

## SECTION 7 ELECTRICAL SYSTEM

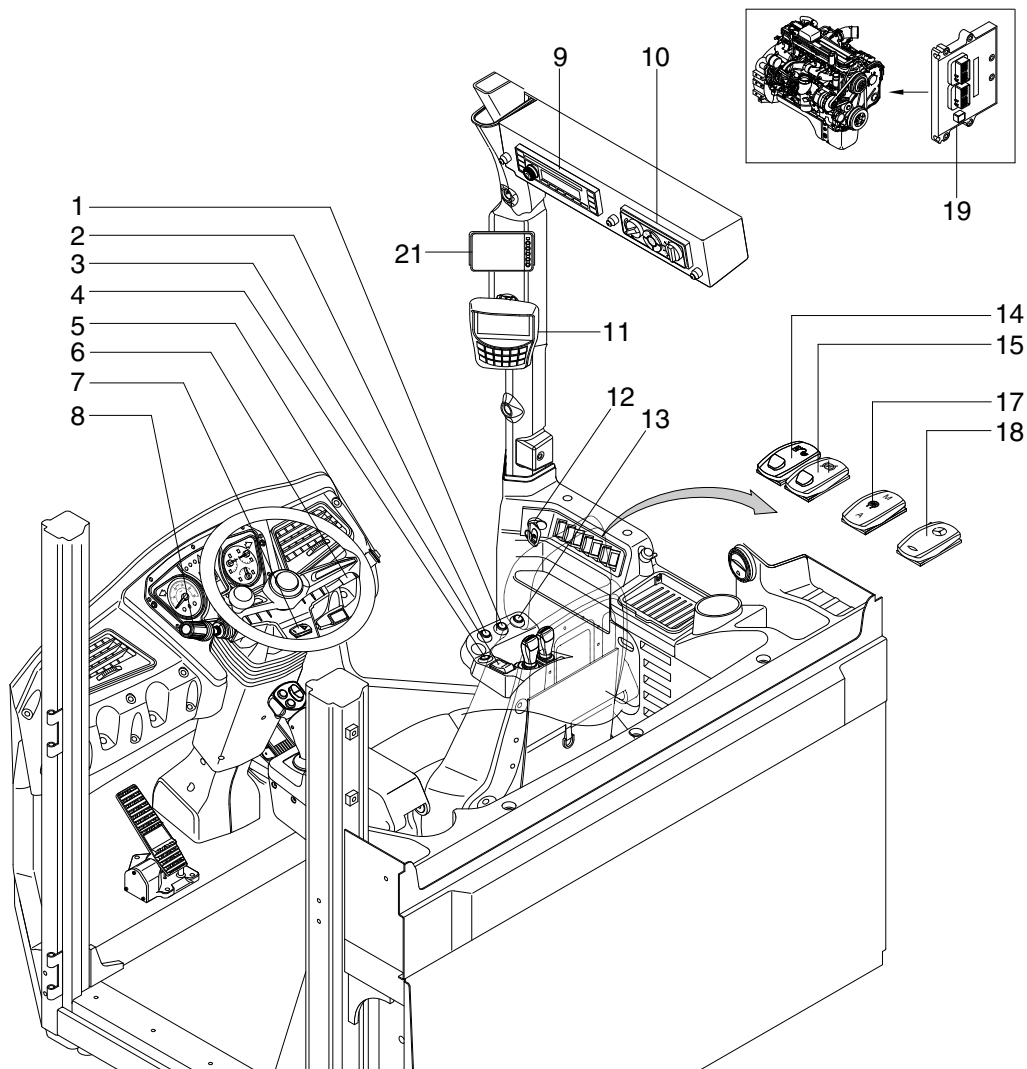
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# SECTION 7 ELECTRICAL SYSTEM

## GROUP 1 COMPONENT LOCATION

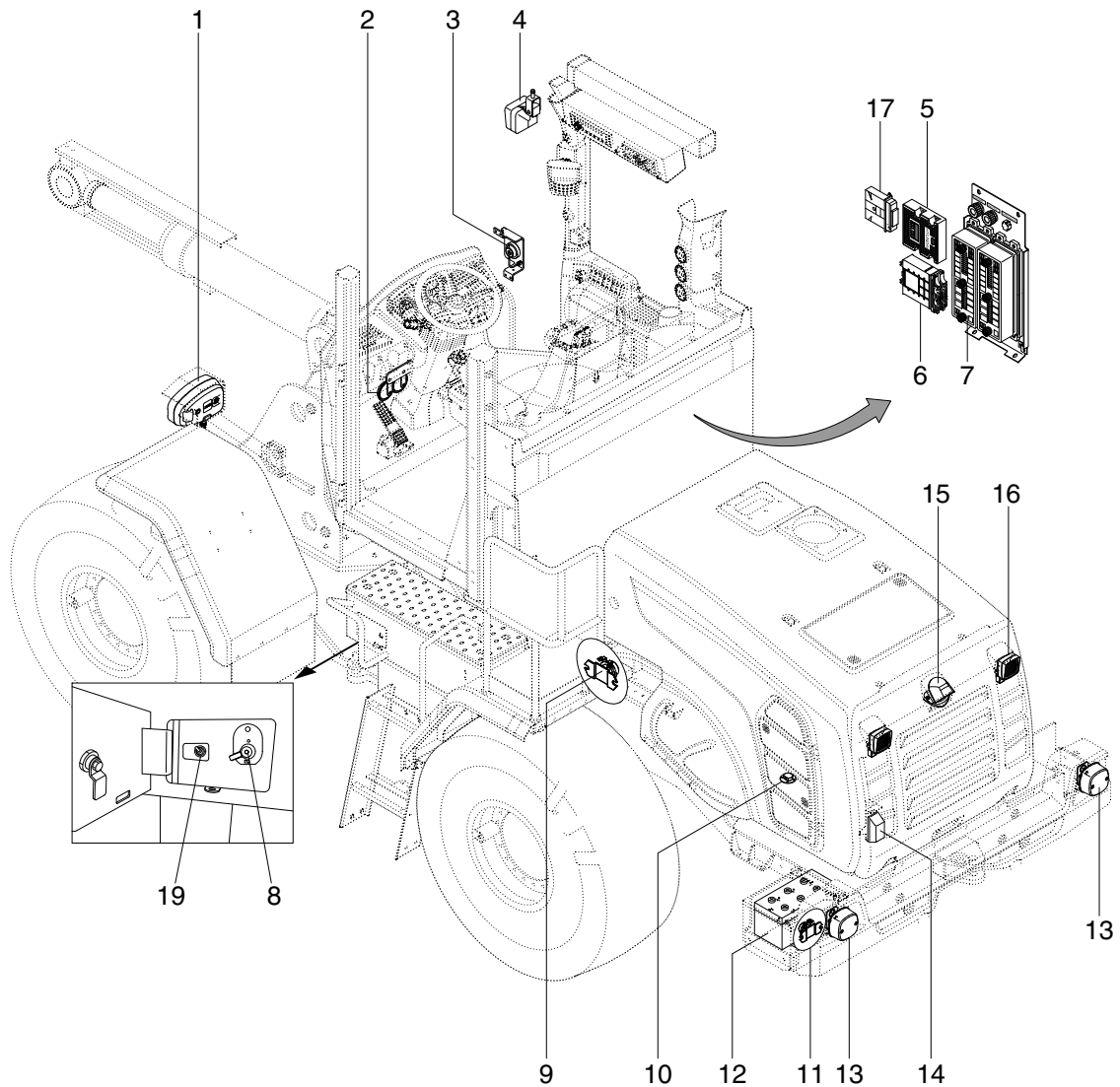
### 1. LOCATION 1



970SA7EL20

- |                         |                           |                                   |
|-------------------------|---------------------------|-----------------------------------|
| 1 Kick down button      | 8 Gear select lever       | 14 Pilot cut off switch           |
| 2 Horn button           | 9 Radio & USB player      | 15 Parking brake switch           |
| 3 FNR switch            | 10 Aircon & heater switch | 17 Differential lock switch (opt) |
| 4 FNR select button     | 11 Monitor                | 18 Emergency test switch          |
| 5 Hone button           | 12 Starting switch        | 19 Engine control unit (ECU)      |
| 6 Multi function switch | Starting button (opt)     | 21 Camera monitor                 |
| 7 Hazard switch         | 13 Work load button       |                                   |

## 2. LOCATION 2

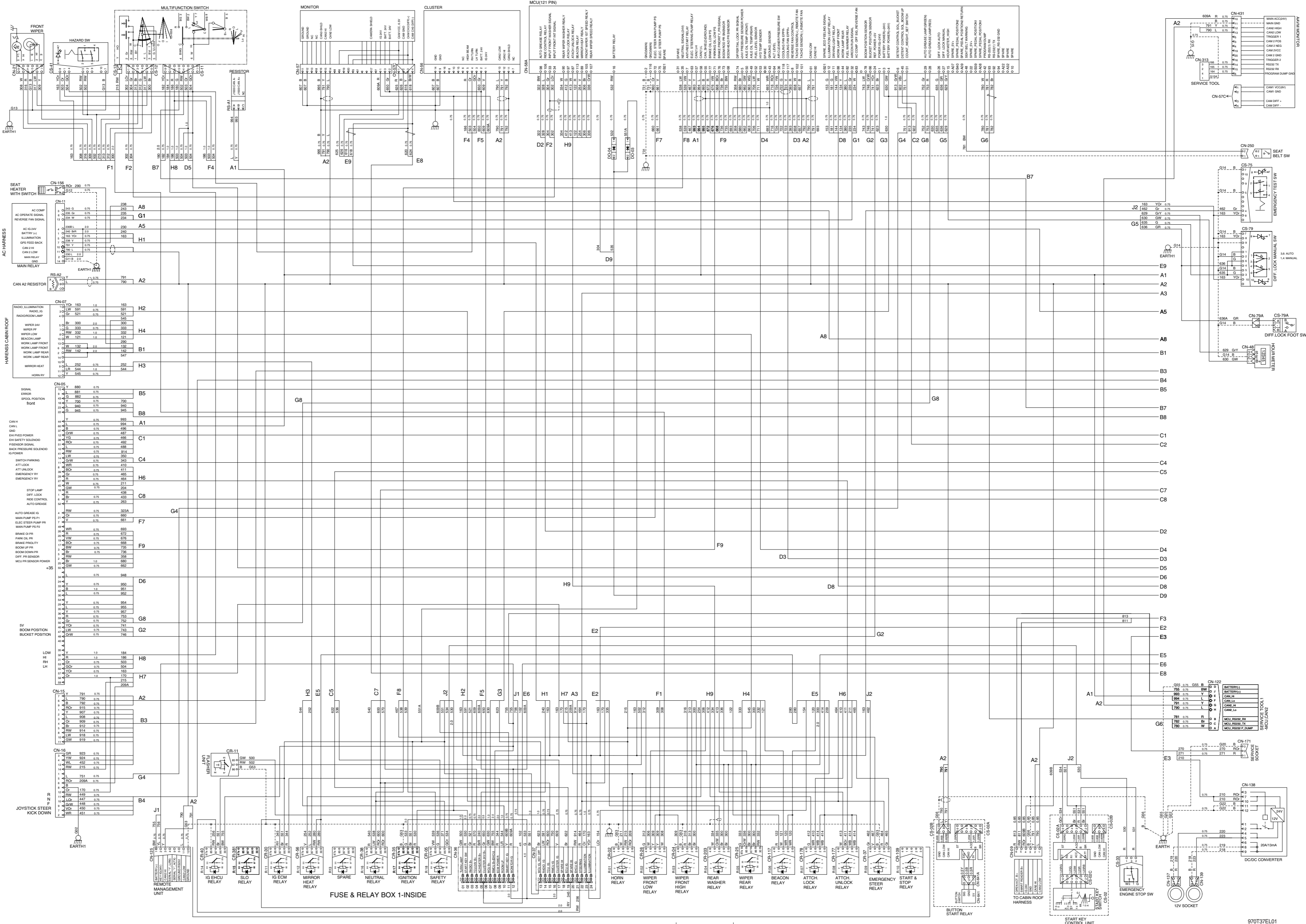


960A7EL21

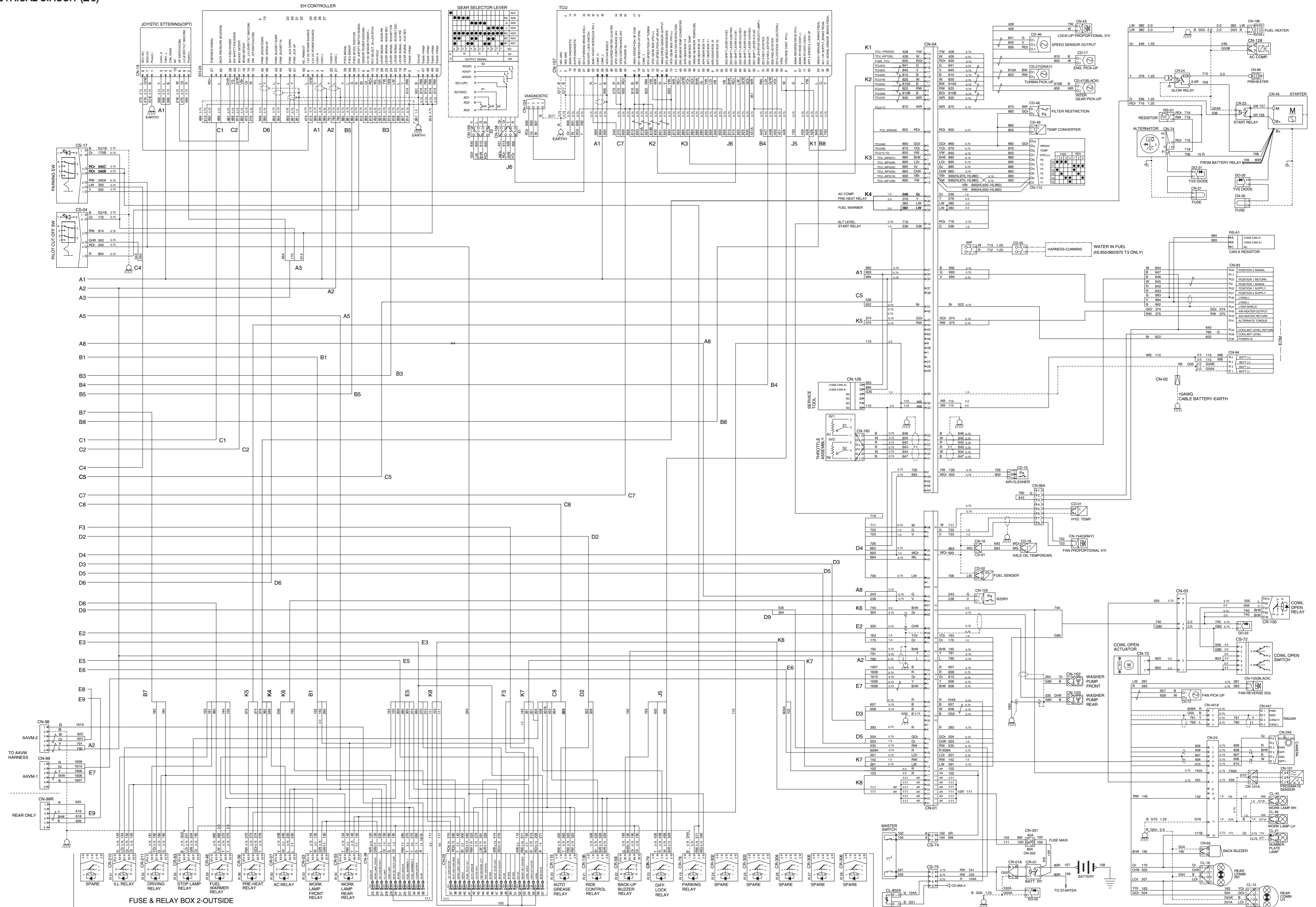
- |   |                                 |    |                   |    |  |
|---|---------------------------------|----|-------------------|----|--|
| 1 | Head lamp                       | 8  | Master switch     | 15 | Camera (opt)   |
| 2 | Horn                            | 9  | Start relay       | 16 | Work lamp  |
| 3 | Angle sensor                    | 10 | Fuel sender       | 17 | Control unit (electro hydraulic & joystick steering) |
| 4 | Work lamp                       | 11 | Battery relay     | 19 | Engine hood open switch                              |
| 5 | Machine control unit (MCU)      | 12 | Battery           |    |  |
| 6 | Transmission control unit (TCU) | 13 | Rear combi lamp   |    |  |
| 7 | Fuse and relay box              | 14 | Number plate lamp |    |  |

