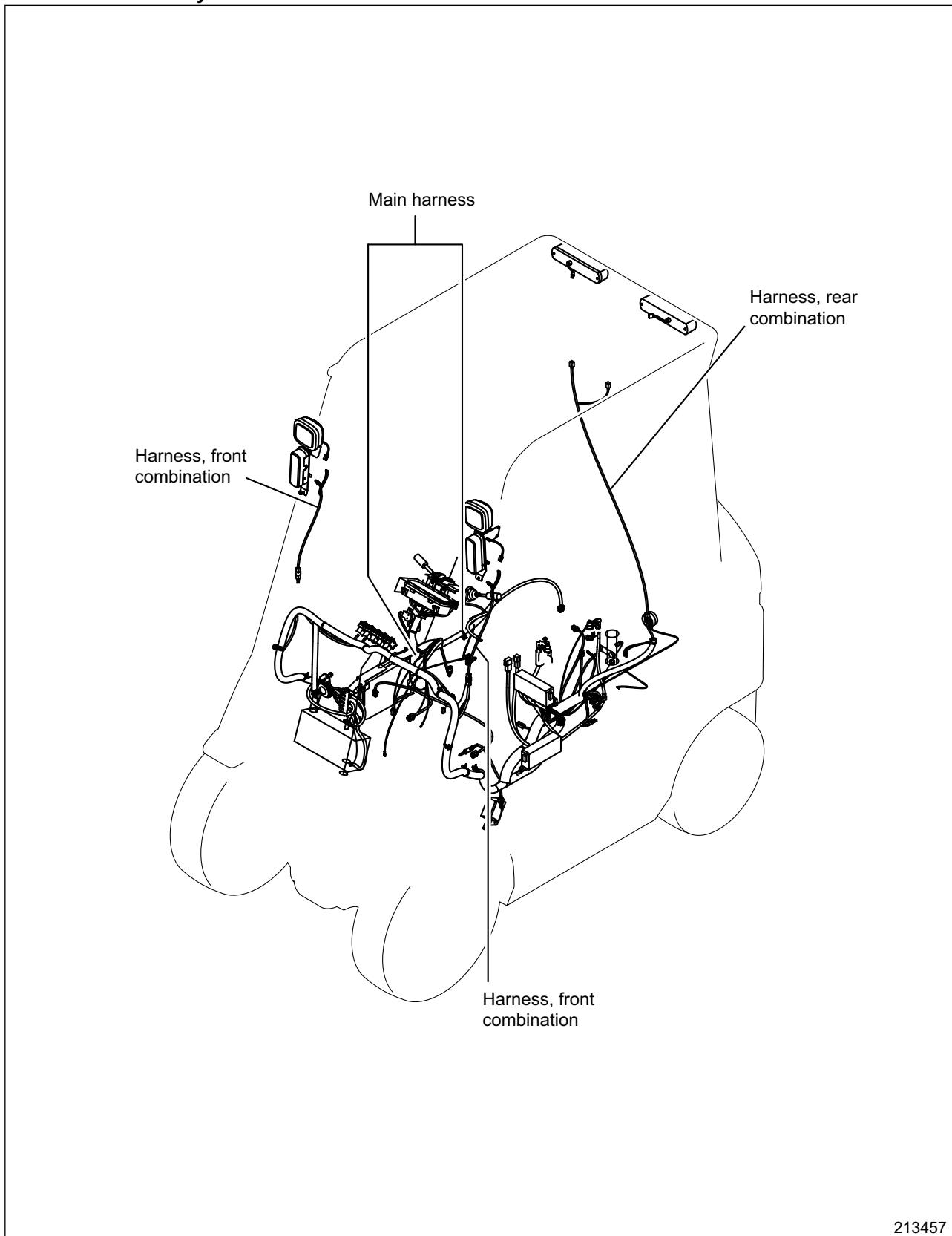


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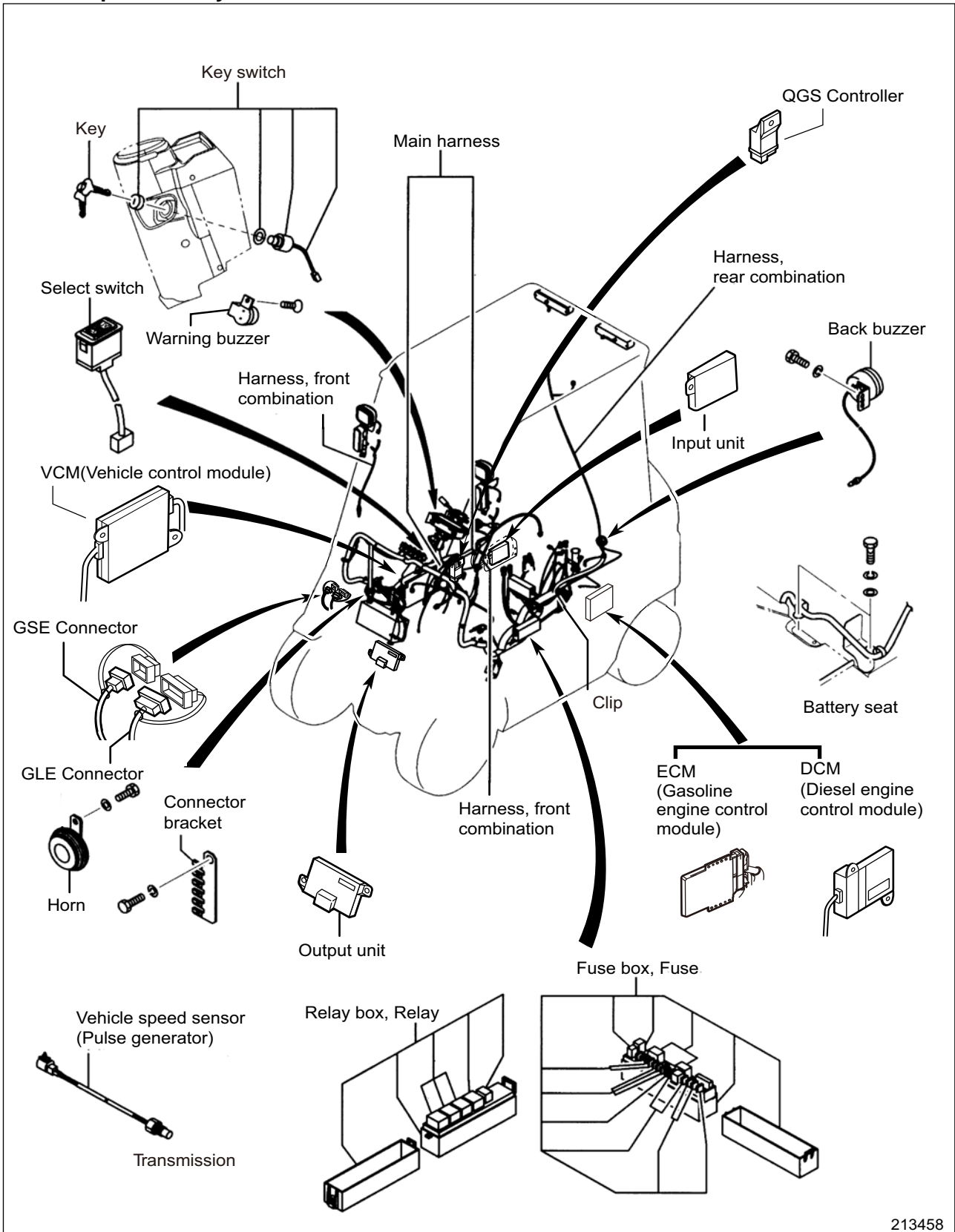
1. Chassis Electrical Devices Wiring Outline

1.1 Harnesses Layout



213457

1.2 Components Layout

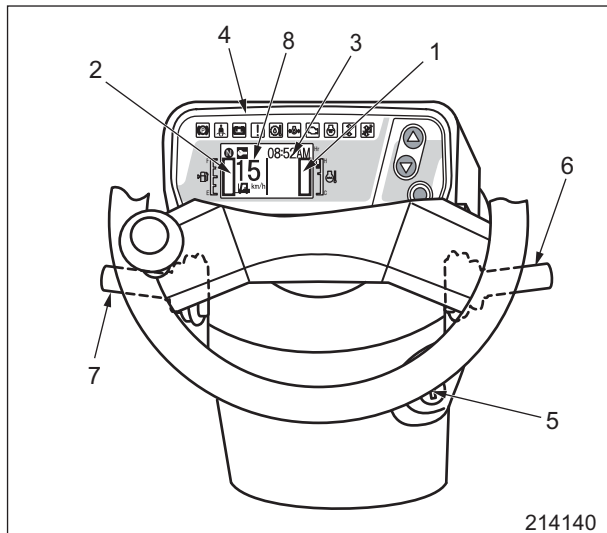


213458

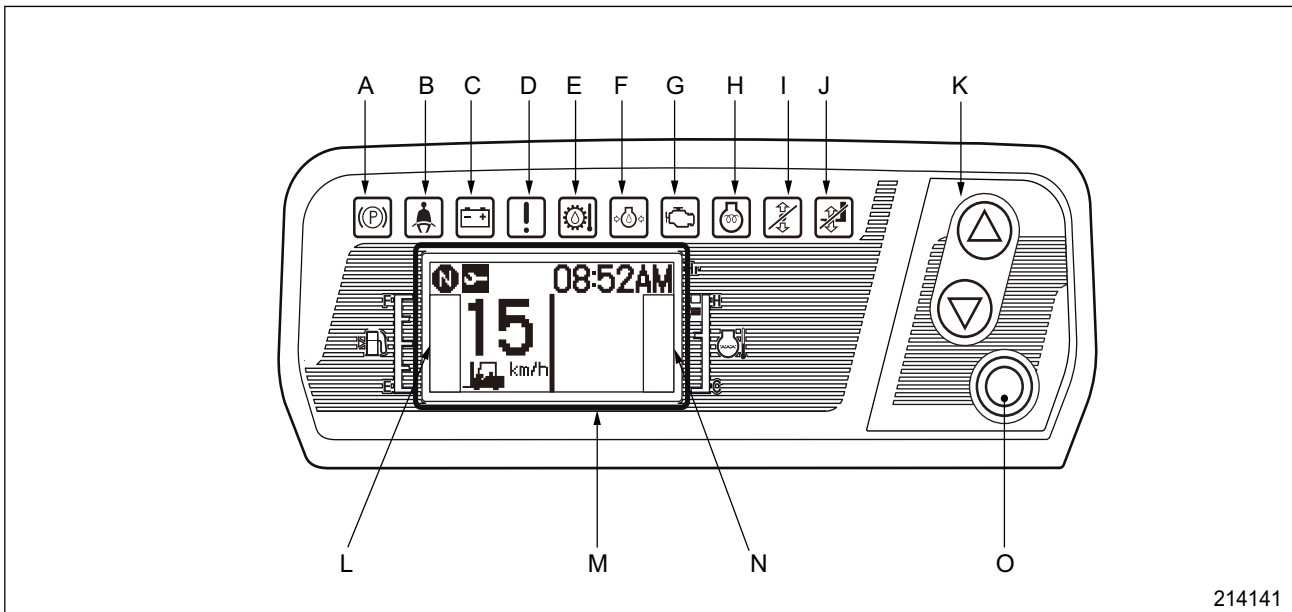
2. Structure

2.1 Console Box

- 1 Water temperature gauge
- 2 Fuel gauge
- 3 Hour meter, various warning lamps
- 4 Instrument panel
- 5 Key switch
- 6 Lighting switch, turn signal switch
- 7 Forward-reverse lever



2.1.1 Function of Instrument Panel



214141

Ref. No.	Name of indicators and warning lamps	When turned off	When glows or blinks	Remark
A	Parking brake warning lamp	Normal	When parking brake is applied (glows)	-
B	Seat belt warning lamp	Fastened	When seat belt is not fastened (glows)	-
C	Charge warning lamp	Normal charging	When charging is not normal (glows / When engine is not running always glows)	-
D	Multi-purpose warning lamp	Normal	When a minor failure occurs or operating caution is being issued (glows)	-
E	Torque converter fluid temperature warning lamp	Normal temperature	When torque converter fluid temperature is not normal (glows)	-
F	Engine oil pressure warning lamp	Normal	When engine oil pressure is low (glows / When engine is not running always glows)	-
G	Engine warning lamp	Normal	When the engine is failed (glows)	-
H	Glow pilot lamp	Preheating completed	When the glow plug is ON (glows)	-
I	Smart shift indicator lamp	-	When protective function of sudden acceleration/full reverse (shifting in the opposite direction of traveling) is activated (glows)	Option
J	Mast interlock indicator lamp	-	When mast interlock is activated (glows)	-
K	Cursor buttons	-	-	-
L	Fuel gauge	Indicates remaining fuel amount with key in "ON" position.		-
M	LCD screen	-	-	-
N	Water temperature gauge	Indicates water temperature with key in "ON" position.		-
O	Enter/display button	-	-	-

Description of function

Inspection method of blown bulbs for instrument panel

All warning and indicator lamps are normal, if they glow, when the key switch is turned to the | (ON) position.

2.2 Main Electrical Components

2.2.1 Key switch

The diesel-engine truck, which uses a distributor type injection pump, is equipped with an engine automatic stop mechanism of the key switch fuel cutoff system.

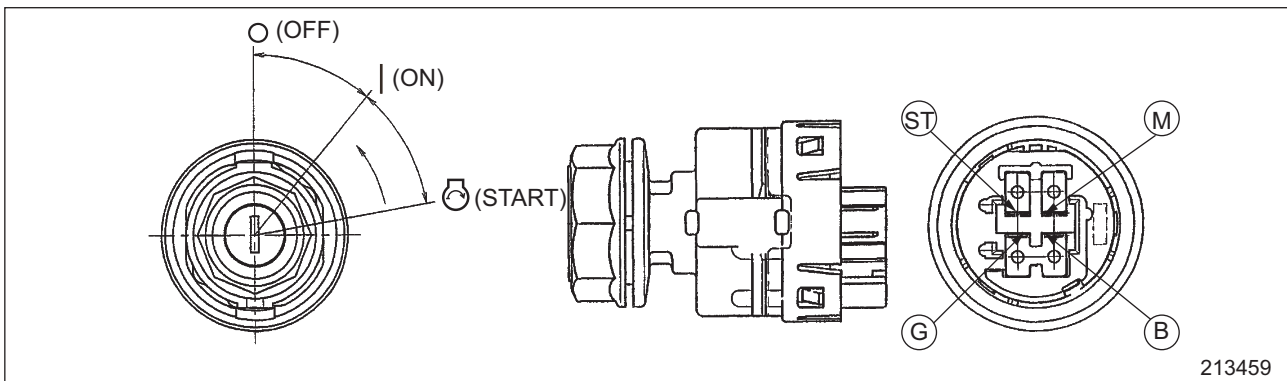
The gasoline-engine truck is also equipped with an engine automatic stop mechanism of the fuel cutoff system.

(Key switch with Anti-Restart Lock)

This key switch has an anti-restarting function.

This switch has a built-in anti-restart lock, so the key cannot be turned from | (ON) to ⌚ (START) position while the engine is running. This prevents starter breakage or flywheel damage caused by an operator restarting the truck when the engine is running.

The gasoline- and diesel-engine models use the same key switch. In the diesel-engine models, the | (ON) position of the switch is for energizing the glow plugs.

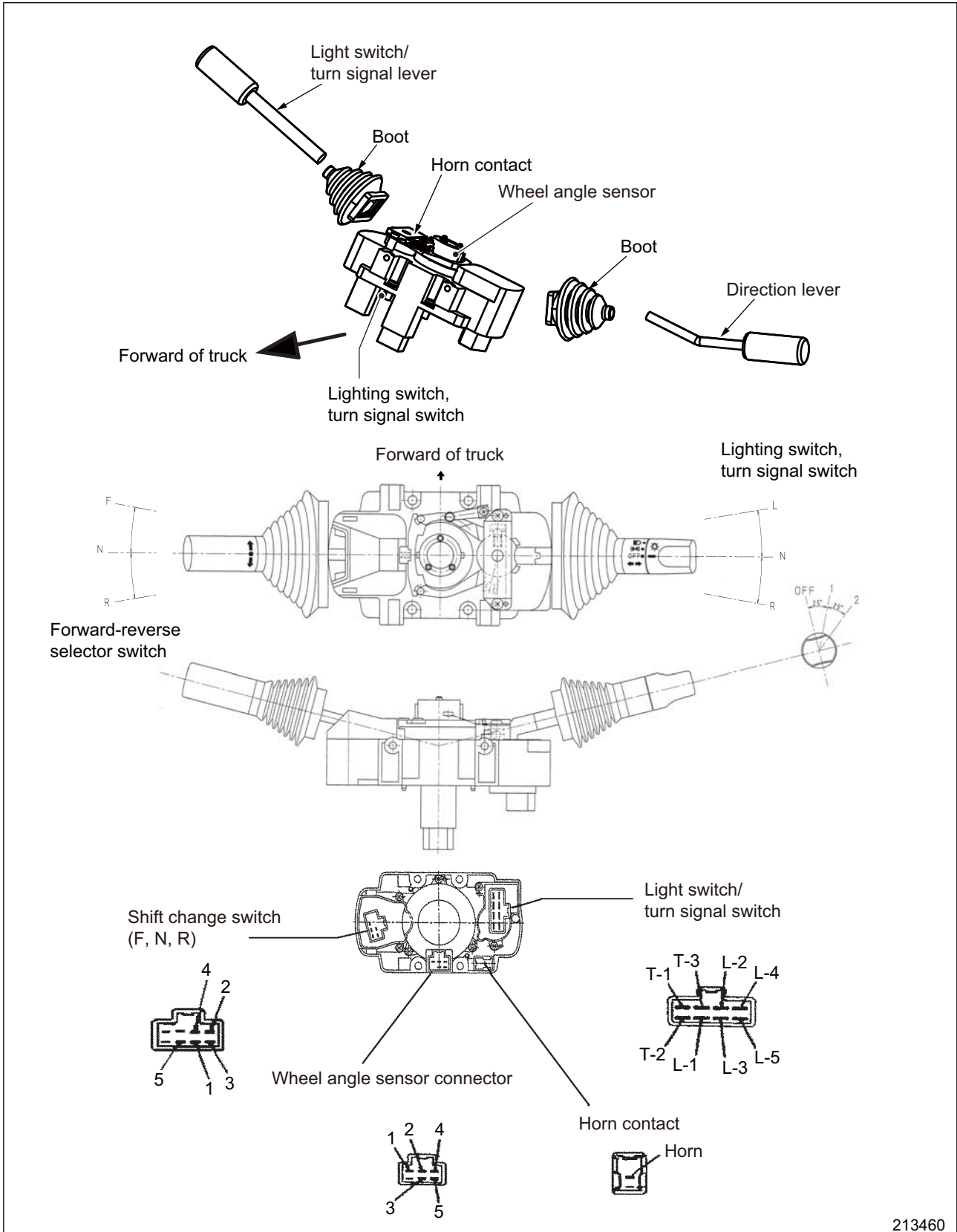


Connection Table

For gasoline truck (12V)

Terminal	G	B	M	ST	Key insertion/ removal
OFF					Yes
ON (when operating)		○-----	-----○		No
START (when starting engine)		○-----	-----○-----	-----○	No

2.2.2 Lighting switch, turn signal switch



213460

2.2.3 Horn

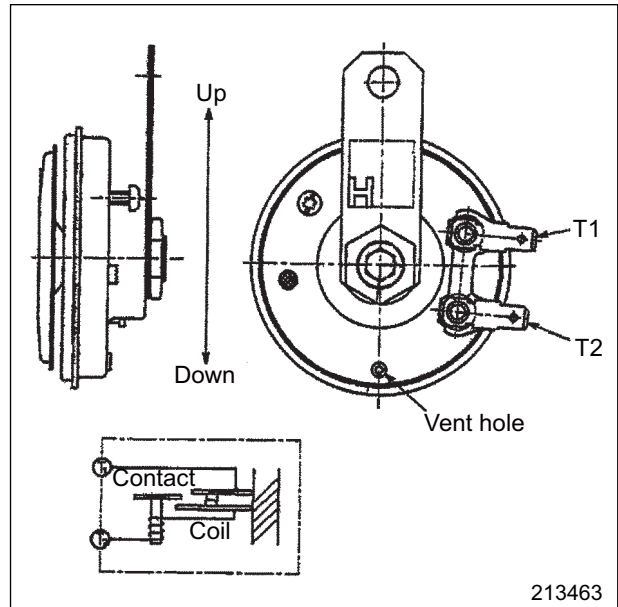
Check that the horn activates when applying the specified voltage to both terminals of the horn, T1 and T2.

