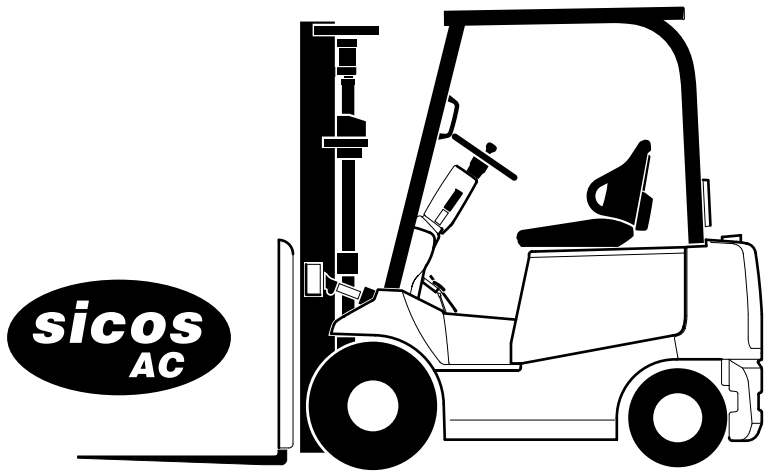
03W-2204

TROUBLESHOOTING MANUAL

Transer

FB10P,14P,15P,18P-75
FB20P,25P,28P,30P-75



NICHIYU
NIPPON YUSOKI CO.,LTD.
KYOTO, JAPAN

CONTENTS

4. Wiring and main controller layout 70

1. Introduction

1- 1. What's new in FB-75

A Equipped with Sicos-AC

- Improved inching
- Enhanced regeneration
- Settings for various modes, power mode, and low speed
- Auto power OFF
- Neutral safety
- Self-diagnosis function
- Contactless traveling, loading and regeneration

B Altered display and board (color display → flourscent display)

(Interchangeable installation with panel Ass'y)

- 10-step battery discharge indication
- Time length of hour meter indication key when it is ON (actual operation time is OPT)
- Canceled battery electrolyte level display
- Altered speed indication (actual speed → converted speed)
- Mono-blocked slow speed (turtle) S/W and mode S/W (sheet type switch)

