+)) ② - GND (Fuse No.1) ③ - GND (Fuse No.3) ④ - GND (Start key)	24V

※ GND : Ground

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

POWER CIRCUIT



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

2. STARTING CIRCUIT

1) OPERATING FLOW

Battery (+) terminal → Start motor [CN-45 (B+)]

└→ Fuse box [CN-36 (1)] → Alternator [CN-74 (B+)] → I/conn [CN-2 (2)] → Start switch [CS-2 (1)]
└→ Start relay [CR-23]

※ The engine can be started only when the gearshift is in neutral position.

(1) When start key switch is in ON position

Start switch ON [CS-2 (2)] → I/conn [CN-2 (1)] → Fuse box [No.36 →33] → ECU (IG)

(2) When start key switch is START position

Start switch START [CS-2 (2)] → I/conn [CN-2 (3)] → Fuse box [No. 34 →31]

→ Neutral relay [CR-5(3) → (4)]
└→ Start relay [CR-23]
└→ ECU [CN-152 (48)]

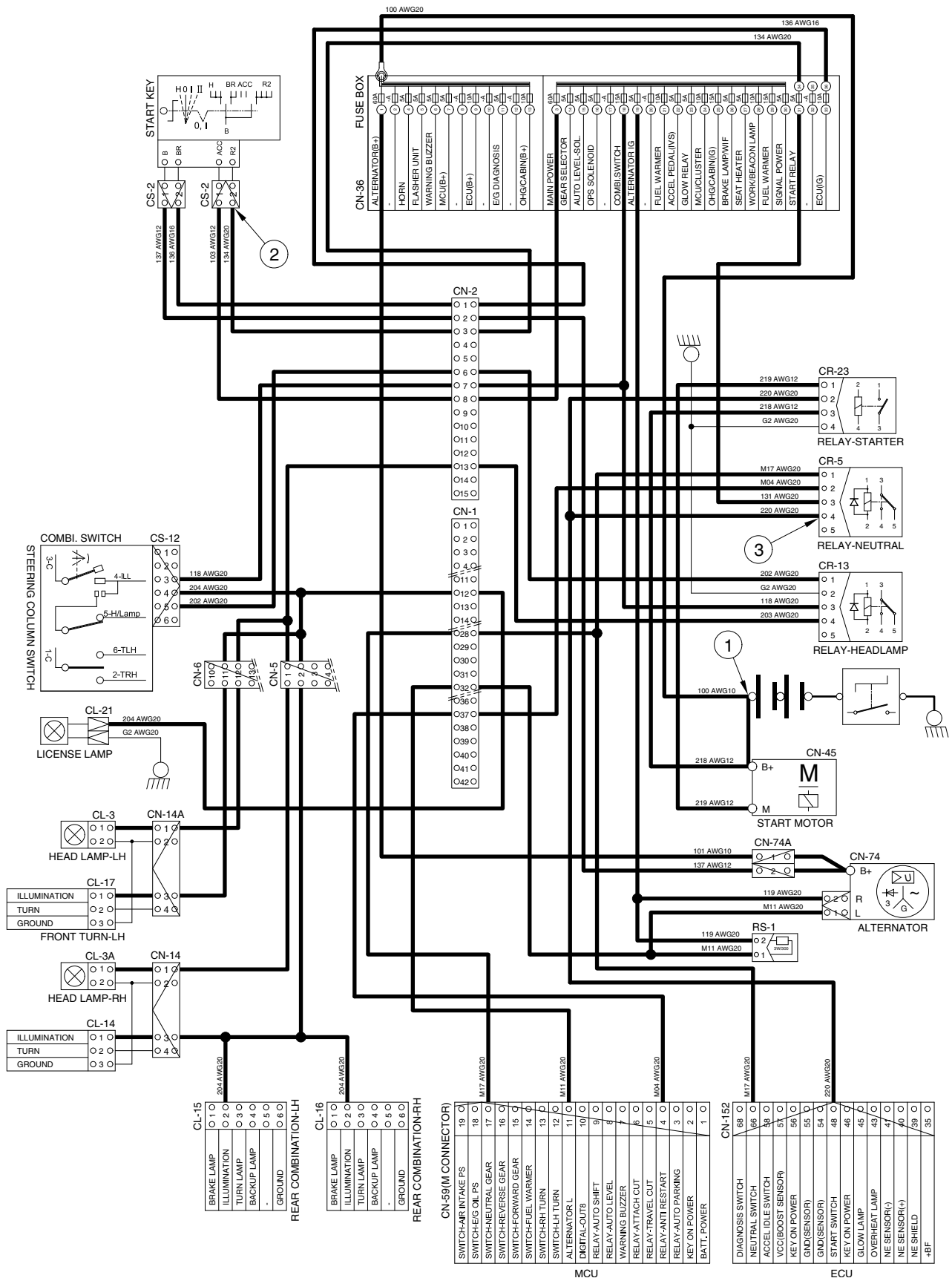
2) CHECK POINT

Engine	Key switch	Check point	Voltage
Running	ON	① - GND (Battery B+) ② - GND (Start key) ③ - GND (Neutral relay)	24V

※ GND : Ground

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

STARTING CIRCUIT



35D9SEL07

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

3. CHARGING CIRCUIT

When the starter is activated and the engine is started, the operator release the start switch to the ON position. Charging current generated by operating alternator flows into the battery.

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

1) OPERATING FLOW

(1) Warning flow

Alternator [CN-74 (L)] → I/conn [CN-1 (32)] → MCU [CN-59 (11)]

(2) Charging flow

Alternator [CN-74 (B+)] → Fuse box [CN-36 (1)] → Starter [CN-45 (B+)] → Battery (+) terminal
→ Charging

2) CHECK POINT

Engine	Key switch	Check point	Voltage
ON	ON	① - GND (Alternator B+) ② - GND (Start switch) ③ - GND (Cluster)	24V