Replace the horn if it does not activate or its sound is abnormal.

Operating voltage: DC12V

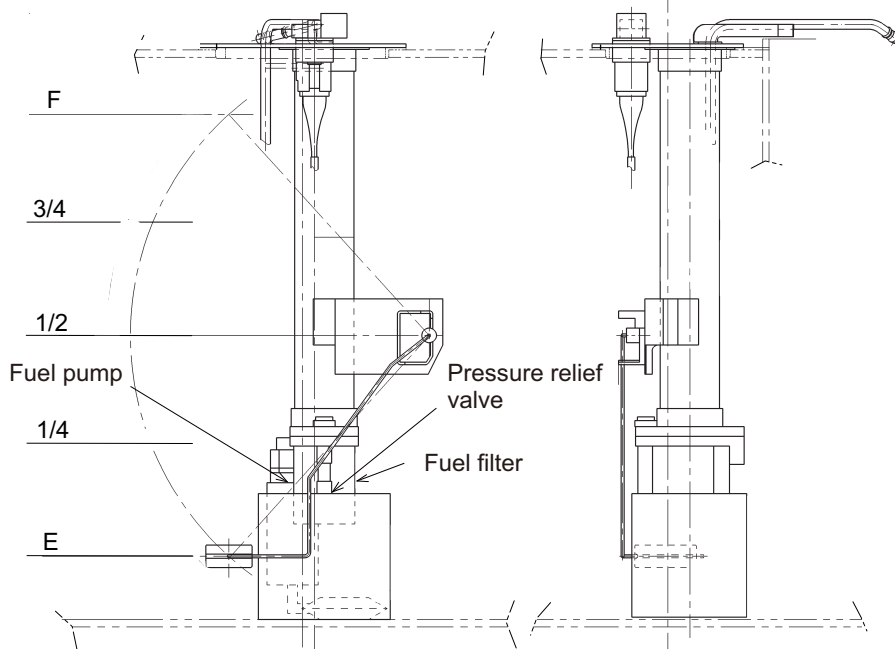
(Gasoline and diesel trucks)

Note: The installed position is that of an actual truck as shown in the illustration.



213463

2.2.4 Tank unit



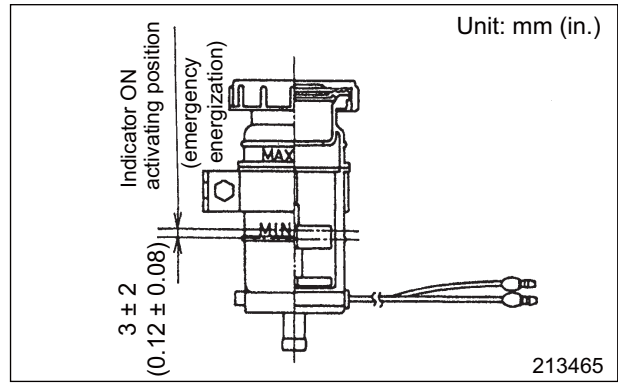
Referential Standards

Float position	E	1/4	1/2	3/4	F
Standard resistance value (ohm)	80	49.5	32	19	10
Tolerance (ohm)	+12 +2	—	±3	—	+1.0 -0.5

213464

2.2.5 Brake fluid sensor

Refer to the "Chapter 11 BRAKE SYSTEM."



2.2.6 Stop lamp switch

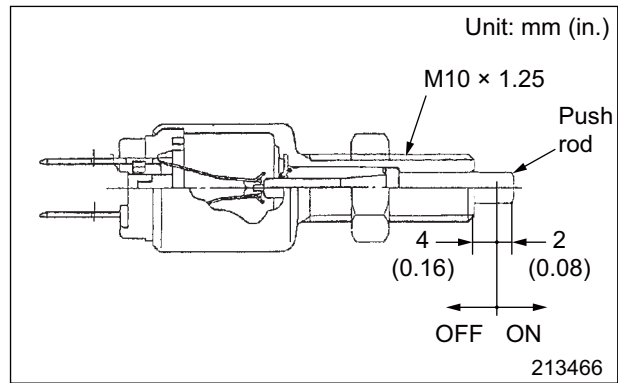
Connect a tester across the terminals and check that the lamps turn ON and OFF when the amount of the push rod extended projection is within the specified value.

Measure the insulation resistance value across the terminals when the push rod is pushed in.

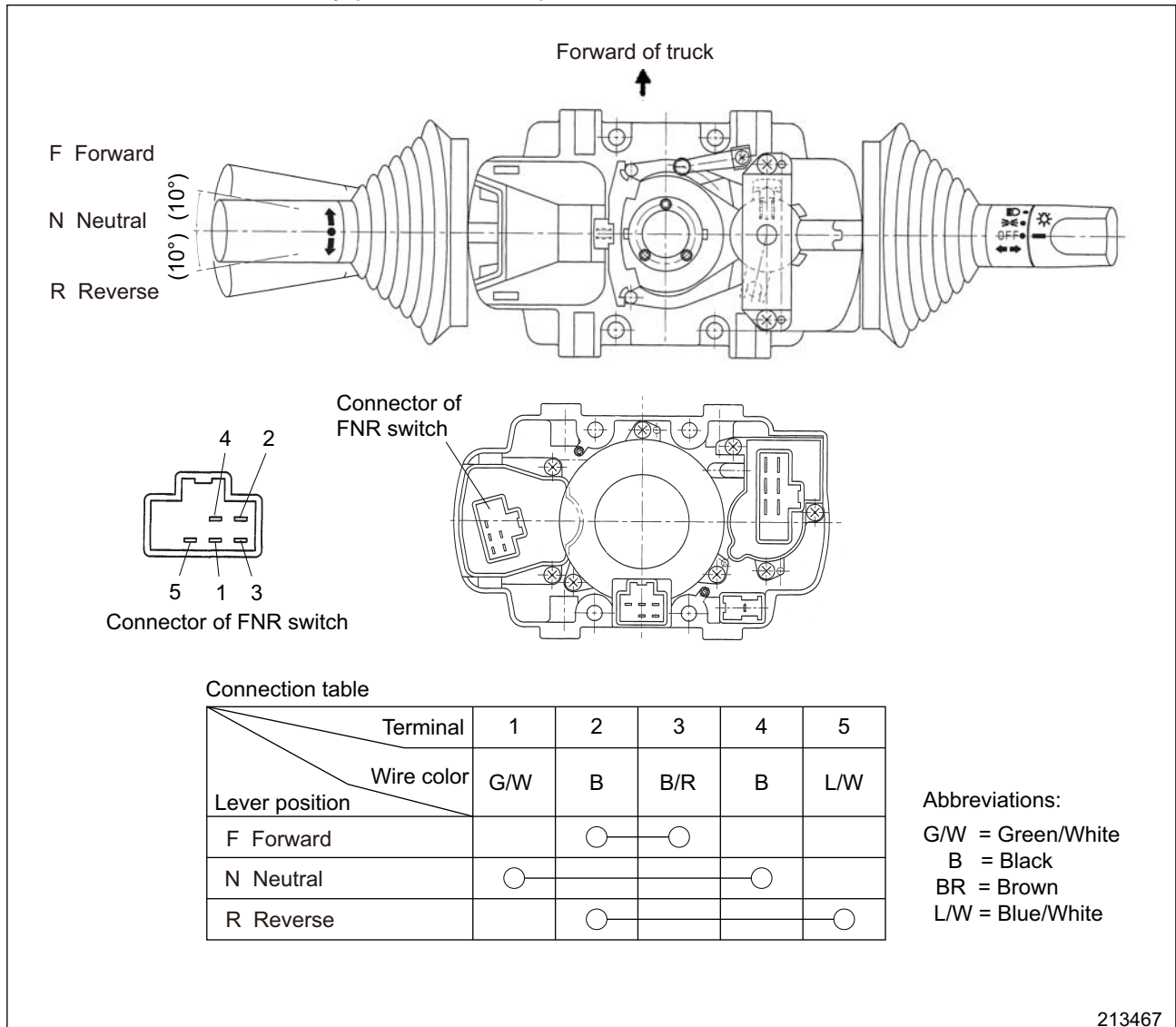
Replace the switch if the measured insulation resistance value is less than the value listed below.

Insulation resistance value	1 M ohm or more (with megger tester at 500V)
-----------------------------	---

Rated voltage DC12V



2.2.7 Direction lever assembly (Powershift truck)



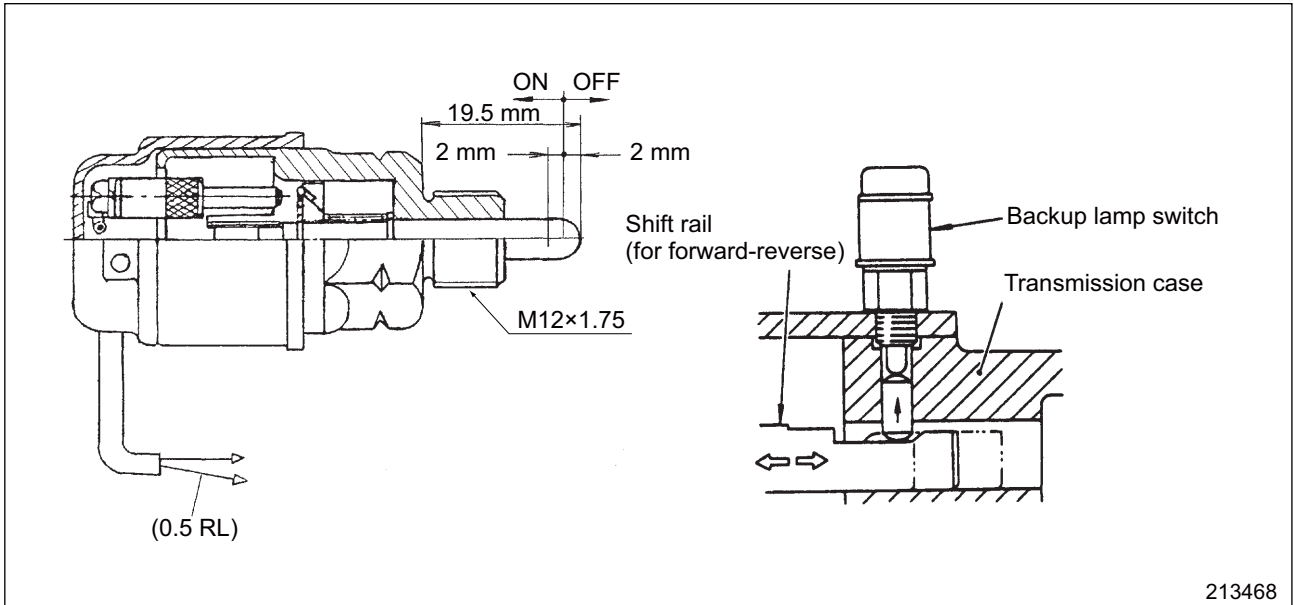
Note: The error code "F-16" is displayed if the direction lever is held between "F" and "N" or "R" and "N" over 1.8 seconds. In this case, the error is reset by turning the direction lever to the NEUTRAL position.

If the error still do not reset stop the truck.

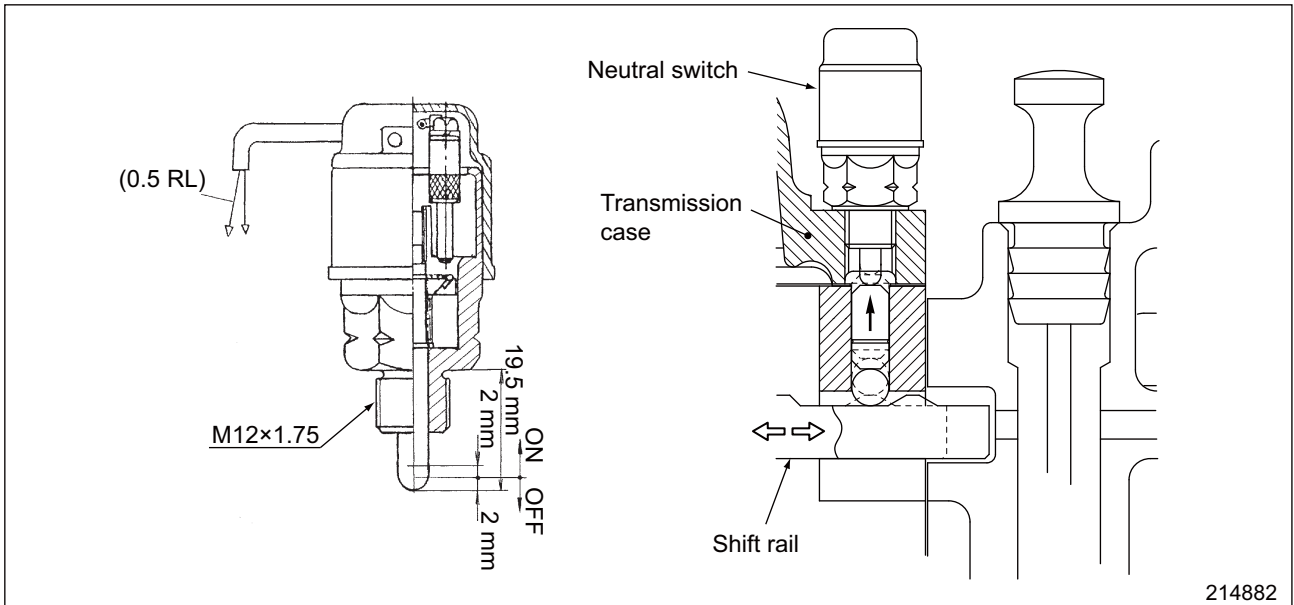
Turn the starter switch to [OFF] position, then start the truck.

For more details, refer to Chapter 4 CONTROLS, "10. Error Codes and Troubleshootings."

2.2.8 Backup lamp switch (Manual T/M truck)



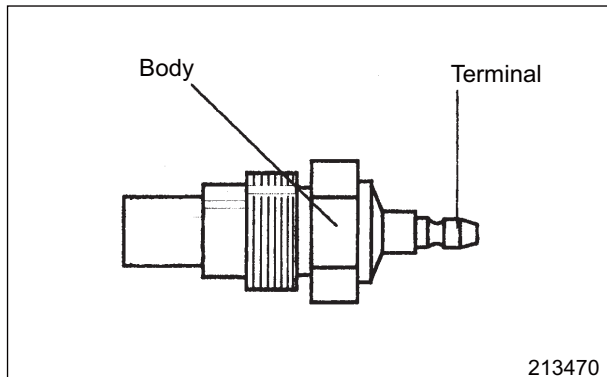
2.2.9 Neutral switch



2.2.10 Thermoswitch (Engine cooling water temperature)

- (1) Apply an ohmmeter between the terminal and body of the sender unit and check for continuity (resistance value).
- (2) Replace the sender unit if there is no continuity or the measured resistance value is outside the standard resistance value.

Note: The illustration is for a gasoline-engine truck.



Gasoline-engine truck

Temperature °C (°F)	60 ± 0.2 (140 ± 32.36)	65 ± 0.2 (149 ± 32.36)	80 ± 0.2 (176 ± 32.36)	100 ± 0.3 (212 ± 32.54)	125 ± 0.3 (257 ± 32.54)	130 ± 0.3 (266 ± 32.54)
Standard resistance value (ohm)	80 ± 10	67 ± 7.8	40.6 ± 2.7	22.2 ± 1.4	11.3 ± 0.4	10 ± 0.3

Diesel-engine truck

Temperature °C (°F)	50 ± 0.2 (122 ± 32.36)	60 ± 0.2 (140 ± 32.36)	80 ± 0.2 (176 ± 32.36)	100 ± 0.3 (212 ± 32.54)	105 ± 0.3 (221 ± 32.54)	120 ± 0.3 (248 ± 32.54)
Standard resistance value (ohm)	80 ± 10	56.3 ± 5	29.5 ± 2.5	16.5 ± 0.8	14.3 ± 0.5	10 ± 0.3

2.2.11 Thermoswitch (T/C oil)

Apply an ohmmeter between the terminal and body and check for continuity (resistance value). Replace the switch if the measured insulation resistance value is less than the value shown below.

Insulation resistance value	1 M ohm or more (with contact point OFF) (with megger tester at 500V)
-----------------------------	---

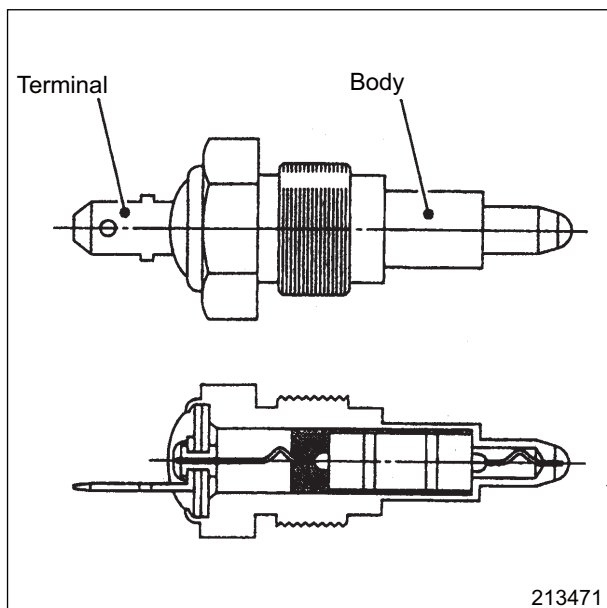
Internal resistance: 0.5 ohm or less (with contact point ON)

Allowable load: 0.5 A

Note: When installing the thermostatic switch, tighten it to the specified torque.