22 Inclined lift chain → parallel (P mast)

23 Altered chain anchor figure (P mast)

24 Altered side roller attaching structure (P mast)

25 Altered chain attaching location (M mast)

26 M mast using 2t type outer mast

- FB15P

27 Enlarged mast's outer width

- FB20P

15 Strengthened front wheel covers

16 Strengthened steps

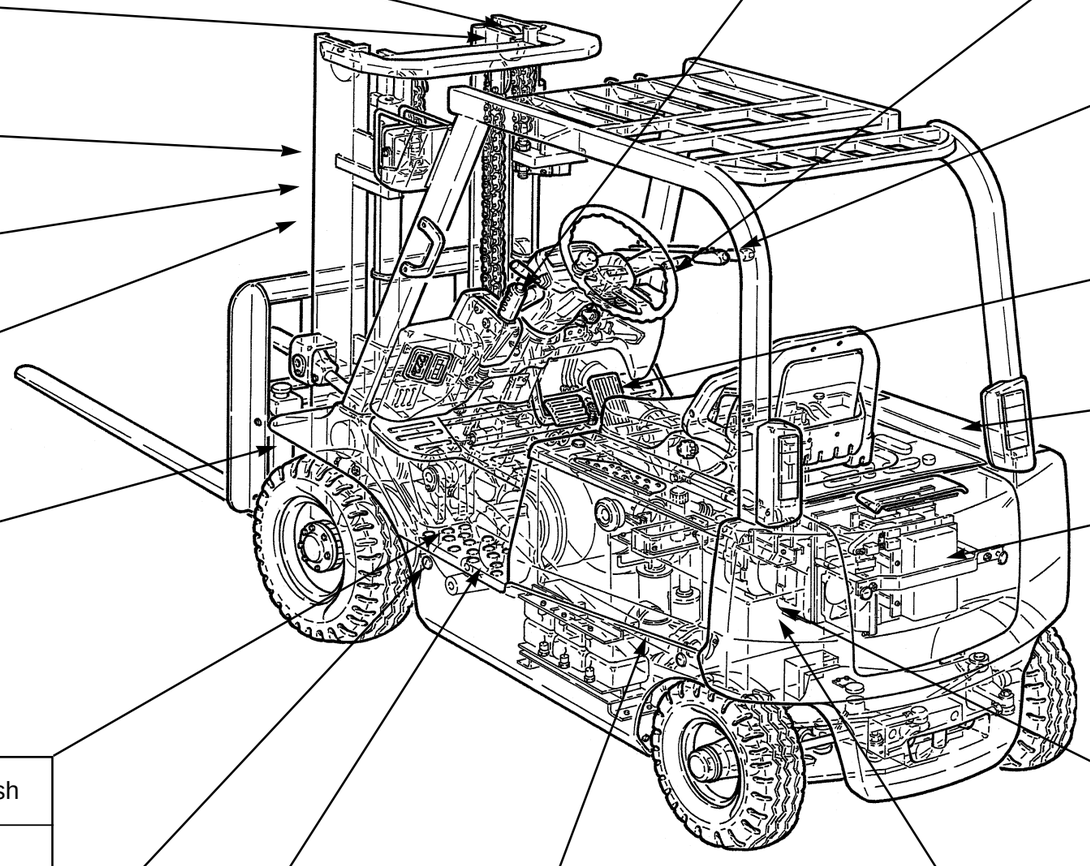
- FB30P

19 Reduced gear sound because of lowered backlash

- FB20P

20 Improved brake because of altered wheel cylinders

- FB20P



7 Shortened turn signal's come back

11 Altered display cover figure

28 Altered control bulb spool figure

14 Altered hydraulic lever link ratio

4 Altered accelerator structure

- Made identical with potentiometer FBR-75

17 Enlarged opening angle on battery cover

5 Controlled travel/hydraulic vector

6 Type-VE controller

- Mono-blocked heat sink and base, mono-blocked gate board, mono-blocked condenser (soldering) etc.

10 Altered counter weight figure

3 Controlled hydraulic motor sensorless (altered board and software)

- Improved software, hydraulic response

12 Altered oil tank structure

8 Altered hydraulic motor's diameter

- FB15P

18 Altered to anti-loose knob on the cover

1- 2. FB-75 new features

1-2-1. Battery discharge indicator

1. 48V capacity indication

<5-step indication (FB-70)>

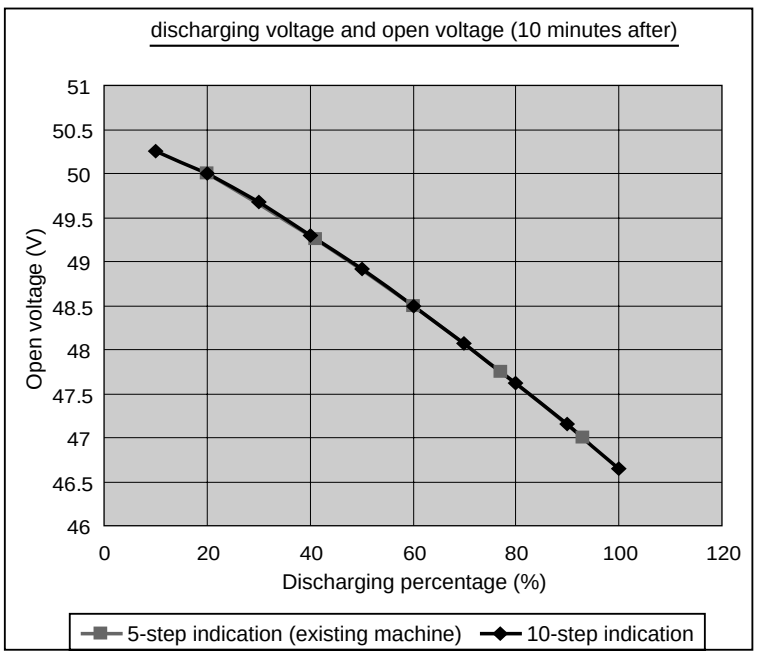
FB-70 is not completely in proportion to discharging capacity because it divides voltage by 0.75V.

discharging percentage (%)	terminal voltage (V)
20	50
41	49.25
60	48.5
77	47.75
93	47

<10-step indication (FB-75)>

It sets dividing voltage to be in proportion completely to the capacity.

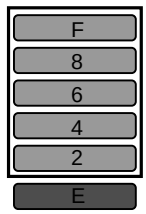
discharging percentage (%)	terminal voltage (V)
10	50.25
20	50
30	49.67
40	49.3
50	48.91
60	48.5
70	48.07
80	47.62
90	47.15
100	46.65



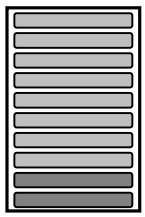
The graph below shows the relation between discharging percentage and capacity indication.
From this graph, 5-step indication goes off when the discharging percentage gets below 93%, and it seems one segment is on when the discharging percentage gets 93% through 100% in case of 10-step indication. In deed, however, a red segment is lit when the discharging percentage gets 93% in case of 5-step indication. In other words, a red segment is lit when the discharging percentage gets 93% in case of FB-70. On the other hand, a red segment is lit when the discharging percentage gets 80% in case of FB-75.