GROUP 2 ELECTRICAL CIRCUIT

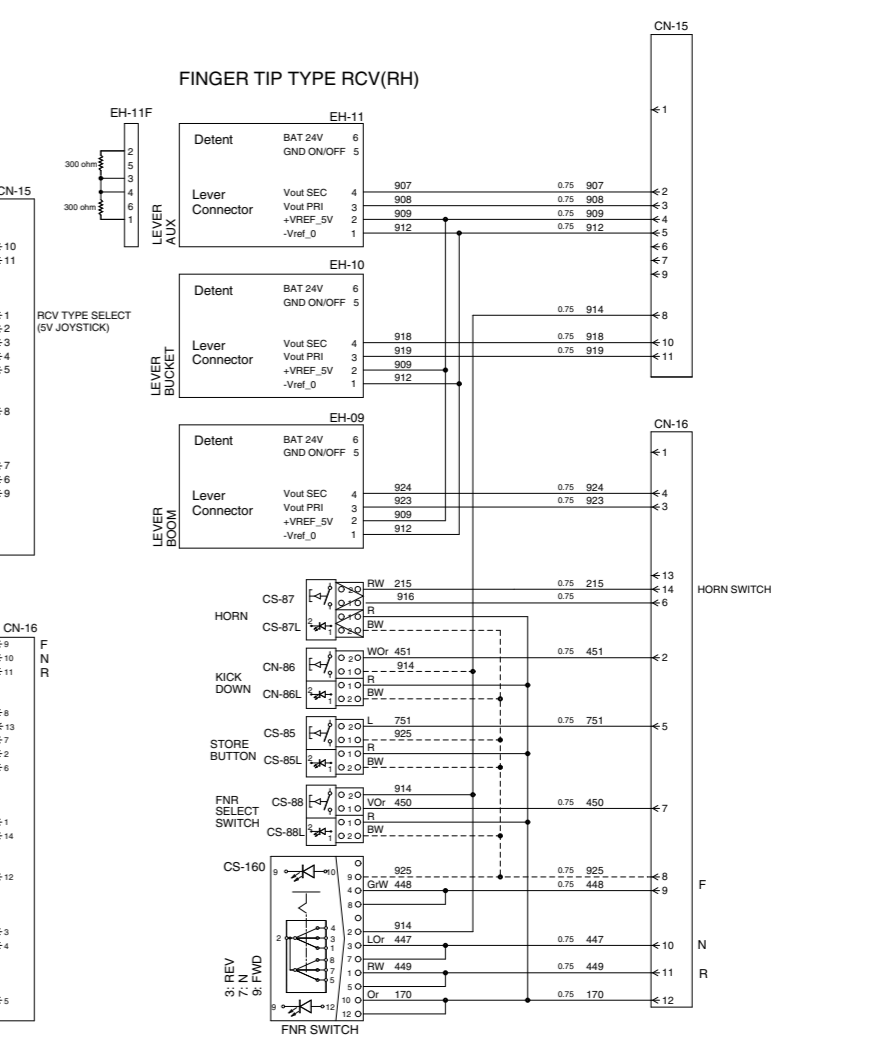
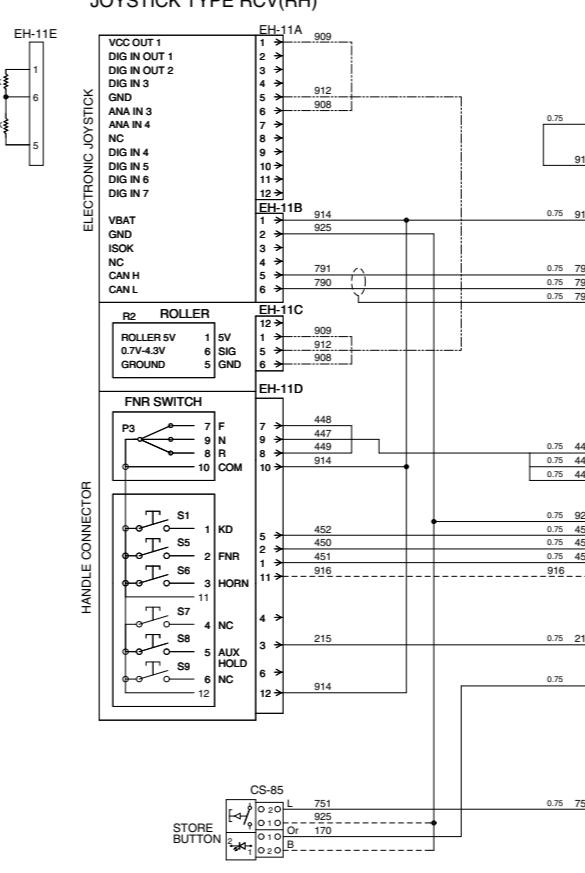
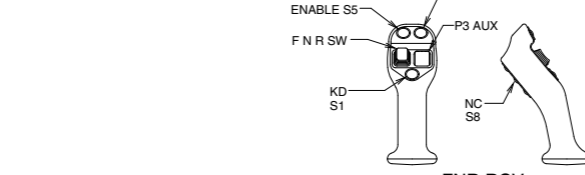
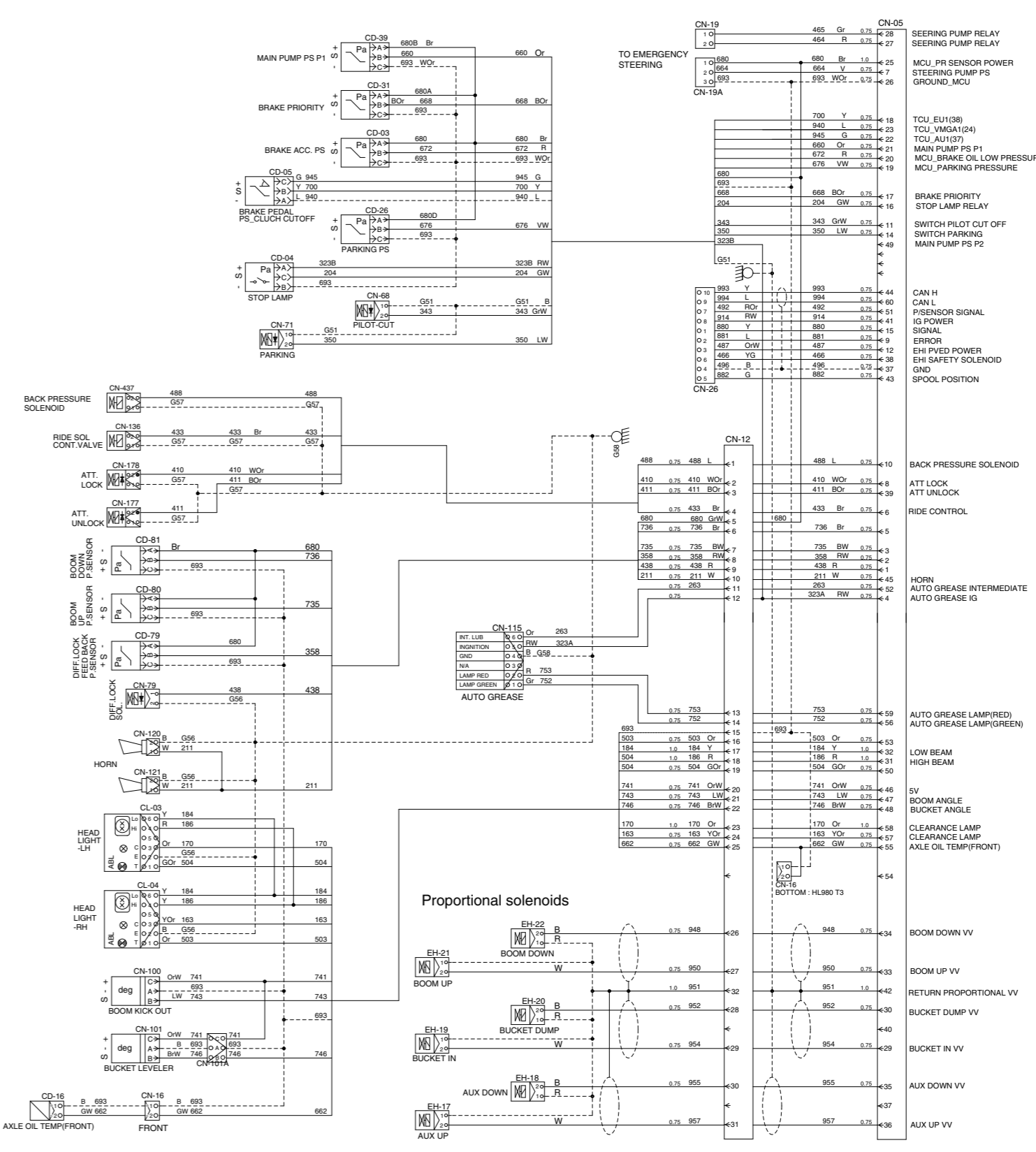
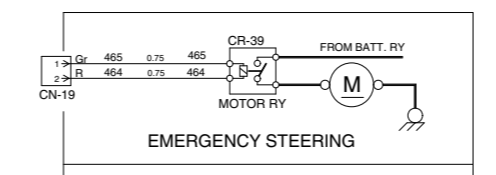
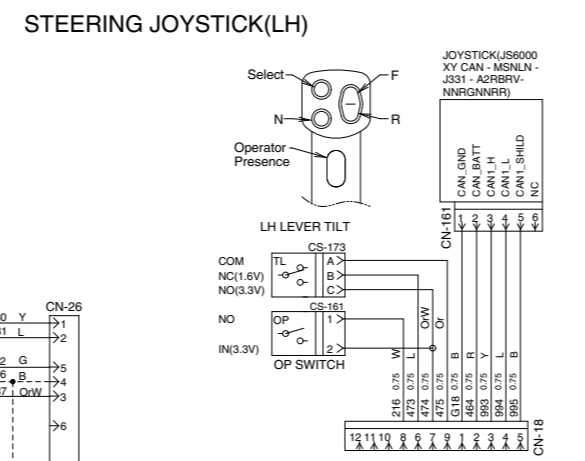
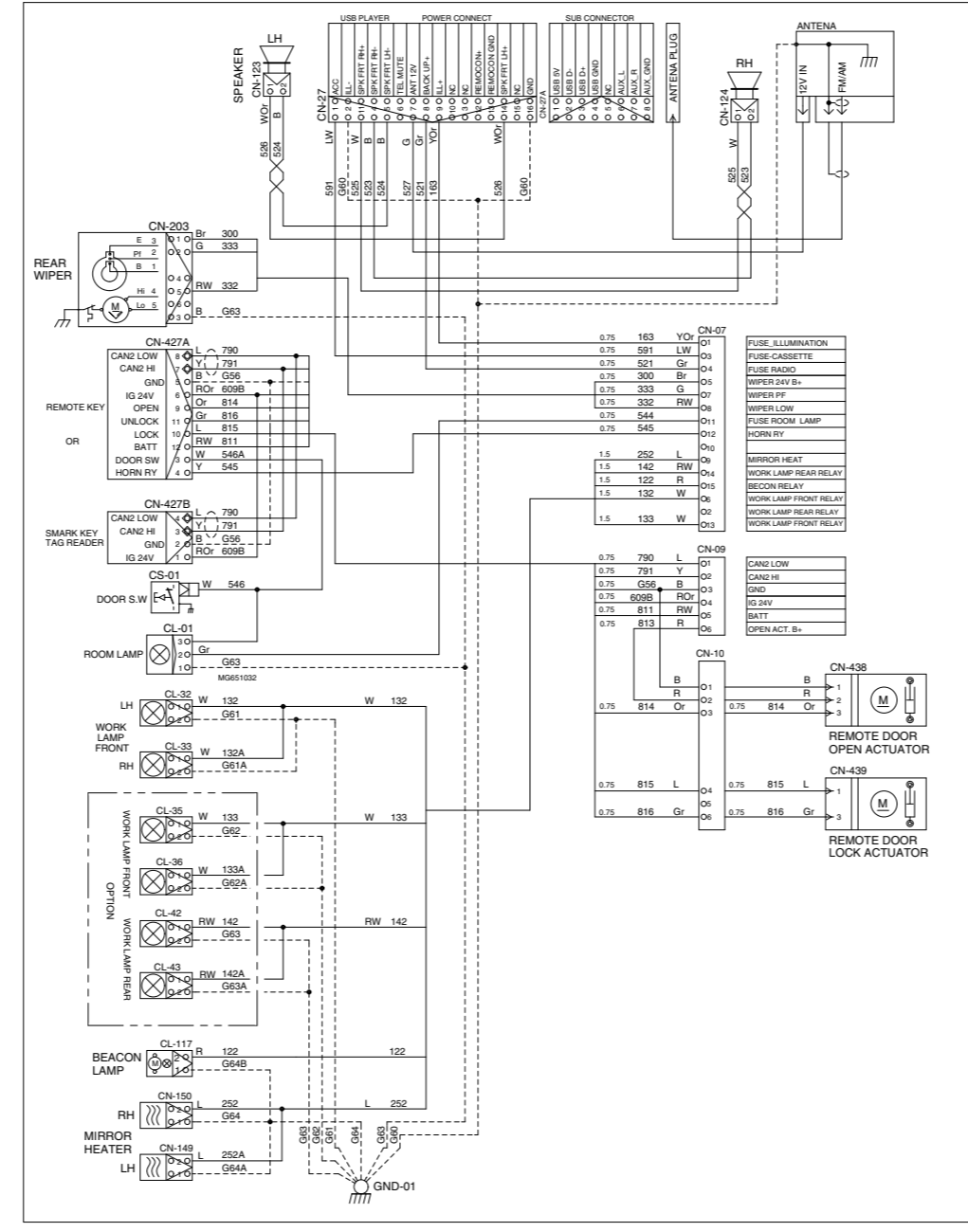
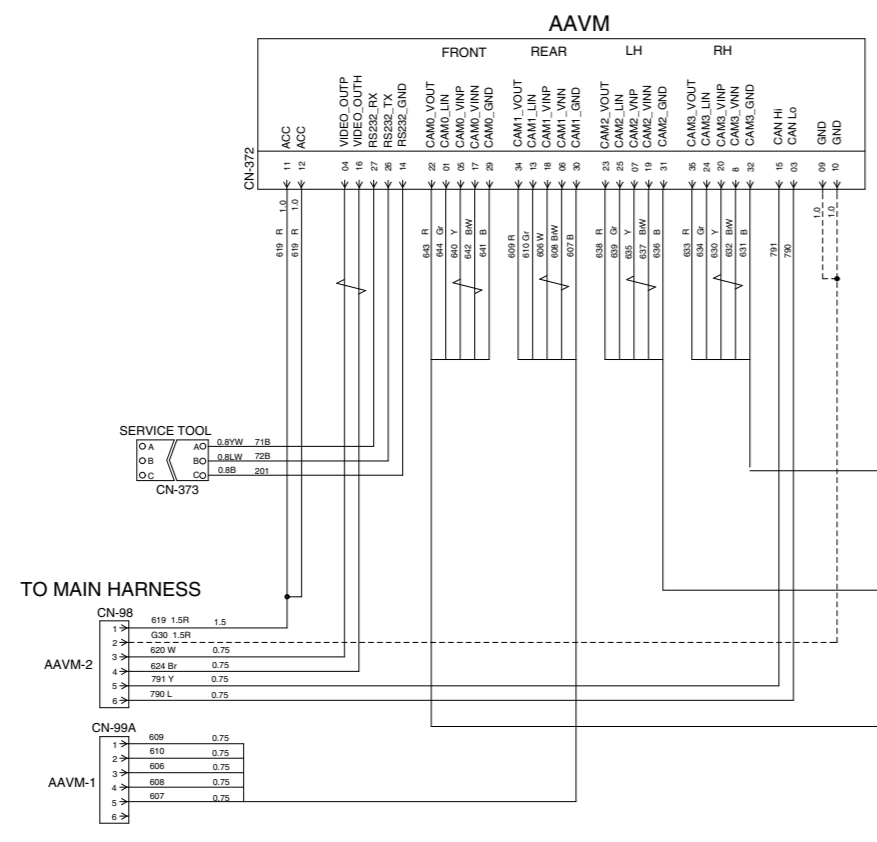
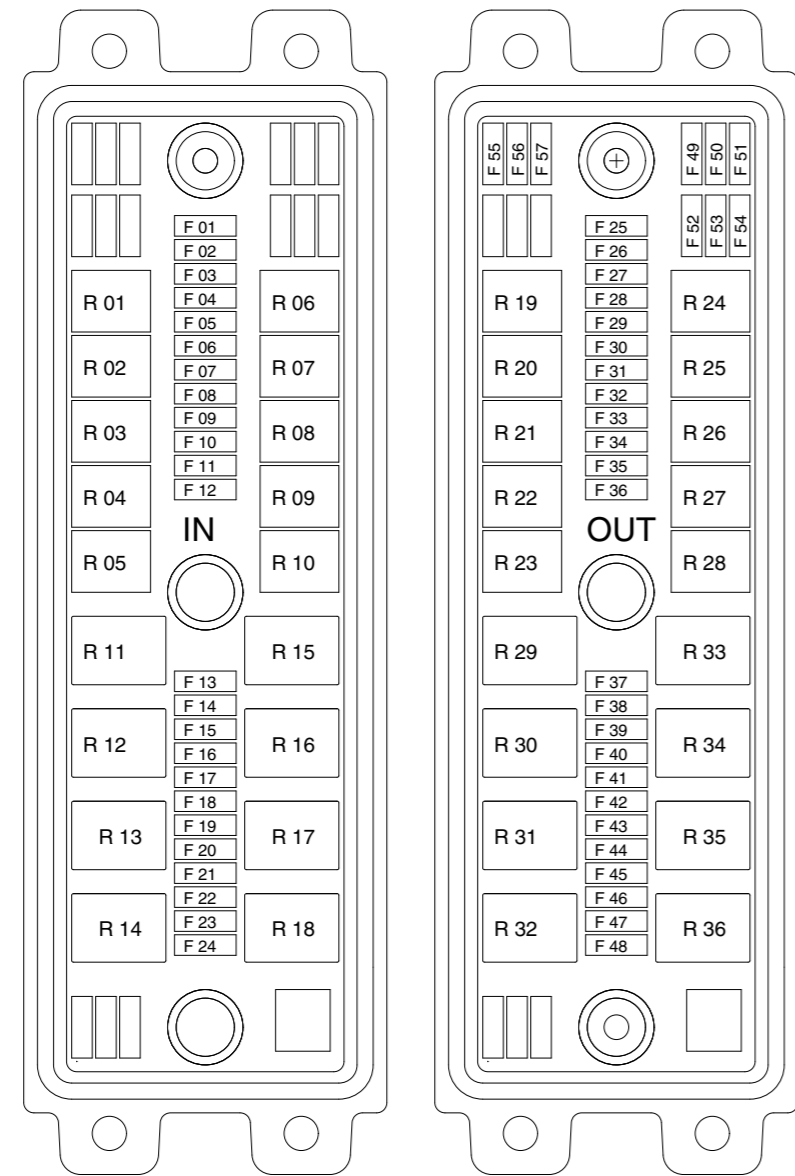
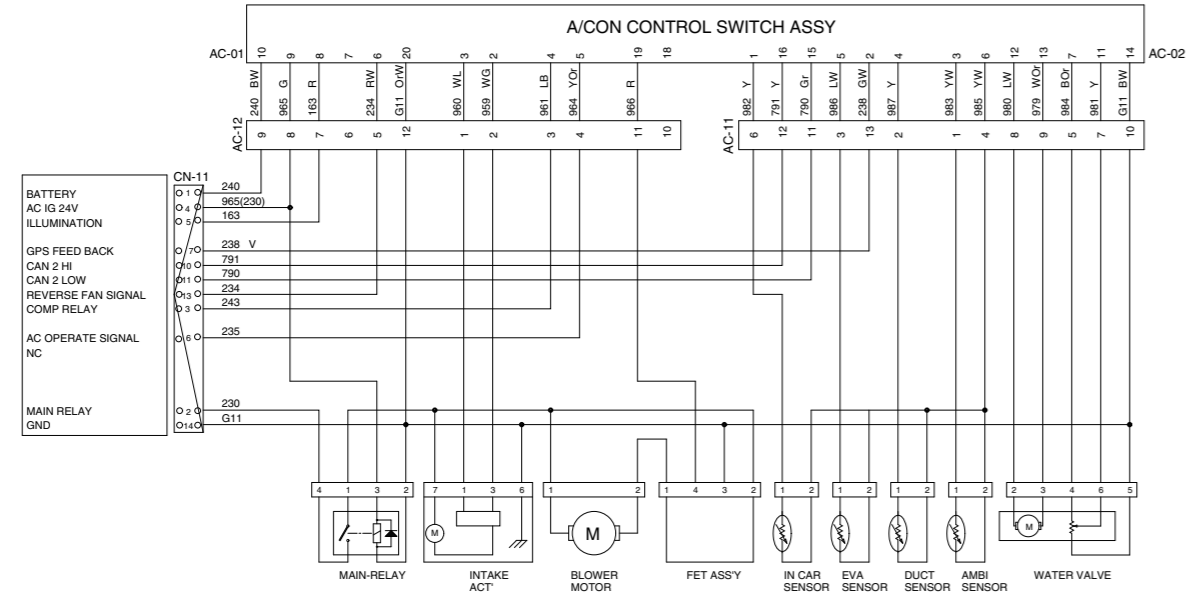
- ELECTRICAL CIRCUIT (1/3)



ELECTRICAL CIRCUIT (2/3)



· ELECTRICAL CIRCUIT (3/3)



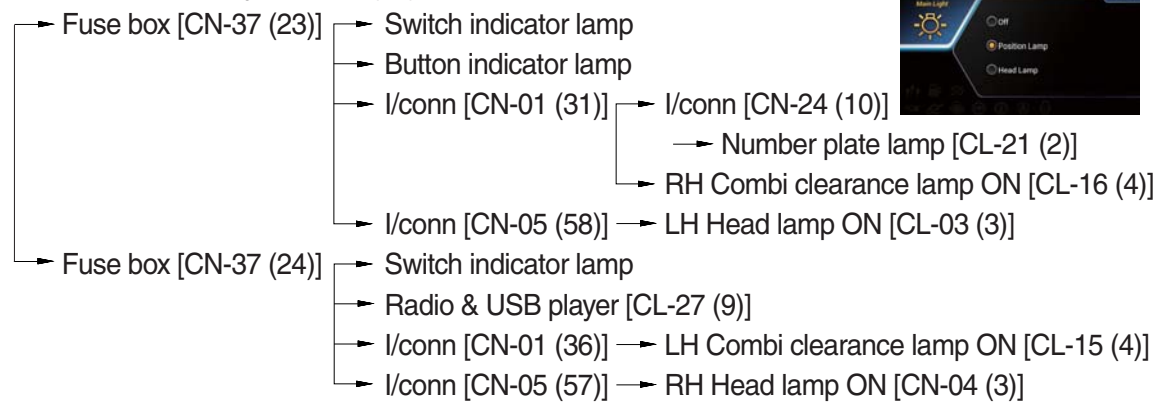
**MEMORANDUM**

# 1. ILLUMINATION CIRCUIT

## 1) OPERATING FLOW

Main light switch on monitor → Switch ON, Select position lamp → MCU [CN-58A (12)]

→ Illumination relay [CR-210 (87)]



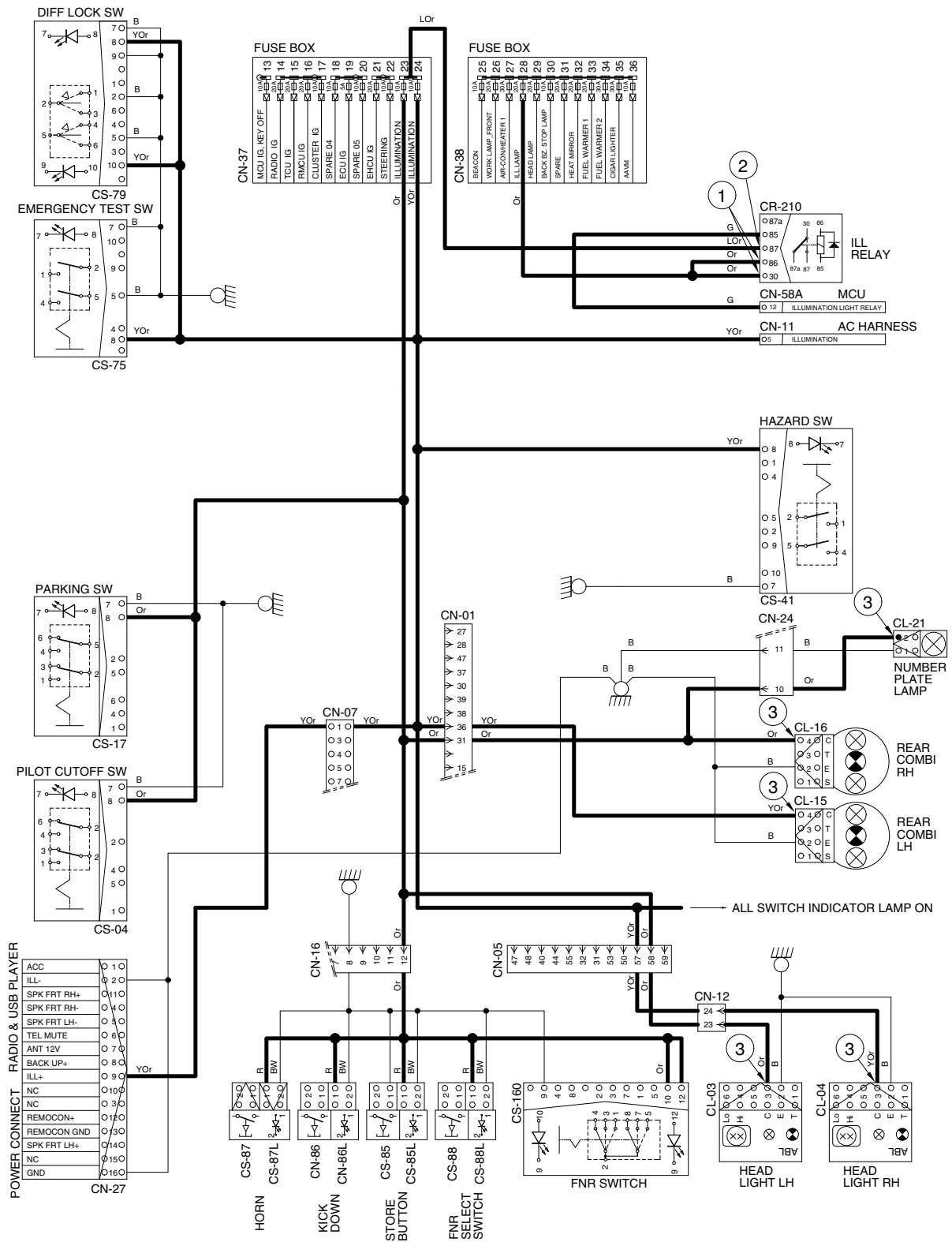
## 2) CHECK POINT

Engine	Key switch	Check point	Voltage
OFF	ON	① - GND (relay input) ② - GND (relay output) ③ - GND (to light)	20~25V

※ GND : Ground

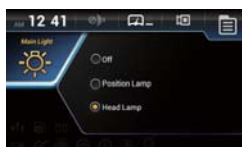
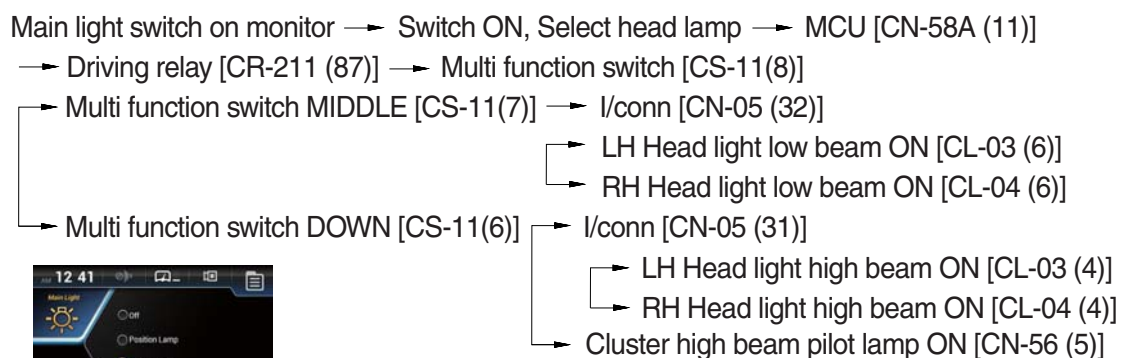


# ILLUMINATION CIRCUIT



## 2. HEAD LIGHT CIRCUIT

### 1) OPERATING FLOW



### 2) CHECK POINT

Engine	Key switch	Check point	Voltage
OFF	ON	① - GND (relay input) ② - GND (relay output) ③ - GND (multi function input) ④ - GND (multi function output) ⑤ - GND (multi function output) ⑥ - GND (low beam) ⑦ - GND (high beam) ⑧ - GND (passing B <sup>+</sup> )	20~25V

※ GND : Ground



### 3. WORK LIGHT SWITCH

#### 1) OPERATING FLOW

※ Main light switch on monitor : Select position lamp.