Unit: N·m (kgf·m) [lbf·ft]

Tightening torque	31.4 to 47.1 (3.2 to 4.8) [23.2 to 34.7]
-------------------	--



Technical data		
Operating temperature	OFF to ON	122 ± 3°C (251 ± 5.4°F)
	ON to OFF	115 °C (239°F) or higher
Insulation resistance (with contact point OFF)		1 M ohm or more

CAUTION

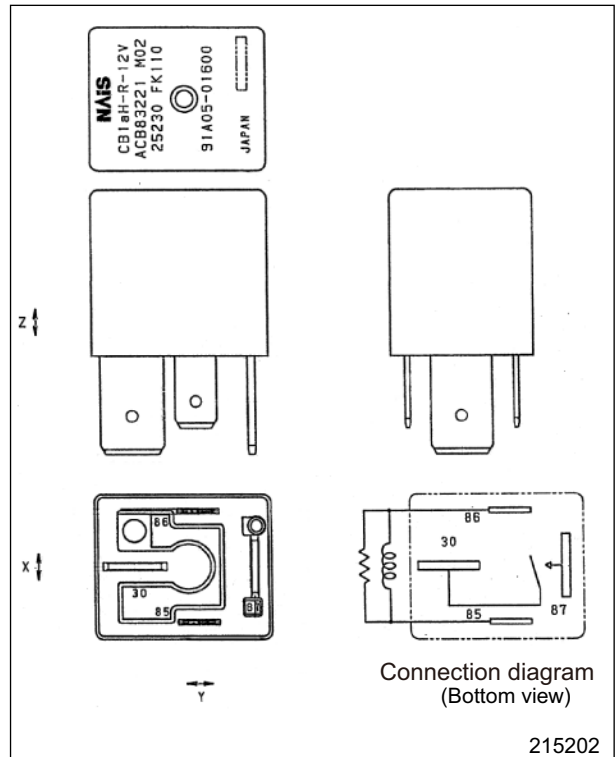
Replace the thermostatic switch if it is dropped or abused.

2.2.12 Power relay (for backup lamps of powershift T/M truck)

(1) CB relay

Coil rating (at 20 °C (68 °F))

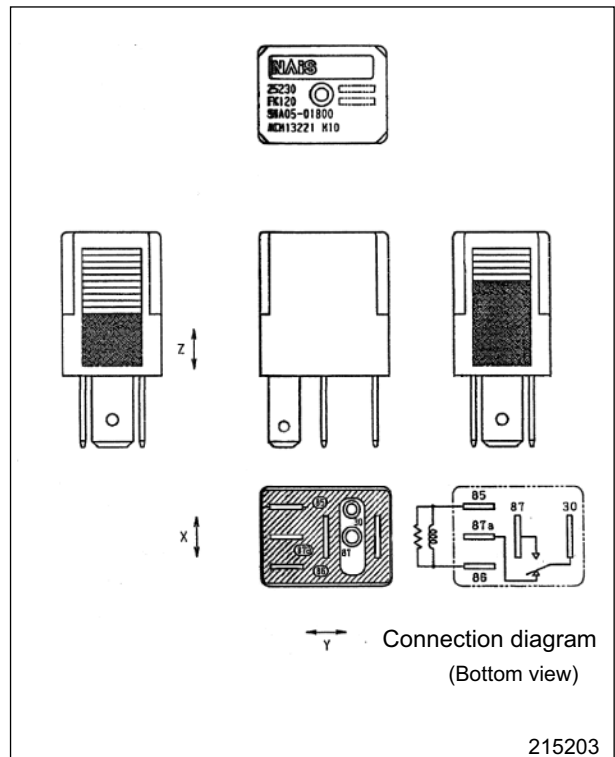
Items	Truck type
	Gasoline and diesel engine lift trucks
Rated operating voltage	DC12V
Working voltage	DC3.0 to 7.0 V
Open-circuit voltage	DC1.2 to 3.9 V
Coil resistance	80 ohm ±10%
Rated exciting current	168mA±10%



(2) CM relay

Coil rating (at 20 °C (68 °F))

Items	Truck type
	Gasoline and diesel engine lift trucks
Rated operating voltage	DC12V
Working voltage	DC 3.0 to 7 V
Open-circuit voltage	DC 0.5 to 3.1 V
Coil resistance	120 ohm ±10%
Rated exciting current	117.6 mA±10%



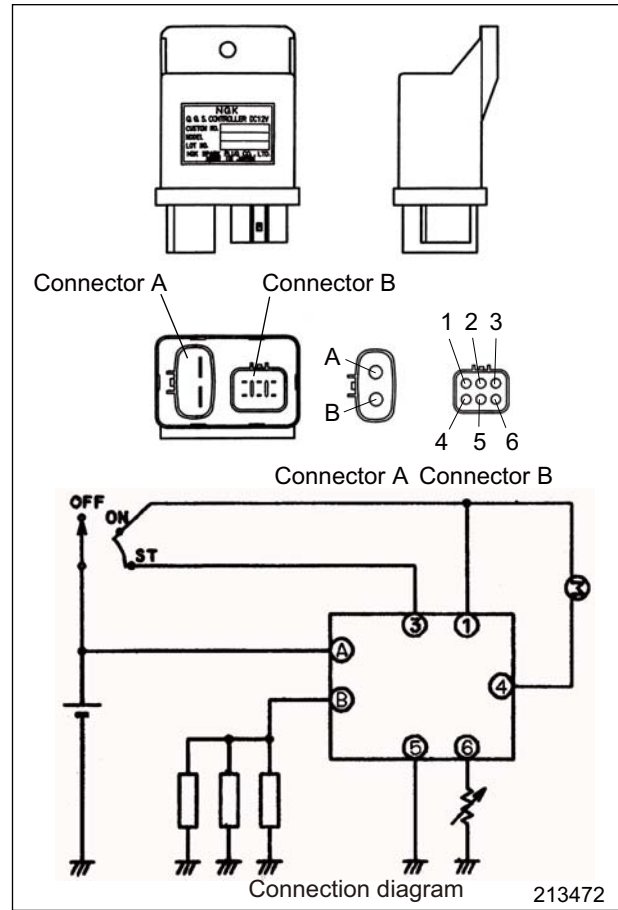
2.2.13 QGS controller (Diesel truck)

When the starter key switch turns from OFF to ON, the QGS controller turns the glow lamp and glow plugs to ON during the time period shown below.

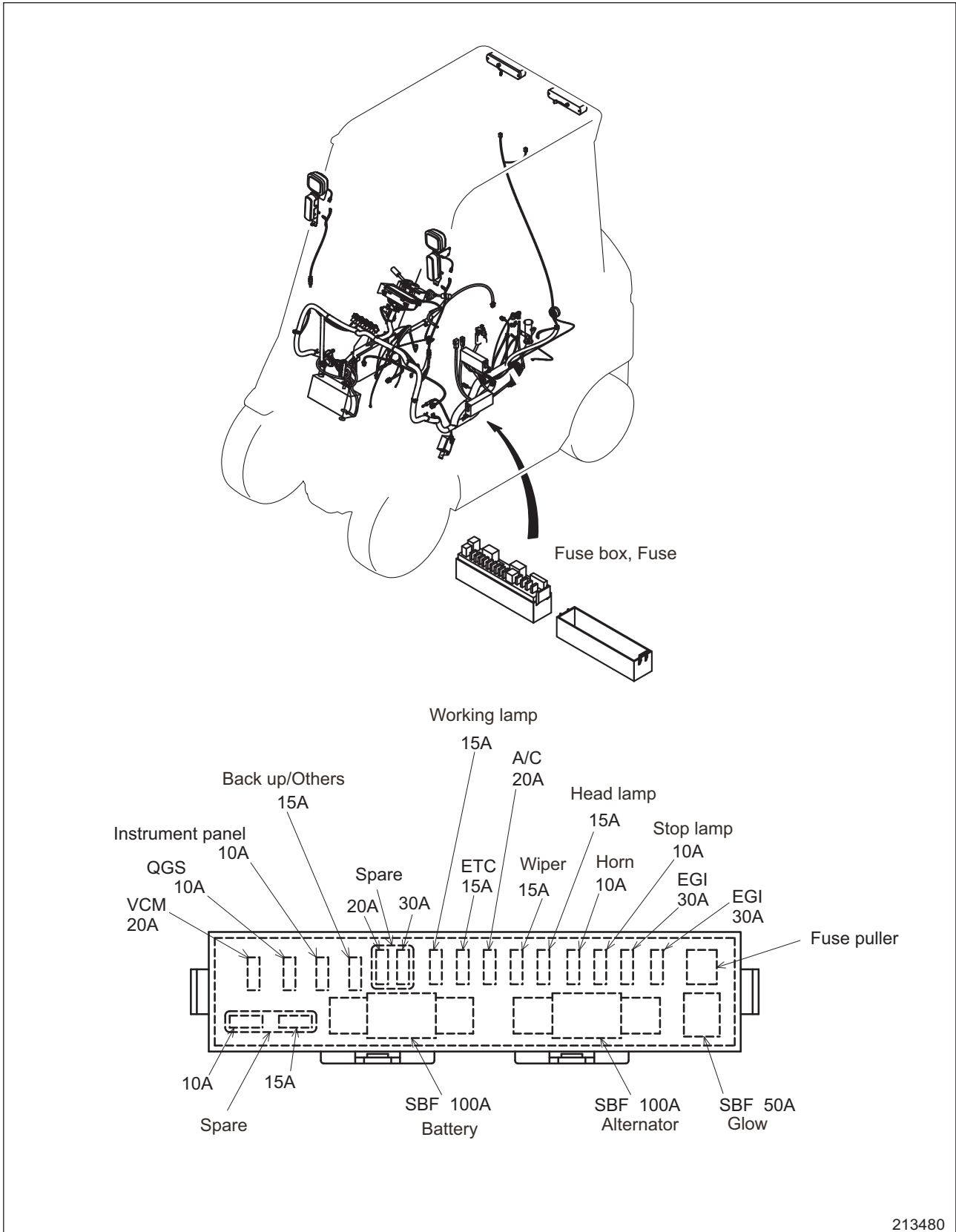
When the key switch is turned to the START position, glow lamp and glow plugs are also turned ON.

Items	Water temperature (Resistance value)	ON time
Glow lamp Glow plug	-15°C(5°F) (12.1 K ohm)	10.0 ± 2.0 sec.
	0°C (5.9 K ohm)	6.4 ± 1.3 sec.
	+10°C(50°F) (3.8 K ohm)	3.0 ± 0.6 sec.

Rated voltage: DC12V

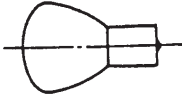
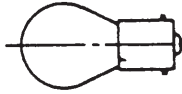

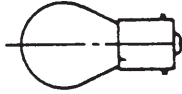
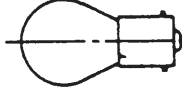



2.2.14 Fuse box



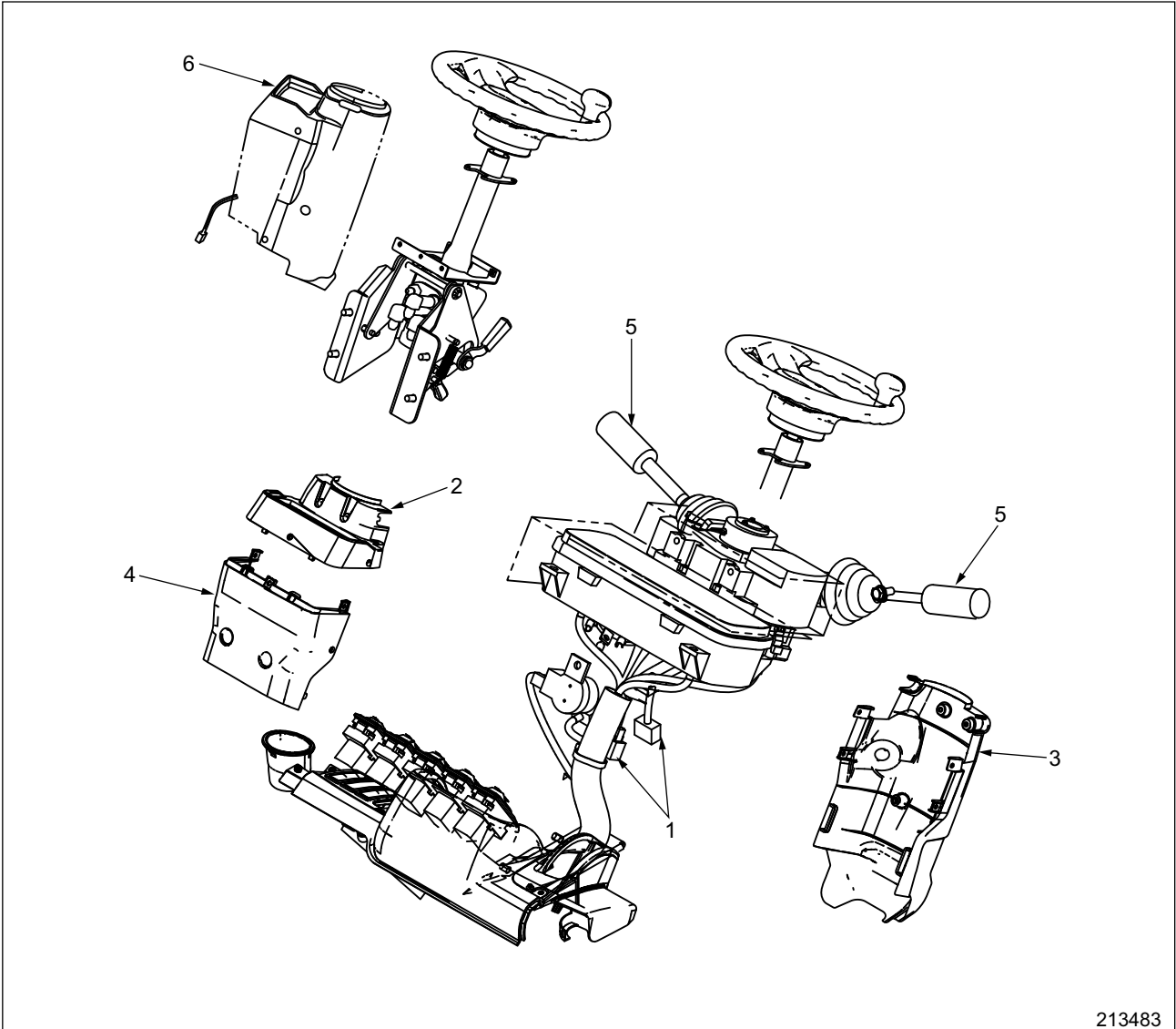
213480

2.3 Table of Lamps

Items		Quantity	Lens color	Valve	Remark	
				Illustration		
Type of lamp	Head lamps	2	Colorless		Standard	
	Combination Lamp (front)	Turn signal lamp	2	Amber		Standard (Installed on the Head guard)
		Clearance lamp	2	Colorless		
	Combination Lamp (rear)	Turn signal lamp	2	Amber		Standard
		Tail and Stop lamps	2	Red		Standard
		Backup lamps	2	Colorless		

3. Console Box

3.1 Disassembly



213483

3.1.1 Start by

Place the key switch to the OFF position, and remove the cable from the ground side of the battery.

3.1.2 Removal sequence

- (1) Disconnect the electrical wiring from connector 1.
- (2) Remove the screw using a Phillips screwdriver and remove cover 2.
- (3) Remove the screw and then, remove cover (U-Re) 3.
- (4) Remove the screw and then, remove cover (U-Fr) 4.
- (5) Remove direction lever (FNR lever), turn signal lever 5.
- (6) Remove the bolt and then, remove console box assembly 6.

3.1.3 Installation

To install, follow the removal sequence in reverse.

4. Battery Maintenance

4.1 State of Charge and Electrolyte Specific Gravity (S.G.) Adjustment

Specific gravity reading at 20°C (68°F)	Condition	Adjustment
1.280 to 1.265	Good	If the difference in S.G. between any two cells is 0.020 or less, continue to use as is. If the difference is more than 0.020, discharge the battery in an efficient manner. If the battery recovers, charge the battery to adjust the electrolyte S.G.
1.260 to 1.225	Half charged	Recharge battery to adjust electrolyte S.G. Check for any short-circuited cables or corroded cable connections in the electrical system.
1.220 or less	Battery low (caution required)	Recharge battery. If the difference in S.G. is too much, charge the battery to adjust the electrolyte S.G.
If the difference in S.G. is more than 0.040.	A cell with a low S.G. may cause a short circuit. It is caused when electrolyte leaks or electrolyte rate is too high or too low.	Recharge the battery until its voltage and S.G. stabilize and remain constant for more than 2 hours. Charge the battery to adjust the electrolyte S.G. It should read between 1.280 and 1.265. If the difference in S.G. is more than 0.040 and a low S.G. is found in any of the cells, replace the battery with a new one. Conduct a high current discharge test after leaving the battery for 12 to 96 hours.

4.2 Specific Gravity Reading and State of Charge

Fully charged condition can be verified by the electrolyte S.G. (1.280 to 1.265), and also the reduction speed of electrolyte implies the battery condition. If the electrolyte in the battery cell decreases to the level where the pole plates are exposed within one month, it may be overcharged. If the electrolyte amount remains sufficient for more than three months, the battery may discharge.

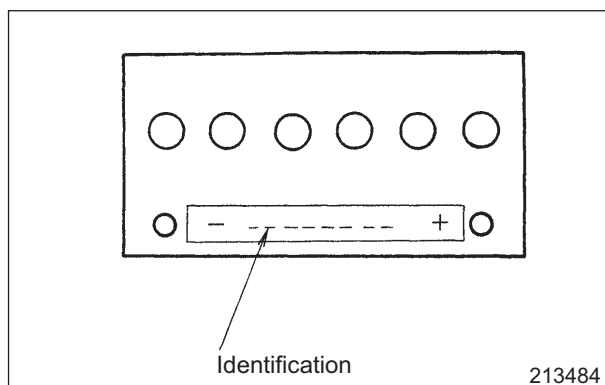
4.3 Charging Precautions

- (1) In slow charging, the charging current should be about 1/10 the capacity of the battery being charged.
- (2) In quick charging, the battery capacity in ampere should not be exceeded.
- (3) During charging, adjust the charging current so that the electrolyte temperature does not exceed 45°C (113°F).
- (4) When connecting cables to battery terminals, always connect the (+) terminal first, and when disconnecting, remove the (-) terminal first.
- (5) During charging, hydrogen gas is generated, which requires attention to ventilation.