It is as good as over-discharging lift interrupt option; the lift speed reduced by half when the red segment is lit. It limits earlier than FB-70 setting.

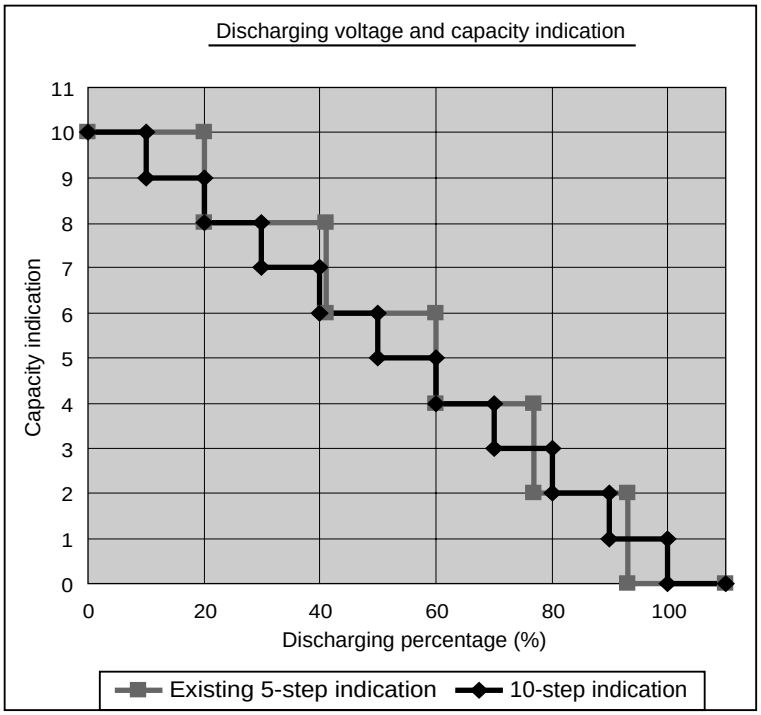
Also, the lift interruption functions when the last red segment is lit. In this case, the segment flashes as well as the frame of the segment. After the last segment goes off, only the frame flashes.