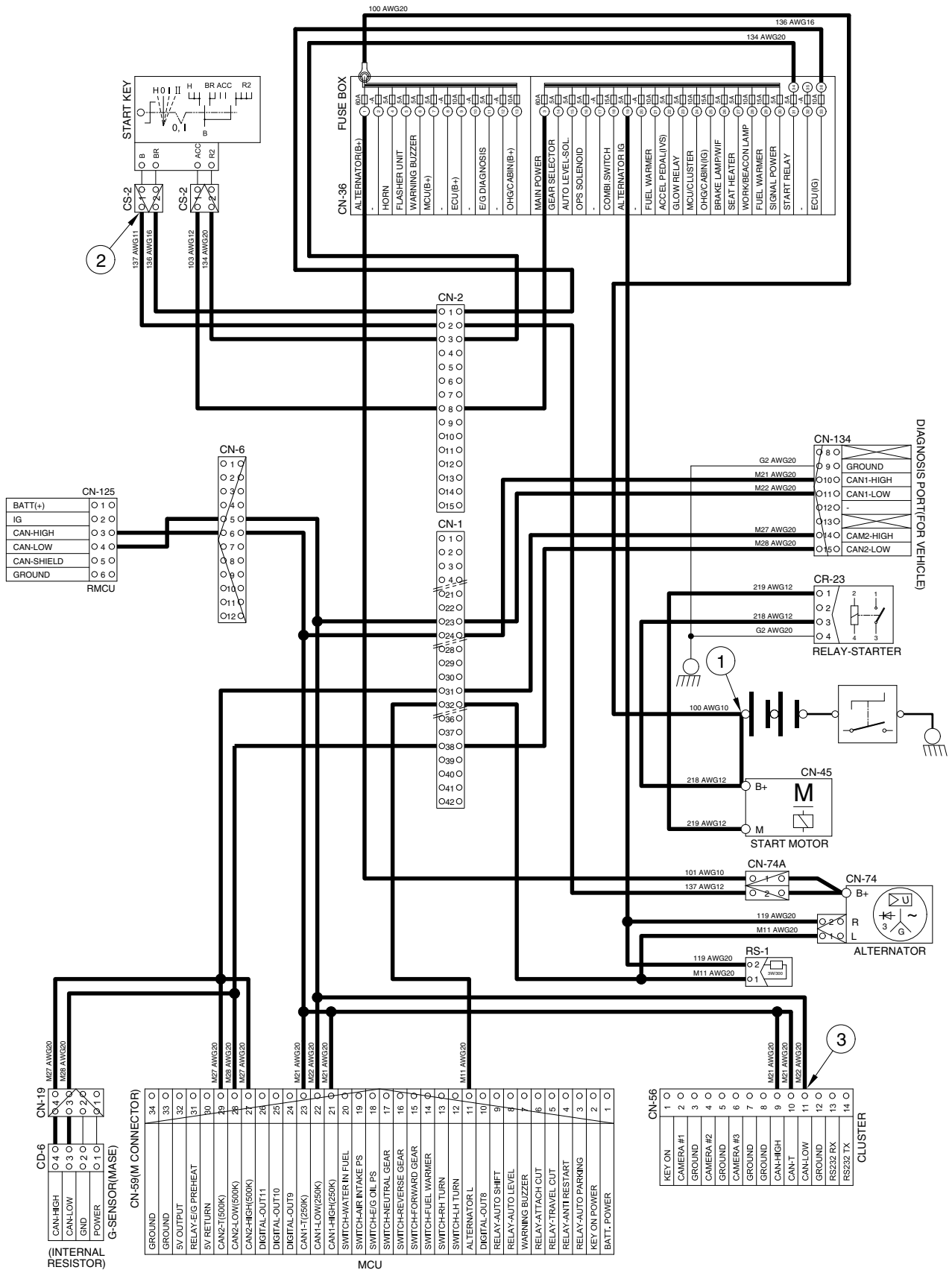
※ GND : Ground

※ Cautions

1. When using an arc welder, always disconnect the ground lead from the battery to prevent alternator or battery damage.
2. Attach the welding ground clamp as close to the weld area as possible to prevent welding current from damaging the bearings of the alternator.
3. Do not disconnect the battery when the engine is running. The voltage surge can damage the diode and resistors in the electrical system.
4. Do not disconnect an electric wire before the engine is stopped and the switches are OFF.

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

CHARGING CIRCUIT



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

4. PREHEATING CIRCUIT

Combustion chamber glow plugs are used in order to give satisfactory starting of low ambient temperatures.

1) OPERATING FLOW

Battery (+) terminal → Fuse box [CN-36 (1)] → I/conn [CN-74A (1)] → Alternator [CN-74 (B+)]
→ I/conn [CN-74A (2)] → I/conn [CN-2 (2)] → I/conn [CS-2(1)] → Start switch
→ Glow relay [CR-24]

※ When you turn the start switch to the ON position, the glow relay makes the glow plugs operated and the glow lamp of the cluster turned ON.

Start switch ON [CS-2 (2)] → I/conn [CN-2 (8)] → Fuse box [CN-36 (3)]
→ Glow aux relay [CR-42 (3)→(4)] → Glow relay ON [CR-24] → Glow plug operating
→ Cluster [CN-56 (1)] → Key ON
→ MCU [CN-59 (2)] → Key ON power