##### (1) Work lamp switch (select Front)

MCU [CN-58A (88)] → Front work lamp relay [CR-03 (87)] → I/conn [CN-07 (06)]

- LH Front work lamp ON [CL-32 (1)]
- RH Front work lamp ON [CL-33 (1)]



##### (2) Work lamp switch (select Rear)

MCU [CN-58A (44)] → Rear work lamp relay [CR-55 (87)] → I/conn [CN-01 (05)]

- I/conn [CN-24 (12)]
  - LH Rear work lamp ON [CL-46 (1)]
  - RH Rear work lamp ON [CL-45 (1)]

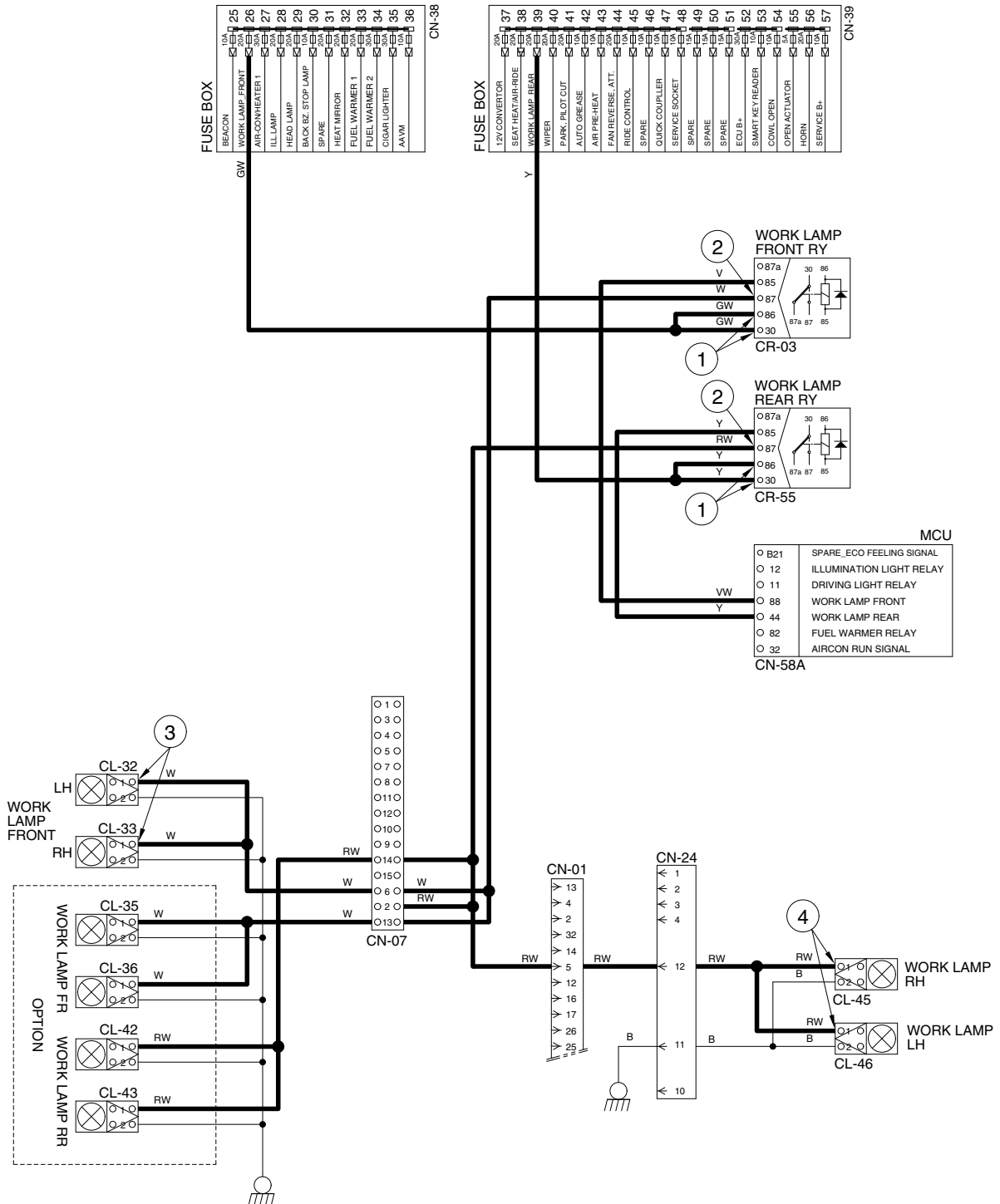


#### 2) CHECK POINT

Engine	Key switch	Check point	Voltage
OFF	ON	① - GND (work lamp power input) ② - GND (work lamp power output) ③ - GND (front work lamp) ④ - GND (rear work lamp)	20~25V

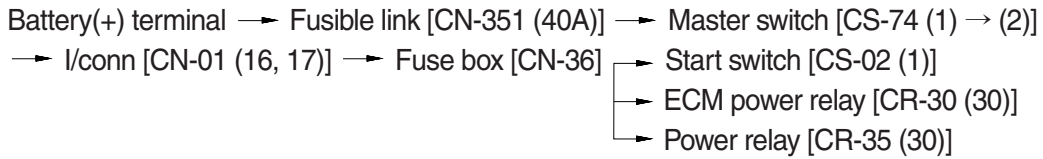
※ GND : Ground

# WORK LIGHT SWITCH



## 4. STARTING CIRCUIT

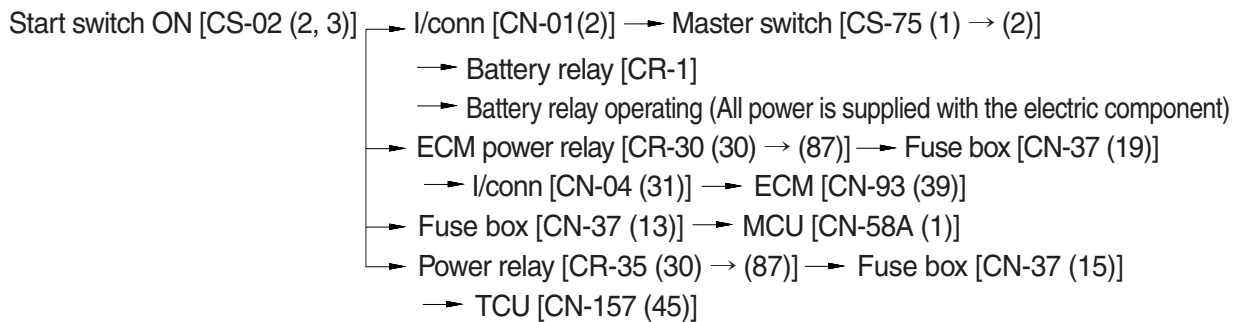
### 1) OPERATING FLOW



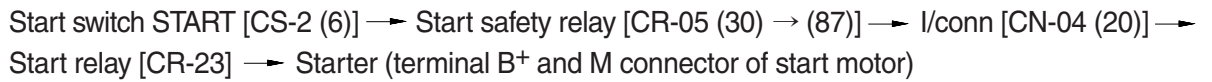
※ The gear selector lever is neutral position. It is necessary condition before the starting.

The gear selector has an output signal which is activated whenever the shift lever is in the neutral position. This signal can be used to control a relay and prevent engine from starting whenever the shift lever is not in the neutral position.

(1) When start key switch is in ON position



(2) When start key switch is in START position



### 2) CHECK POINT

Engine	Key switch	Check point	Voltage
Running	ON	① - GND (battery B <sup>+</sup> ) ② - GND (fusible link) ③ - GND (start key B terminal) ④ - GND (start key BR terminal) ⑤ - GND (i/conn CN-01 (16)) ⑥ - GND (start key C terminal) ⑦ - GND (start safety relay output) ⑧ - GND (start key ACC terminal)	20~25 V

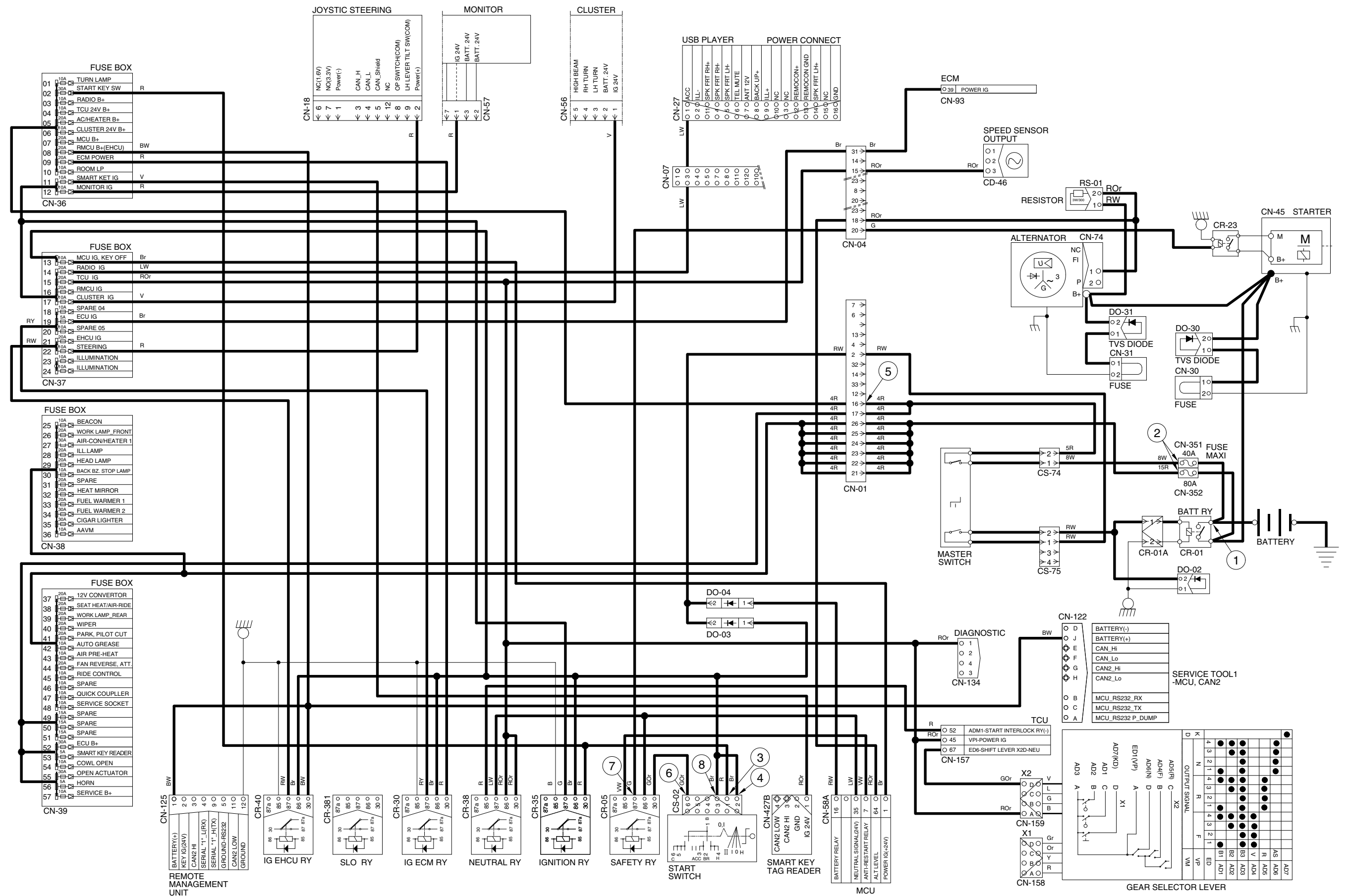
※ GND : Ground

※ ECM : Electronic control module

※ MCU : Machine control unit

※ TCU : Transmission control unit

# STARTING CIRCUIT



## 5. 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-01).

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 (18)] → MCU [CN-58A (64)]

→ Cluster charge warning lamp ON

#### (2) Charging flow

Alternator → Starter [CN-45 (B<sup>+</sup>)] → Battery relay [CR-01]

→ Battery (+) terminal → Charging

→ Fusible link [CN-351 (40A)] → Master switch [CS-74 (1)→(2)] → I/conn [CN-01 (16, 17)]

→ Fuse box [CN-36, 39]

→ Fusible link [CN-352 (80A)] → I/conn [CN-01 (21~26)] → Fuse box [CN-38, 39]

### 2) CHECK POINT

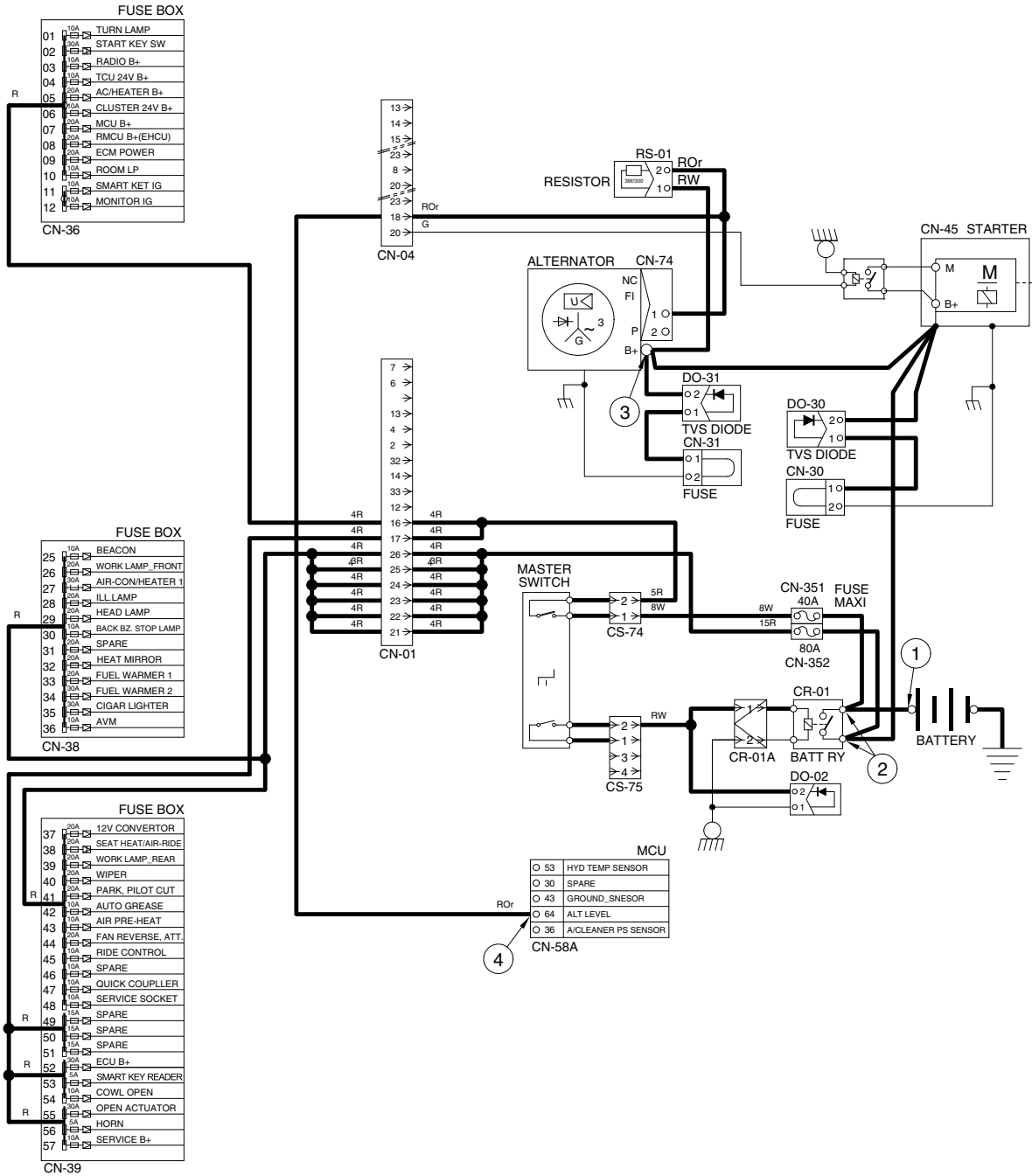
Engine	Key switch	Check point	Voltage
OFF	ON	① - GND (battery) ② - GND (battery relay) ③ - GND (alternator B <sup>+</sup> ) ④ - GND (MCU)	20~28V

※ GND : Ground

※ MCU : Machine control unit



# CHARGING CIRCUIT

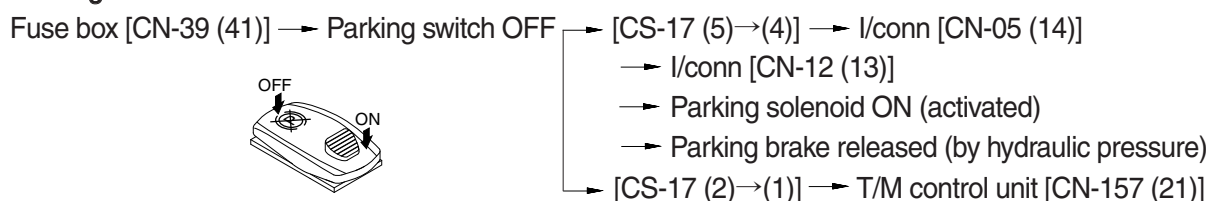


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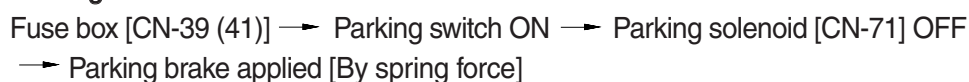
## 6. ELECTRIC PARKING, PILOT CUT OFF CIRCUIT

### 1) OPERATING FLOW

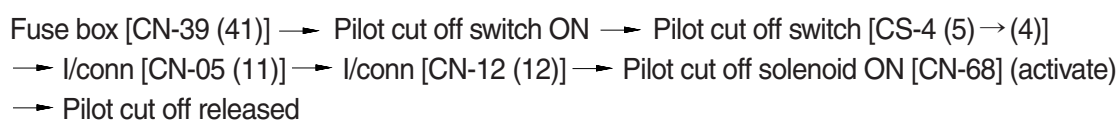
#### (1) Parking OFF



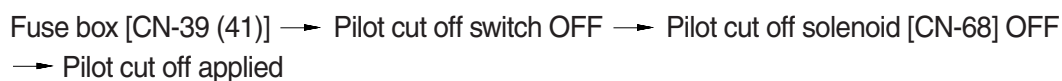
#### (2) Parking ON



#### (3) Pilot cut off ON



#### (4) Pilot cut off OFF

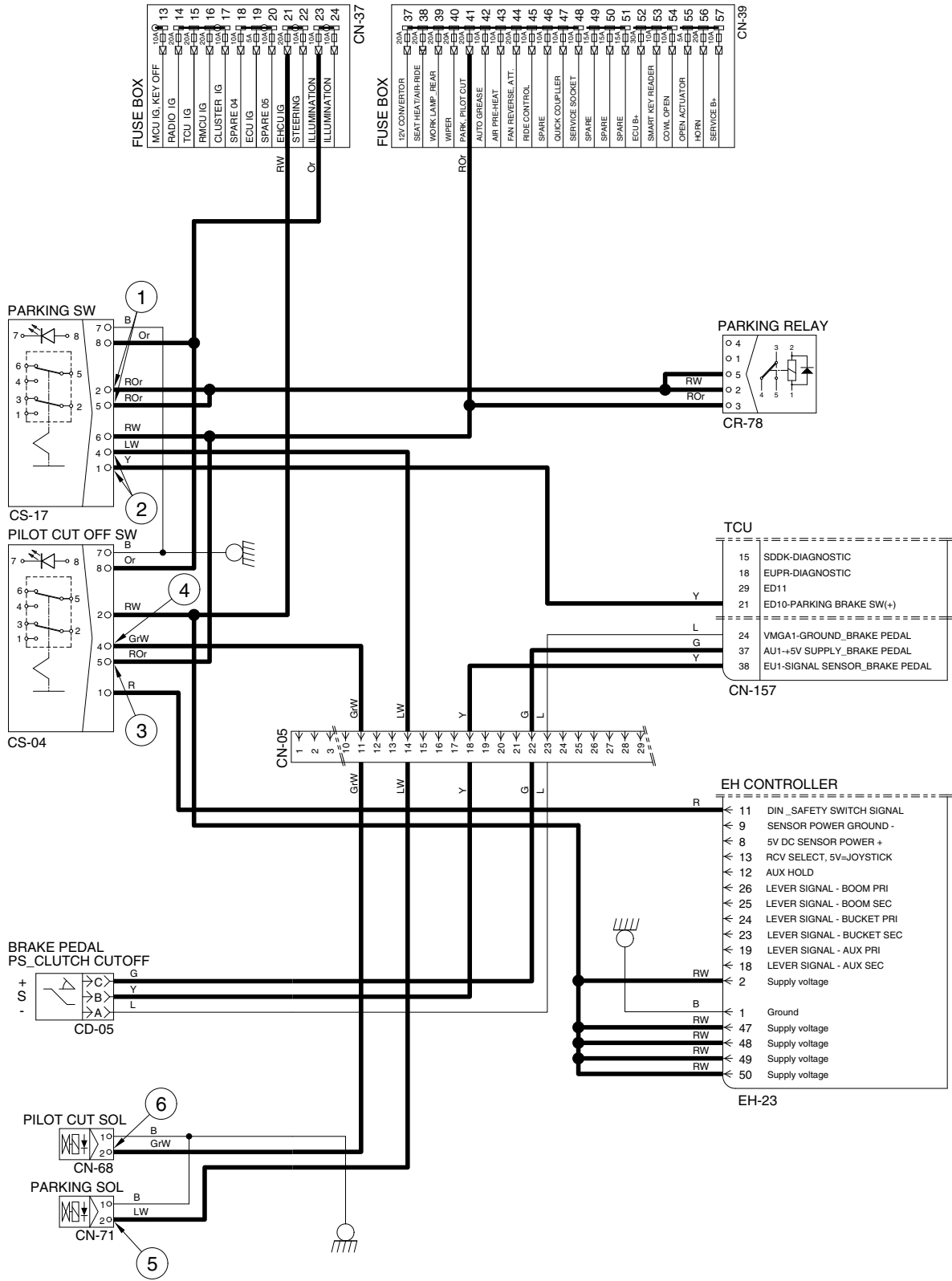


### 2) CHECK POINT

Engine	Key switch	Check point	Voltage
Running	ON	① - GND (parking switch input) ② - GND (parking switch output) ③ - GND (pilot cut off switch input) ④ - GND (pilot cut off switch output) ⑤ - GND (parking solenoid) ⑥ - GND (pilot cut off solenoid)	20~25V