FB-70



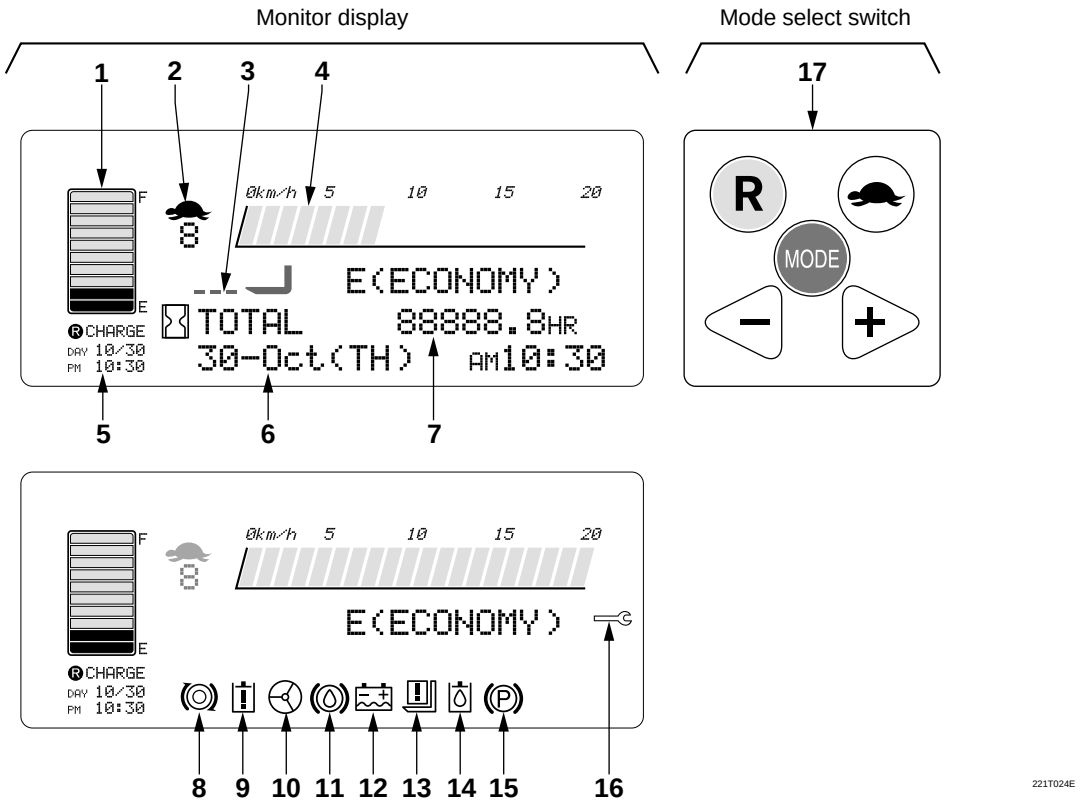
FB-75



2. Adjustment of SICOS-AC

2- 1. Explanation of the monitor display

2-1-1. Indicator panel



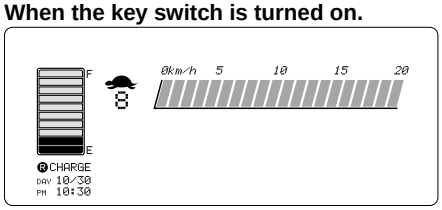
1. Battery discharge indicator
2. Slow speed mode monitor (Turtle mark)
3. Fork horizontal indicator (Option)
4. Travel speed meter
5. Battery charge reservation indicator (Option with built-in charger)
6. Calendar and clock
7. Hour meter
8. Safety monitor for traction circuit
9. Safety monitor for hydraulic circuit
10. Safety monitor for power steering circuit
11. Safety monitor for brake fluid
12. Safety monitor for battery electrolyte level (Option with GS battery)
13. Safety monitor for overload (Option)
14. Safety monitor for hydraulic oil level (Option)
15. Safety monitor for parking brake
16. Service (spanner) mark
17. Mode select button

NOTE **Icons of 8 to 14, and 16 shown in the illustration are displayed for the explanation. It is not actual indication. They are displayed when abnormalities are occurred.**

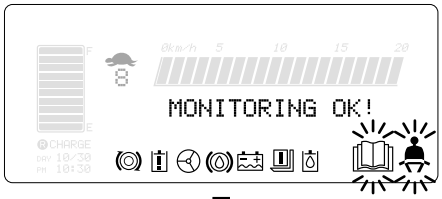
2-1-2. Indication of display

Turn on the key switch.

When the key switch is turned on.

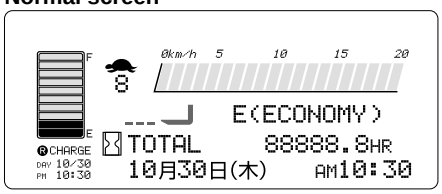


After 0.5 seconds



After 2 or 3 seconds

Normal screen



221T025E

The self-diagnosis function checks the control system and display "MONITORING OK" when no problems are found. Icons of "Read operator's manual" and "Fasten seat belt" are flashed three times for warning to the operator.

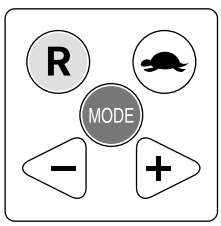
The normal screen is displayed.
If any abnormalities are detected, the error message is displayed. If the long message is displayed or some messages are displayed, they are scrolled from right to left alternatively.

NOTE **If traveling or hydraulic operation is done while this (with-in 3 or 4 seconds), the normal screen is displayed after finishing the initial monitoring function.**

CAUTION **Contact to your local Nichiyu dealer if the error message is displayed.**

Mode setting buttons

NOTE **If travel/hydraulic operation is done while one-touch operation screen is being displayed, it returns to the normal screen.**



121T188

Setting screen by one touch operation

Push (R) button. ➡ **Reserve charge screen**
- Set the starting time of battery charge.

(This screen is displayed if the optional built-in charger is equipped.)

• • • Refer to the section of the reserve charging on FB-75 OPERATOR'S MANUAL or WORKSHOP MANUAL.

Push (MODE) button.
(Release within 3 seconds.) ➡ **Mode select screen**
- Slow speed mode setting
- Travel mode setting
- Hour meter / odometer selection
- Display mode setting
- Coast mode setting

• • • Refer to each setting section.

Push (MODE) button
for more than 3 seconds. ➡ **Date / time setting screen**
For setting of date and time.