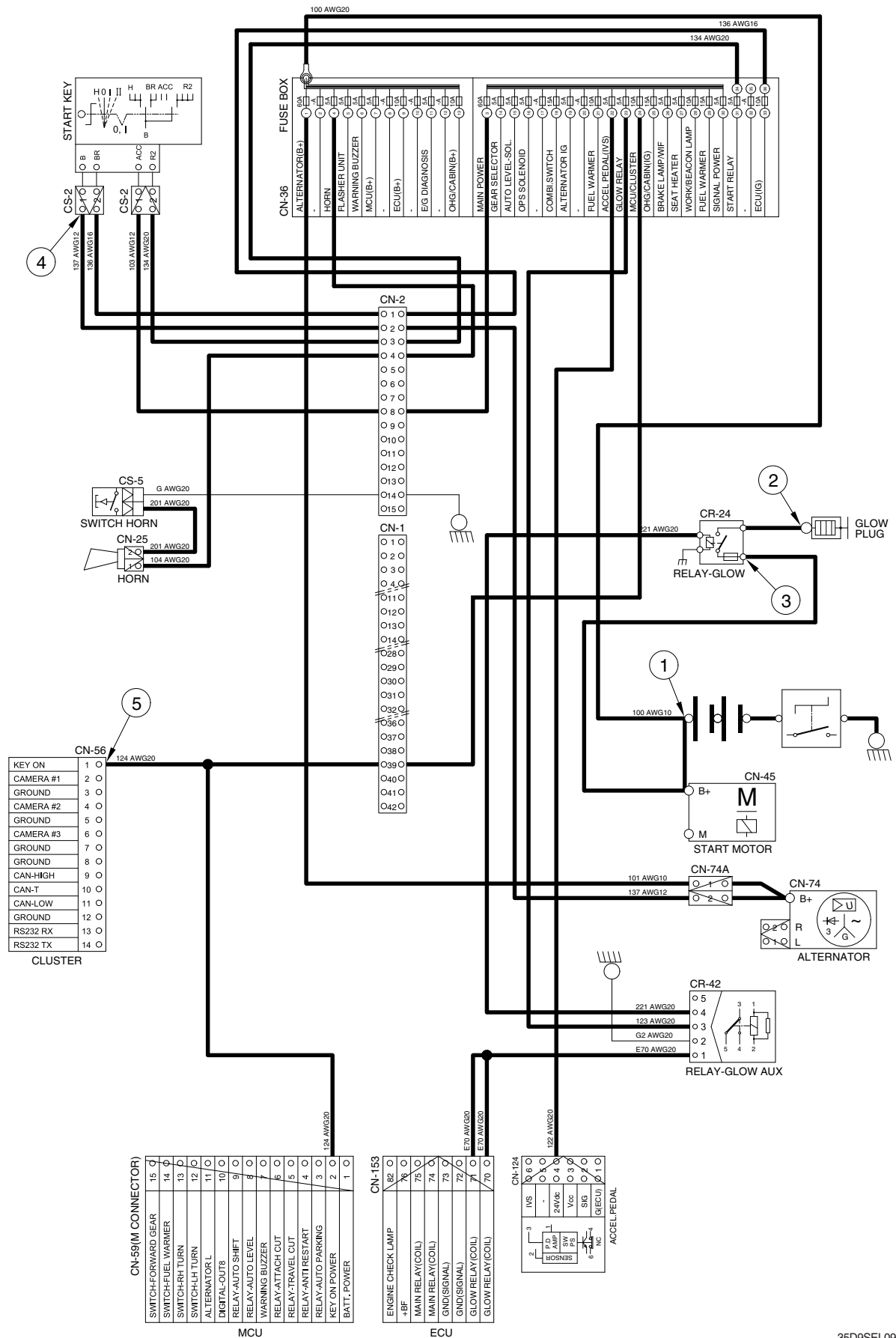
2) CHECK POINT

Engine	Key switch	Check point	Voltage
Stop	HEAT	① - GND (Battery B+) ② - GND (Glow plug) ③ - GND (Glow relay) ④ - GND (Start switch) ⑤ - GND (Cluster)	24V

※ GND : Ground

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

PREHEATING CIRCUIT



35D9SEL09

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

GROUP 3 COMPONENT SPECIFICATION

No	Part name	Qty	Specification														
1	Battery	2	12V×96 AH×2 EA RC : 130 min CCA : 630A														
2	Working lamp	1	24V, 70W														
3	License lamp	1	24V, 3W×2														
4	Rear Combination lamp	2	24V, 25/10W (Stop/Tail) 24V, 21W (Turn) 24V, 10W (Back Up)														
5	Head lamp	2	24V, 70W														
6	Flasher lamp	2	24V, 25/10W														
7	Glow relay	1	24V, 300A														
8	Relay (4P)	3	24V, 20A														
9	Relay (5P)	3	24V, 6A														
10	Flasher Unit	1	85±10 CM, (21W + 21W) × 2 + 3W × 2														
11	Back buzzer	1	24V, 90±5 dB, 60±10 C/M														
13	Horn	1	24V, MAX 1.5A, 100 ~ 115 dB														
14	Fuel level sender	1	<table border="1"> <tr> <td>Float indicator</td><td>E</td><td>1/2</td><td>F</td></tr> <tr> <td>Resistance (Ω)</td><td>105</td><td>32.5</td><td>5</td></tr> <tr> <td rowspan="2">Tolerance (Ω)</td><td>+0</td><td rowspan="2">±2.5</td><td>+0.5</td></tr> <tr> <td>5</td><td>0</td></tr> </table>	Float indicator	E	1/2	F	Resistance (Ω)	105	32.5	5	Tolerance (Ω)	+0	±2.5	+0.5	5	0
Float indicator	E	1/2	F														
Resistance (Ω)	105	32.5	5														
Tolerance (Ω)	+0	±2.5	+0.5														
	5		0														
15	Master switch	1	24V, 180A														
16	Combination switch	1	Direction 4.5A, Tail 5A Head 6A, Horn 4A														
17	Brake switch	1	24V, 50W														
18	Working lamp switch	1	24V, 8A														
19	Hazard switch	1	24V, 8A														
20	Start switch	1	24V, 30A														