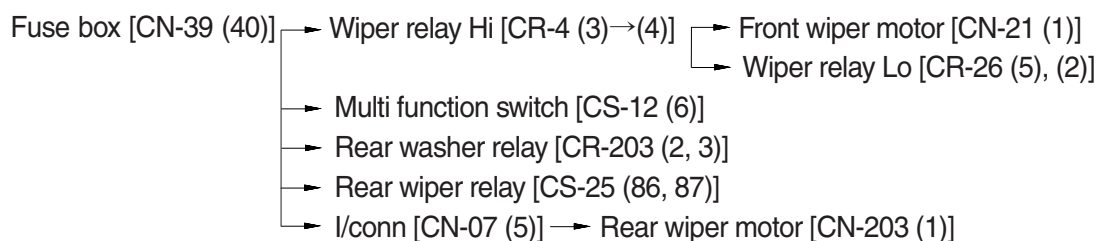
※ GND : Ground

# ELECTRIC PARKING, PILOT CUT OFF CIRCUIT

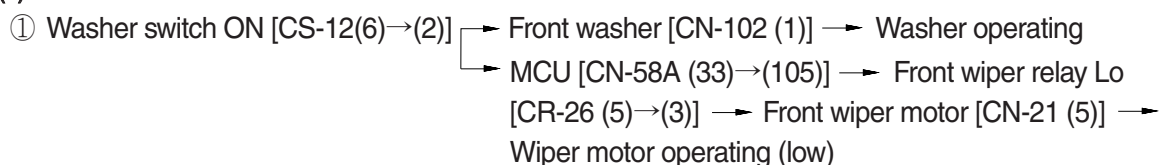


## 7. WIPER AND WASHER CIRCUIT

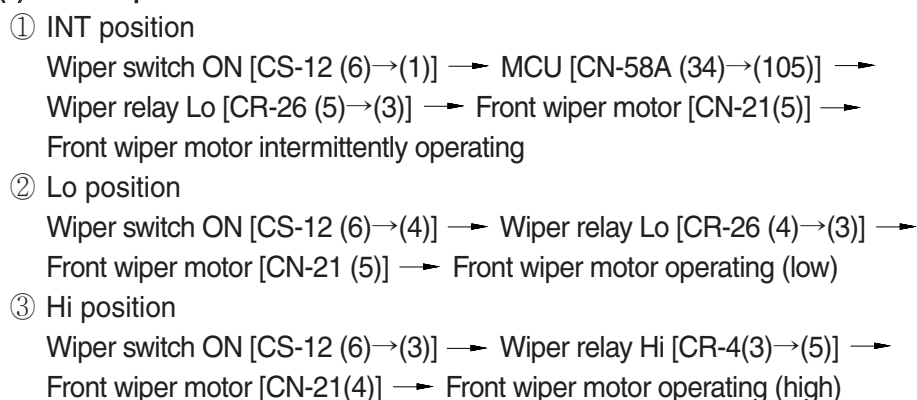
### 1) OPERATING FLOW



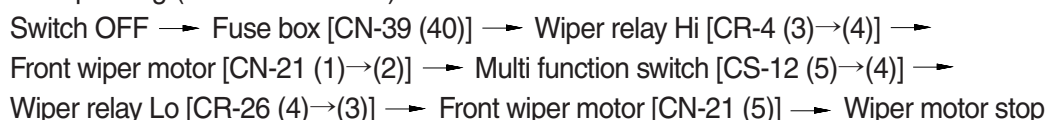
#### (1) Front washer switch ON



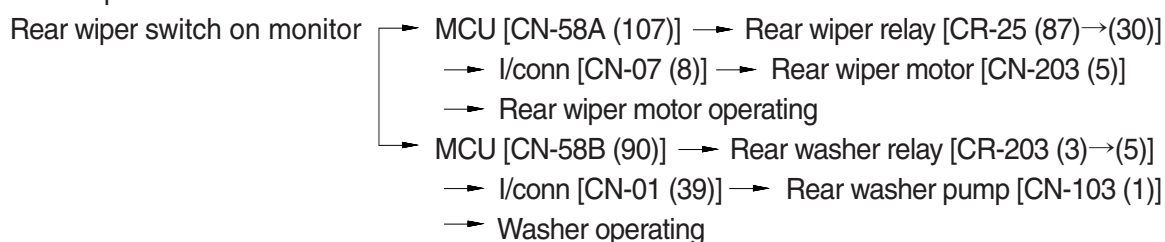
#### (2) Front wiper switch ON



#### (3) Auto-parking (when switch OFF)



#### (4) Rear wiper and washer switch

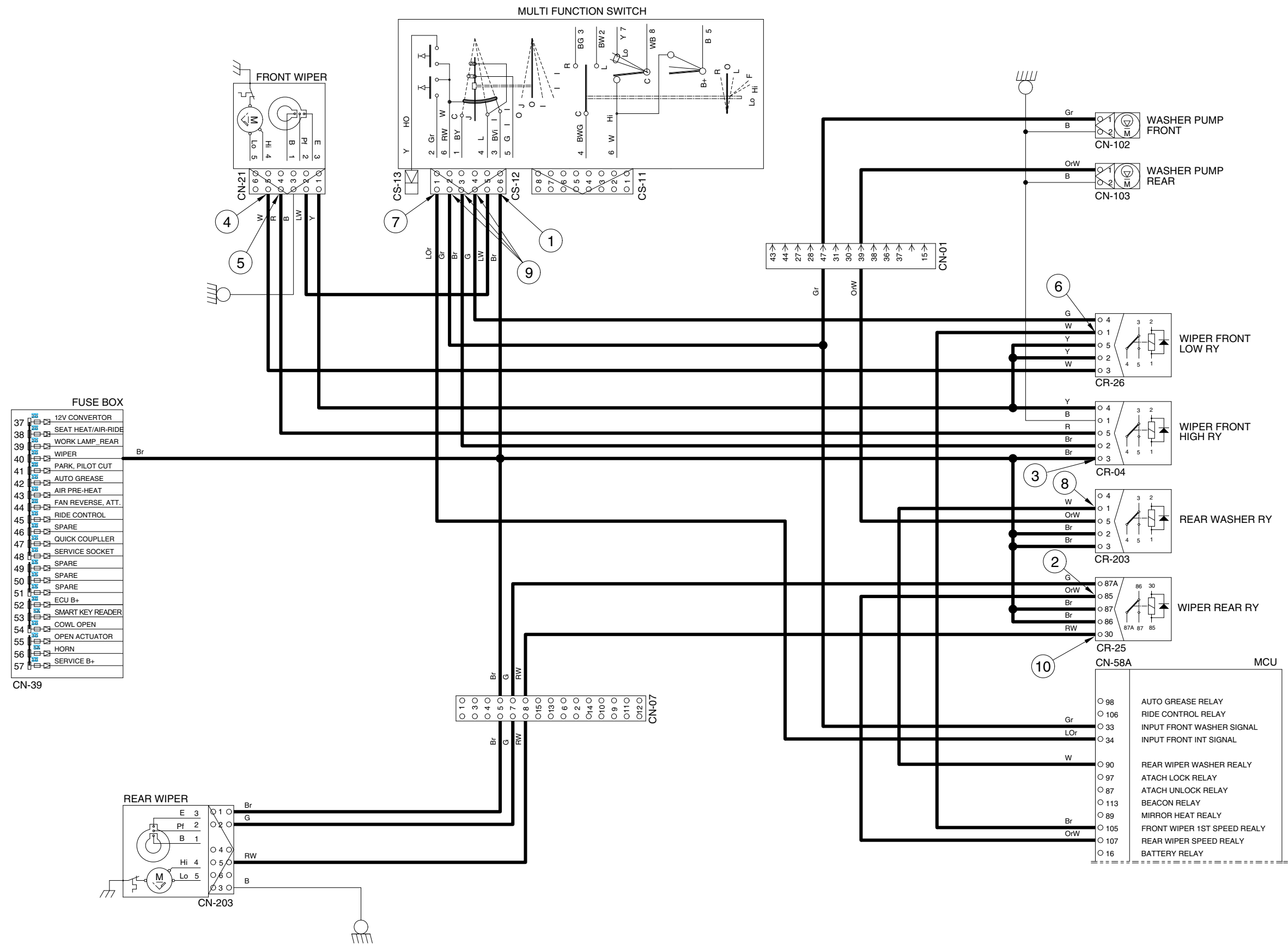


### 2) CHECK POINT

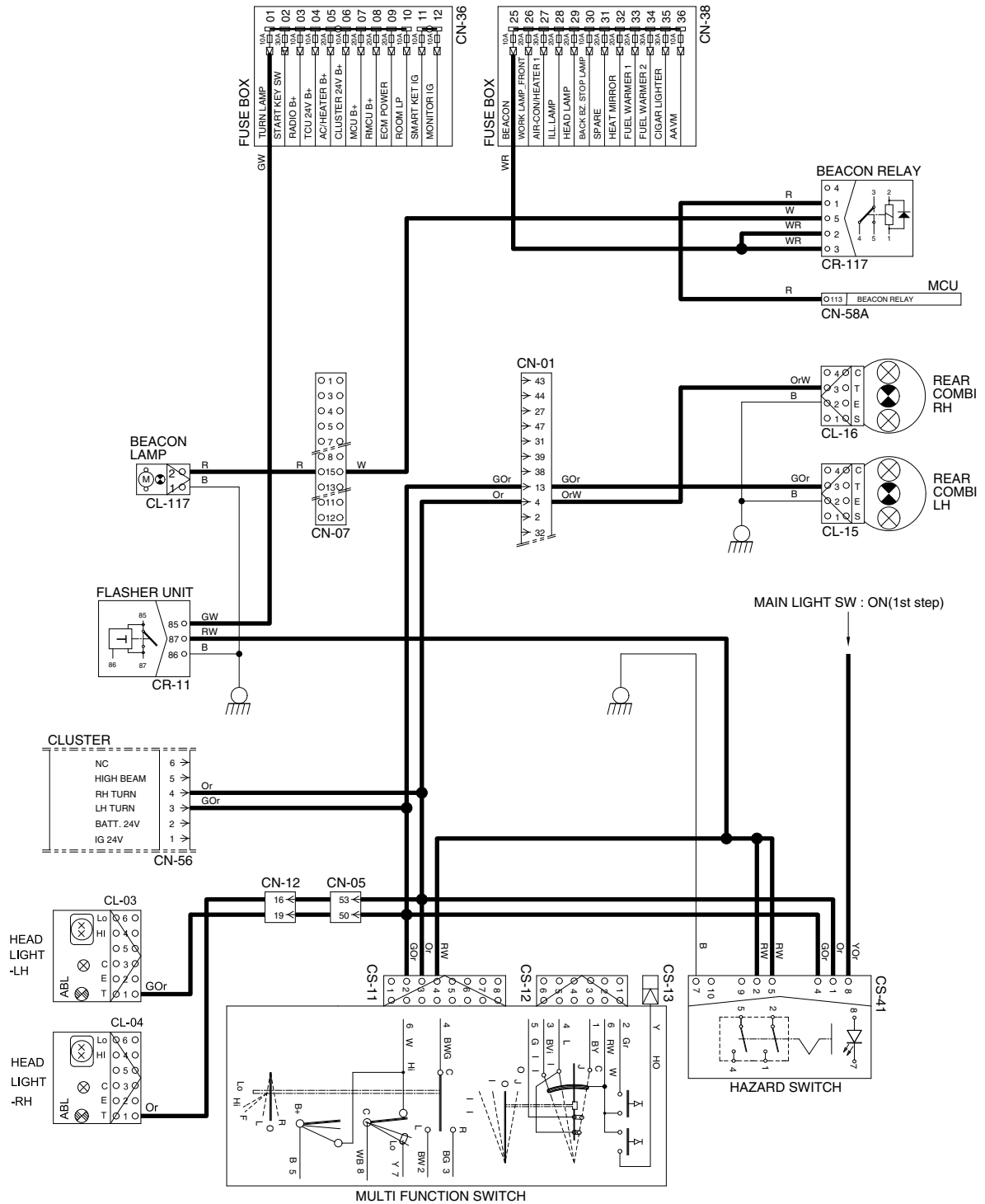
Condition	Check point	
Engine : Stop	① - GND (front wiper switch power input)	⑥ - GND (wiper relay power input)
Key switch : ON	② - GND (rear wiper relay power input)	⑦ - GND (front washer power output)
Voltage : 20~25V	③ - GND (wiper relay power input)	⑧ - GND (rear washer power output)
	④ - GND (front wiper motor Lo power input)	⑨ - GND (front wiper motor power output)
	⑤ - GND (front wiper motor High power input)	⑩ - GND (rear wiper motor power output)

※ GND : Ground


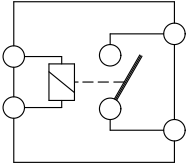
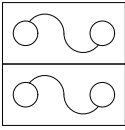
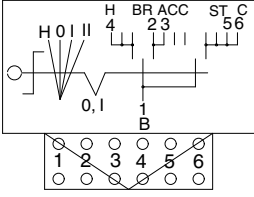
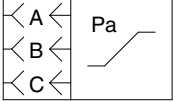
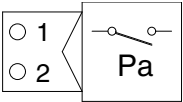
# WIPER AND WASHER CIRCUIT

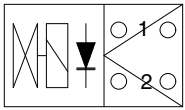
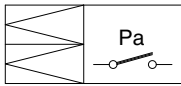
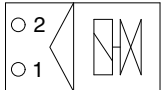
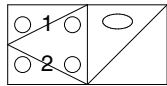
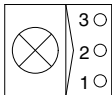
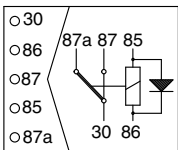


# HAZARD, TURN AND ROTARY CIRCUIT

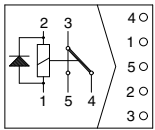
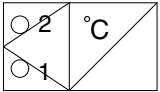
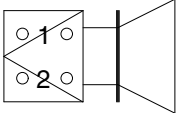
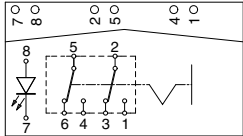
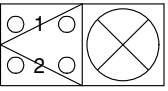
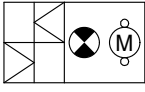


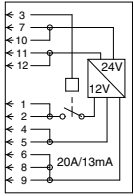
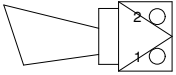
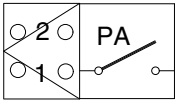
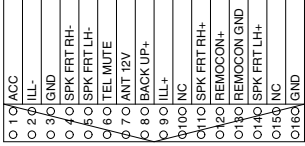
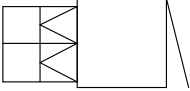
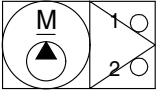
## GROUP 3 ELECTRICAL COMPONENT SPECIFICATION

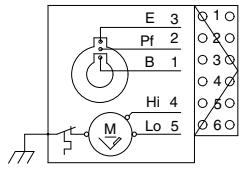
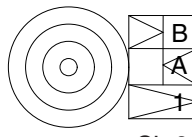
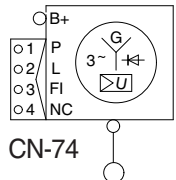
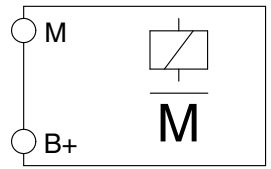
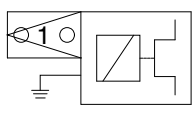
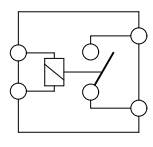
Part name	Symbol	Specifications	Check item
Battery		12V × 200Ah (2EA)	Gravity 1.280 over : over charged 1.280 ~ 1.250 : normal 1.250 below : discharged
Battery relay	 <p style="text-align: center;">CR-1</p>	Rated load : 24V 100A (continuity) 1000A (30seconds)	Coil resistance broken : approx 50 Ω connected : ∞ Ω
Fusible link	 <p style="text-align: center;">CN-351 (40A), CN-352 (80A)</p>	24V	Resistance between ring terminal and each connector pin 0 Ω : normal
Start key	 <p style="text-align: center;">CS-2</p>	B-BR : 24V 1A B-ACC : 24V 10A B-ST : 20V 40A	Resistance between each pin Key off : ∞ Ω (for each pin) Key on : 0 Ω (for pin 1-2 & 1-3) Start : 0 Ω (for pin 1-5)
Pressure switch	 <p style="text-align: center;">CD-3   CD-26   CD-31 CD-39   CD-40   CD-58 CD-79   CD-80   CD-81</p>	N.C Type	Resistance 0 Ω : normal (close)
Pressure switch	 <p style="text-align: center;">CD-48   CD-129</p>	N.O Type	Resistance ∞ Ω : normal (open)

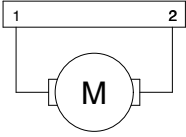
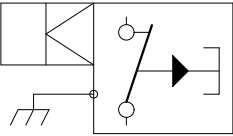
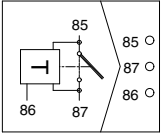
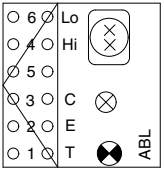
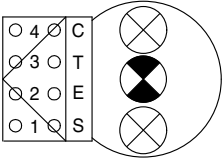
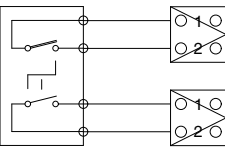
Part name	Symbol	Specifications	Check item
Pilot cut off, parking brake, diff lock, attach lock, unlock solenoid	 CN-68 CN-177 CN-71 CN-178 CN-79	24V 1A	Resistance normal : 15~25Ω
Air cleaner pressure switch	 CD-10	Max load : 6W N.O Type	Resistance ∞Ω : normal (open)
Lock-up, Ride control valve / Fan sole- noid	 CN-43 CN-136 CN-154 CN-155	24V 1.2A	※ Check LED lamp ※ Check resistance about 24Ω
Fuel sender	 CD-2	-	Resistance at fuel levels full level : 200Ω 9/12 level : 500Ω 6/12 level : 800Ω 3/12 level : 1100Ω empty : 1300Ω
Room lamp	 CL-1	24V 10W	Resistance normal : 1.2Ω
Relay (5pin)	 CR-3 CR-5 CR-7 CR-30 CR-35 CR-36 CR-38 CR-40 CR-46 CR-55 CR-56 CR-63 CR-210 CR-211 CR-381	24V 20A	Resistance normal : about 160Ω (for pin 85~86) 0Ω (for pin 30~87) ∞Ω (for pin 30~87)

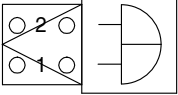
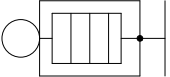
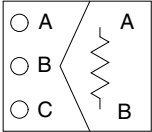


Part name	Symbol	Specifications	Check item
Relay (5 pin)	 <p>CR-2 CR-4 CR-25 CR-26 CR-37 CR-58 CR-79 CR-115 CR-117 CR-136 CR-302 CR-303</p>	24V 20A	Resistance normal : about 160Ω (for pin 1~2) 0Ω (for pin 3~4) ∞Ω (for pin 3~5)
Hydraulic, transmission temperature	 <p>CD-1 CD-49</p>	-	Resistance normal : ∞Ω 105. C over : 0Ω
Speaker	 <p>CN-123 (LH) CN-124 (RH)</p>	4Ω 20W	Resistance normal : 4Ω
Switch (Locking type)	 <p>CS-4 CS-17 CS-75</p>	24V 8A	Resistance at switch off position ∞Ω between pin 1-5 and 2-6 0Ω between pin 5-7 and 6-8
Work lamp, Number plate lamp	 <p>CL-21 CL-32 CL-33 CL-35 CL-36 CL-42 CL-43 CL-45 CL-46</p>	Work lamp 24V 70W Number plate lamp 24V 10W	Resistance normal : 1.2Ω
Beacon lamp	 <p>CL-117</p>	24V 70W (H1 TYPE)	Resistance normal : 1.1Ω

Part name	Symbol	Specifications	Check item
DC/DC Converter	 <p>CN-138</p>	12V 3A	Resistance 8.8Ω (for pin A-B) 7.7Ω (for pin B-C)
Horn	 <p>CN-120 CN-121</p>	24V 2A	Operation by external power source - connct 24V power to (+) terminal - ground the (-) terminal
Receiver dryer	 <p>CN-29</p>	24V 2.5A	Resistance 0Ω : 2.1 ± 0.3 ~ 27 ± 2kgf/cm <sup>2</sup> ∞Ω : ~2.1 ± 0.3, 27 ± 2~kgf/cm <sup>2</sup>
Radio & USB player	 <p>CN-27</p>	24V 20W+20W	Resistance Power ON : 4Ω+4Ω (for pin 1-6, 4-8)
Back up buzzer	 <p>CN-65</p>	24V 0.5A 110dB	Resistance normal : 5.2Ω
Washer pump	 <p>CN-102 (FR) CN-103 (RR)</p>	24V 2.5A	Resistance normal : 26.4 Ω (for pin1-2)

Part name	Symbol	Specifications	Check item
Wiper motor	 <p>CN-21 (FR) CN-102 (RR)</p>	<p>24V 1.5A 2-speed Auto parking</p>	-
Cigar lighter	 <p>CL-2</p>	<p>24V 5A 1.4W</p>	<p>Coil resistance normal : about 1M<math>\Omega</math></p>
Alternator	 <p>CN-74</p>	<p>Denso 24V 70A</p>	<p>Voltage normal : 24~28V</p>
Starter	 <p>CN-45</p>	<p>24V-7.8kW</p>	<p>Operating or not</p>
Aircon compressor	 <p>CN-28</p>	<p>24V 79W</p>	<p>Resistance normal : 13.4<math>\Omega</math></p>
Start relay	 <p>CR-23</p>	<p>24V 300A</p>	<p>Coil resistance normal : 1-2<math>\Omega</math> Switch connection <math>\infty \Omega</math> at normal open position 0<math>\Omega</math> when engaged</p>

Part name	Symbol	Specifications	Check item
Blower motor		24V 9.5A	Resistance at each switch position normal : 0.5-2Ω
Door switch	 <p>CS-1 CS-55</p>	24V 2W	Resistance normal : about 5MΩ
Flasher unit	 <p>CR-11</p>	24V 85 ~ 190 C/M 50dB	-
Head lamp	 <p>CL-3 CL-4</p>	24V 75W/70W (H4 TYPE) 24V 4W (T4W)	Resistance normal : a fewΩ
Combi lamp (rear)	 <p>CL-15 CL-16</p>	24V 5W (R5W) 2×24V 21W (P21W)	-
Master switch	 <p>CS-74 CS-75</p>	Continuous capacity : 180Amp Push in capacity : 1000Amp	-

Part name	Symbol	Specifications	Check item
Warning buzzer	 <p>CN-26</p>	<p>24V 200mA  <math>90 \pm 5\text{dB}</math> ( ℓ m)</p>	-
Preheater	 <p>CN-80</p>	<p>24V 200A</p>	<p>Resistance  <math>0.25 \sim 0.12 \Omega</math></p>
Resistor	 <p>CN-99</p>	<p>4W</p>	<p>Resistance  A - B : <math>120 \Omega</math></p>

## GROUP 4 CONNECTORS

### 1. CONNECTOR DESTINATION

Connector number	Type	No. of pin	Destination	Connector part No.	
				Female	Male
CN-1	DEUTSCH	48	I/conn (Frame harness-Main harness)	DRB16-48SAE-L018	DRB12-48PAE-L018
CN-4	DEUTSCH	60	I/conn (Engine harness-Main harness)	DRB16-60SAE-L018	DRB12-60PAE-L018
CN-5	DEUTSCH	60	I/conn (Front harness-Main harness)	DRB16-60SBE-L018	DRB12-60PBE-L018
CN-7	AMP	15	I/conn (Main harness-Cab harness)	2-85262-1	368301-1
CN-9	DEUTSCH	6	I/conn (Main harness-Cab harness)	174264-2	174262-2
CN-11	AMP	15	I/conn (Main harness-Aircon harness)	2-85262-1	368301-1
CN-12	DEUTSCH	35	I/conn (Front harness-Bottom harness)	2-85262-1	HDP24-24-35PN-L015
CN-14	DEUTSCH	12	I/conn (Frame harness-Grill harness)	DT06-12S	DT04-12P
CN-15	KET	11	I/conn (RH console harness-Main harness)	MG651350	MG641353
CN-16	KET	14	I/conn (RH console harness-Main harness)	MG651110	MG641113
CN-18	DEUTSCH	12	LH seat console	DT06-12S	DT04-12P
CN-19	DEUTSCH	2	I/conn (Emer steer harness-Bottom harness)	DT06-2S	DT04-2P
CN-21	AMP	6	Front wiper motor	936257-2	-
CN-22	DEUTSCH	2	Compressor	DTP06-2S	
CN-24	DEUTSCH	12	Grill harness	DT06-12S	-
CN-26	TYCO	10	EHI unit	174655-2	174657-2
CN-26A	AMP	10	Joystick steering	-	174657-2
CN-27	MK II	16	Radio and USB player	PK145-16017	-
CN-27A	MK II	8	USB connector	174984-2	-
CN-31	DEUTSCH	3	Brake priority	DT06-3S	-
CN-36~39	-	-	Fuse box assy	21WF-17031	-
CN-43	AMP	2	Lock-up	282028	-
CN-45	Ring term	-	Starter	R14-12	ST 710246-2
CN-48	AMP	1	Hour meter	2-520193-2	-
CN-49	AMP	2	Torque converter temperature	85202-1	-
CN-56	KUM	16	Cluster	KPK145-16017	-
CN-57	AMP	20	Monitor	174047-2	-
CN-57C	DEUTSCH	4	Camera monitor	DT06-4S-EP06	-
CN-58A	AMP	81	MCU (machine control unit)	1473244-1	-
CN-58B	AMP	40	MCU (machine control unit)	1473252-1	-
CN-64	MOLEX	4	Smart key	39012040	-
CN-65	DEUTSCH	2	Back up buzzer	DT06-2S	-
CN-68	DEUTSCH	2	Pilot cut off	DT06-2S	-
CN-71	DEUTSCH	2	Parking solenoid	DT06-2S	-
CN-72	DEUTSCH	2	Cowl open activator	DT06-2S	-

Connector number	Type	No. of pin	Destination	Connector part No.	
				Female	Male
CN-74	PACKARD	4	Alternator	1218-6568	-
CN-79	DEUTSCH	2	Differential lock solenoid	DT06-2S	-
CN-79A	DEUTSCH	2	Differential lock foot switch	DT06-2S-EP06	DT04-2P-E005
CN-93	DEUTSCH	-	ECM (engine control module)	DRC26-50S-04	-
CN-94	DEUTSCH	-	ECM power	DT06-4S-EP06	-
CN-99,99R	DEUTSCH	6	Rear camera	DT06-6S	DT04-6P
CN-100	DEUTSCH	3	Boom kick out	DT06-3S	-
CN-101	DEUTSCH	3	Bucket leveler	DT06-3S	-
CN-102	KET	2	Front washer tank	MG640605	-
CN-103	KET	2	Rear washer tank	MG640605	-
CN-112	-	16	Gear box	21L7-60290	-
CN-115	DEUTSCH	6	Auto grease	DT06-6S	DT04-6P
CN-120,121	DEUTSCH	2	Horn	DT06-2S	-
CN-122	DEUTSCH	9	Machine service tool	HD10-9-96P	-
CN-123	KET	2	Speaker (LH)	7123-1520	-
CN-124	KET	2	Speaker (RH)	7123-1520	-
CN-125	DEUTSCH	12	RMCU(remote management control unit)	DT06-12S	DT04-12P
CN-126	DEUTSCH	9	Engine service tool	HD10-9-1939P	-
CN-128	KET	1	Aircon compressor	PB625-01027	-
CN-129	KET	2	Receiver drier	MG640795	-
CN-134	AMP	6	Diagnostic (TCU)	1-480705-0	-
CN-136	DEUTSCH	2	Ride control solenoid	DT06-2S	-
CN-136A	Econoseal J	2	I/conn (Ride control harness-Front harness)	S816-002002	S816-102002
CN-137	AMP	1	12V socket	172434-2	-
CN-138	AMP	12	DC/DC Converter	1-967622-1	-
CN-139	AMP	2	12V socket	172434-2	-
CN-149	DEUTSCH	2	Mirror heat (LH)	DT06-2S	DT04-2P
CN-150	DEUTSCH	2	Mirror heat (RH)	DT06-2S	DT04-2P
CN-152	AMP	4	Proportional valve	2-967059-1	-
CN-154	DEUTSCH	2	Fan speed solenoid	DT06-2S	-
CN-155	DEUTSCH	2	Fan reverse solenoid	DT06-2S	-
CN-156	DEUTSCH	2	Seat heat (with switch)	-	DT04-2P-E005
CN-157	AMP	68	Transmission control unit	963598-1	-
CN-158	PACKARD	4	Gear shift lever	1201-0974	-
CN-159	PACKARD	4	Gear shift lever	1201-5797	-
CN-160	CARLING	12	FNR joystick lever	LC3-01	-
CN-162	AMP	6	Throttle pedal	174262-2	-
CN-163	AMP	2	ECO feeling switch	174352-2	-