CAUTION

Be sure to turn OFF the key switch and lighting switch before disconnecting or connecting the battery cables (to prevent IC regulator from damage).



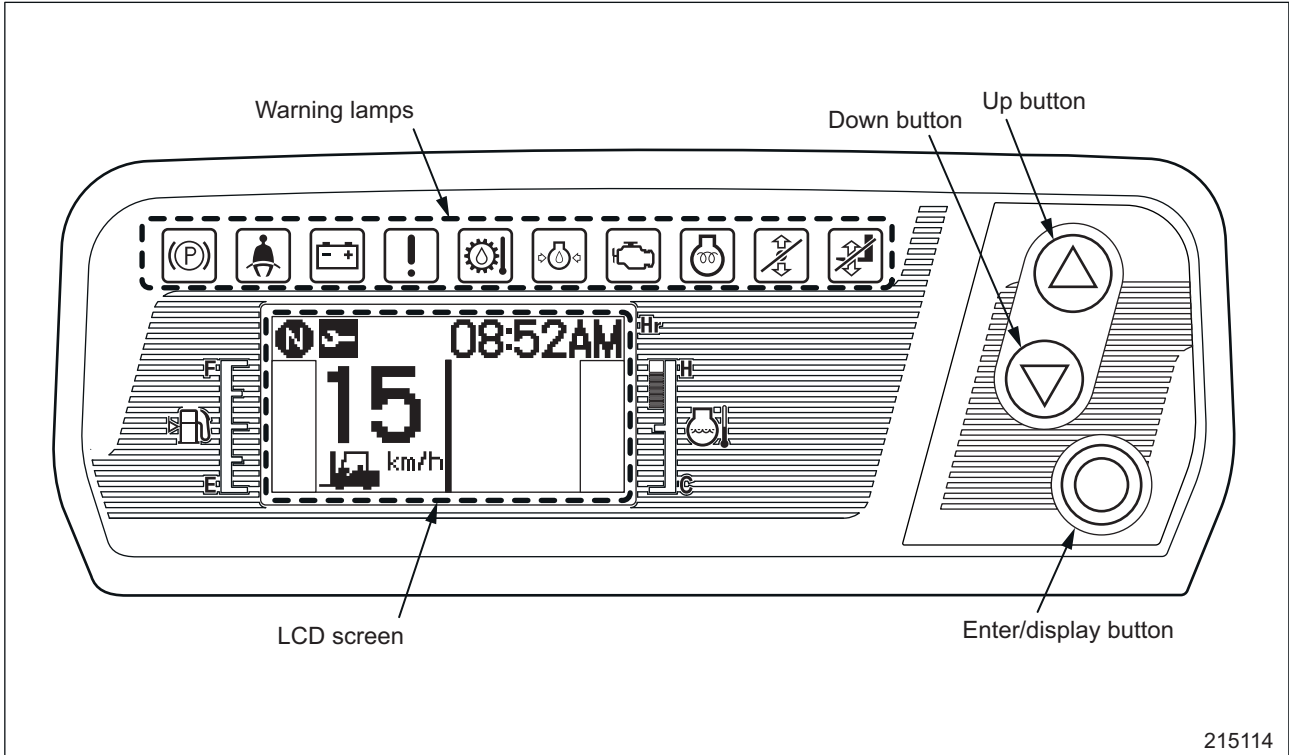
Identification

34B19L	(Gasoline-engine truck)
55D23L	
75D26L	(Diesel-engine truck)
95D31L	

5. Instrument Panel

5.1 Instrument Panel Screen Components

Instrument panel screen consists of warning lamps, LCD (Liquid Crystal Display) screen, and Δ and ∇ buttons, and enter/display button).



215114

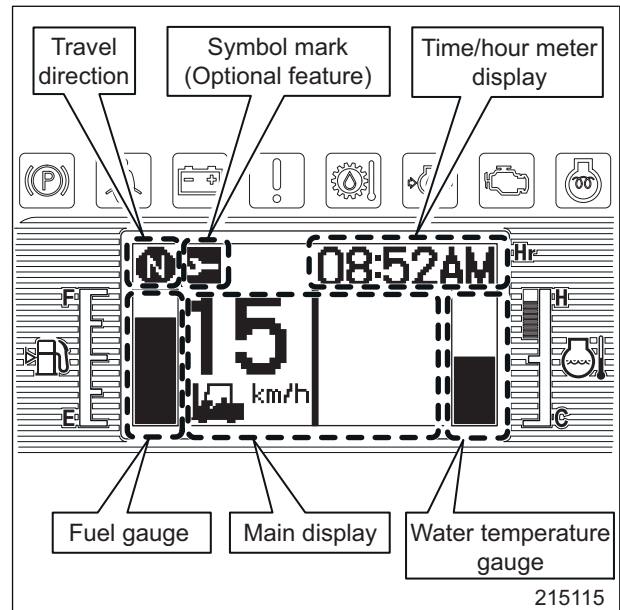
The LCD screen consists of main area, fuel gauge area, travel direction area, symbol mark area, hour meter area and water temperature gauge area. The main area is divided into two parts; right and left.

Note: The instrument panel has the following functions to protect circuits in the panel.

Instrument panel internal (ambient) temperature	-
85 °C (185 °F) or higher	Display on the LCD is automatically not displayed.
105 °C (221 °F) or higher	Back light is automatically turned to off.

Note: 1. Back-up light illuminates both the fuel mark and water temperature mark on the LCD from inside.

- Warnings will not automatically be turned off for safety reasons.
- When the temperature is extremely low [0 °C (32 °F) or below], the response of the LCD display is slower.



215115

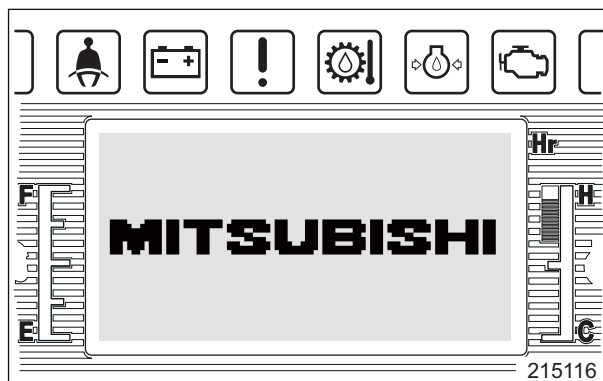
5.2 Basic Screen Display

5.2.1 LCD screen display with the key switch in the ON position

When the key switch is turned to the ON position, the LCD screen displays the brand logo screen, the password authentication screen, and the standard display screen in this order. Also, error history is displayed by pressing a button.

(1) Brand logo screen

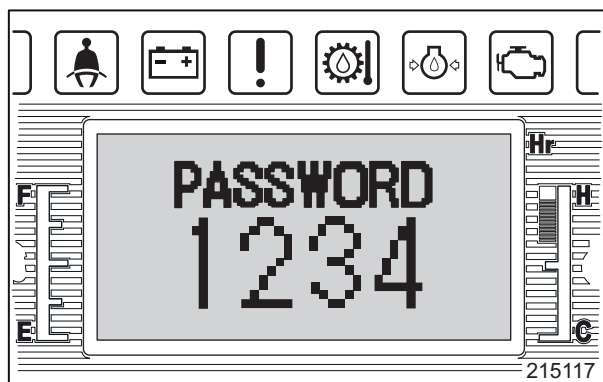
When the key switch is turned to the ON position, the brand logo screen will be displayed for 2 seconds while the lamps are being checked.



(2) Password authentication screen

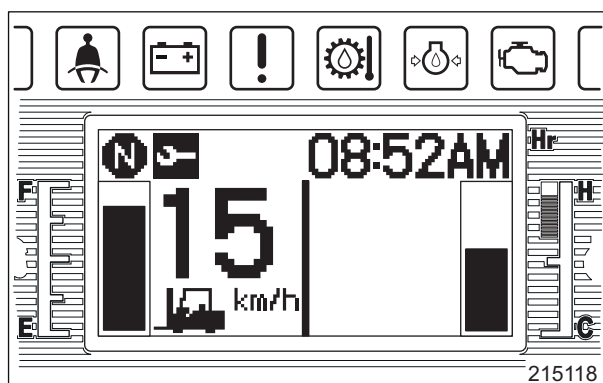
(Display by optional function)

Inputting the registered password in advance makes it possible to operate the lift truck.



(3) Standard display screen

The screen changes to the standard display screen that shows the conditions of the lift truck.



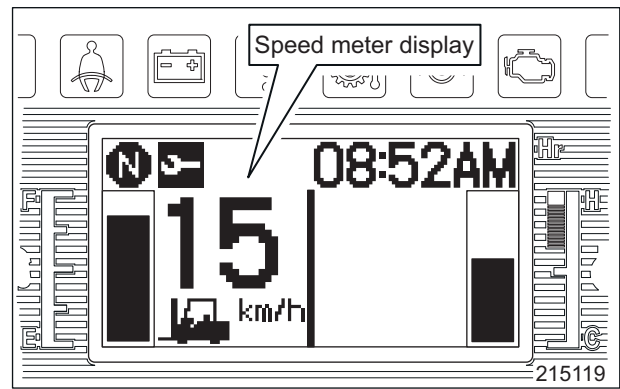
5.2.2 Speed meter display

Speed meter reads the current truck speed

Note:

Actual speed	Display
0.1 - 1.0 km/h	1 km/h
1.1 - 2.0 km/h	2 km/h
.	.
.	.
.	.
.	.
19.1 - 20.0 km/h	20 km/h

Speed meter display value is rounded to a higher number.



5.2.3 Fuel gauge

This gauge shows the remaining amount of fuel (gasoline or diesel fuel) just after the key switch is turned to the ON position. After that, the remaining amount is displayed for 2 minutes on average.

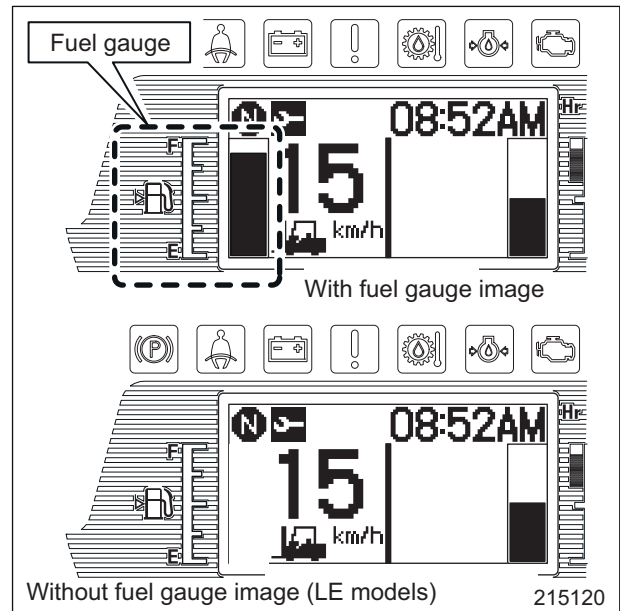
Note:

Remaining amount of E (Empty)

Truck model	Remaining amount
1.0 - 2.0C ton truck	5.0 liter (305.1 cu.in) or less
2.0 - 3.5 ton truck	7.5 liter (457.7 cu.in) or less

Note: 1. The LPG dual fuel truck shows the remaining amount of gasoline only.

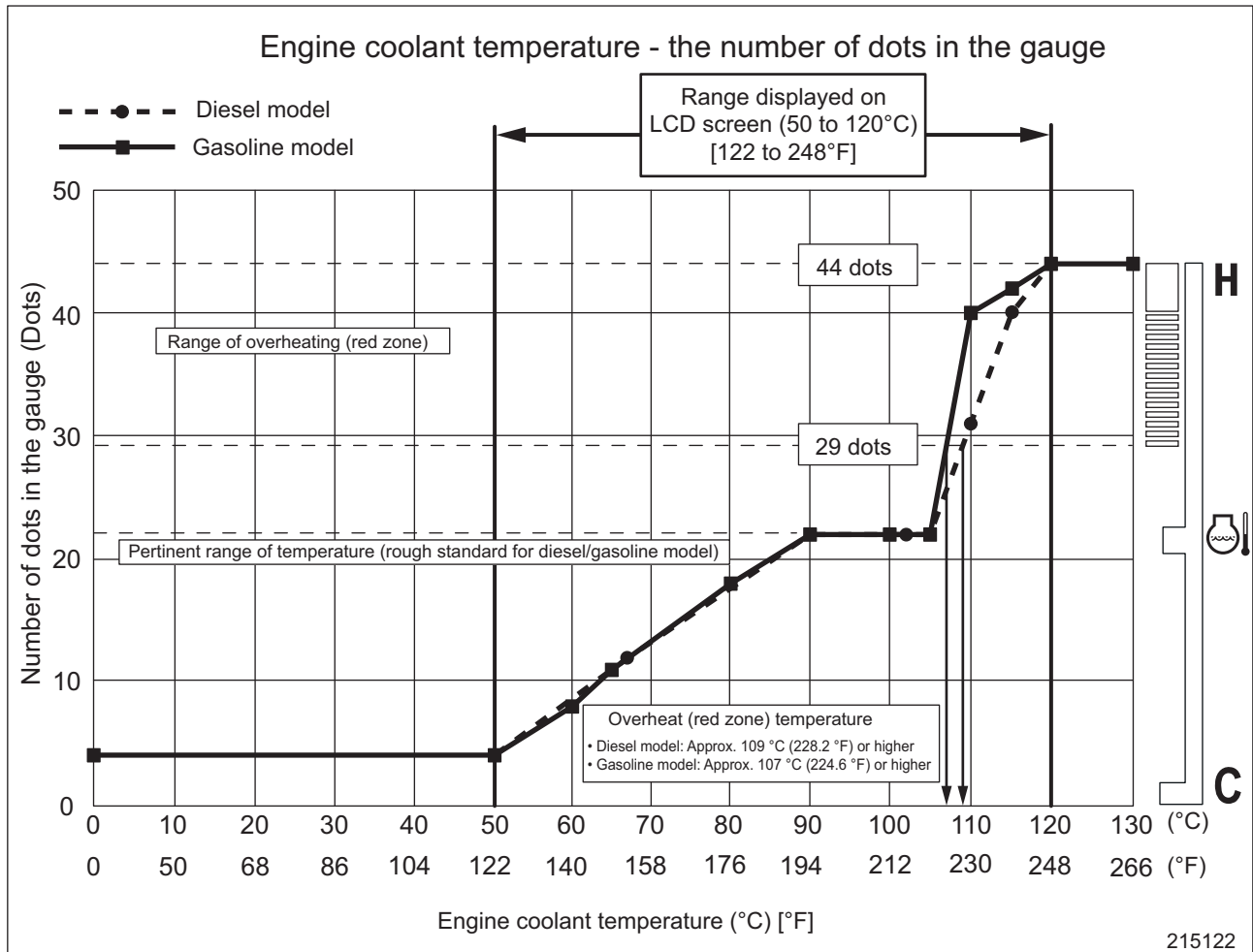
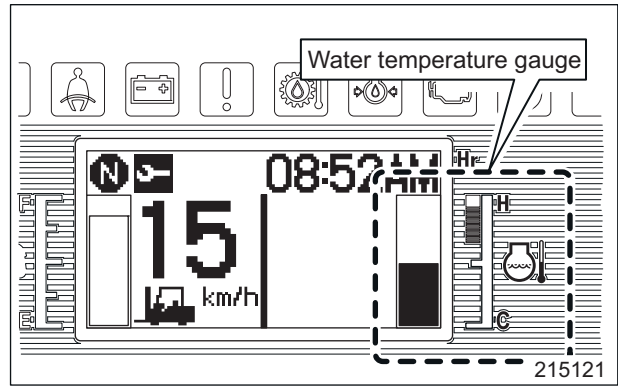
2. CNG truck will not show the fuel amount on LCD.



5.2.4 Water temperature display

Engine coolant temperature is displayed.

Note: The graph below shows the relation between engine cooling water temperature and water temperature displayed on the LCD.

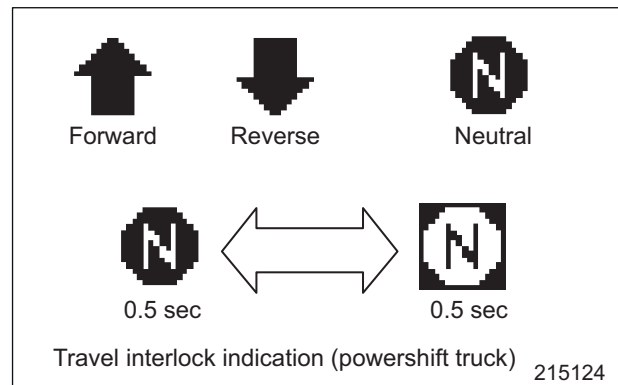
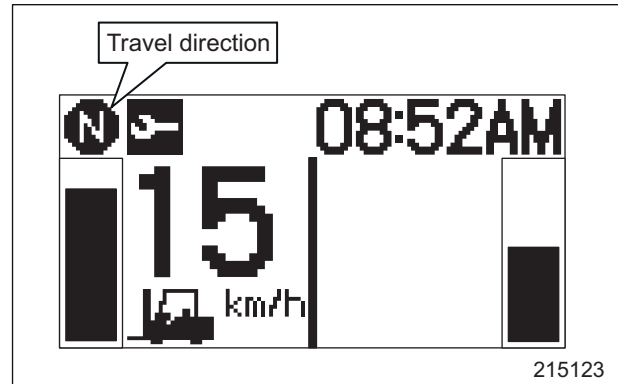


5.2.5 Direction display

This shows truck traveling direction. When starting the engine, if the direction lever is positioned to a place other than N (Neutral) position, symbol N blinks and the engine can not be started. In the powershift truck, if an operator leaves the seat while the engine is running and the direction lever is positioned to a place other than the N (Neutral) position, the symbol N blinks and the transmission is shifted to N (neutral).

Note: 1. Truck direction display is changed by direct lever signal.

2. Manual T/M truck shows N (neutral) only, and does not show forward and reverse. A blinking N (Driving interlock indication) is not shown.



5.3 Basic Operation

5.3.1 How to use operation buttons

There are three types of manual operation buttons: Δ button, ∇ button, and \bigcirc button, and they are located on the right side of the instrument panel. The operation of these three buttons varies with each display screen.