GROUP 4 CONNECTOR DESTINATION

Connector number	Type	No. of pin	Destination	Connector part No.	
				Female	Male
CN-1	AMP	42	I/conn (Frame harness-dashboard harness)	936421	936614-2
CN-2	AMP	15	I/conn (Dashboard harness-frame harness)	2-85262-1	368301-1
CN-5	KET	12	I/conn (Cabin harness-dashboard harness)	MG610346	MG640348
CN-6	KET	12	I/conn (Cabin harness-dashboard harness)	MG610346	MG640348
CN-9	AMP	42	Engine harness	936421	-
CN-10	KUM	8	I/conn (Frame harness-HMC engine harness)	PB625-08027	-
CN-14	DAEDONG	4	Head/Turn lamp harness	110-4PR	110-4PT G
CN-14A	DAEDONG	2	Head lamp (LH)	110-2PR	-
CN-15	DAEDONG	2	Work lamp harness (LH)	110-2PR	-
CN-15A	DAEDONG	2	Work lamp harness (RH)	110-2PR	-
CN-16	AMP	3	I/conn (Load sensor-frame harness)	-	174359-2
CN-17	AMP	2	I/conn (Frame harness-tilt lever switch)	174352-2	174354-2
CN-18	AMP	2	Socket harness	174352-2	174354-2
CN-19	AMP	4	G-sensor (G-sensor-dashboard harness)	174257-2	174259-2
CN-25	MOLEX	2	Horn	35825-0211	-
CN-28	DEUTSCH	6	I/conn (Frame harness-Hyd pressure switch)	-	DT04-6P
CN-36	QPL	-	Fuse box	21HN-55010	-
CN-45	RING TERM	2	Start motor (B+)	S820-308000	-
			Start motor (M)	S820-205000	-
CN-56	AMP	14	Cluster	776273-2	-
CN-59N	AMP	34	MCU	4-1437290-0	-
CN-59M	AMP	34	MCU	4-1437290-1	-
CN-65	KET	1	Back buzzer	ST730018-3	ST750036-3
CN-74	SUMITOMO	2	Alternator	6189-0172	-
CN-74A	KET	2	Alternator	MG640188-4	-
CN-96	AMP	2	Fuel warmer	85202-1	-
CN-96A	AMP	2	Fuel warmer	15300027	-
CN-113	KET	2	OPSS buzzer	MG610320	-
CN-122	DEUTSCH	2	Forward solenoid 1	DT06-2S	-
CN-123	DEUTSCH	2	Reverse solenoid 1	DT06-2S	-
CN-124	AMP	6	Accelerator pedal	174262-2	-
CN-125	DEUTSCH	8	RMCU	DT06-8S	-
CN-130	AMP	2	Cut-off solenoid 1 (Tilt)	174352-2	174357-2
CN-131	AMP	2	Cut-off solenoid 2 (Lift)	174352-2	174357-2
CN-132	DEUTSCH	2	Forward solenoid 2	DT06-2S	-
CN-133	DEUTSCH	2	Reverse solenoid 2	DT06-2S	-
CN-134	KET	20	Diagnosis port	MG652863	-