Connector number	Type	No. of pin	Destination	Connector part No.	
				Female	Male
CN-171	DEUTSCH	3	Service socket	DT06-3S-EP06	-
CN-177	DEUTSCH	2	Quick coupler unlock solenoid	DT06-2S	-
CN-177A	Econoseal J	3	I/conn (Front harness-Quick coupler harness)	S816-003002	S816-103002
CN-178	DEUTSCH	2	Quick coupler lock solenoid	DT06-2S	-
CN-196	PACKARD	4	Fuel heater	2-967325-3	-
CN-203	AMP	6	Rear wiper motor	936257-1	-
CN-246	KET	1	PTC power	-	MG620659-5
CN-249	DEUTSCH	6	Camera	DT06-4S	DT04-6P
CN-250	DEUTSCH	2	Seat belt alarm	DT06-2S-EP06	-
CN-252	TYCO	6	Differential lock	S816-006602	S816-106602
CN-313	DEUTSCH	4	AAVM monitor service tool	DT06-4S-EP06	-
CN-399	AMP	4	DEF sensor	1-967325-1	-
CN-431	KET	20	AAVM monitor	MG635026	-
Relay					
CR-1	Ring term	-	Battery relay	S820-104002	-
CR-2	AMP	5	Horn relay	VCFM-1002	-
CR-3	AMP	5	Front work lamp relay	VCFM-1002	-
CR-4	AMP	5	Wiper relay (Hi)	VCFM-1002	-
CR-5	HELLA	5	Safety relay	8JA003526-001	-
CR-7	AMP	5	Aircon relay	VCFM-1002	-
CR-11	250	-	Flasher unit	S810-003702	-
CR-23	Ring term	-	Start relay	ST 710289-2	ST 710384-2
CR-24	Shur	1	Preheater relay	S822-014000	-
CR-25	AMP	5	Rear wiper relay	VCFM-1002	-
CR-26	AMP	5	Wiper relay (low)	VCFM-1002	-
CR-30	HELLA	5	ECM power relay	8JA003526-001	-
CR-36	AMP	5	Preheater relay	VCFM-1002	-
CR-39	-	2	Emergency steering pump relay	S820-104000	-
CR-40	KET	5	EHCU power relay	MG610047-1	-
CR-46	HELLA	5	Fuel warmer relay	8JA003526-001	-
CR-55	AMP	5	Rear work lamp relay	VCFM-1002	-
CR-56	KET	5	Mirror heat relay	MG610047-1	-
CR-58	AMP	5	Back up relay	VCFM-1002	-
CR-63	AMP	5	Stop lamp relay	VCFM-1002	-

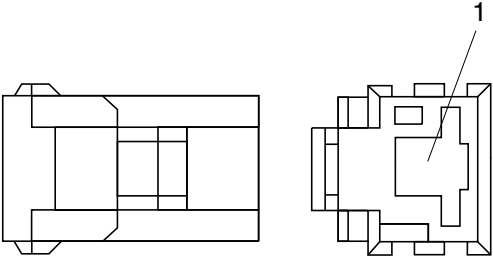
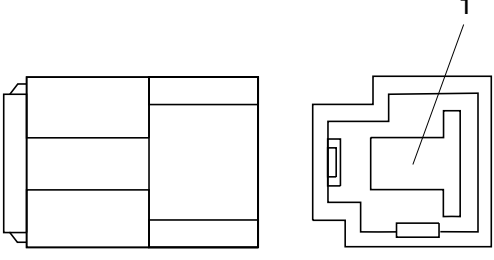
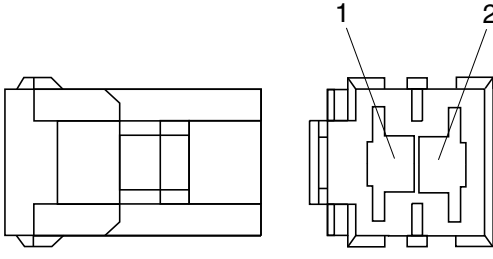
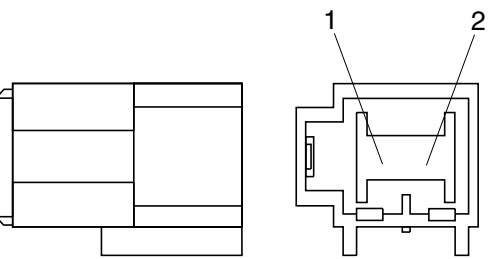


Connector number	Type	No. of pin	Destination	Connector part No.	
				Female	Male
Switch					
CS-1	AMP	1	Door switch	ST730018-3	-
CS-2	KET	6	Start key switch	MG610335-5	-
CS-4	CARLING	10	Pilot cut off switch	VC2-01	-
CS-11	KET	8	Multi function switch	MG610339-5	-
CS-12	KET	6	Multi function switch	MG610339-5	-
CS-13	KET	1	Multi function switch	ST730018-3	-
CS-17	CARLING	10	Parking switch	VC2-01	-
CS-33	AMP	6	Engine stop switch	174262-2	-
CS-41	CARLING	10	Hazard switch	VC2-01	-
CS-74	-	2	Master switch	S813-030200	-
CS-75	CARLING	10	Emergency steering test switch	VC2-01	-
CS-79	CARLING	10	Differential lock switch	VC2-01	-
CS-85, 85L	KET	2	Workload switch	MG610070	MG620074
CS-86, 86L	KET	2	Kick down switch	MG610070	MG620074
CS-87, 87L	KET	2	Horn switch	MG610070	MG620074
CS-88, 88L	KET	2	FNR select switch	MG610070	MG620074
CS-105	CARLING	10	SCR switch	VC2-01	-
Light					
CL-1	KET	3	Room lamp	MG651032	-
CL-3	DEUTSCH	6	Head light (LH)	DT06-6S	-
CL-4	DEUTSCH	6	Head light (RH)	DT06-6S	-
CL-15	YAZAKI	4	Combi lamp (RR, LH)	7232-7444	-
CL-16	YAZAKI	4	Combi lamp (RR, RH)	7232-7444	-
CL-21	SWP	2	Number plate lamp	S814-002000	-
CL-22	DEUTSCH	2	Work light (LH)	DT06-2S	-
CL-23	DEUTSCH	2	Work light (RH)	DT06-2S	-
CL-32	DEUTSCH	2	Rear work light (RH)	DT06-2S	DT04-2P
CL-33	DEUTSCH	2	Rear work light (LH)	DT06-2S	DT04-2P
CL-42	DEUTSCH	2	Rear work light (opt)	DT06-2S	DT04-2P
CL-45	DEUTSCH	2	Work light (RH)	DT06-2S-EP06	-
CL-46	DEUTSCH	2	Work light (LH)	DT06-2S-EP06	-
CL-117	AMP	2	Beacon lamp	174198-2	-

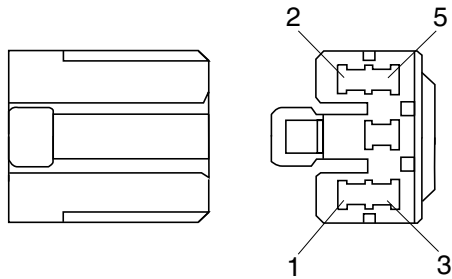
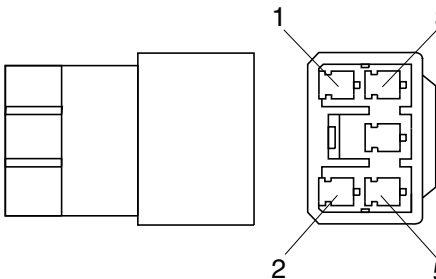
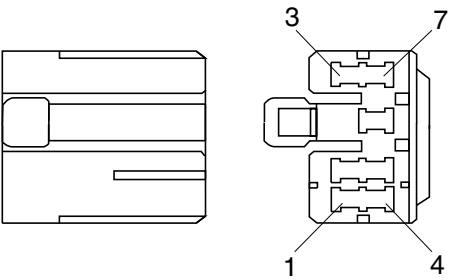
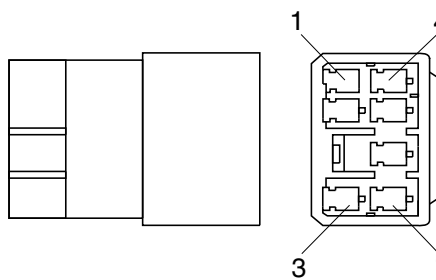
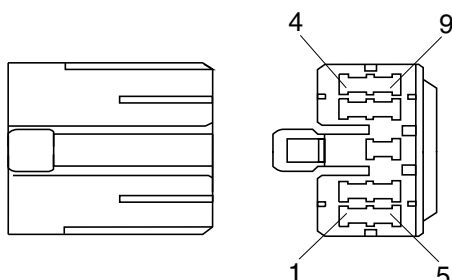
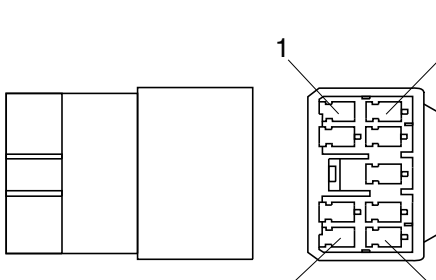
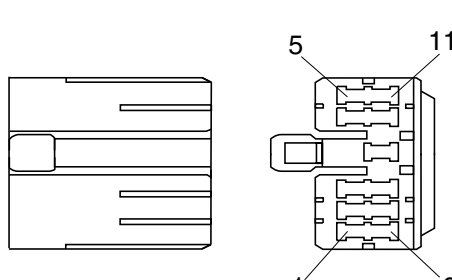
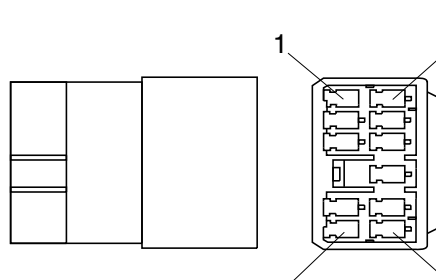
Connector number	Type	No. of pin	Destination	Connector part No.	
				Female	Male
Sensor, sender					
CD-1	AMP	2	Hydraulic oil temp sensor	85202-1	-
CD-2	YAZAKI	2	Fuel sensor	7123-7424	-
CD-3	DEUTSCH	3	Brake fail pressure switch	DT06-3S	-
CD-4	DEUTSCH	3	Stop lamp pressure switch	DT06-3S	-
CD-5	PACKARD	3	Clutch cut off pressure switch	-	1215793
CD-10	AMP	2	Air cleaner switch	85202-1	-
CD-17	AMP	2	Engine pick-up sensor	85202-1	-
CD-26	DEUTSCH	3	Parking pressure switch	DT06-3S	-
CD-27	AMP	2	Turbin pick up sensor	85202-1	-
CD-31	DEUTSCH	3	Brake priority pressure switch	DT06-3S	-
CD-39	DEUTSCH	3	Main pump pressure switch	DT06-3S	-
CD-40	DEUTSCH	3	Steering pump pressure switch	DT06-3S	-
CD-43	AMP	2	Lock up proportional valve	282027	-
CD-45	DEUTSCH	2	WIF sensor	DT06-2S	-
CD-46	AMP	3	Output speed sensor	282087	-
CD-47	AMP	2	Gear chain sensor	85202-1	-
CD-48	AMP	2	Oil filter restriction sensor	282080	-
CD-49	AMP	2	Converter temp sensor	85202-1	-
CD-73	AMP	2	Speed sensor	174352-2	-
CD-79	DEUTSCH	3	Diff lock feed back sensor	DT06-3S	-
CD-80	DEUTSCH	3	Boom up positioner sensor	DT06-3S	-
CD-81	DEUTSCH	3	Boom down positioner sensor	DT06-3S	-
CD-96	PACKARD	3	Coolant level sensor	12110293	-
CD-101	SUMITOMO	4	TBAP sensor	6098-0144	-

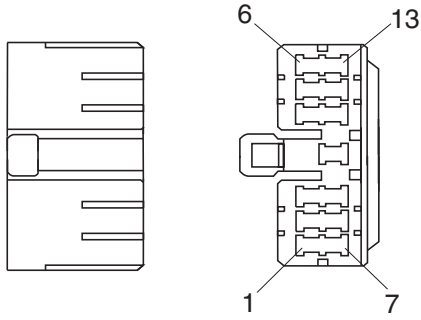
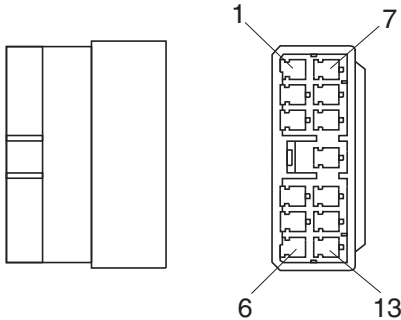
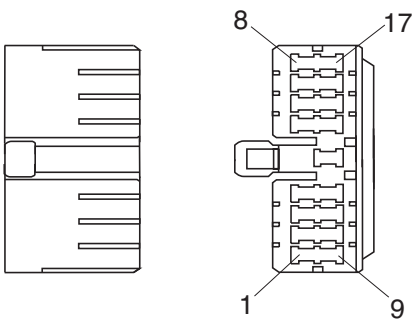
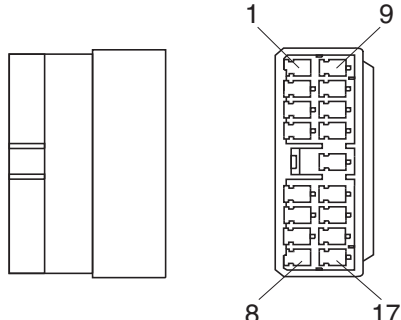
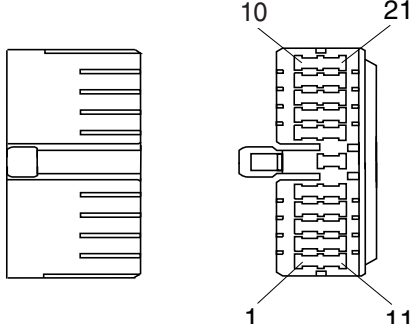
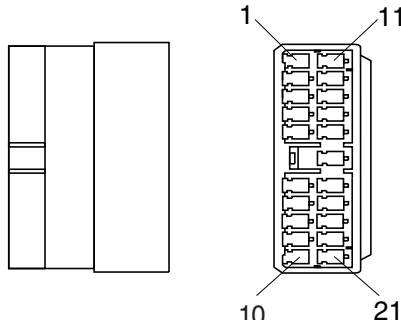
## 2. CONNECTION TABLE FOR CONNECTORS

### 1) 58-L TYPE CONNECTOR

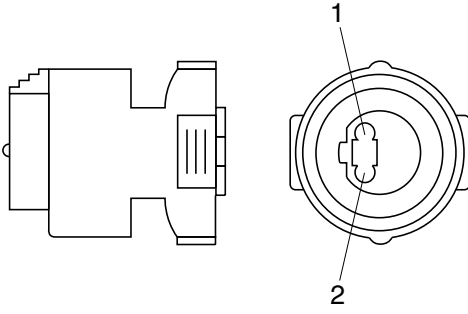
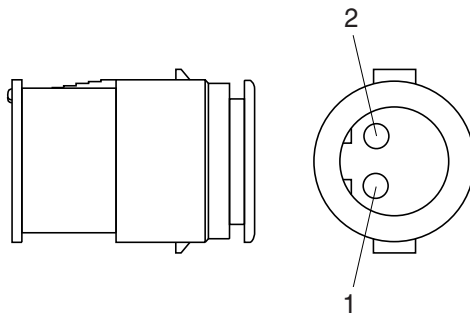
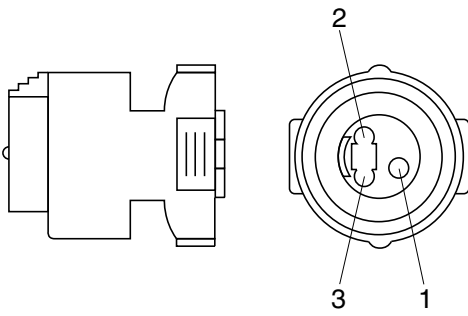
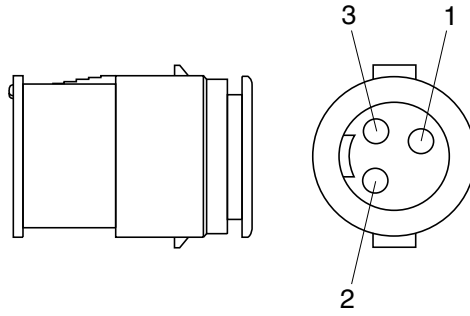
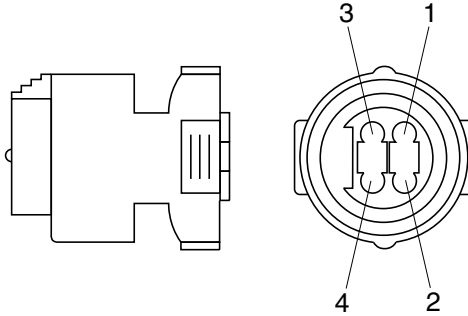
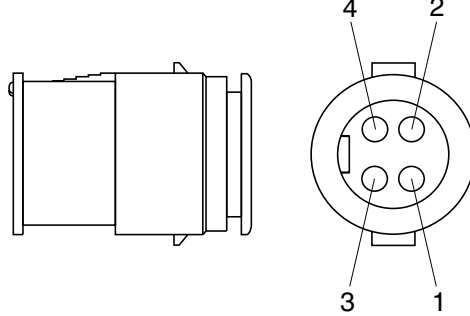
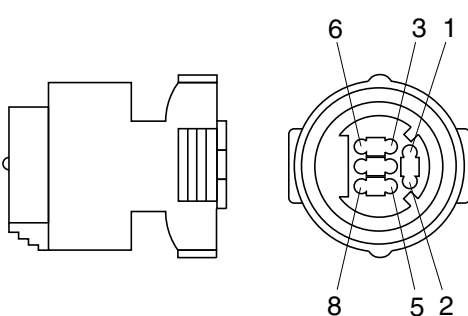
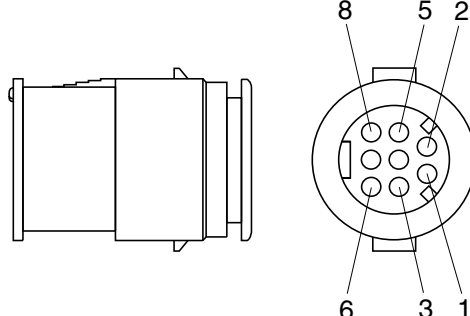
No. of pin	Receptacle connector (female)	Plug connector (male)
1	 <p data-bbox="699 728 842 757">S813-030100</p>	 <p data-bbox="1265 728 1409 757">S813-130100</p>
2	 <p data-bbox="699 1137 842 1167">S813-030200</p>	 <p data-bbox="1265 1137 1409 1167">S813-130200</p>

## 2) PA TYPE CONNECTOR

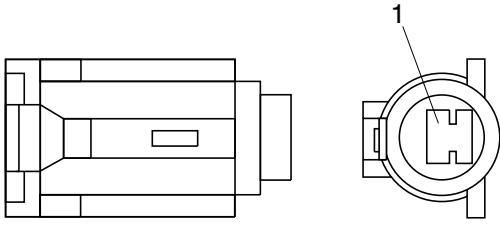
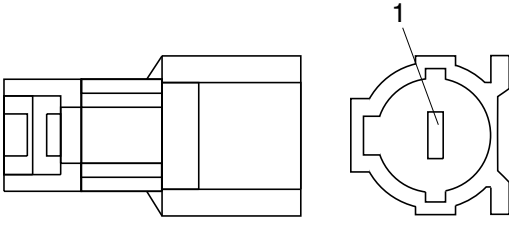
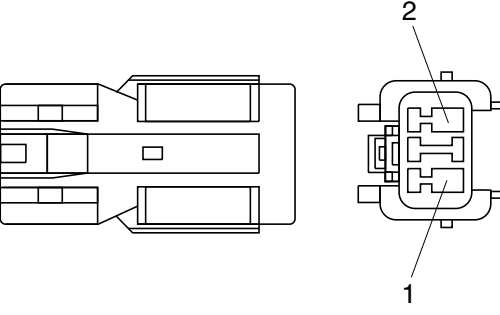
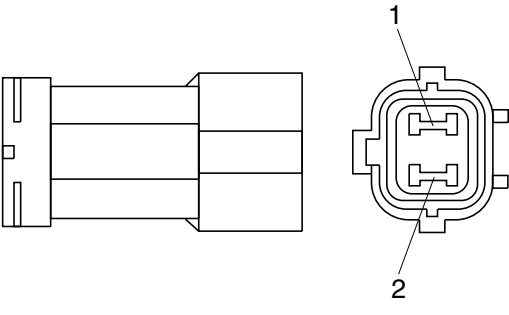
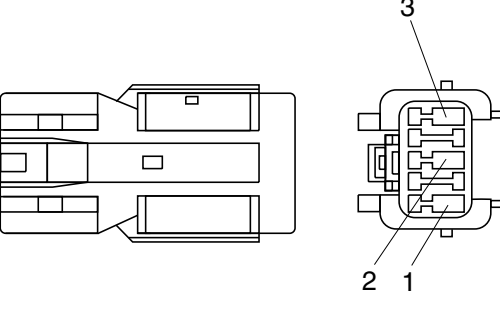
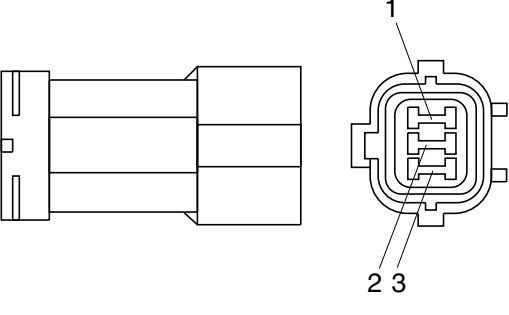
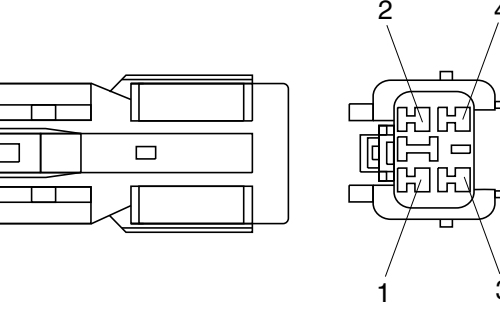
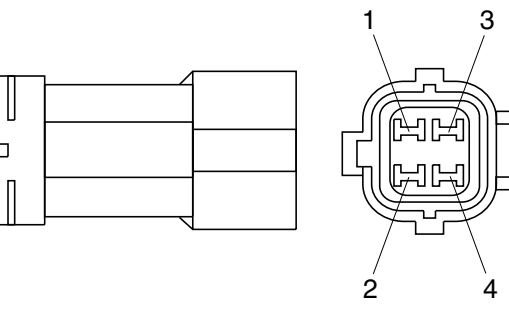
No. of pin	Receptacle connector (female)	Plug connector (male)
5	 <p data-bbox="683 674 831 703">S811-005002</p>	 <p data-bbox="1262 674 1410 703">S811-105002</p>
7	 <p data-bbox="683 1079 831 1108">S811-007002</p>	 <p data-bbox="1262 1079 1410 1108">S811-107002</p>
9	 <p data-bbox="683 1485 831 1514">S811-009002</p>	 <p data-bbox="1262 1485 1410 1514">S811-109002</p>
11	 <p data-bbox="683 1890 831 1919">S811-011002</p>	 <p data-bbox="1262 1890 1410 1919">S811-111002</p>