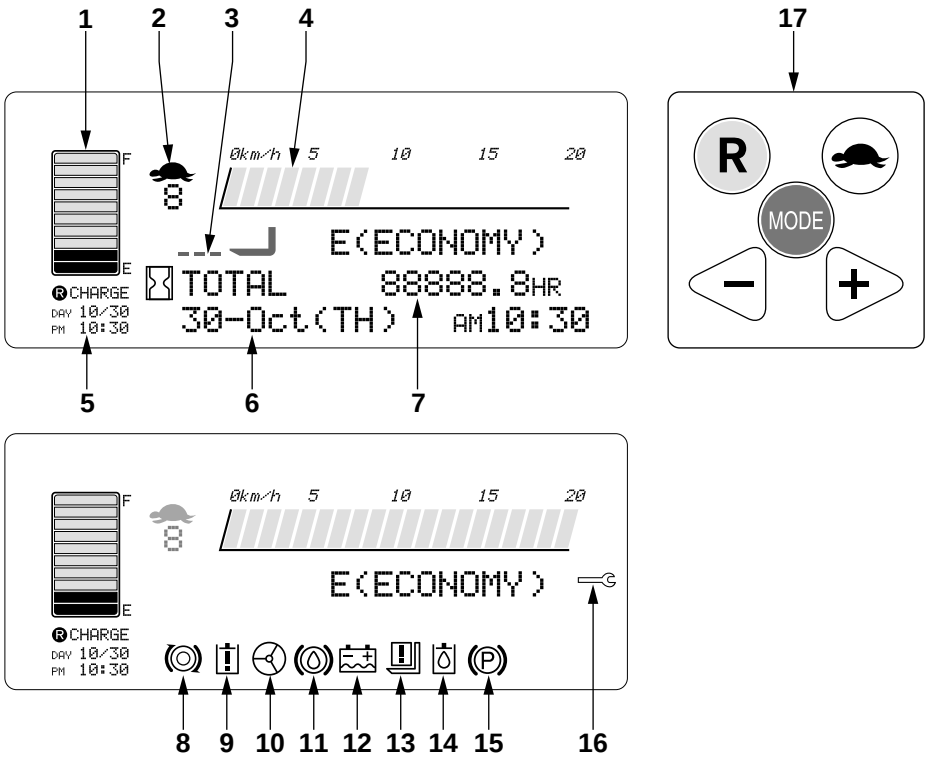
• • • Refer the page 15 for details.

Push one of (−) or (+) . ➡ **Hour meter screen**
- Three hour meters of traction, hydraulic and the total hour are displayed.

• • • Refer the page 8 for details.

2-1-3. Function of display

This forklift truck has the self-diagnosis function.



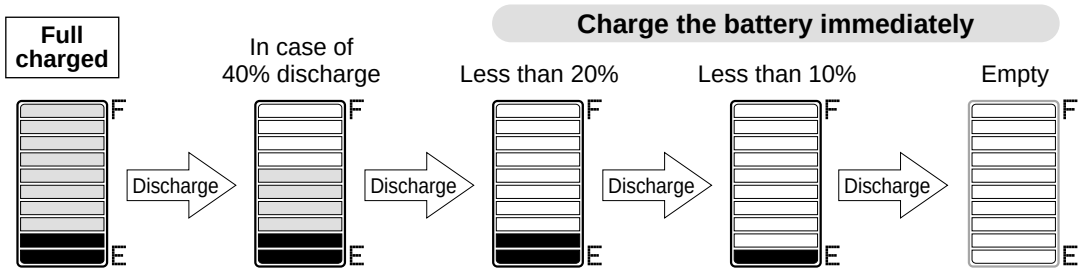
221T026E

NOTE **Icons of 8 to 14, and 16 shown in the illustration are displayed for the explanation. It is not actual indication. They are displayed when abnormalities are occurred.**

1. Battery discharge indicator

The battery discharge indicator shows the discharged condition of the battery.

CAUTION **Do not over-discharge.**
The battery life can be shorten by over-discharging.
Charge the battery as soon as possible when [E] segment is lit.



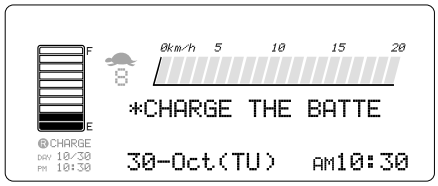
When the battery capacity is less than 20%, all blue segments are disappeared and two red segments are lit.

When the capacity is less than 10%, one red segment is flashed with the frame of the indicator.
When the capacity is empty, only the frame of the indicator is flashed.