Button operation is available only when the key switch is in the ON position and not available when the engine is running. Note that adjustment of screen contrast and selection between the hour meter display and the time display are available even when the engine is running.

Short press of button:

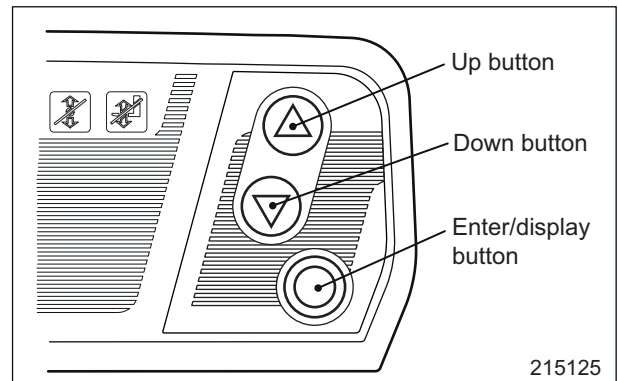
Press button for less than two seconds.

Long press of button:

Press button for more than two seconds.

Multiple button presses:

All buttons pressed at the same time for more than two seconds.



5.3.2 How to adjust the screen contrast

Turn the key switch to the ON position. Screen contrast can be adjusted while the engine is running.

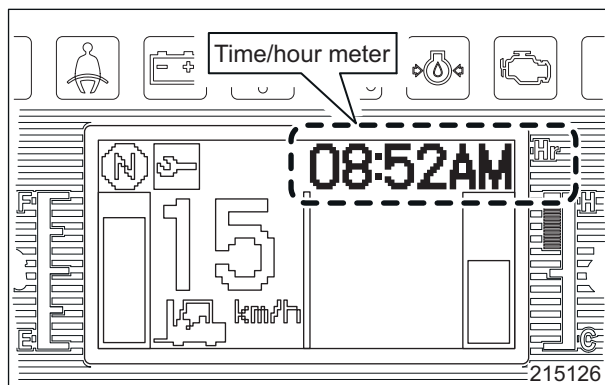
Button	Press	Display
△	Short	Light → Dark
▽		Dark → Light

Note: The screen becomes dark when the temperature inside the instrument panel (ambient temperature) is high, and the screen becomes light when the temperature is low.

5.3.3 How to display the clock time

Turn the key switch to the ON position. This operation is available while the engine is running. With a short press of ○ button, the display changes between the hour meter and the clock time.

Button	Press	Display
○	Short	Hour meter ↔ clock



5.3.4 How to change between 12 hour display and 24 hour display

With a long press of the △ button while the clock time is on display, the clock system changes alternately between 12 hour display and 24 hour display.

Button	Press	Display
△	Long	12 hour ↔ 24 hour

5.3.5 How to set up the clock time

- (1) Turn the key switch to the ON position.
- (2) Select clock time display (when the hour meter is being displayed).

Button	Press	Display
○	Short	Clock time (":" will blink)

- (3) Select time adjust mode and unit adjust mode.

Button	Press	Display
○	Long	Time unit adjust mode

- (4) Time unit adjustment

Button	Press	Display
△	Short	01→12 (1 hour at each press)
	Long	01→12 (continuous)
▽	Short	12→01 (1 hour at each press)
	Long	12→01 (continuous)
○	Short	After adjusting, change to minute adjust mode.

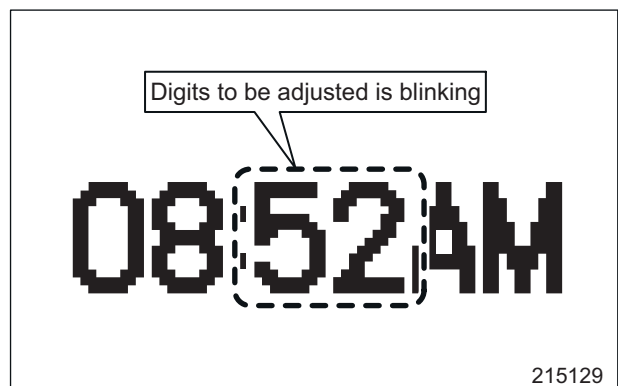
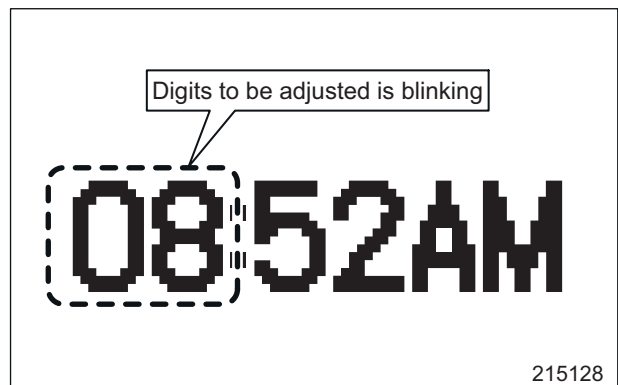
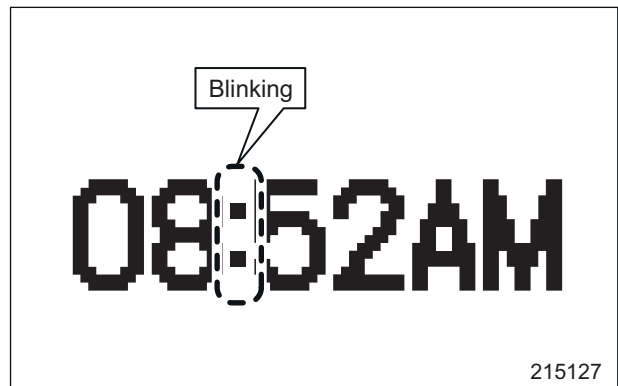
Note: Hour display shows 00:00 PM after 11:00 AM, and AM and PM are displayed in sequence.

- (5) Minute adjustment


Button	Press	Display
△	Short	01→59 (1 minute at each press)
	Long	00→59 (continuous)
▽	Short	59→00 (1 minute at each press)
	Long	59→00(continuous)
○	Short	After adjusting, change to the standard screen.


Note: 1. A second time scale is not available.

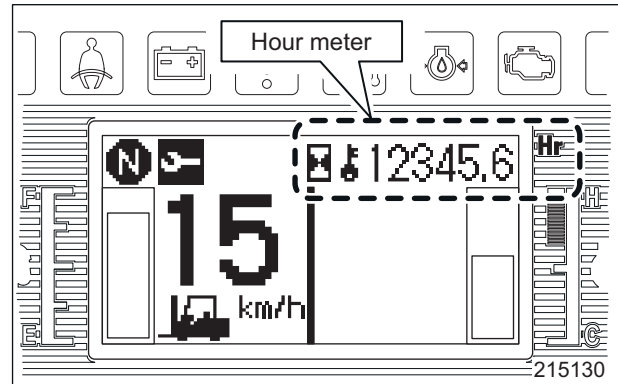
2. If elapsed time is 3 minutes or more after the last operation of button, the screen returns to the standard screen automatically.
3. Precision errors are one minute or less per month.
4. When the battery is changed, the time resets. Be sure to set the time after the battery change.
5. If the engine is started during setup procedure, the setting being conducted becomes invalid and the display returns to the standard screen.




5.3.6 How to display the hour meter


Turn the key switch to the ON position. This operation is available while the engine is running. With a short press of the  button, the display changes between the clock time and the hour meter.

Button	Press	Display
	Short	Clock ↔ hour meter



5.3.7 How to change types of hour meters

Turn the key switch to the ON position. There are three counters; key-on time, engine-on time, and seat switch-on time, and with a long press of the  button, the display changes.

Button	Press	Display
	Long	Key-on time ↓ Engine-on time ↓ Seat switch-on time

Key-on time:

Total hours of engine key-on time switch.

Engine-on time:

Total hours of engine running time

This is helpful in comparing the wear of engine related parts to the actual engine operation hours.

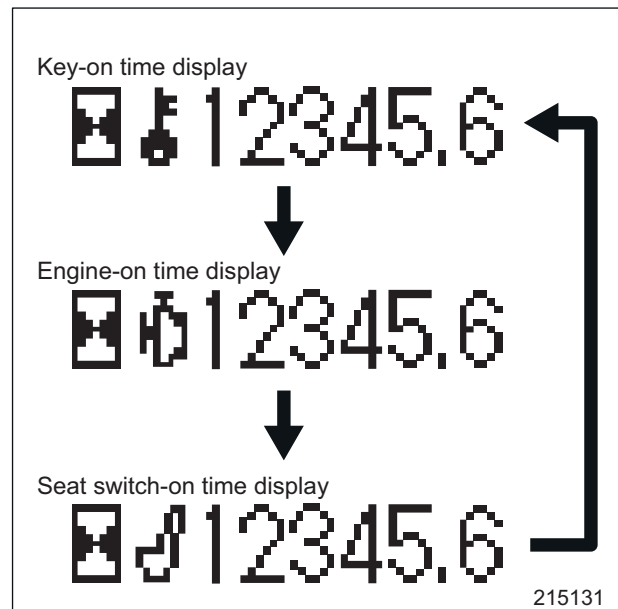
Seat switch-on time:

Total hours that the operator has been seated.

This is helpful in comparing the actual working hours to the actual hours of operation.

Note: 1. Previous model shows key-on time switch only.

- When six minutes have elapsed, 0.1 hour is added.
- Warranty period shall be based on the key-on time switch.
- The key-on time switch shall be used for entries in commercial paper (trading paper).



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5.3.8 How to display the error history

Turn the key switch to the ON position. A long press on the three buttons at the same time brings up the error history display.

Button	Press	Display
△ ▽ ○	Multiple	Error history

Error messages displayed are limited to F error codes only. Error codes are displayed from the latest error (▲-1) up to the past 32 errors (▲-32). Oldest data (error) exceeding the limit (32 errors) is automatically erased.

Note: The service tool is used to remove the error history.

The display order of error code can be changed with short press of △ or ▽ button.

Button	Press	Display
△	Short	Old → New
▽		New → Old

A long press on all buttons at the same time brings back to the standard display screen.

Button	Press	Display
△ ▽ ○	Multiple	Normal display screen

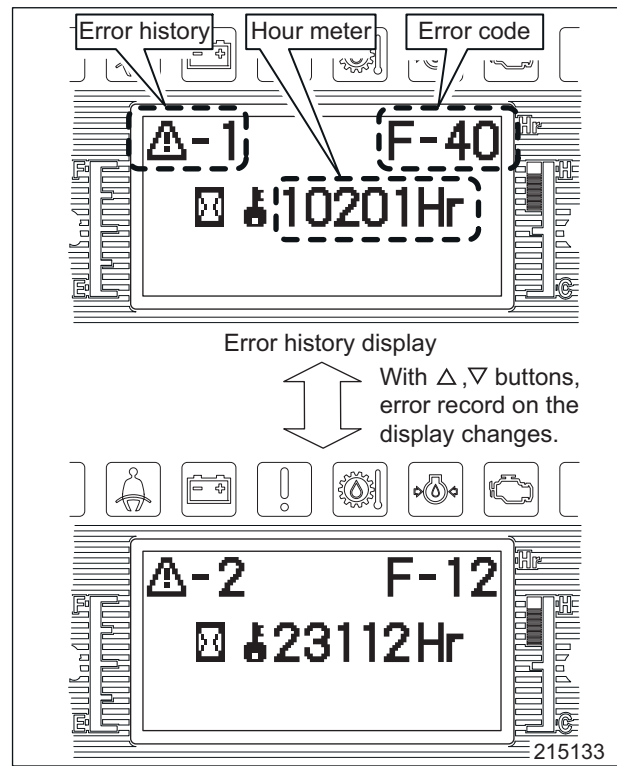
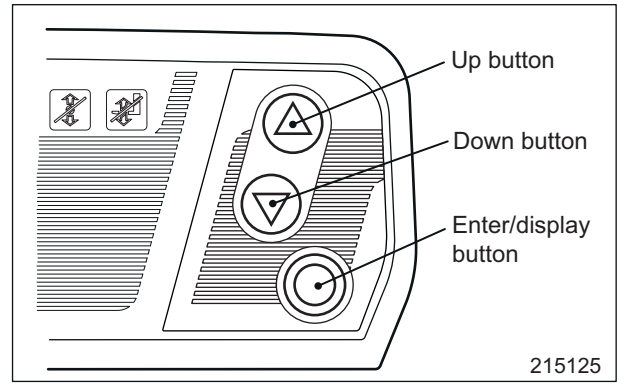
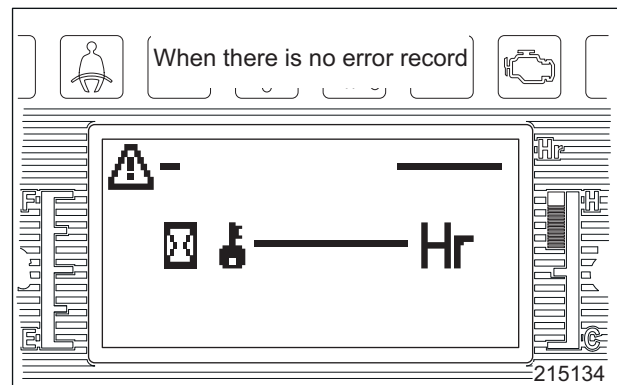


Figure shows the error history screen when there is no record of error.

Note: 1. If elapsed time is 3 minutes or more after the last button operation is performed, the screen returns to the standard screen automatically.

2. Starting the engine while using the error history display cancels the data and the display returns to the standard screen.



5.4 When An Error Occurs

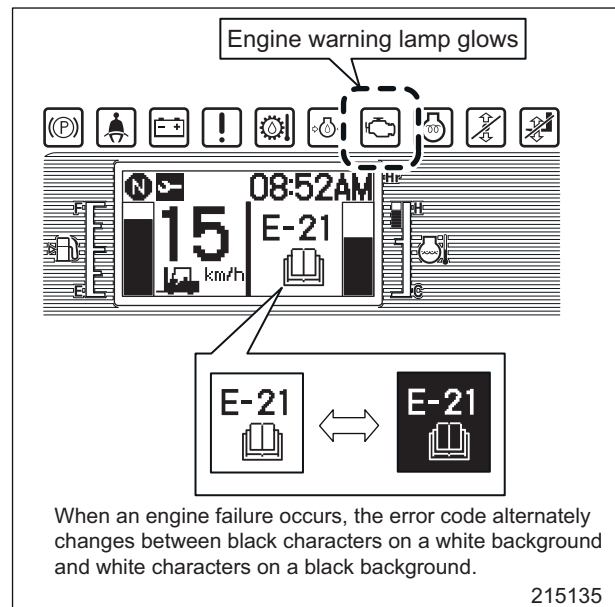
When an error occurs, the screen displays the corresponding error code. The error code will be erased by placing the key switch to the ON position after solving the cause of the trouble and then by turning the key switch to the OFF position. (The error code remains displayed on the screen until the cause of the trouble is removed.)

Refer to the engine service manual for the error codes relating to engine troubles (error codes from ECM).

The order of error display is; engine failures, serious failures and minor failures.

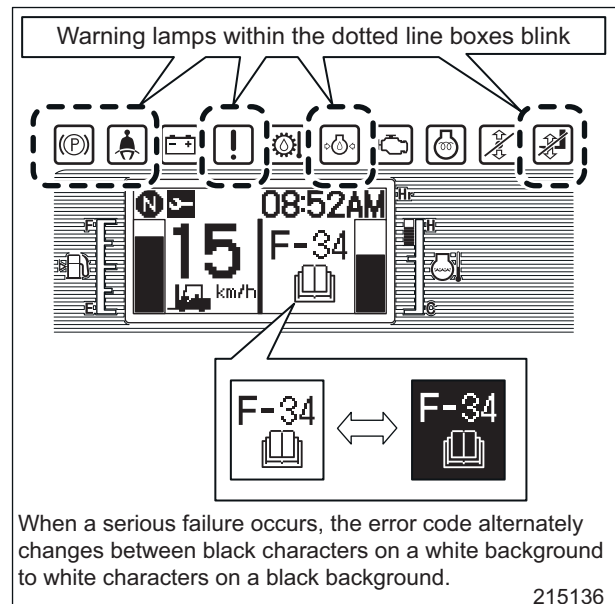
5.4.1 When an engine failure occurs

The corresponding error code is displayed in the main area, and the black and white in the error code display is reversed. Also the engine warning lamp glows.



5.4.2 When a serious failure occurs

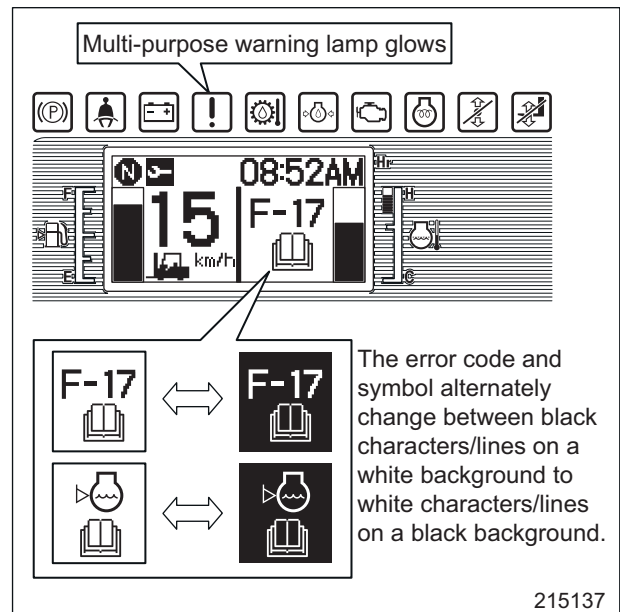
The corresponding error code is displayed in the main area, and the black and white in the error code display is reversed. Also all warning lamps shown in the figure (right) blinks.



5.4.3 When a minor failure occurs







The corresponding error code is displayed in the main area, and the black and white in the error code display is reversed. Also, the multi-purpose warning lamp glows.

Note: The minor failure indication is displayed in the event fuel gauge reaches the empty level (E).