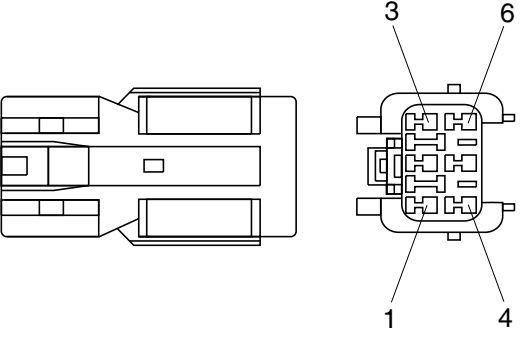
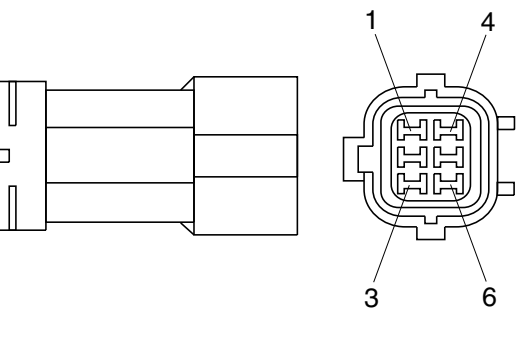
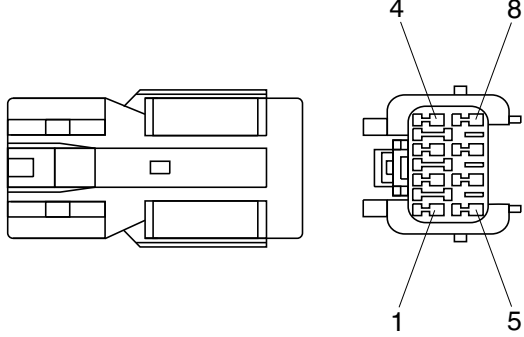
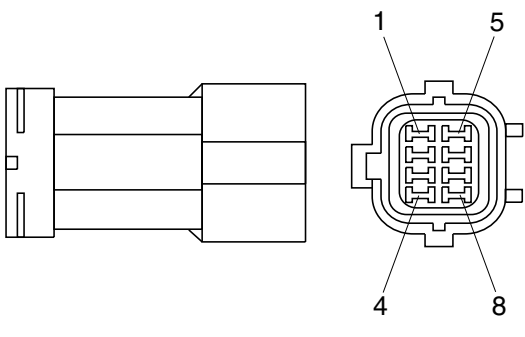
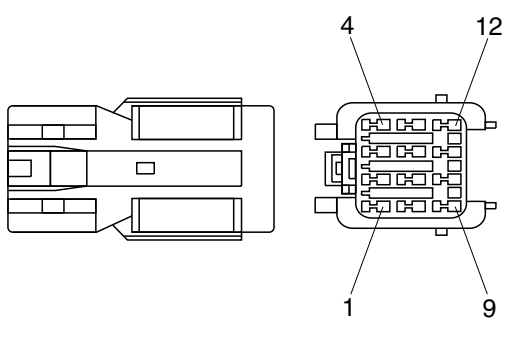
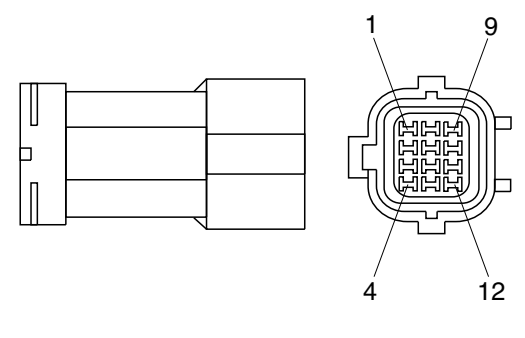
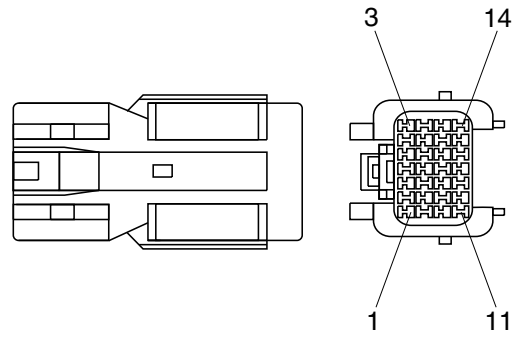
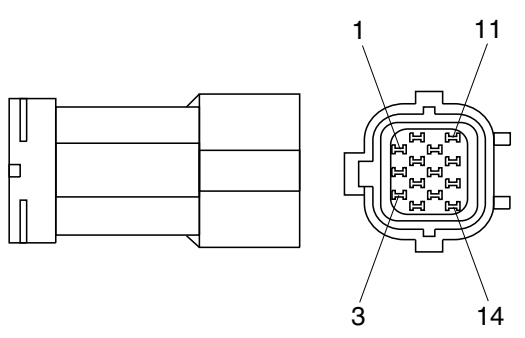
No. of pin	Receptacle connector (female)	Plug connector (male)
13	 <p data-bbox="691 633 839 663">S811-013002</p>	 <p data-bbox="1265 633 1414 663">S811-113002</p>
17	 <p data-bbox="691 1041 839 1070">S811-017002</p>	 <p data-bbox="1265 1041 1414 1070">S811-117002</p>
21	 <p data-bbox="691 1444 839 1473">S811-021002</p>	 <p data-bbox="1265 1444 1414 1473">S811-121002</p>

### 3) J TYPE CONNECTOR

No. of pin	Receptacle connector (female)	Plug connector (male)
2	 <p style="text-align: center;">S816-002001</p>	 <p style="text-align: center;">S816-102001</p>
3	 <p style="text-align: center;">S816-003001</p>	 <p style="text-align: center;">S816-103001</p>
4	 <p style="text-align: center;">S816-004001</p>	 <p style="text-align: center;">S816-104001</p>
8	 <p style="text-align: center;">S816-008001</p>	 <p style="text-align: center;">S816-108001</p>

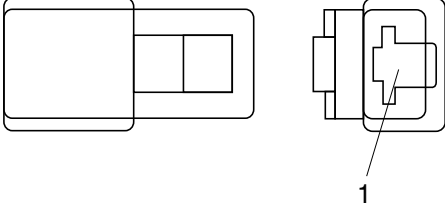
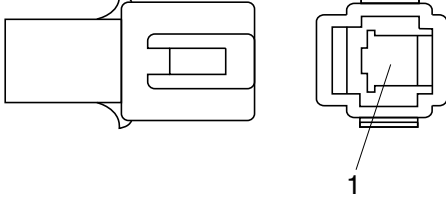
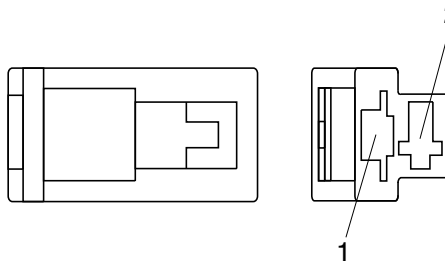
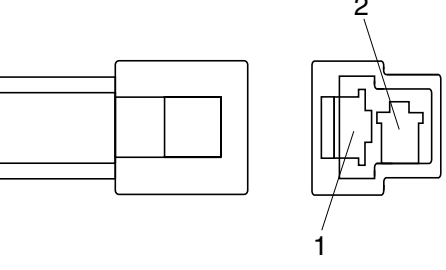
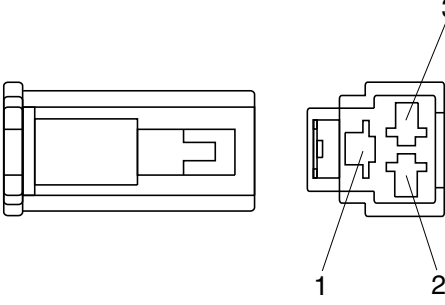
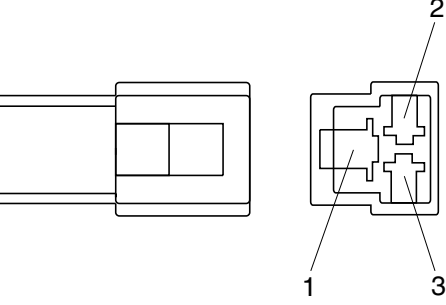
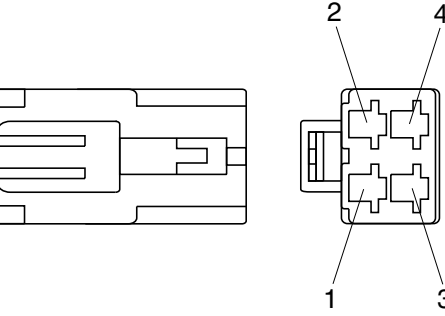
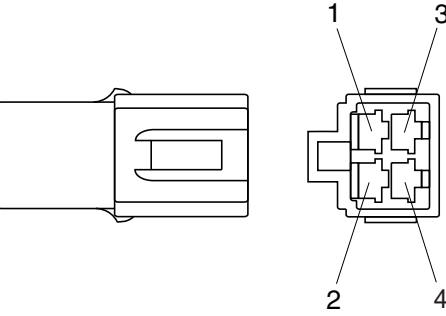
#### 4) SWP TYPE CONNECTOR

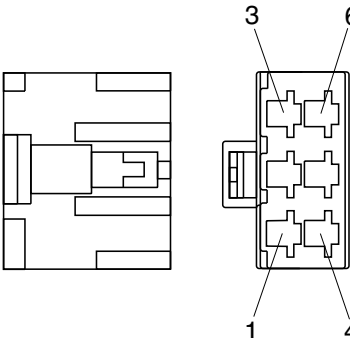
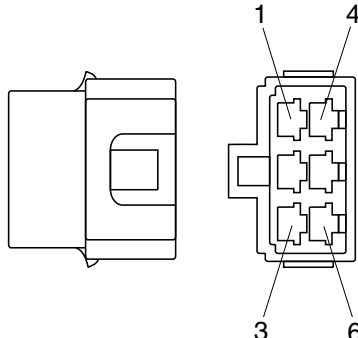
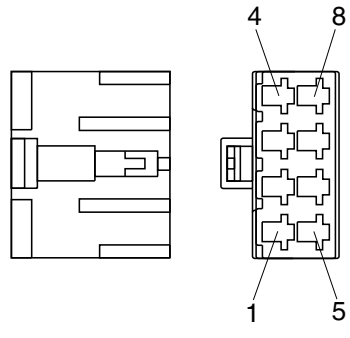
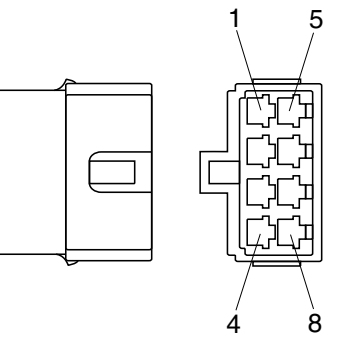
No. of pin	Receptacle connector (Female)	Plug connector (male)
1	 <p data-bbox="686 683 837 712">S814-001000</p>	 <p data-bbox="1236 683 1388 712">S814-101000</p>
2	 <p data-bbox="686 1086 837 1115">S814-002000</p>	 <p data-bbox="1236 1086 1388 1115">S814-102000</p>
3	 <p data-bbox="686 1496 837 1525">S814-003000</p>	 <p data-bbox="1236 1496 1388 1525">S814-103000</p>
4	 <p data-bbox="686 1892 837 1921">S814-004000</p>	 <p data-bbox="1236 1892 1388 1921">S814-104000</p>

No. of pin	Receptacle connector (female)	Plug connector (male)
6	 <p data-bbox="686 627 837 660">S814-006000</p>	 <p data-bbox="1260 627 1412 660">S814-106000</p>
8	 <p data-bbox="686 1030 837 1064">S814-008000</p>	 <p data-bbox="1260 1030 1412 1064">S814-108000</p>
12	 <p data-bbox="686 1438 837 1471">S814-012000</p>	 <p data-bbox="1260 1438 1412 1471">S814-112000</p>
14	 <p data-bbox="686 1845 837 1879">S814-014000</p>	 <p data-bbox="1260 1845 1412 1879">S814-114000</p>

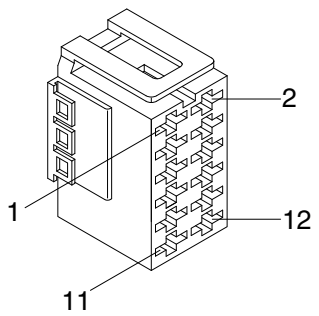


### 5) CN TYPE CONNECTOR

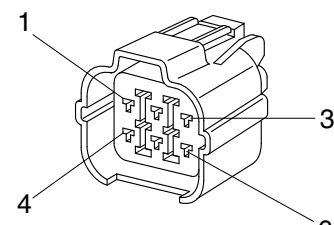
No. of pin	Receptacle connector (female)	Plug connector (male)
1	 <p data-bbox="687 678 839 707">S810-001202</p>	 <p data-bbox="1262 678 1414 707">S810-101202</p>
2	 <p data-bbox="687 1081 839 1111">S810-002202</p>	 <p data-bbox="1262 1081 1414 1111">S810-102202</p>
3	 <p data-bbox="687 1491 839 1520">S810-003202</p>	 <p data-bbox="1262 1491 1414 1520">S810-103202</p>
4	 <p data-bbox="687 1895 839 1924">S810-004202</p>	 <p data-bbox="1262 1895 1414 1924">S810-104202</p>

No. of pin	Receptacle connector (female)	Plug connector (male)
6	 <p data-bbox="686 638 837 672">S810-006202</p>	 <p data-bbox="1236 638 1388 672">S810-106202</p>
8	 <p data-bbox="686 1041 837 1075">S810-008202</p>	 <p data-bbox="1236 1041 1388 1075">S810-108202</p>

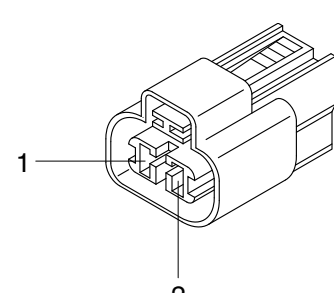
### 6) ITT SWF CONNECTOR

No. of pin	Receptacle connector (female)	Plug connector (male)
10	 <p style="text-align: right;">SWF589790</p>	

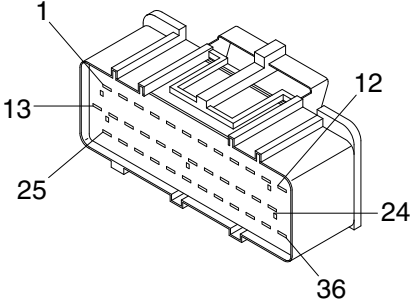
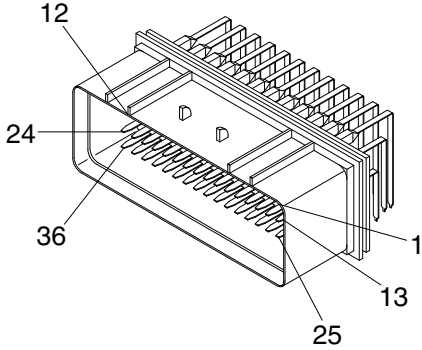
### 7) HW090 SEALED CONNECTOR

No. of pin	Receptacle connector (female)	Plug connector (male)
6	 <p style="text-align: right;">6189-0133</p>	

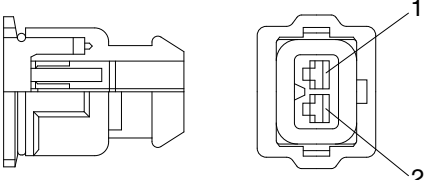
### 8) MWP02F-B CONNECTOR

No. of pin	Receptacle connector (female)	Plug connector (male)
2	 <p style="text-align: right;">PH805-02028</p>	

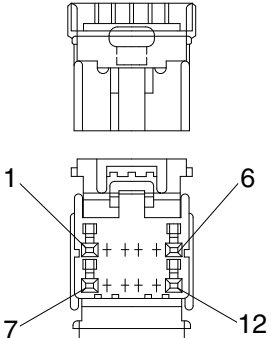
### 9) AMP ECONOSEAL CONNECTOR

No. of pin	Receptacle connector (female)	Plug connector (male)
36	 <p style="text-align: right;">344111-1</p>	 <p style="text-align: right;">344108-1</p>

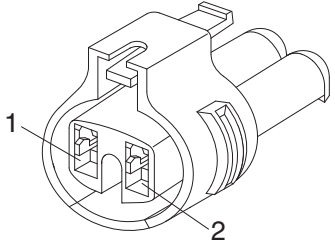
### 10) AMP TIMER CONNECTOR

No. of pin	Receptacle connector (female)	Plug connector (male)
2	 <p style="text-align: right;">85202-1</p>	

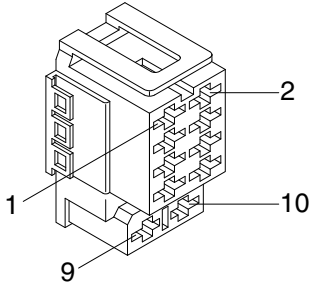
### 11) AMP 040 MULTILOCK CONNECTOR

No. of pin	Receptacle connector (female)	Plug connector (male)
12	 <p style="text-align: right;">174045-2</p>	

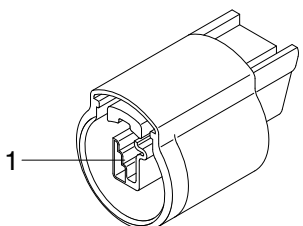
### 12) KET 090 WP CONNECTORS

No. of pin	Receptacle connector (female)	Plug connector (male)
2	 <p style="text-align: right;">MG640795</p>	

### 13) ITT SWF CONNECTOR

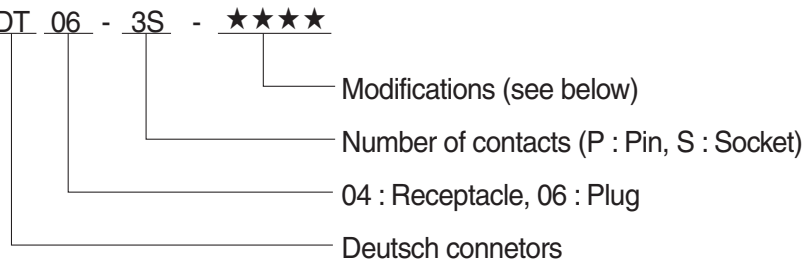
No. of pin	Receptacle connector (female)	Plug connector (male)
10	 <p style="text-align: right;">SWF593757</p>	

### 14) MWP NMWP CONNECTOR

No. of pin	Receptacle connector (female)	Plug connector (male)
1	 <p style="text-align: right;">NMWP01F-B</p>	

## 15) DEUTSCH DT CONNECTORS

DT 06 - 3S - ★★☆☆



### ※ Modification

E003 : Standard end cap - gray

E004 : Color of connector to be black

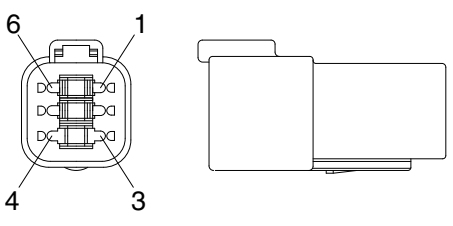
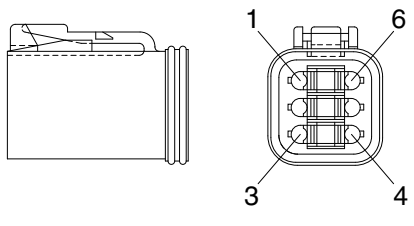
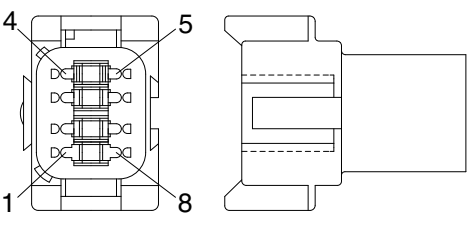
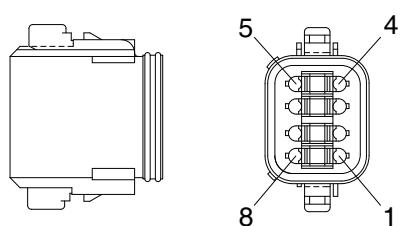
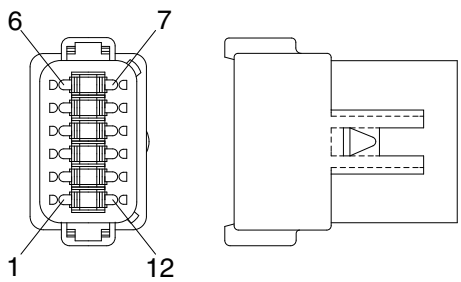
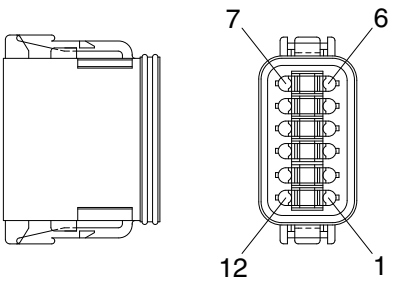
E005 : Combination - E004 & E003

EP04 : End cap

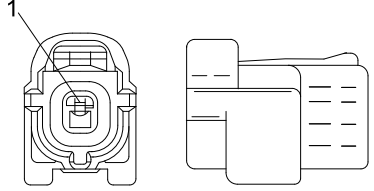
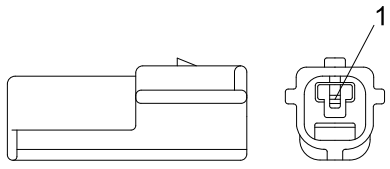
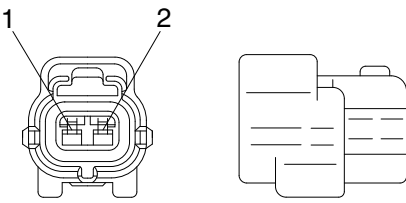
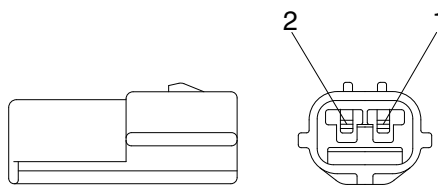
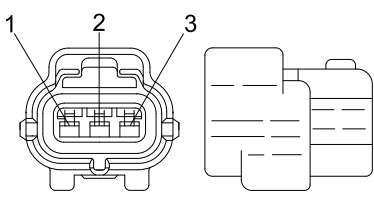
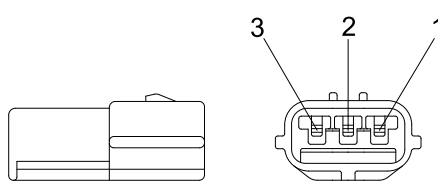
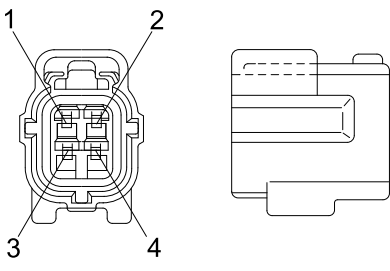
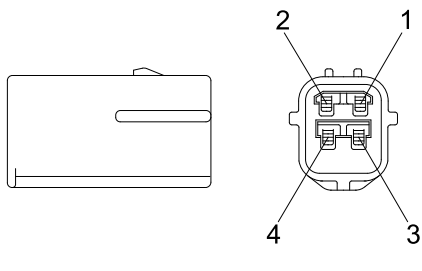
EP06 : Combination P012 & EP04