121T190E

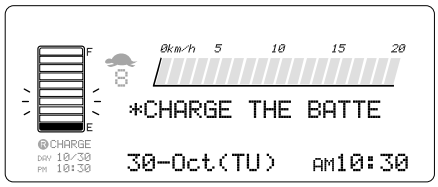
● Lift interrupt (Option)

When all green segments are disappeared and two red segments are lit, the lift speed is reduced by half.
At the same time, "✻CHARGE THE BATTERY✻" message appears on the screen.
When the truck is continued to use, only one red segment is started to flash and the lift function is interrupted.



Two red segments are lit.

After 10 minutes

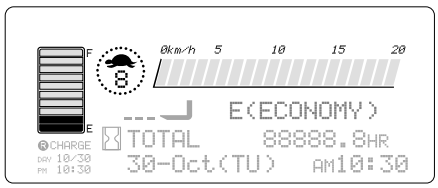


One red segment is started to flash.

121T191E

2. Slow speed mode monitor (Turtle mark)

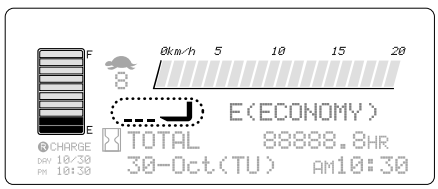
When the turtle button is pushed, the turtle mark is indicated on the screen with the preset speed.



121T192E

3. Fork horizontal indicator (Option)

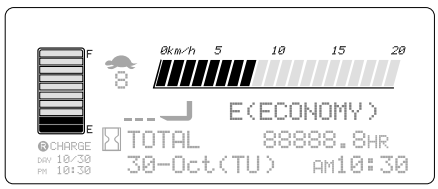
This mark is indicated when the fork is horizontal and possible to use the laser pointer.



121T193E

4. Speed meter

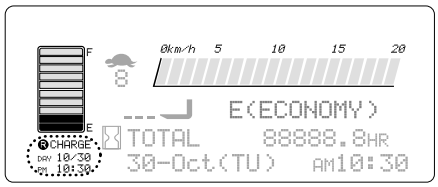
The traveling speed is displayed on the screen.



121T194E

5. Reserve charge indication (Option)

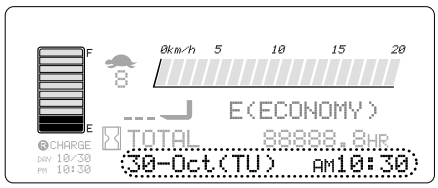
The reserved date and time to start charging the battery is displayed. Refer the section of "Battery and charger" on FB-75 OPERATOR'S MANUAL or WORKSHOP MANUAL for details.



121T195E

6. Date and time (Calendar and clock)

The current date and time are displayed. If the (MODE) button is pushed for more than 3 seconds, the display is changed to the setting screen. Refer the page 16 for details.



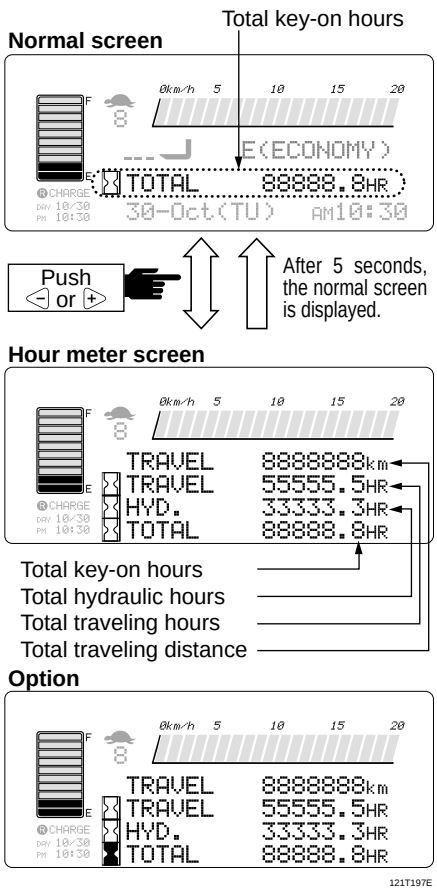
121T196E

7. Hour meter

The hour meter shows the total hours of turning on the key switch.
(The actual operating hours can be displayed as option.)
It is useful to know the total operating hours for the daily job management and scheduling of the periodical inspection.

When pushing ⊖ or ⊕ button, each individual hours for travel, hydraulic and total are displayed for 5 seconds.
The normal screen and hour meter screen are changed by turn by pushing ⊖ or ⊕ button.
After 5 seconds, the normal screen is displayed.