5.4.4 Error symbols

Error symbols displayed in the main area are as follows:

Symbol	Name/Meaning	Indicated condition
	Brake fluid level warning lamp	When brake fluid level is low (option)
	Fuel filter drain warning lamp	When fuel filter needs to be drained (diesel model)
	Coolant level warning lamp	When coolant level is low (option)
	Clogged air cleaner element warning lamp	When air cleaner element is clogged (option)
	Low fuel level warning lamp	When fuel level is low (on E level) (On LPG/gasoline dual models, when gasoline level is low.)
	LPG level warning lamp	When LPG level is low (LPG models) (option)

5.5 Warning Lamps

The table below shows function of each warning lamp:

Lamp	Name	Color	Glow (blink) condition	Model applicable
	Parking brake warning lamp	Red	When parking brake is activated (glows)	All models (Standard)
	Seat belt warning lamp	Red	When seat belt is not fastened (glows)	All models (Standard)
	Battery charge warning lamp	Red	When charging system is not working properly (glows) (The lamp always glows when the engine is stopped.)	All models (Standard)
	Multi-purpose warning lamp	Red	When a minor failure occurs or operating cautions are being issued (glows)	All models (Standard)
	Torque converter fluid temperature warning lamp	Red	When torque converter fluid temperature is not normal (glows)	Powershift transmission models (Standard)
	Low oil pressure warning lamp	Red	When engine oil pressure is low (glows) (This lamp always glows when the engine is stopped.)	All models (Standard)
	Engine check lamp	Amber	When the engine is failed (glows)	Electronic gasoline engine models (Standard)
	Glow pilot lamp	Amber	When the glow plug is ON (glows)	Diesel models (Standard)
	Pro shift lamp	Amber	When protective function against sudden acceleration/ full reverse* is activated (glows)	Option
	Mast interlock lamp	Amber	When mast interlock is activated (glows)	All models (Standard)

*full reverse: sudden traveling direction change.

5.6 Optional Functions

The following optional functions are available; password authentication, service interval display, over speed warning, load meter display, over load warning, exterior alarm, smart shift display, and speed restrictions. Note that installation of special devices are required on the lift truck for load meter display, over load warning, exterior alarm and smart shift display.

5.6.1 Password authentication (Dealer option)

(1) Purpose and function

To prevent unauthorized personnel from driving the lift truck, the password can be registered. The lift truck cannot be operable unless a 4 digit password is correctly inputted. Note that this function is not available for manual lift trucks.

(2) Inputting a password

(a) Turn the key switch to the ON position. When the password input screen is displayed after the brand logo screen, enter the password.

(b) Password input procedure

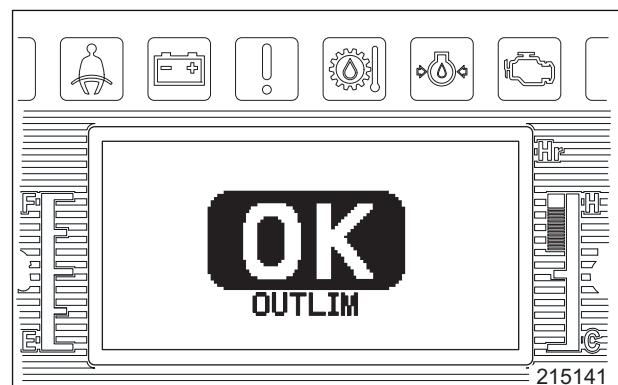
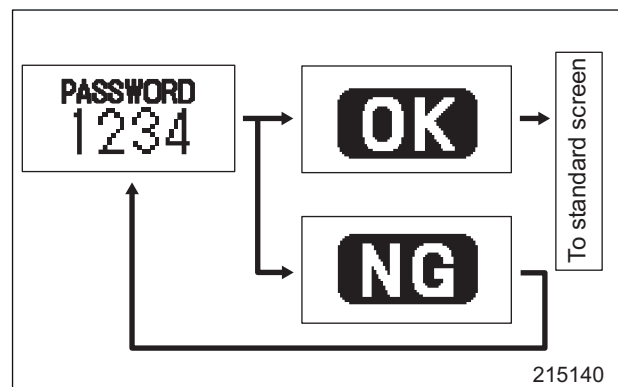
Button	Press	Display
△	Short	0 to 9, and "←", one at a time
	Long	0 to 9, and "←", incrementally
▽	Short	"←", 9 to 0, one at a time
	Long	"←", 0 to 9, incrementally
○	Short	Enter (to move to next digit)

Note: 1. To return the previous digit, use "←."

2. With one short pushing on the ○ button, the next digit is selected. After inputting a 4-digit number, press the ○ button to enter the password.
3. When the password is correctly inputted, an "OK" message is displayed. If not, an "NG" message is displayed. With an "NG" message, the engine can be started, but the lift truck will not move and the loading operation will not be available.

Note: 1. In case of an emergency or when the registered password is forgotten, enter "1111." The screen shown on the right will appear, and the minimized travel and loading operation will be available.

2. Password input is necessary for starting the operation, but if it is within 3 minutes after the key switch is turned to the OFF position, the user does not need to re-input the password.



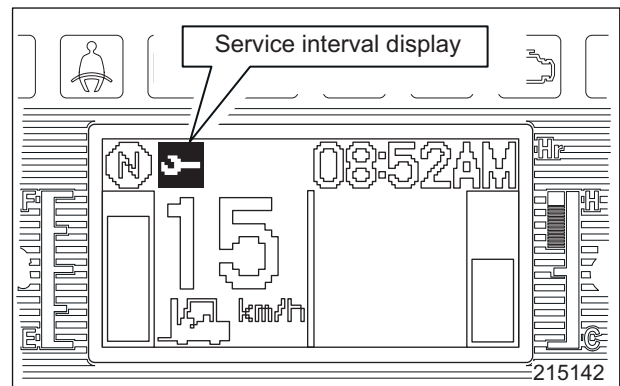
- (3) Password registration, change and cancellation
 Service tool is required for registration, change and cancellation of password.
 (For details, see the service tool manual.)

- Note: 1. Password registration, change and cancellation, should be performed by service personnel.
- 2. Password registration of "0000" or "1111" are not available. Register a different 4-digit password.
 - 3. Up to 32 different passwords can be registered to support different truck operations.

5.6.2 Service interval display (Dealer option)

Service interval display will notify an operator of the scheduled inspections and maintenance when the hour counter reaches to pre-set number of hours. Note that service interval symbol will not be displayed if this setup is not installed. Service tool is required to set up the service interval. (For details, see the service tool manual.)

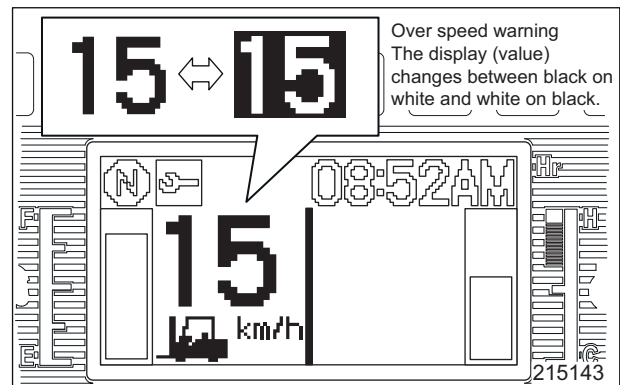
Note: ONLY service engineers should set up and perform the service interval display setting.



5.6.3 Over speed warning (Dealer option)

When the pre-set speed limit is exceeded, the image of the speedometer display in the LCD screen alternately changes between black characters on a white background and white characters on a black background. Also, a warning buzzer activates. Service tool is required to set up the over speed warning. (For details, see the service tool manual.)

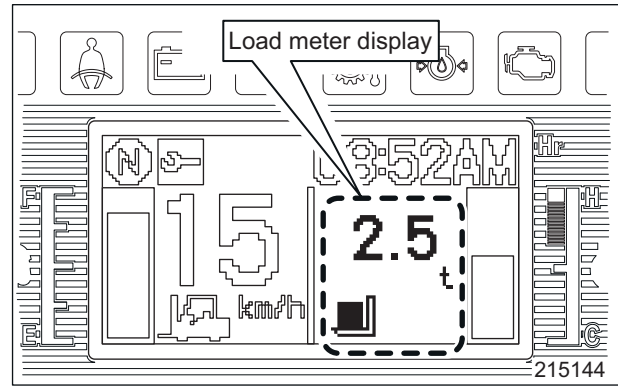
- Note: 1. ONLY service engineers should set up and perform the overspeed warning display setting.
- 2. The travel speed of lift truck is limited within the range of pre-set speed.
 - 3. Over speed warning can not be used for lift trucks used on public roads.
 Note that the buzzer setting only is available.



5.6.4 Load meter display (Maker option)

Loaded weight is detected and displayed. Service tool is required to set up the load weight display. (For details, see the service tool manual.)

Note: ONLY service engineers should set up and perform the load meter display setting.

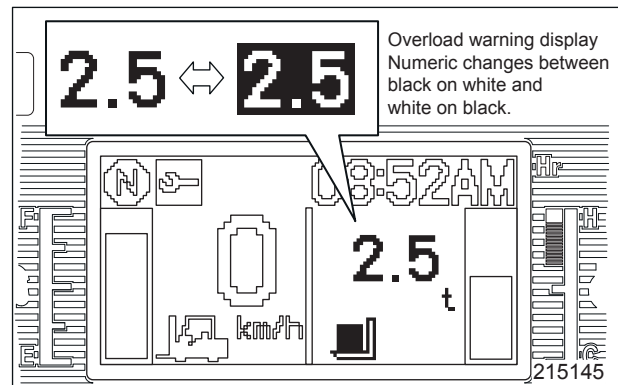


5.6.5 Overload warning display (Maker option)

When the pre-set load limit is exceeded, the image of the speedometer display in the LCD screen alternately changes between black characters on a white background and white characters on a black background. Also, a warning buzzer activates. Service tool is required to set up the overload warning. (For details, see the service tool manual.)

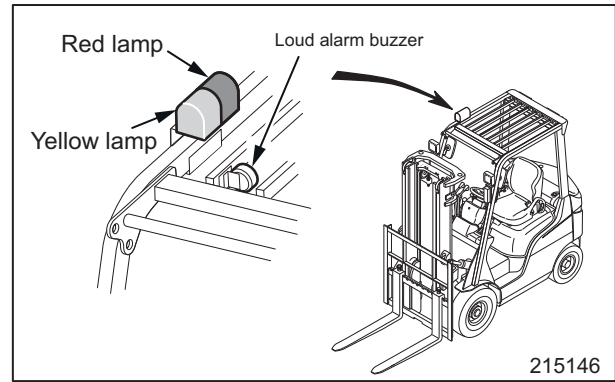
Note: 1. Only service engineers should set up and perform the overload warning display setting.

2. The setting of load meter display is required to use overload warning display.

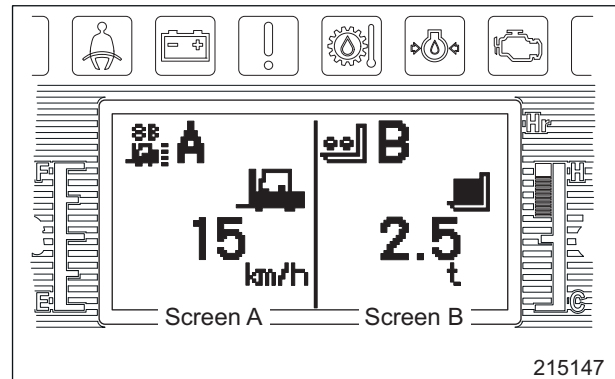


5.6.6 Exterior alarms (Maker option)

When the pre-set speed limit or overload limit is exceeded, the exterior lamps installed on the lift truck glow and/or alarm activates at full blast. Service tool is required to set up the exterior alarms. (For details, see the service tool manual.) Then set the truck speed and load using exterior alarm settings screen.



For exterior alarm setting, screens A and B are provided, screen A on the left side of the display and screen B on the right side. On screen A, the user can select one of three choices; speed, load or no setting. On screen B, the user can select one of the three choices; speed, load or no setting.



- Note:
1. Setting of screen A is reflected by yellow lamp. Also mega-volume warning buzzer activates.
 2. Setting of screen B is reflected by red lamp. Also mega-volume warning buzzer activates.
 3. Exterior alarm settings should be performed by service personnel.
 4. During setup procedure, a long press of the buttons at the same time brings up the standard screen.
 5. If elapsed time is 3 minutes or more after the last button operation is performed, the screen returns to the standard screen automatically.
 6. If the engine is started during setup, the setup being made is cancelled, and the display returns automatically to the standard screen.

Exterior alarm basic setup procedures:


- 1 Select exterior alarms screen. First, configure the speed or settings for screen A, and then move to the speed or load settings for screen B.
- 2 Set up a trigger load on screen A, three types of symbols (speed, load and no-setting) are displayed in turn with a press of the Δ or the ∇ button. When the target symbol is displayed, press the \bigcirc button for entry.
- 3 Next, using the Δ or the ∇ button, select speed value or load value that triggers the exterior alarm, and enter the value with the \bigcirc button.

(1) Trigger speed setup (on screen A for example)

(a) Select exterior alarms screen.

Button	Press	Display
Δ ∇	Long	Exterior alarm setting screen

(b) With a short press on the Δ or the ∇ button, select the speed symbol to bring up the speed value setup screen on screen A.

Button	Press	Display
Δ or ∇	Short	
\bigcirc	Short	Enter (execution)

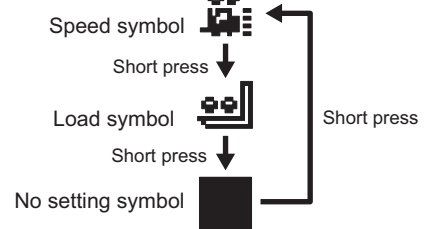
(c) Set up a trigger speed

Button	Press	Display
Δ	Short	0 to 50, one at a time
	Long	0 to 50, incrementally
∇	Short	50 to 0, one at a time
	Long	50 to 0, incrementally
\bigcirc	Short	Enter (execution)

Note: 1. The travel speed of lift truck is limited within the range of pre-set speed.

2. Trigger speed setup for exterior alarm function has no connection with the setting of over speed warning display.
3. Speed setup on screen B is also available.
4. Different set up on screen B is also available
5. Different load setup on screen A and B is also available.

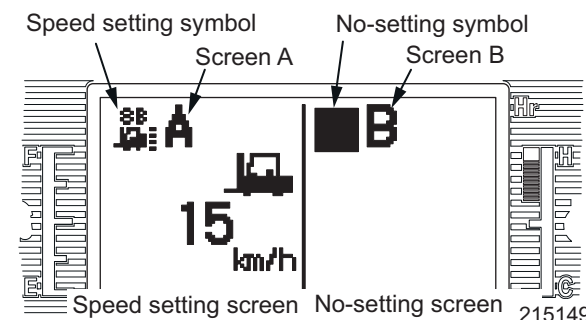
With a short press of Δ button, the symbol displayed changes in the following order:



With a short press of ∇ button, the symbol displayed changes in the reverse order of Δ button. Press \bigcirc button for entry.

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Screen A: Speed setting Screen B: No-setting



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(2) Trigger load value setup
(on screen B for example)

(a) With a short press on the Δ or the ∇ button, select the load value symbol to bring up the load value setup screen on screen B.

Button	Press	Display
Δ or ∇	Short	
\bigcirc	Short	Enter (execution)

(b) Set up a trigger load

Button	Press	Display
Δ	Short	0 to 50.0, 0.1 at a time
	Long	0 to 50.0, incrementally
∇	Short	50.0 to 0, 0.1 at a time
	Long	50.0 to 0, incrementally
\bigcirc	Short	Enter (execution)

After the setup of screen B is completed, the setup value is displayed for one second, and then the display returns to the standard screen.

Note: Trigger load setup for exterior alarm function has no connection with the setting of overload warning display.

(3) When speed or load value is not set up, select exterior alarm setup screen

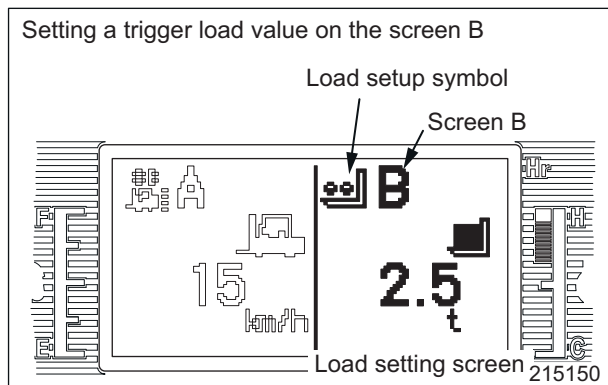
(a) Select exterior alarms screen.

Button	Press	Display
Δ ∇	Long	Exterior alarm setting screen

(b) With a short press on the Δ or the ∇ button, select the symbol for no setup.

Button	Press	Display
Δ or ∇	Short	
\bigcirc	Short	Enter (execution)

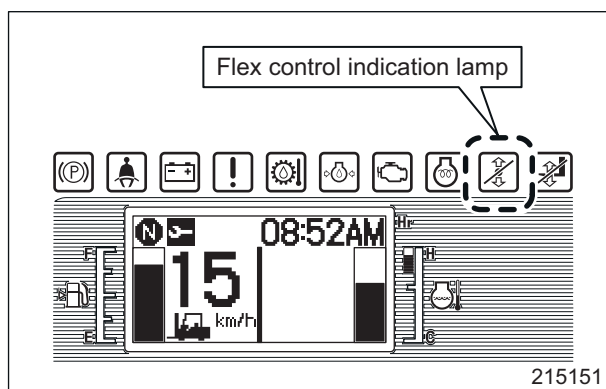
Note: When the exterior alarms are not used, select no set up on screen A and B.



5.6.7 Smart shift display (Maker option)

The smart shift display will notify an operator of the lift truck condition by the smart shift lamp glowing when a protective function activates against a full reverse or sudden acceleration. Service tool is required to setup the smart shift display. (For details, see the service tool manual.)

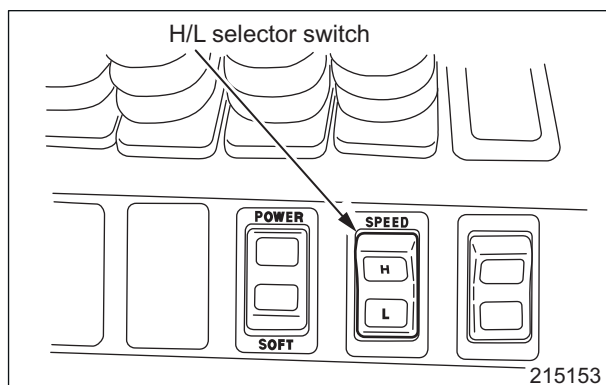
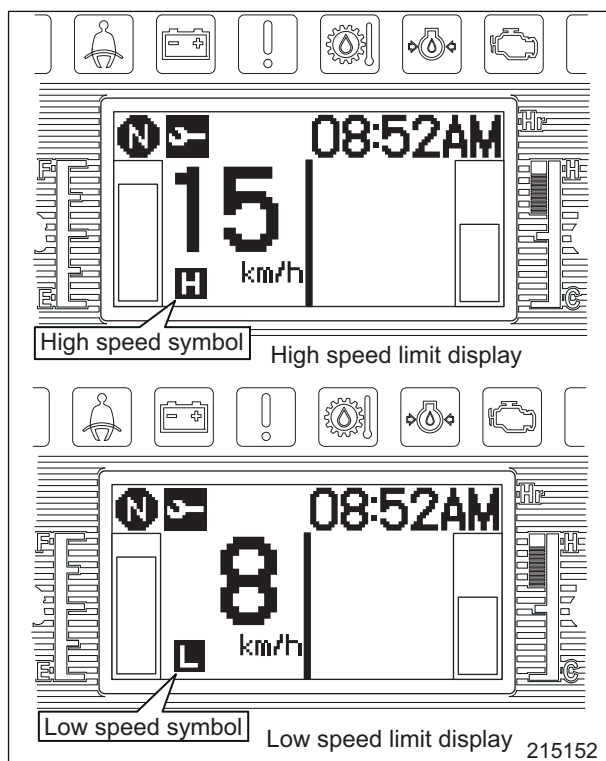
Note: ONLY service engineers should set up and perform the smart shift display setting.