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

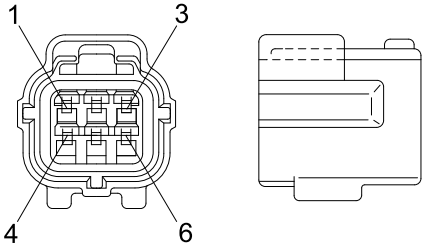
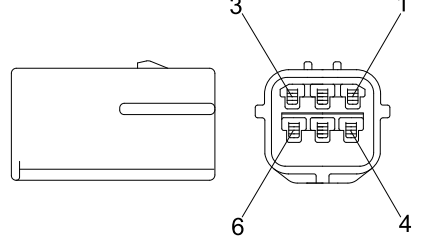
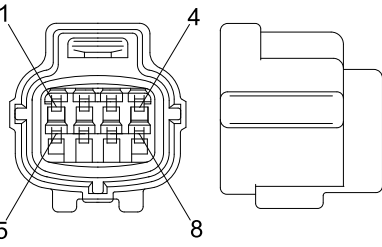
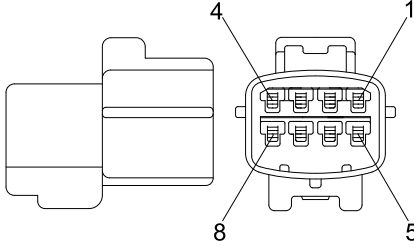
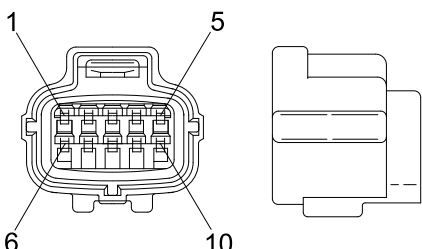
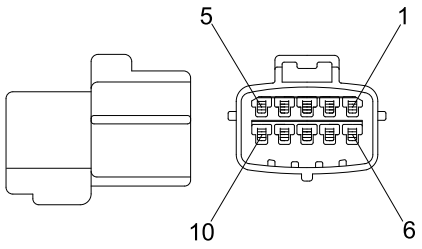
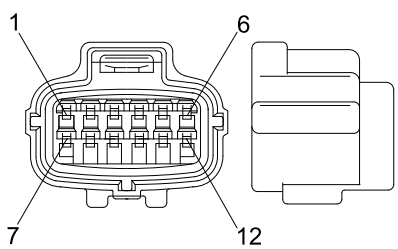
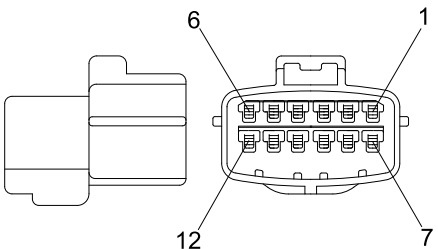
No. of pin	Receptacle connector (female)	Plug connector (male)
2	<p style="text-align: right;">DT06-2S</p>	<p style="text-align: right;">DT04-2P</p>
3	<p style="text-align: right;">DT06-3S</p>	<p style="text-align: right;">DT04-3P</p>
4	<p style="text-align: right;">DT06-4S</p>	<p style="text-align: right;">DT04-4P</p>

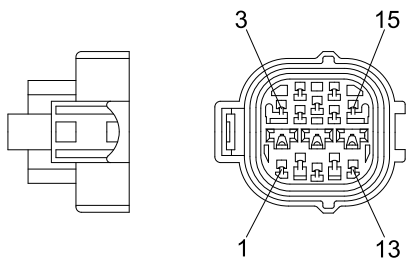
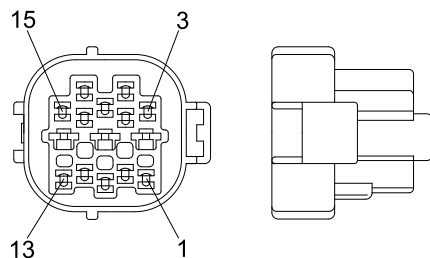
No. of pin	Receptacle connector (female)	Plug connector (male)
6	 <p style="text-align: right;">DT06-6S</p>	 <p style="text-align: right;">DT04-6P</p>
8	 <p style="text-align: right;">DT06-8S</p>	 <p style="text-align: right;">DT04-8P</p>
12	 <p style="text-align: right;">DT06-12S</p>	 <p style="text-align: right;">DT04-12P</p>

### 16) ECONOSEAL J TYPE CONNECTORS

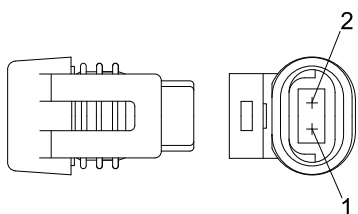
No. of pin	Receptacle connector (female)	Plug connector (male)
1	 <p style="text-align: right;">S816-001002</p>	 <p style="text-align: left;">S816-101002</p>
2	 <p style="text-align: right;">S816-002002</p>	 <p style="text-align: left;">S816-102002</p>
3	 <p style="text-align: right;">S816-003002</p>	 <p style="text-align: left;">S816-103002</p>
4	 <p style="text-align: right;">S816-004002</p>	 <p style="text-align: left;">S816-104002</p>



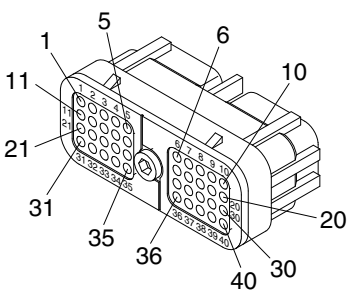
No. of pin	Receptacle connector (female)	Plug connector (male)
6	 <p data-bbox="686 638 837 672">S816-006002</p>	 <p data-bbox="1236 638 1388 672">S816-106002</p>
8	 <p data-bbox="686 1041 837 1075">S816-008002</p>	 <p data-bbox="1236 1041 1388 1075">S816-108002</p>
10	 <p data-bbox="686 1444 837 1478">S816-010002</p>	 <p data-bbox="1236 1444 1388 1478">S816-110002</p>
12	 <p data-bbox="686 1848 837 1881">S816-012002</p>	 <p data-bbox="1236 1848 1388 1881">S816-112002</p>

No. of pin	Receptacle connector (female)	Plug connector (male)
15	 <p data-bbox="730 633 834 663">368301-1</p>	 <p data-bbox="1278 633 1382 663">2-85262-1</p>

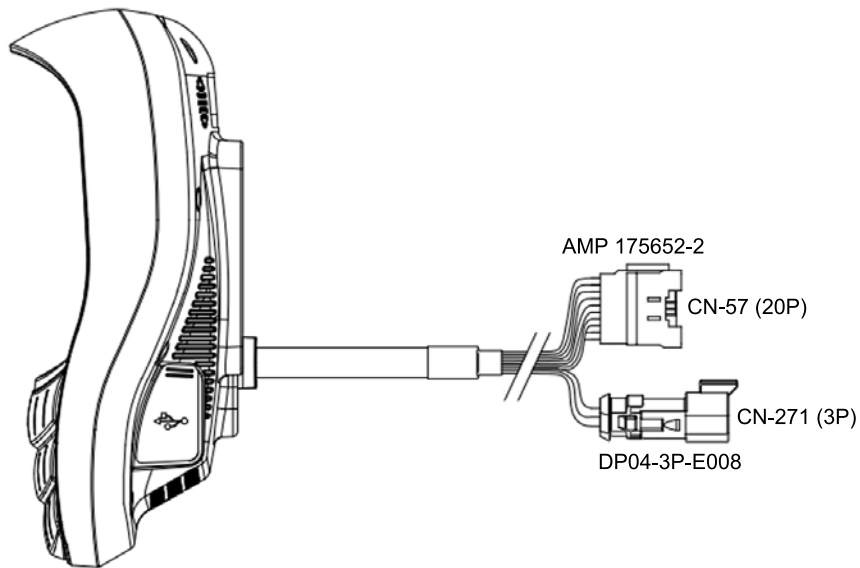
### 17) METRI-PACK TYPE CONNECTOR

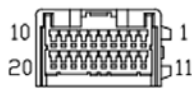
No. of pin	Receptacle connector (female)	Plug connector (male)
2	 <p data-bbox="726 1236 829 1265">12040753</p>	


### 18) DEUTSCH MCU CONNECTOR

No. of pin	Receptacle connector (Female)	Plug connector (Male)
40	 <p data-bbox="667 1839 837 1868">DRC23-40PA/B</p>	

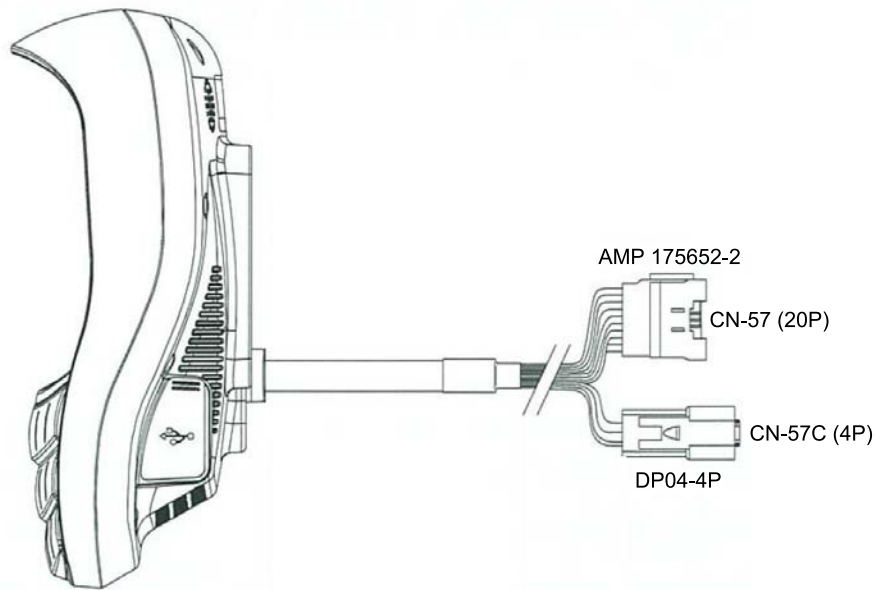
19) MONITOR CONNECTOR (21WD-11100, 21WD-11101, 21WD-11102)



			
PART NO. : AMP 175652-2			
NO	PIN NAME	NO	PIN NAME
1	IG 24V	11	GND
2	BATTERY 24V	12	GND
3	BATTERY 24V	13	CAN1 H
4	CAMERA CH0	14	CAN2 L
5	CAMERA CH0 SIDE	15	CAN2 H
6	6.5V OUTPUT	16	CAN2 SHIELD
7	AVX LEFT	17	CAMERA SHIELD
8	AVX RIGHT	18	CAN1 LOW
9	CAMERA CH1	19	GND
10	CAMERA CH2	20	CAMERA CH3

			
PART NO. : DP04-3P-E008			
NO	PIN NAME	NO	PIN NAME
A	AUX GND	C	AUX RIGHT
B	AUX LEFT		

# MONITOR CONNECTOR (21WD-11103, 21WD-11104)



NO	PIN NAME	NO	PIN NAME
1	IG 24V	11	GND
2	BATTERY 24V	12	GND
3	BATTERY 24V	13	CAN1 H
4	CAMERA CH0	14	CAN2 L
5	CAMERA CH3 DIFF-	15	CAN2 H
6	6.5V OUTPUT	16	CAN2 SHIELD
7	N.C	17	CAMERA SHIELD
8	N.C	18	CAN1 L
9	CAMERA CH1	19	N.C
10	CAMERA CH2	20	CAMERA CH3 DIFF+

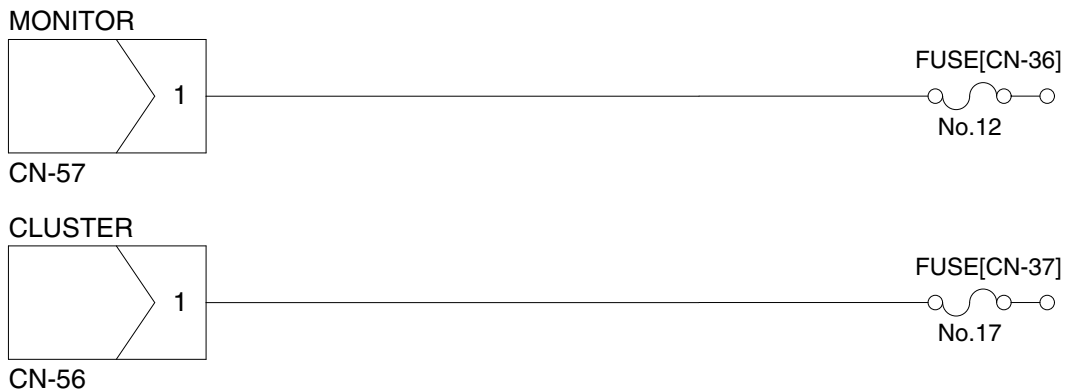
NO	PIN NAME	NO	PIN NAME
1	CAM VCC	3	CAM CH3 +
2	CAM GND	4	CAM CH3 -

## GROUP 5 TROUBLESHOOTING

### 1. WHEN STARTING SWITCH IS TURNED ON, CLUSTER AND MONITOR LAMP DOES NOT LIGHT UP

- Before carrying out below procedure, check all the related connectors are properly inserted and the fuse No.12, 17 are not blown out and ON/OFF of bulb.
- After checking, connect the disconnected connectors again immediately unless otherwise specified.

	Cause	Remedy
Check voltage between CN-56 (1), CN-57(1) and chassis YES	Defective cluster	Replace
	Defective monitor	Replace
NO	Disconnection in wiring harness or poor contact between CN-56 (1), CN-57 (1) and fuse No. 12, 17	Repair or replace (after clean)



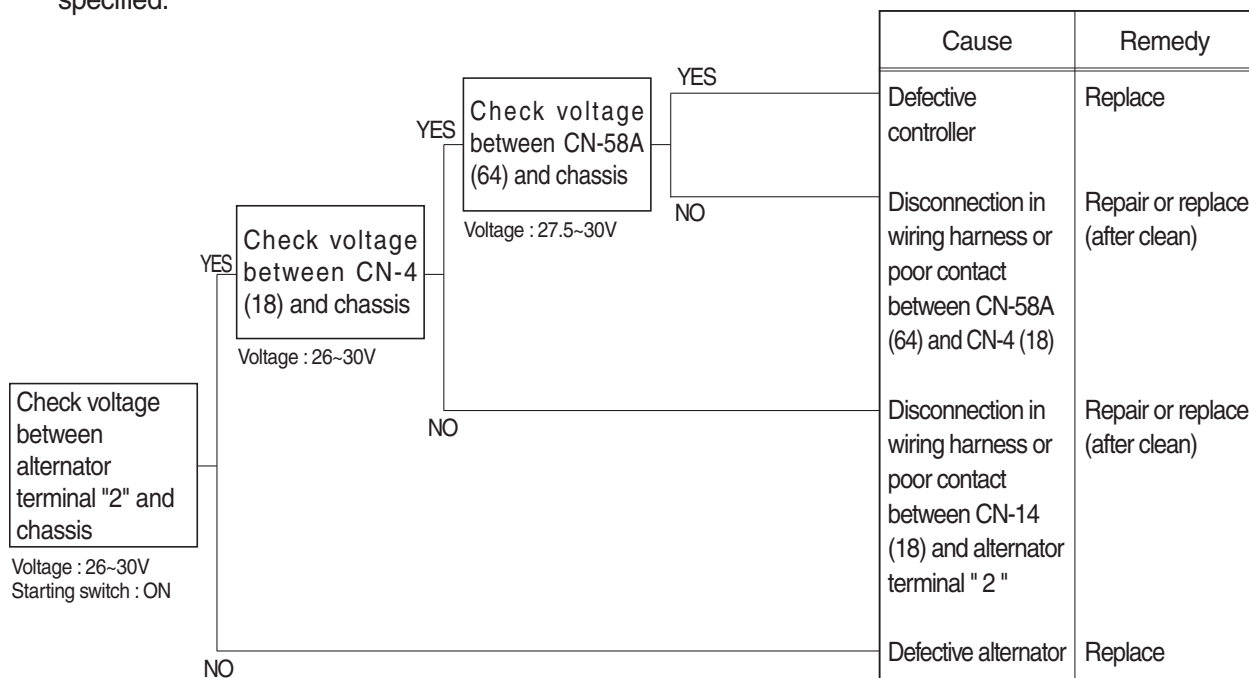
960A7EL24

Check voltage

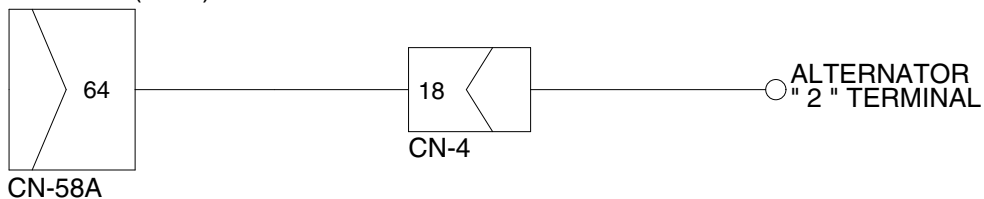
YES	20 ~ 30 V
NO	0 V

2.  WHEN BATTERY LAMP LIGHTS UP (engine is started)

- Before carrying out below procedure, check all the related connectors are properly inserted.
- After checking, connect the disconnected connectors again immediately unless otherwise specified.



CONTROLLER(MCU)



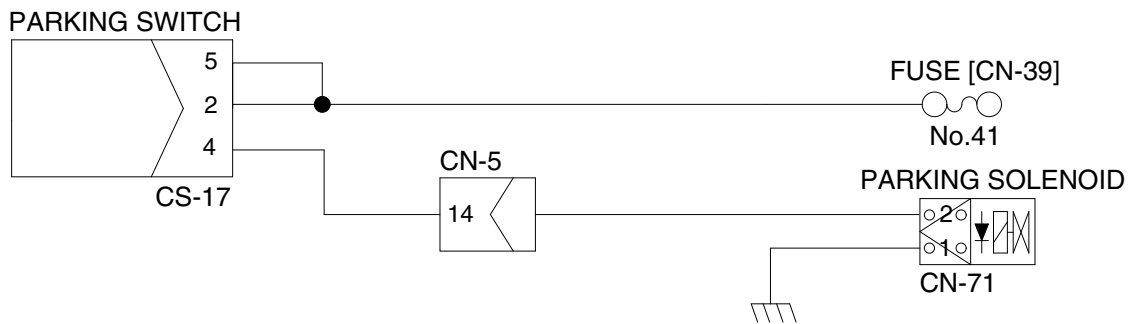
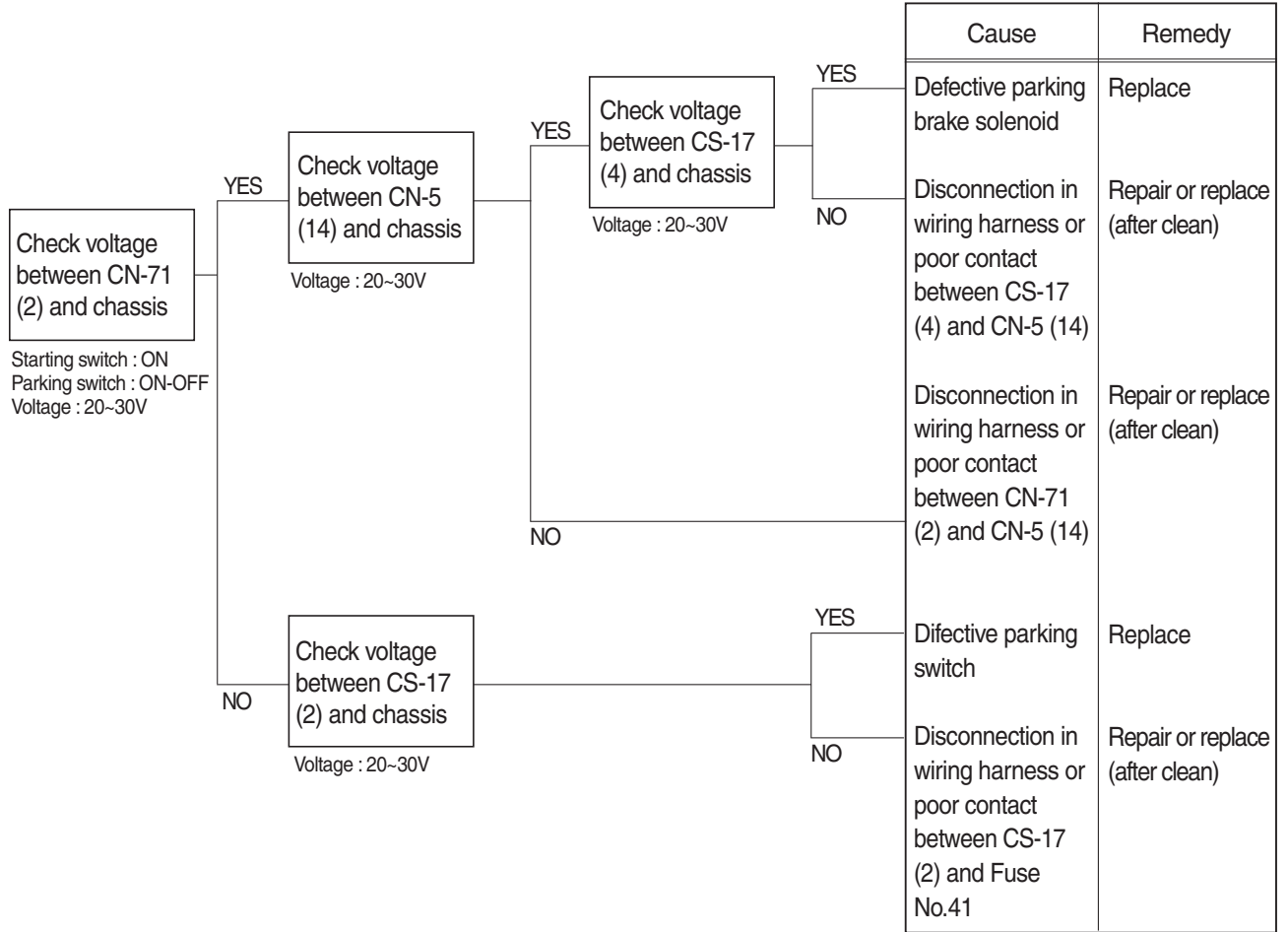
970SA7EL38

Check valtage

YES	20 ~ 30 V
NO	0 V

### 3. WHEN PARKING SOLENOID DOES NOT WORK

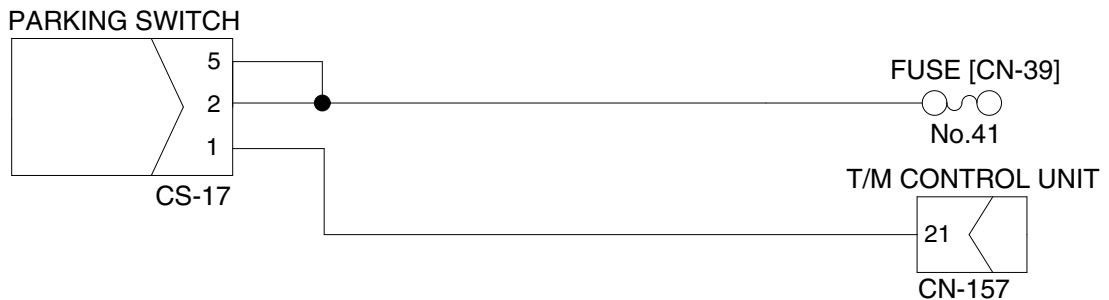
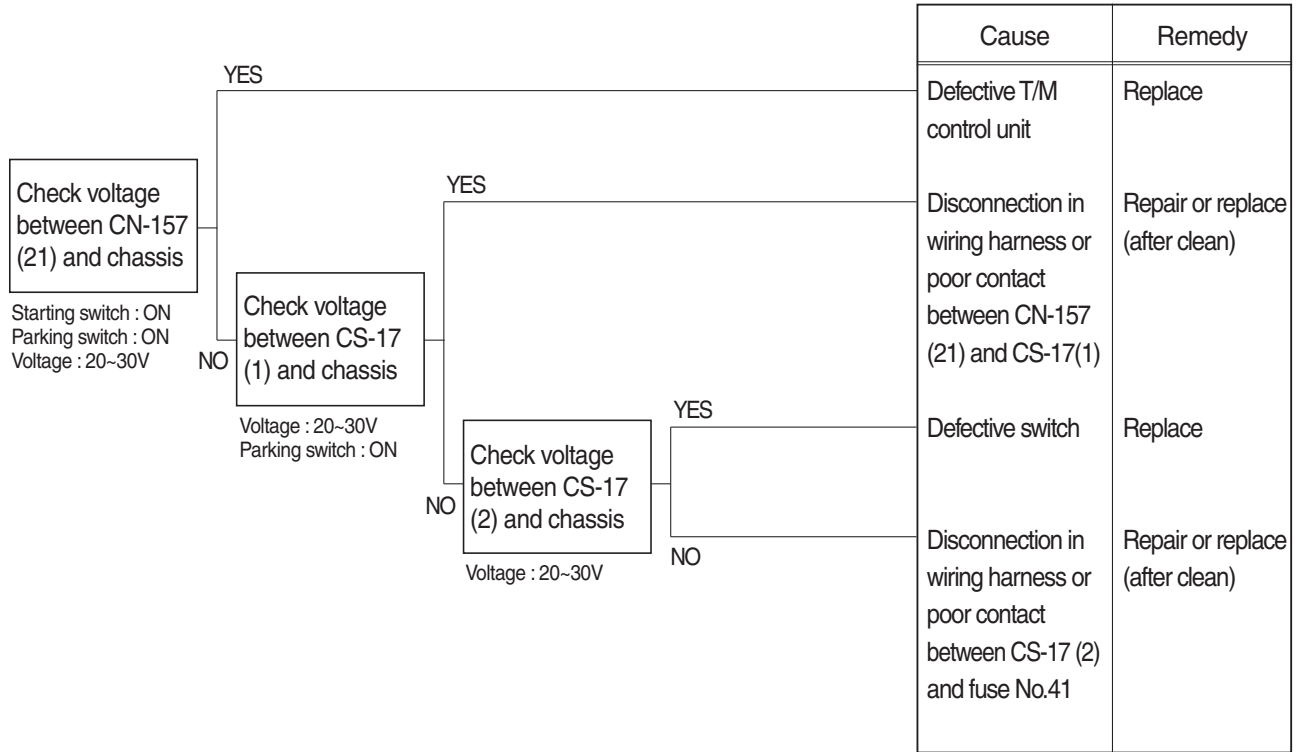
- Before carrying out below procedure, check all the related connectors are properly inserted and the fuse No.41 is not blown out.
- After checking, connect the disconnected connectors again immediately unless otherwise specified.