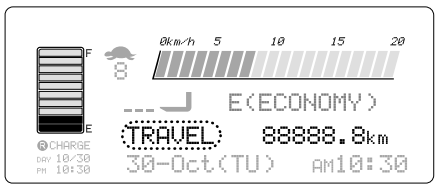
The odometer can be displayed in the normal screen instead of hour meter. Refer the meter mode setting in the setting mode section.



⚠ CAUTION

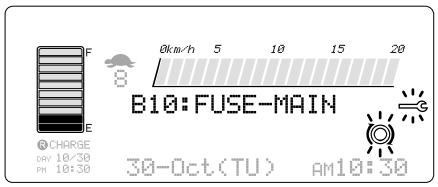
The hour meter screen is returned to the normal screen even less than 5 seconds by operating traveling or hydraulic function.

When the screen displays the odometer, the word of “TRAVEL” is flashed while travelling.



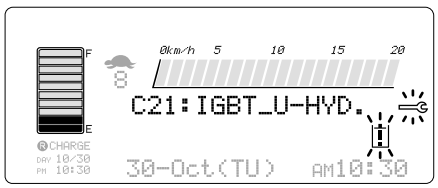
8. Safety monitor (for travel circuit)

When fault is detected in the travel circuit, the travel icon flashes and the presumed defective part name is displayed.



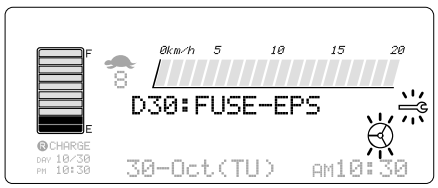
9. Safety monitor (for hydraulic circuit)

When fault is detected in the hydraulic circuit, the hydraulic icon flashes and the presumed defective part name is displayed.



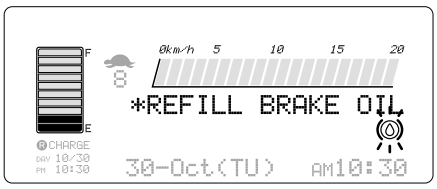
10. Safety monitor (for steering circuit)

When fault is detected in the power steering circuit, the steering icon flashes and the presumed defective part name is displayed.



11. Safety monitor (for brake fluid level)

When the brake fluid level is low, the brake icon flashes and " ✻ REFILL BRAKE OIL ✻ " message is displayed.



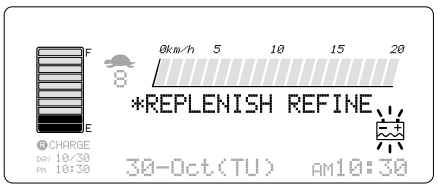
221T027E

NOTE

When [name of a damaged part] or " ✻ REFILL FORK OIL ✻ " is lit, please contact the your local Nichiyu dealer.

12. Safety monitor (for battery electrolyte level) (for GS battery only)

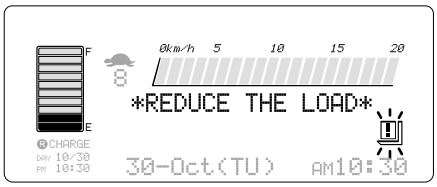
When the electrolyte level is lower than the specific level, the battery icon flashes and " ✻ REPLENISH REFINED WATER FOR BATTERY ✻ " message is displayed.



121T202E

13. Safety monitor (for overloading) (Option)

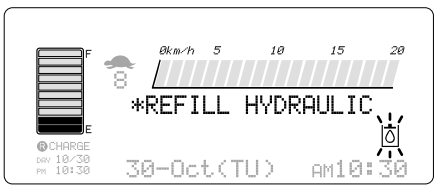
When overloaded, the load icon flashes and " ✻ REDUCE THE LOAD ✻ " message is displayed on the screen.



121T203E

14. Safety monitor (for hydraulic oil) (Option)

If the hydraulic oil level is low, the icon is flashed and the message of " ✻ REFILL HYDRAULIC OIL ✻ " is displayed.



121T204E

NOTE

The hydraulic oil level sensor detects the oil level for 2 seconds after turning on the key switch. So, the mast must be retracted completely and fork must be lowered on the ground before turning on the key switch. Otherwise, the warning message of " ✻ REFILL HYDRAULIC OIL ✻ " may be displayed even the quantity of oil is normal.

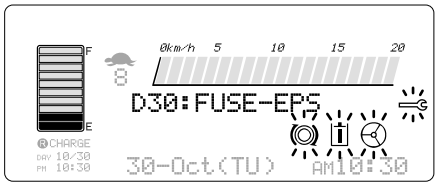
15. Safety monitor (for parking brake)

When the parking brake lever is pulled, the parking brake icon is lit. if the operator move the truck without releasing the parking lever, the icon flashes and the warning buzzer is beeped.