5.6.8 Speed restriction (Maker option)

Speed restrictions that limits maximum speed (for both high and low speeds) can be pre-set. H/L selector switch is used to change between high and low speeds. Service tool is required to set up the speed limits. (For details, see the service tool manual.)

Note: Speed limit setting should be performed by service personnel.



5.7 Hour Meters

5.7.1 Hour meter reading system

Three on time hour meter readings are available on trucks equipped with the new instrument panel.

(For details, see 5.3.5 in this manual.)

- 1.Key-on time
- 2.Engine-on time
- 3.Seat switch-on time

- (1) Meter reading of key-on time 1 is controlled by both the instrument panel and the VCM. If a meter reading difference between them (key-on time) is detected, an error (F-73) occurs.
- (2) Meter reading of engine-on time 2 and seat switch-on time 3 are controlled by the instrument panel only.

5.7.2 Error (F-73) – Hour meter error

An error (F-73) occurs if there is a difference between the instrument panel and the VCM hour meter (Key-on time) readings. An error recovery procedure allows for the recovery from the said error, in which the smaller value is overwritten by the larger value to erase the difference between instrument panel and VCM. Service tool is required to update the hour meter. (For details, see the service tool manual.)

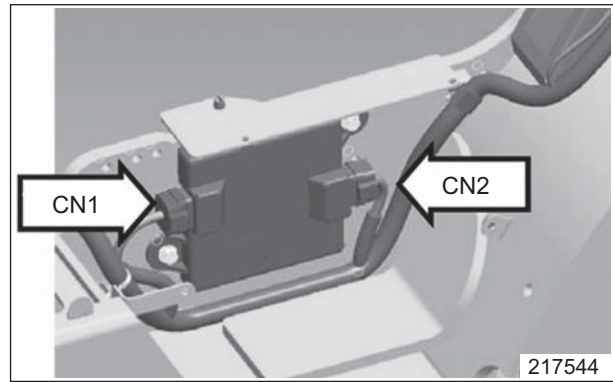
5.7.3 Applying specified grease to VCM connector

Apply the specified grease to the VCM connector (CN1, CN2) for waterproof property.

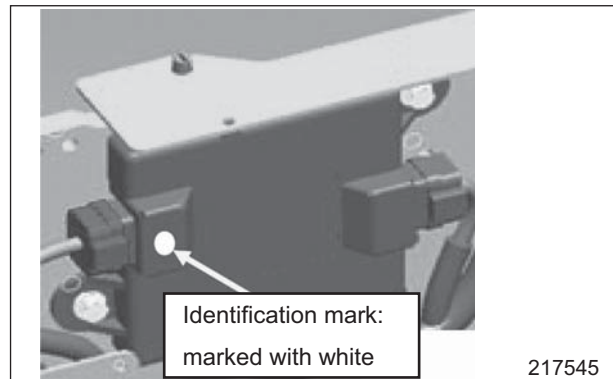
Parts name	Parts No.
GREASE KIT	91A93-08600

CAUTION

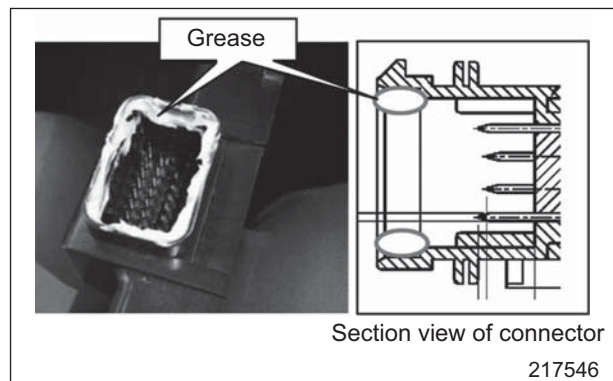
Do not apply other grease. Doing so may cause an electrical problem by corrosion



When the specified grease had been applied on the VCM, it is marked with white paint near the connector.



- (1) Wipe off the grease with a cloth when removing the connector.
- (2) Apply the grease as shown in the figure when attaching the connector. Bridge the groove of connector with about 1g grease.



5.7.4 Instrument panel and/or VCM replacement

When replacing the instrument panel or VCM, be sure to observe the instructions described below to transfer the hour meter data to the new instrument panel or VCM.

(1) Replacing instrument panel only

When the instrument panel is replaced, the error (F-73) occurs. In this case, simply cancel the error code using service tool to send the hour meter data (key-on time) stored in the VCM to the memory of the instrument panel. (For details, see the service tool manual In Chapter 4 in the "Service Tool Function section".) After the recovery procedure is finished, turn the key switch ON and OFF several times to make sure that the hour meter reading is the same as VCM, and that the error (F-73) message has been erased.

(2) Replacing VCM only

When replacing VCM only, follow the usual procedure of installation of VCM. (For details, see the service tool manual.) After the usual procedure is finished, turn the key switch ON and OFF several times to make sure that the error (F-73) message has been erased.

(3) Replacing both instrument panel and VCM

Step 1:

Follow the procedure (1) above for replacing instrument panel.

Step 2:

Follow the procedure (2) above for replacing VCM.

Note: 1. When replacing instrument panel and/or VCM, be sure to replace them with new ones.

2. If the instrument panel and/or VCM are used from another lift truck, the error (F-73) occurs. Should the hour meter be replaced with a used hour meter, never conduct an error recovery procedure.

The error recovery procedure, in this case, results in overwriting the large value in order to erase the difference between the values of the hour meter and the VCM.

Note: When replacing the instrument panel, only key-on time is transferred over to the new instrument panel. (Meter readings of engine on-time and seat switch-on time will be zero on the new instrument panel.)

5.8 Troubleshooting

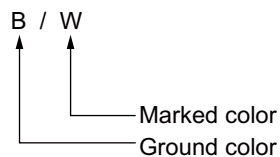
Condition	Explanation	Countermeasures
The fuel gauge shows some remaining fuel, but the lift truck stops with no fuel.	On gasoline LPG dual fuel lift truck, the fuel gauge shows only gasoline amount. LPG amount is not shown.	For LPG low fuel, use LPG fuel warning.
Back-up lamp is turned off.	The back-up lamp is turned off when the internal temperature of the instrument panel is high (105°C (221°F)) or higher to prevent the lamp from breakage.	Move the lift truck to shade and cool down.
LCD is not displayed.	The LCD is turned off when the internal temperature of the instrument panel is high (85°C (185°F)) or higher to prevent the LCD from breakage.	Move the lift truck to shade and cool down.
	LCD contrast may be adjusted to minimum.	Adjust contrast with buttons.
The display changing speed is slow.	When the instrument panel temperature is low (0 °C (0 °F) or lower), the speed is slow for one of LCD characteristics.	-
LCD screen is too dark.	The display becomes dark when the instrument panel temperature is high, for one of the LCD characteristics.	Adjust contrast with buttons.
LCD screen is too light.	The display becomes light when the instrument panel temperature is low, for one of the LCD characteristics.	Adjust contrast with buttons.
Button press (long) is invalid.	When the engine is running, long push of button is invalid.	Stop the engine, and place the engine key switch in the ON position.
Time becomes 00:00 AM.	When the battery is changed, the time resets.	Refer to "5.3.5 How to set up the clock time" to adjust the time.
Password "0000" and "1111" can not be registered.	You can not register "0000" and "1111."	-
Overload warning function is not available.	This function is available only for the trucks with load instrument display option.	Select the load meter display option (maker option) for overload warning display.
Alarm lamp of exterior alarm function does not glow. (The buzzer does not sound.)	A trigger speed setting should be 20 km/h or lower, and a trigger load setting should be 3.5 ton or less (depending on the type of trucks).	Check to see if exterior alarm function is correctly set up.
Error (F-73) occurs.	This error message is for the instrument panel and hour meter update error.	Using the service tool, update the hour meter appropriately.
During the time setup, the screen returns to the standard screen while the setups of the error history and the exterior alarm have not been completed.	During setup procedures, if there is no operation of buttons for three minutes or more, or if the engine is started, the setup being conducted becomes invalid and the standard screen will appear. Repeat the setup procedure from the beginning.	-
Display of fuel gauge and water temperature gauge are blinking.	Electrical short circuit is suspected, check the wiring and interconnection of fuel sensor and water temperature sensor.	-

Note: The conditions above occur due to the characteristics of each of the materials used in the equipment, therefore they are not defective.

6. Wire Color

Wire colors listed in the table below show standard colors (base colors). For wiring composed of two colors, the first color shows a base color and the second color a marking color.

Example: The wire color of B/W shows that its base color is B with a marking W.



Note: For wiring identification, the same color, in principle, must be used for the circuit from the power supply to the load.

⚠ CAUTION

Be careful that allowable current differs between solid wires and stranded wires even if they are of the same gauge.

6.1 List of Wire Colors

Wire color	Color
B	BLACK
W	WHITE
R	RED
G	GREEN
Y	YELLOW
BR	BROWN
L	BLUE
LG	LIGHT GREEN
OR	ORANGE
P	PINK
GY	GRAY
SB	LIGHT BLUE
PU	PURPLE

7. Troubleshooting

7.1 Starter System

Key switch	Starter will not crank engine.	Weak or dead battery	Recharge or replace.
		Short or open circuit	Repair or replace.
		Poor continuity in key switch	Replace.
		Starter or starter relay defective	Replace.
		Direction lever not in neutral position (Powershift truck)	Move the direction lever to neutral position.
Turning off key switch will not stop engine.		Short or open circuit	Repair or replace.
		Engine stop solenoid defect	Replace or adjust.
		Control timer defect	Replace.

7.2 Gauges

Water temperature gauge	Indicated temperature is low.	M/P - Water temperature meter connection defect		
		1.Check the connectors.		
		2.Check the conductivity.		
		3.Check the display with warmed water temperature sensor.		
		4.Replace the water temperature sensor.		
	Will not indicate accurately.		Check the part number.	
			1.Check the part specification.	
			2.Check the connectors.	
	The indication value blinks.		M/P - Water temperature meter connection defect	
1.Correct the short circuit.				
Fuel gauge	Indication value is not displayed.	Setting is not proper.		
		1.CNG truck and LPG truck do not show the value.		
		2.VCM setting is not correct.		
	Will not indicate accurately.		Check the part number.	
			1.Check the part specification.	
			2.Check the connectors.	
			3.Replace the water temperature sensor.	
	The indication value blinks.		4.Remove fuel tank cap assembly and check such items as bent float.	
			1.Correct the short circuit.	
		2.Remove fuel tank cap assembly and check wirings in the tank.		

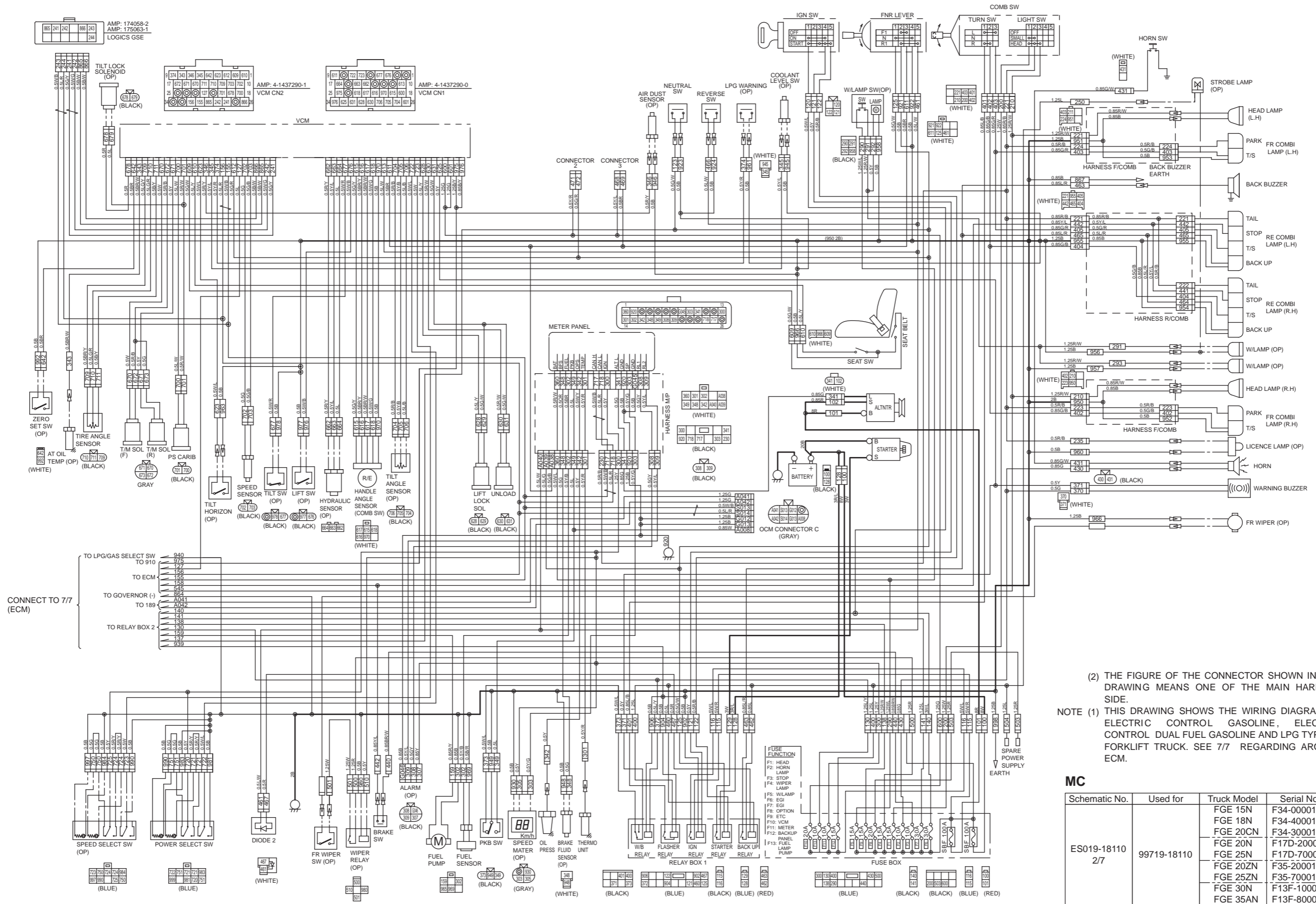
7.3 Lighting System

Lamps - general	Will not glow (blink) when turned ON.	Weak or dead battery	Recharge or replace.
		Fuses blown out	Check and replace.
		Short or open circuit	Repair or replace.
		Poor grounding	Remove corrosion from the terminal or retighten.
		Defective switch conductivity	Replace.
		Bulbs burnt out	Replace.
	Will glow dimly.	Weak battery	Check and recharge.
		Switch contact defect	Repair or replace.
		Loose terminals	Repair.
		Dirty lenses	Clean.
Water drops inside lenses		Dry and replace packings.	
Head lamp	Will not glow	Bulbs service life expired	Replace.
		Light switch conductivity defect	Replace.
Turn signal lamp	Will not blink.	Bulbs burnt out	Replace.
		Turn signal switch defect	Replace.
	Will not go out.	Turn signal relay defect	Replace.
		Turn signal relay defect	Replace.
	Will blink too slow.	Bulb wattage less than the rating	Replace it with specified bulb.
		Turn signal relay defect	Replace.
	Will blink too fast.	Bulb wattage greater than the rating	Replace it with specified bulb.
Turn signal relay defect		Replace.	
Other lamp	Back-up lamps will not glow	Back-up lamp switch defect	Correct if improperly installed, or replace if internally defective.
		Bulbs burnt out	Replace.
Horn	Will not activate.	Fuses blown out	Check and replace.
		Short or open circuit	Repair or replace.
		Horn switch defect	Replace.
		Horn defect	Replace.
		Horn button defect	Repair or replace.
	Will give an offensive sound.	Horn switch defect	Replace.
		Horn defect	Replace.

Weak battery	Alternator belt	Slipping	Adjust the tension.
	Alternator	Stator coil grounded or open circuit	Repair or replace.
		Rotor coil open	Replace.
		Brushes poorly seating on slip rings	Clean holder and polish slip rings.
		Brush movement defect	Adjust, replace brushes if worn.
		Diode short circuit or open circuit	Replace.
	Regulator	Regulating voltage is too low	Adjust.
	Battery	Defective or inappropriate electrolyte	Refill or adjust the S.G.
		Defective cell plates (internal short-circuit)	Replace.
		Poor terminal connections due to insufficient tightening torque	Clean and tighten.
	Wiring	Open or loose connection between the key switch and regulator IC terminal	Repair.
		Fuse blown in the above mentioned circuit or poor contact in the holder	Replace fuse or repair the holder's contact part.
		Open or loose connection between the regulator terminal F and alternator terminal F	Repair.
Battery Excessive charging	Wiring	Regulator IC and F terminals shorted or incorrectly wired	Repair.
		Defective grounding of regulator terminal F	Repair.
	Regulator	Pressure coil open circuit	Replace.
		Regulating voltage too high	Adjust.