Connector number	Type	No. of pin	Destination	Connector part No.	
				Female	Male
CN-138	KET	3	DC/DC converter	MG610045	MG620044
CN-140	KET	3	MCU update	MG610327	-
CN-151	AMP	34	ECU	1123337-1	-
CN-152	AMP	35	ECU	1123338-1	-
CN-153	AMP	32	ECU	1123339-1	-
CN-154	AMP	35	ECU	1123340-1	-
CN-155	AMP	31	ECU	1123341-1	-
CN-156	MOLEX	16	ECU diagnostic	51115-1601	-
CN-157	KET	2	CAN	MG651026	MG641029
CN-249	AMP	4	Rear view camera	174257-2	174259-2
Switch					
CS-2	KET	2	Start switch	MG610281	MG620282
CS-3	CARLING	10	Beacon lamp	21HN-56300	-
CS-5	RING TERM	-	Horn switch	S810-105000	-
CS-11	DEUTSCH	6	Gear selector switch	DT06-6S	-
CS-12	DEUTSCH	6	Combination switch	DT06-6S-P012	-
CS-13	KET	2	Tilt lever switch	MG610320	MG642552
CS-17	KET	3	Parking switch	MG610045	-
CS-21	AMP	15	Rear work lamp	2-85262-1	-
CS-23	CARLING	10	Wiper/Washer	21HN-56300	-
CS-41	CARLING	10	Hazard switch	21HN-56300	-
CS-73	DEUTSCH	6	Seat switch	DT06-6S	-
Lamp					
CL-3	KET	2	Head lamp	MG652520	-
CL-7	DEUTSCH	2	Beacon lamp	DT06-2P	DT04-2P
CL-14	AMP	3	Front turn lamp	936187-3	-
CL-14A	DAEDONG	4	Head/Turn lamp	110-4PR	-
CL-15	DAEDONG	6	R/Combination lamp-LH	110-6PR	-
CL-16	DAEDONG	6	R/Combination lamp-RH	110-6PR	-
CL-21	KET	1	License lamp	ST730018-3	ST750036-3
Relay					
CR-5	OMRON	5	Neutral relay	21FV-55510	-
CR-11	KET	3	Flasher unit relay	312-GIHUNG-3P	-
CR-12	OMRON	5	Auto level relay	21FV-55510	-
CR-13	OMRON	5	Head lamp relay	21FV-55510	-
CR-23	AMP	4	Start relay	172134-1	-
CR-24	KET	1	Glow relay	ST730018-3	-
CR-43	OMRON	5	ECU (B+) relay	21FV-55510	-
CR-45	OMRON	5	ECU (IG) relay	21FV-55510	-

Connector number	Type	No. of pin	Destination	Connector part No.	
				Female	Male
CR-50	OMRON	5	Travel cut relay	21FV-55510	-
CR-51	OMRON	5	Attach cut relay	21FV-55510	-
CR-52	OMRON	5	Brake lamp relay	21FV-55510	-
CR-57	OMRON	5	Auto shift relay	21FV-55510	-
Sensor and pressure switch					
CD-2	KET	3	Fuel sendor	S810-003201	-
CD-4	DEUTSCH	4	Brake switch	DT06-4S	-
CD-5	KET	4	Hyd temperature sensor	MG610331	-
CD-6	DEUTSCH	4	G sensor	DT06-4S	-
CD-10	KET	1	Air cleaner switch	ST730057-2	-
CD-29	DEUTSCH	4	T/M temperature sensor	DT06-4S	-
CD-35	YAZAKI	3	WIF	7283-7031-10	-
CD-50	DEUTSCH	3	Load sensor	DTM06-3S	-
CD-59	KET	2	Brake oil level	MG610320	-
CD-73	KET	3	Speed sensor	MG610327	-
DO-01	KET	-	Diode	T15890030	-
DO-02	KET	-	Diode	T15890030	-
DO-03	-	-	Diode	21EA-50550	-
DO-04	-	-	Diode	21EA-50550	-

GROUP 5 TROUBLESHOOTING

Trouble symptom	Probable cause	Remedy
Lamps dimming even at maximum engine speed.	Faulty wiring.	Check for loose terminal and disconnected wire.
Lamps flicker during engine operation.	Improper belt tension.	Adjust belt tension.
Charge lamp does not light during normal engine operation.	- Charge lamp defective. - Faulty wiring.	- Replace. - Check and repair.
Alternator makes abnormal sounds.	Alternator defective.	Replace.
Starting motor fails to run.	- Faulty wiring. - Insufficient battery voltage.	- Check and repair. - Recharge battery.
Starting motor pinion repeats going in and out.	Insufficient battery voltage.	Recharge battery.
Excessively low starting motor speed.	- Insufficient battery voltage. - Starting motor defective.	- Recharge battery. - Replace
Starting motor comes to a stop before engine starts up.	- Faulty wiring. - Insufficient battery voltage.	- Recharge battery. - Replace
Heater signal does not become red.	- Faulty wiring. - Glow plug damaged.	- Check and repair. - Replace
Engine oil pressure caution lamp does not light when engine is stopped (with starting switch left in "ON" position).	- Caution lamp defective. - Caution lamp switch defective.	- Replace - Replace