960A7EL39

#### 4. TRANSMISSION IS NOT RETURNED TO NEUTRAL WHEN PARKING BRAKE IS APPLIED

- Before carrying out below procedure, check all the related connectors are properly inserted and the fuse No.15 (transmission control unit) and No.41 are not blown out.
- After checking, connect the disconnected connectors again immediately unless otherwise specified.



Check resistance

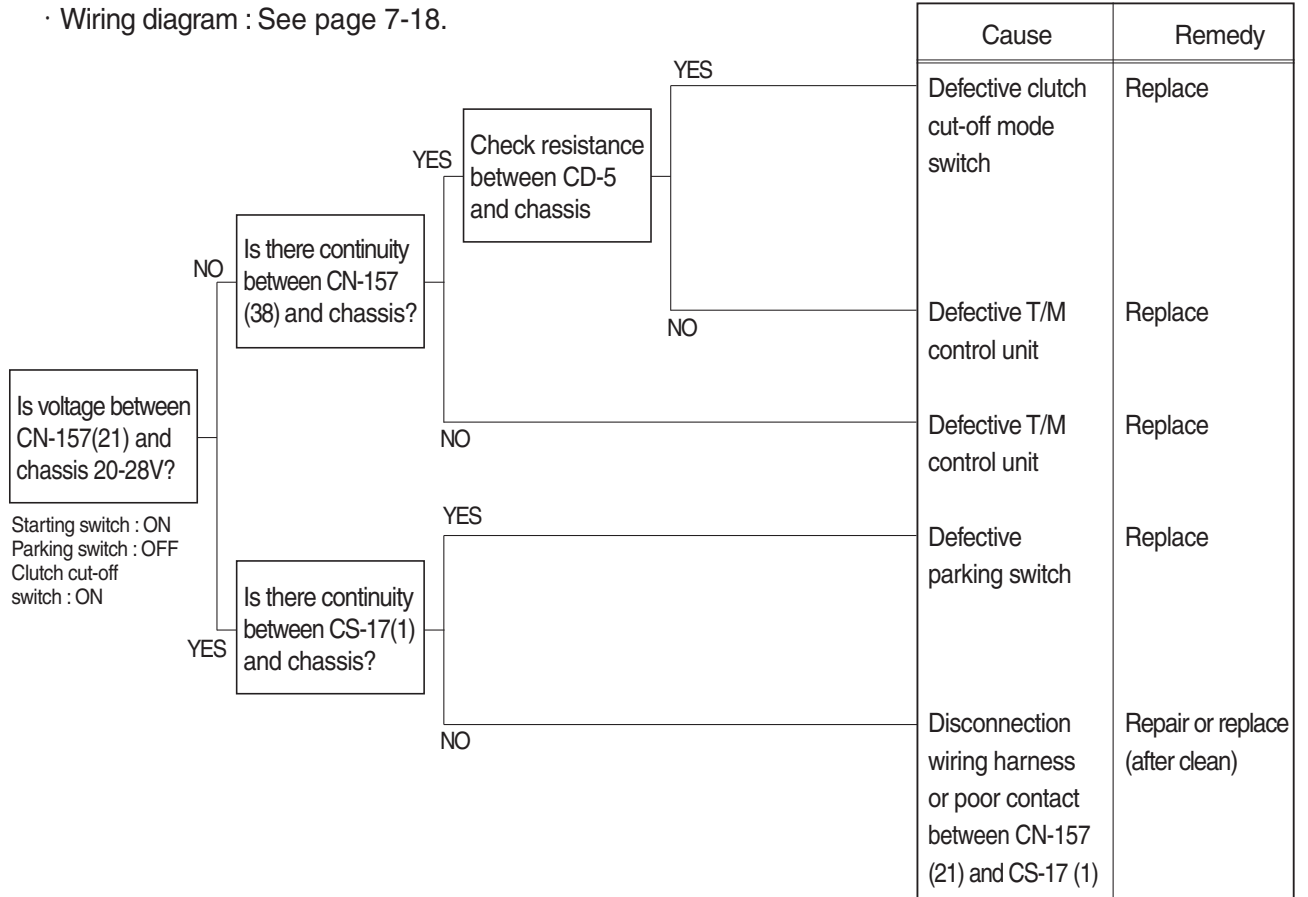
YES	MAX 1Ω
NO	MIN 1MΩ

760F7EL40



## 5. MACHINE DOES NOT TRAVEL

- Before carrying out below procedure, check all the related connectors are properly inserted and the fuse No.15 (transmission control unit) is not blown out.
- After checking, connect the disconnected connectors again immediately unless otherwise specified.
- Wiring diagram : See page 7-18.

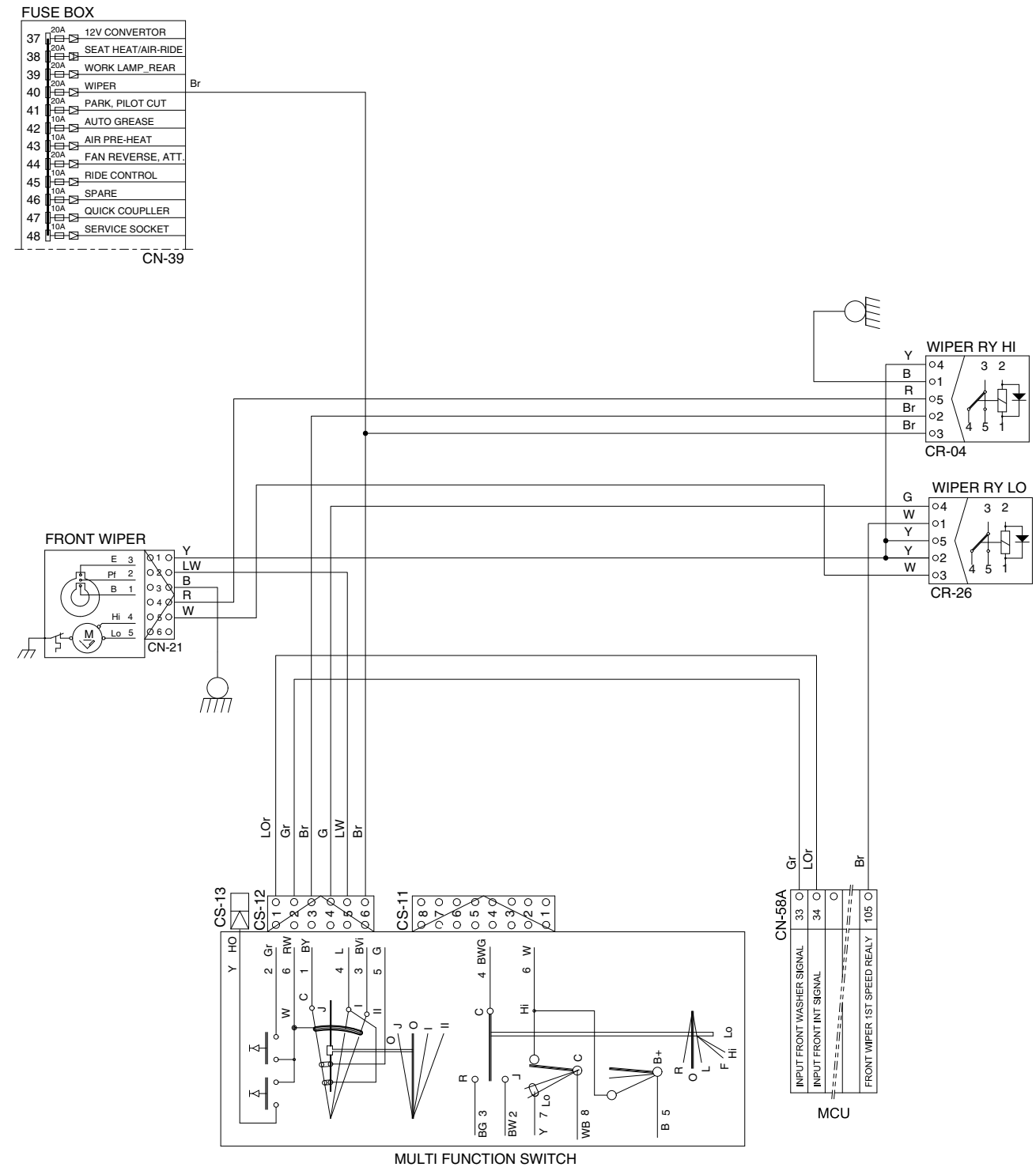
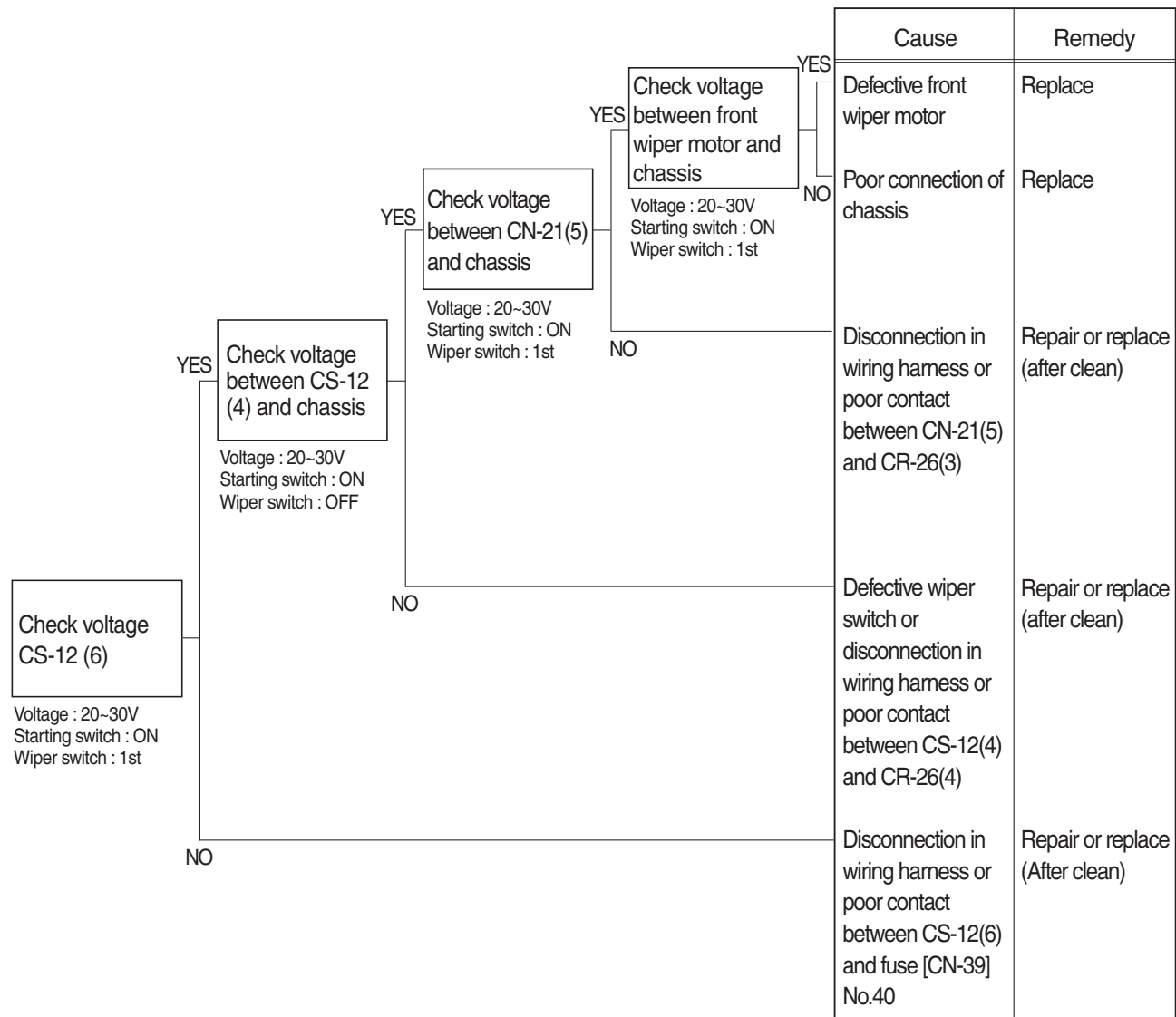


### Check resistance

YES	MAX 1Ω
NO	MIN 1MΩ

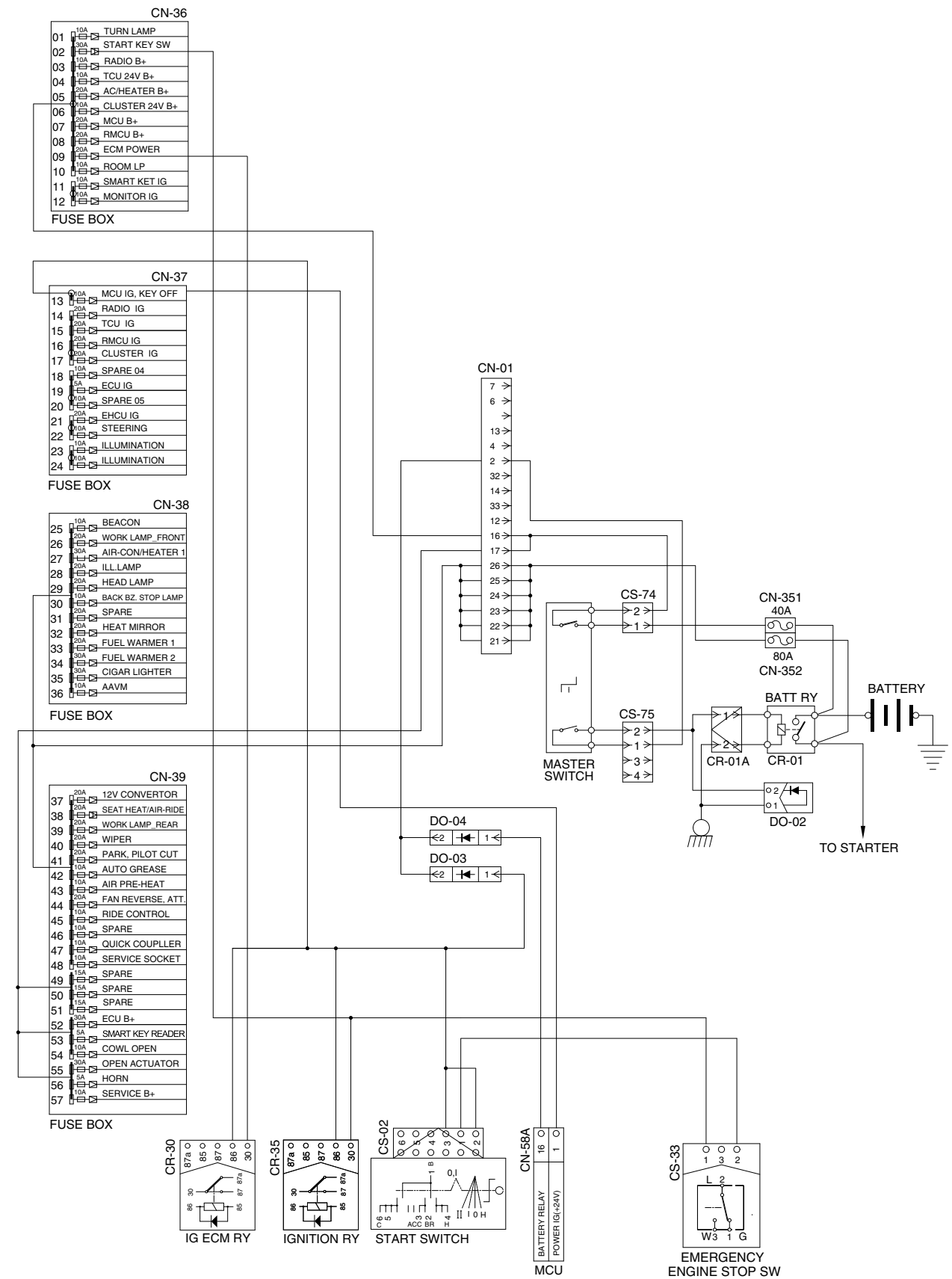
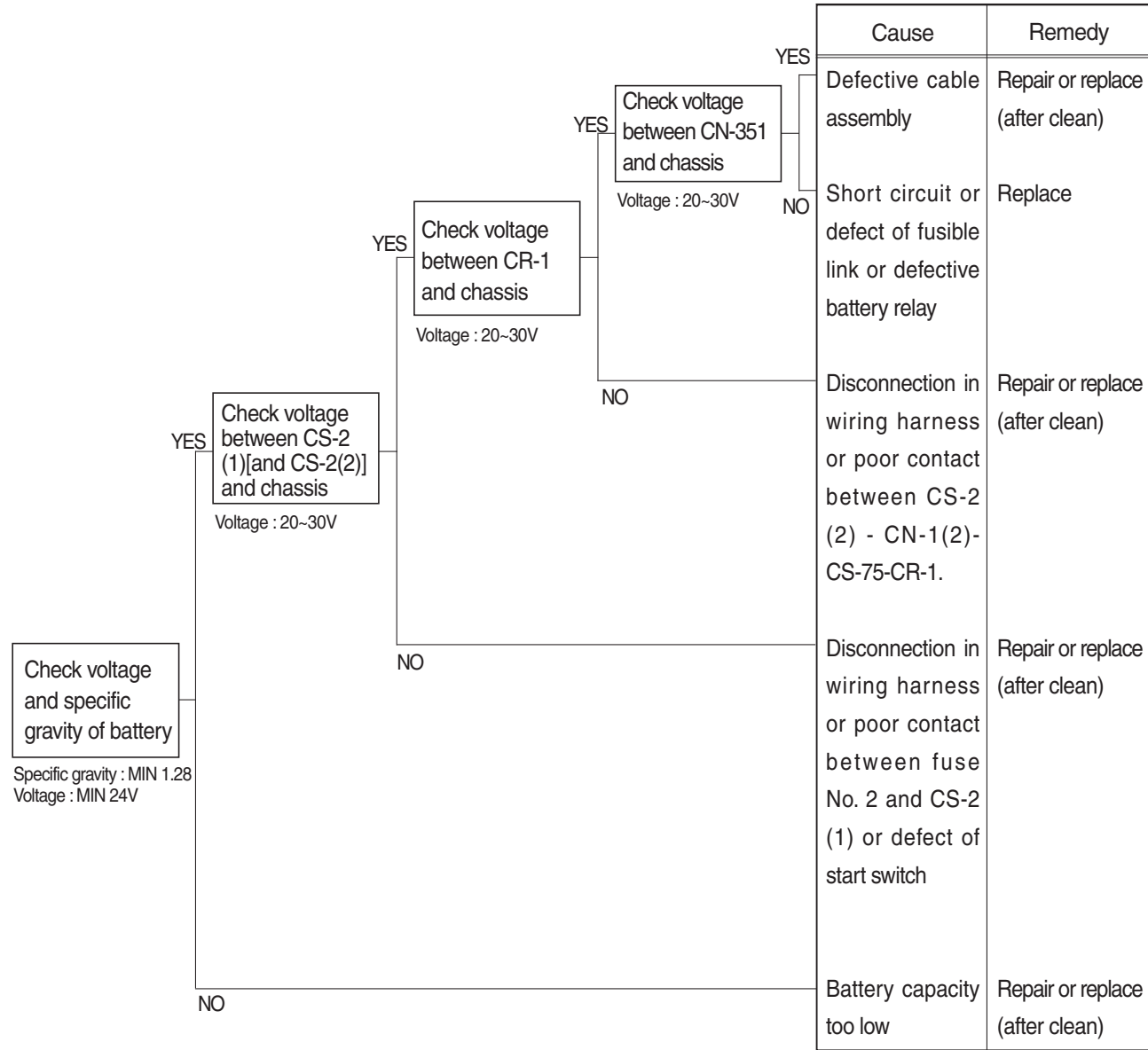
## 6. WHEN STARTING SWITCH IS TURNED ON, WIPER MOTOR DOES NOT OPERATE

- Before carrying out below procedure, check all the related connectors are properly inserted and the fuse No.40 is not blown out.
- After checking, connect the disconnected connectors again immediately unless otherwise specified.



## 7. WHEN STARTING SWITCH "ON" DOES NOT OPERATE

- Before carrying out below procedure, check all the related connectors are properly inserted the fuse No.2 is not blown out.
- After checking, connect the disconnected connectors again immediately unless otherwise specified.



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

- Before carrying out below procedure, check all the related connectors are properly inserted, and the fuse No.26, 39 is not blown out.
- After checking, connect the disconnected connectors again immediately unless otherwise specified.