8. Electrical Schematic

Electrical Schematic (2/7)

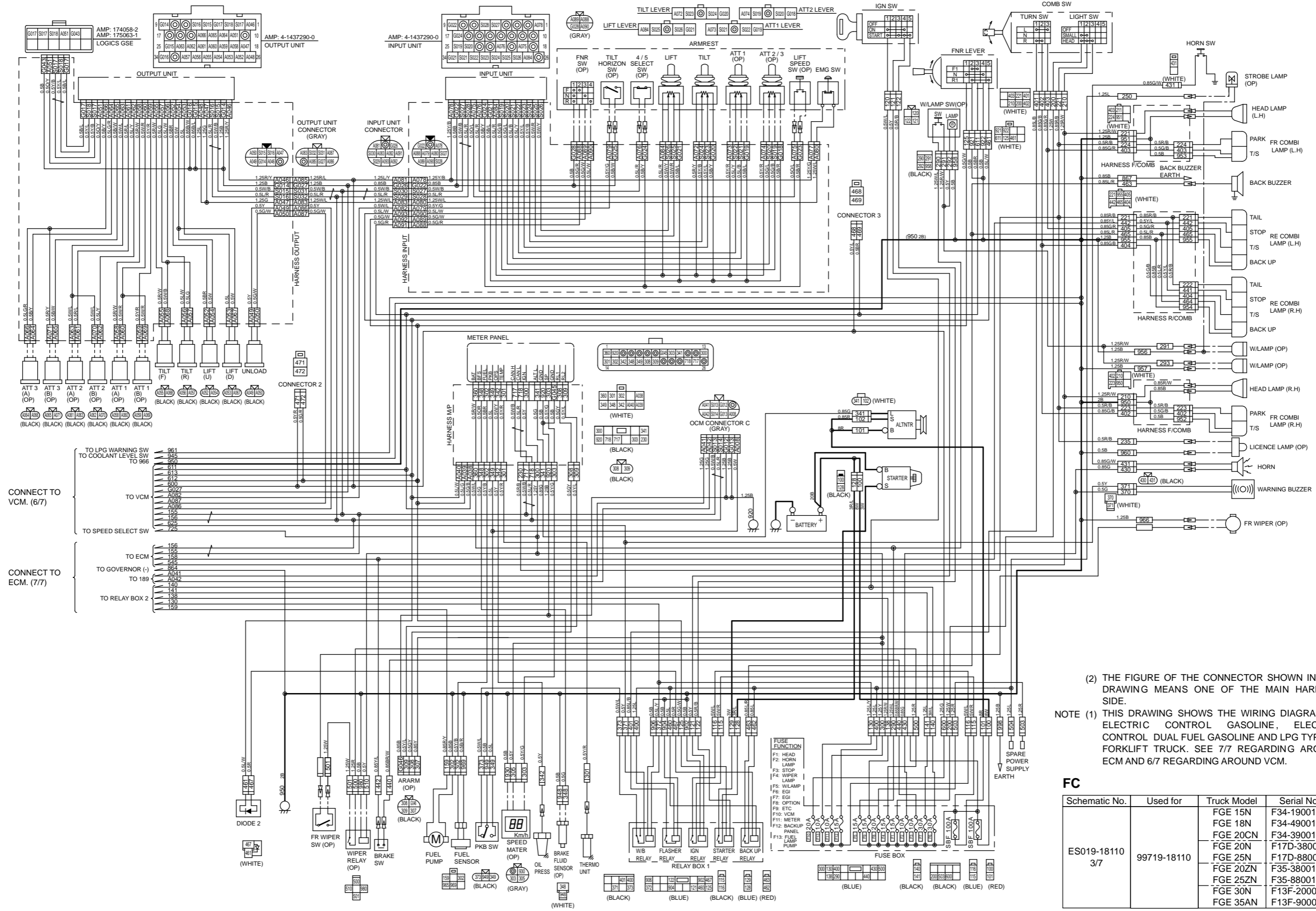


(2) THE FIGURE OF THE CONNECTOR SHOWN IN THIS DRAWING MEANS ONE OF THE MAIN HARNESS SIDE.
 NOTE (1) THIS DRAWING SHOWS THE WIRING DIAGRAM OF ELECTRIC CONTROL GASOLINE, ELECTRIC CONTROL DUAL FUEL GASOLINE AND LPG TYPE OF FORKLIFT TRUCK. SEE 7/7 REGARDING AROUND ECM.

MC

Schematic No.	Used for	Truck Model	Serial No.
ES019-18110 2/7	99719-18110	FGE 15N	F34-00001 up
		FGE 18N	F34-40001 up
		FGE 20CN	F34-30001 up
		FGE 20N	F17D-20001 up
		FGE 25N	F17D-70001 up
		FGE 20ZN	F35-20001 up
		FGE 25ZN	F35-70001 up
		FGE 30N	F13F-10001 up
		FGE 35AN	F13F-80001 up

Electrical Schematic (3/7)

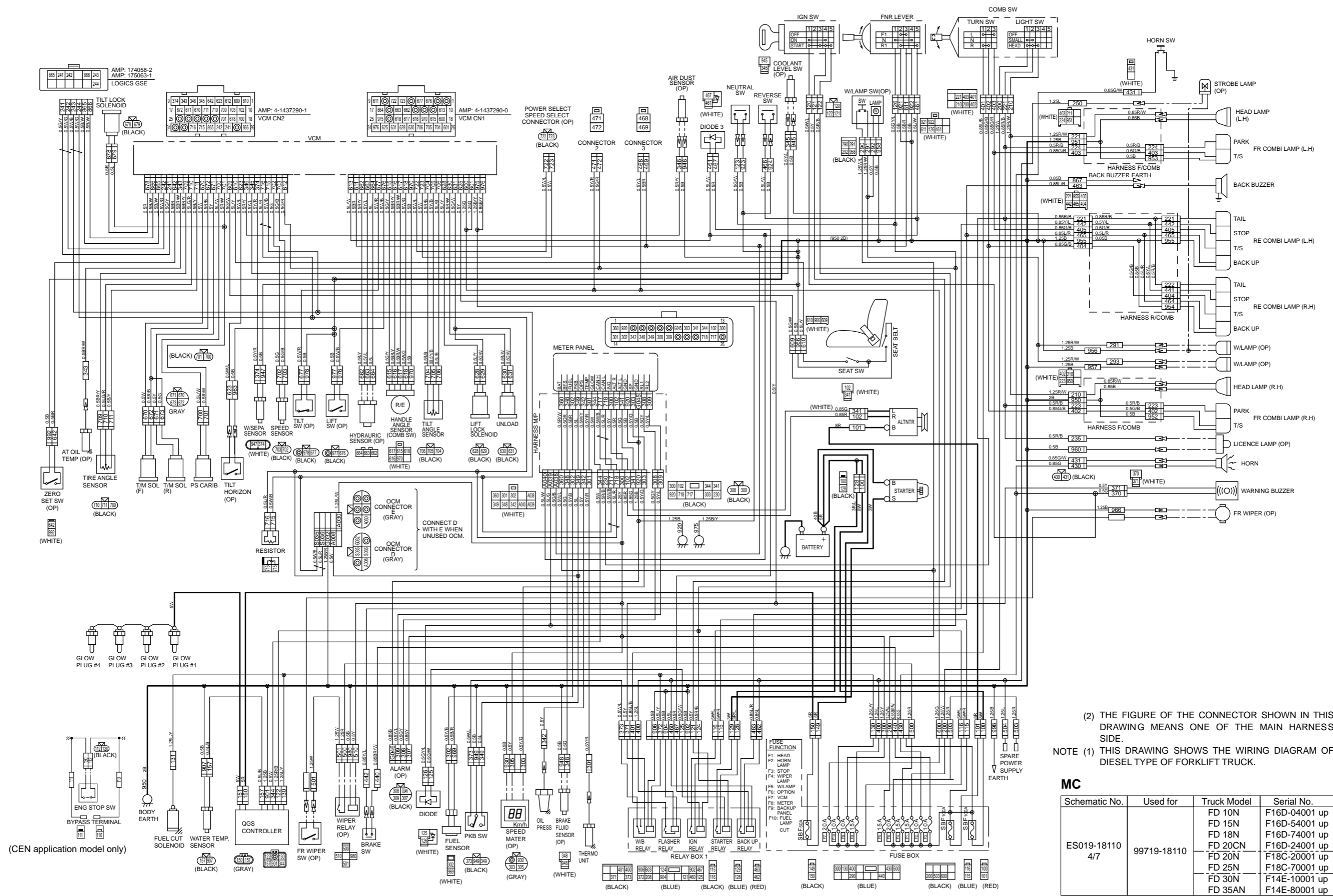


(2) THE FIGURE OF THE CONNECTOR SHOWN IN THIS DRAWING MEANS ONE OF THE MAIN HARNESS SIDE.
 NOTE (1) THIS DRAWING SHOWS THE WIRING DIAGRAM OF ELECTRIC CONTROL GASOLINE, ELECTRIC CONTROL DUAL FUEL GASOLINE AND LPG TYPE OF FORKLIFT TRUCK. SEE 7/7 REGARDING AROUND ECM AND 6/7 REGARDING AROUND VCM.

FC

Schematic No.	Used for	Truck Model	Serial No.
ES019-18110 3/7	99719-18110	FGE 15N	F34-19001 up
		FGE 18N	F34-49001 up
		FGE 20CN	F34-39001 up
		FGE 20N	F17D-38001 up
		FGE 25N	F17D-88001 up
		FGE 20ZN	F35-38001 up
		FGE 25ZN	F35-88001 up
FGE 30N	F13F-20001 up		
FGE 35AN	F13F-90001 up		

Electrical Schematic (4/7)

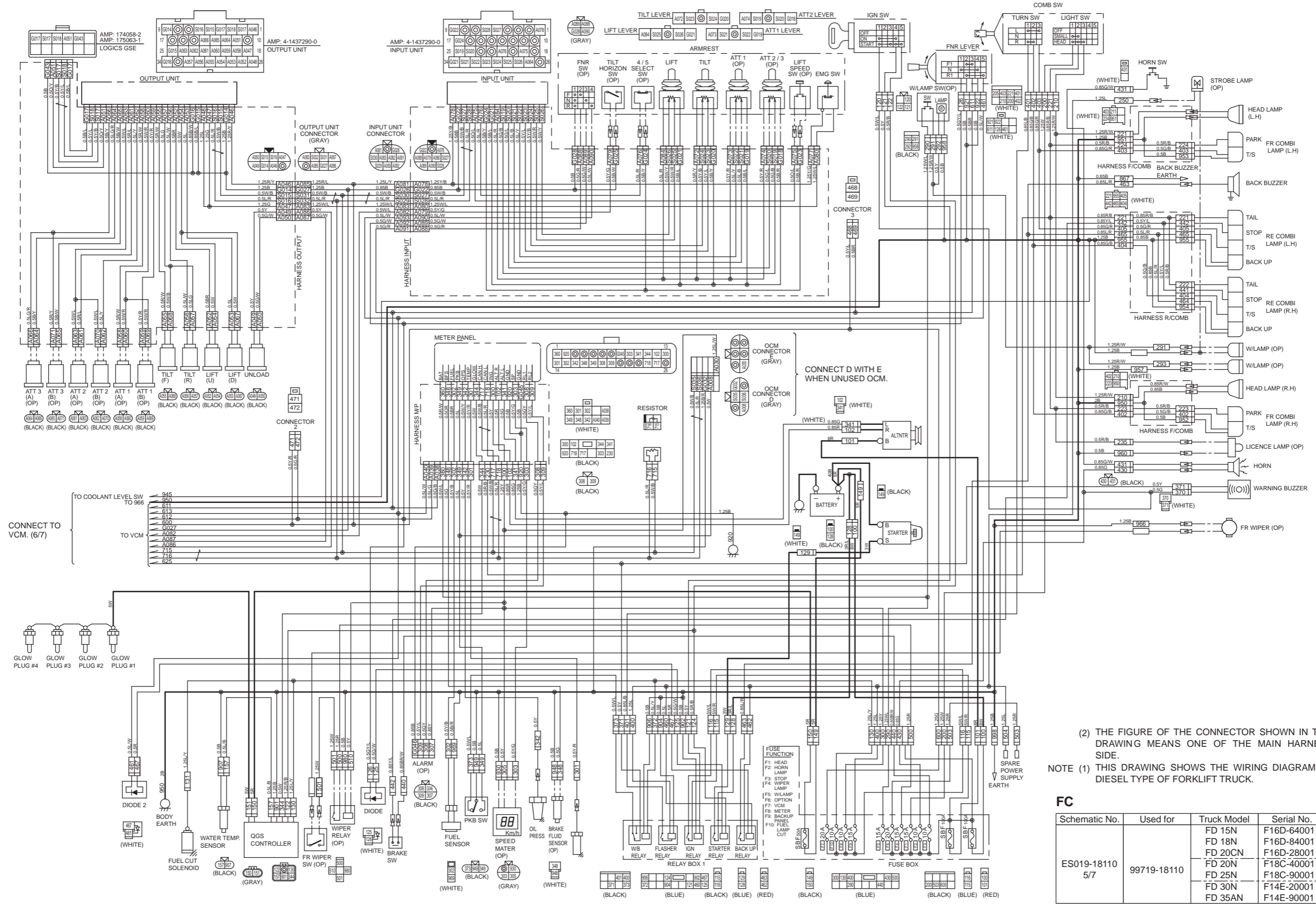


(2) THE FIGURE OF THE CONNECTOR SHOWN IN THIS DRAWING MEANS ONE OF THE MAIN HARNESS SIDE.
 NOTE (1) THIS DRAWING SHOWS THE WIRING DIAGRAM OF DIESEL TYPE OF FORKLIFT TRUCK.

MC

Schematic No.	Used for	Truck Model	Serial No.
ES019-18110 4/7	99719-18110	FD 10N	F16D-04001 up
		FD 15N	F16D-54001 up
		FD 18N	F16D-74001 up
		FD 20CN	F16D-24001 up
		FD 20N	F18C-20001 up
		FD 25N	F18C-70001 up
		FD 30N	F14E-10001 up
		FD 35AN	F14E-80001 up

Electrical Schematic (5/7)

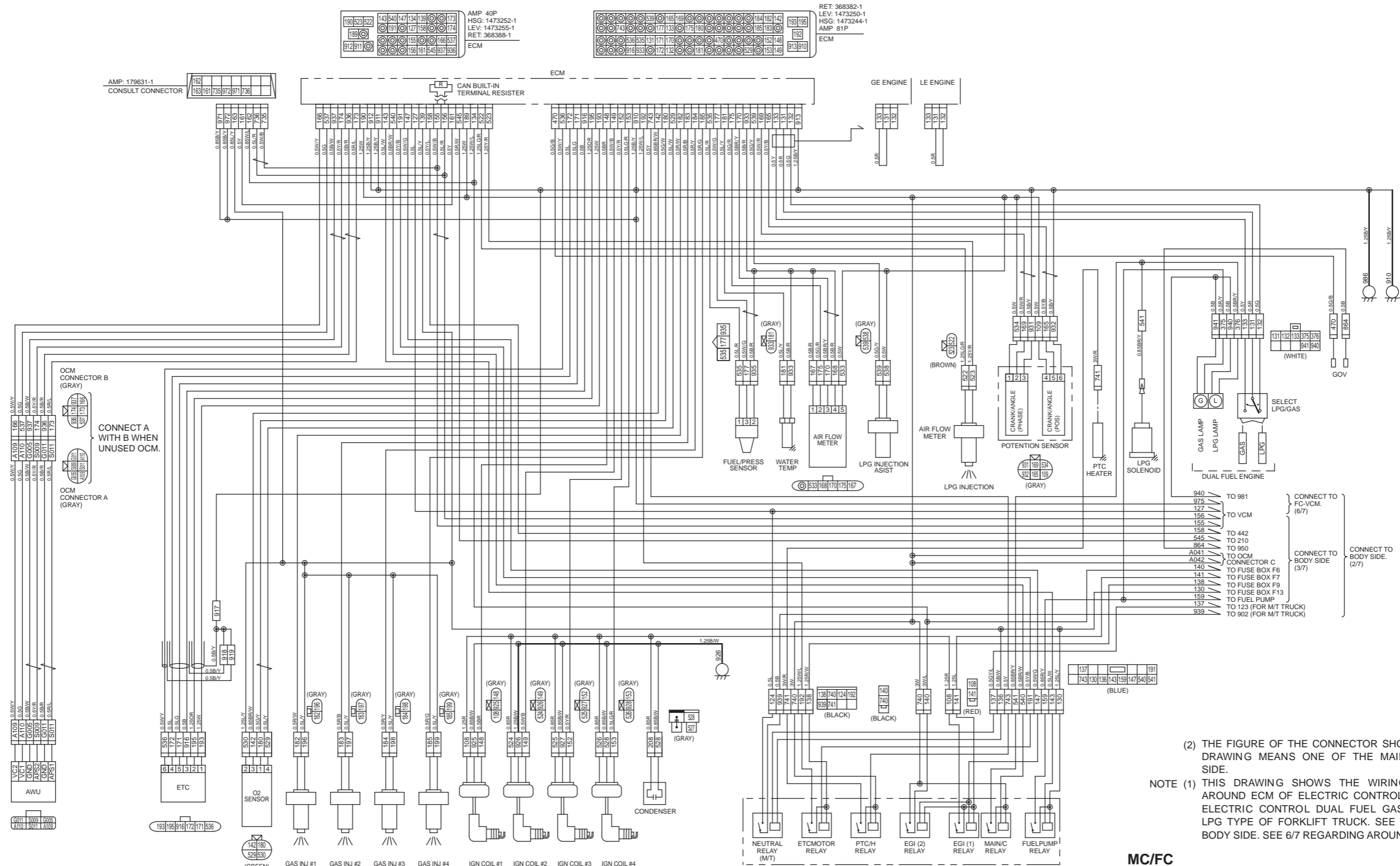


(2) THE FIGURE OF THE CONNECTOR SHOWN IN THIS DRAWING MEANS ONE OF THE MAIN HARNESS SIDE.
 NOTE (1) THIS DRAWING SHOWS THE WIRING DIAGRAM OF DIESEL TYPE OF FORKLIFT TRUCK.

FC

Schematic No.	Used for	Truck Model	Serial No.
ES019-18110 5/7	99719-18110	FD 15N	F16D-64001 up
		FD 18N	F16D-84001 up
		FD 20CN	F16D-28001 up
		FD 20N	F18C-40001 up
		FD 25N	F18C-90001 up
		FD 30N	F14E-20001 up
		FD 35AN	F14E-90001 up

Electrical Schematic (7/7)



(2) THE FIGURE OF THE CONNECTOR SHOWN IN THIS DRAWING MEANS ONE OF THE MAIN HARNESS SIDE.

NOTE (1) THIS DRAWING SHOWS THE WIRING DIAGRAM AROUND ECM OF ELECTRIC CONTROL GASOLINE, ELECTRIC CONTROL DUAL FUEL GASOLINE AND LPG TYPE OF FORKLIFT TRUCK. SEE 2/7, 3/7 FOR BODY SIDE. SEE 6/7 REGARDING AROUND VCM.

MC/FC

Schematic No.	Used for	Truck Model	Serial No.
ES019-18110 7/7	99719-18110	FGE 15N	F34-10001/19001 up
		FGE 18N	F34-40001/49001 up
		FGE 20CN	F34-30001/39001 up
		FGE 20N	F17D-20001/38001 up
		FGE 25N	F17D-70001/88001 up
		FGE 20ZN	F35-20001/38001 up
		FGE 25ZN	F35-70001/88001 up
		FGE 30N	F13F-10001/20001 up
		FGE 35AN	F13F-80001/90001 up