221T028E

16. Service icon

The service icon warns the fault of the forklift truck to an operator. If any faults are detected, the spanner mark is flashed and the presumed defective part name is displayed. If some problems are occurred at the same time, each part name is scrolled alternatively for every 5 seconds.



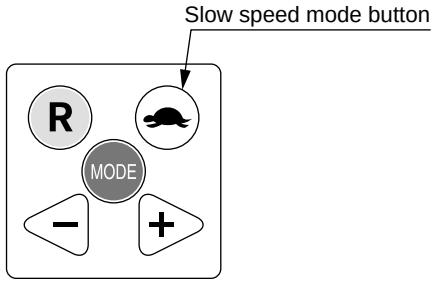
121T205E

⚠ CAUTION

- **If the next fault is detected, all travelling, hydraulics and power steering functions are shut down.**
  B11 : IGBT-TRAVEL
  C21 : IGBT-HYD.
  ⁎FAIL CURRENT-TRAVEL⁎
  ⁎FAIL CURRENT-HYD⁎
  ⁎FAIL OPERATION⁎
- **All (MODE), (R), (−), (+) buttons are invalid while dis-playing these messages.**

17. Mode select button

Change the screen to each mode by pushing these buttons.



Mode select button

121T206E

Slow speed mode button

The slow speed mode is activates by pushing this button.

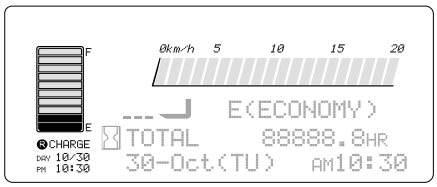
Normal traveling mode (When the slow speed button is off)

The slow speed mode indicator ( ) is not displayed.

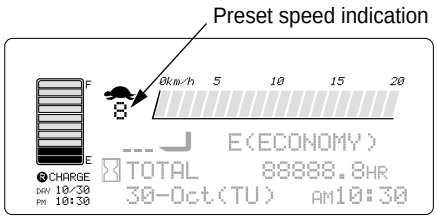
Slow speed mode (when the slow speed button is on)

The turtle icon and preset speed are displayed on the screen.

- If the value of the slow speed mode is preset, the maximum traveling speed can be changed in the normal mode and slow speed mode by pushing the turtle button.



When the slow speed button is off
(Turtle mark is not displayed)



When the slow speed button is on
(Turtle mark is displayed)

121T207E

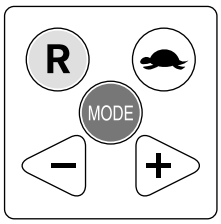
2-1-4. Various kinds of mode selection

[1] Slow speed setting
[2] Travel mode setting
[3] Meter mode setting
[4] Display mode setting
[5] Regeneration (Neutral) mode setting
[6] How to set the date and time

CAUTION

- **These settings are invalid while traveling or depressing the brake pedal.**
- **If traveling or hydraulic operation is done while setting, the display is returned to the normal screen immediately.**

When pushing (MODE) button, the mode selection screen is displayed. If pushing (MODE) button again, the normal screen is displayed again.



121T188

Mode select button

NOTE

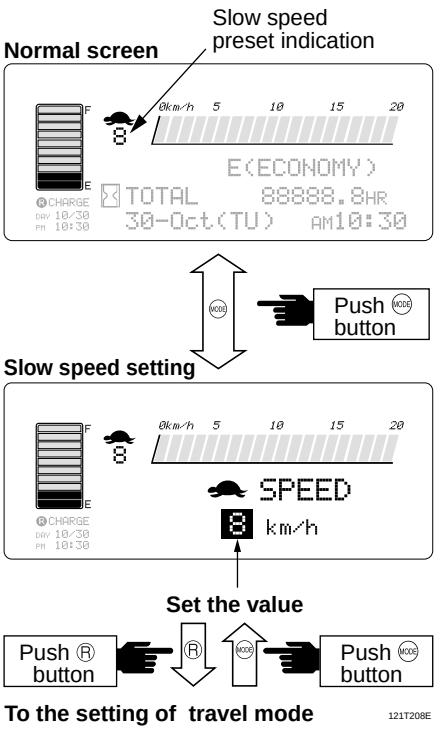
When setting the mode of next [1] to [5] , each button works as below.

- **(−) and (+) buttons : Move the cursor to select the value.**
- **(R) button : Move the cursor to the next item.**
- **(MODE) button : Back the cursor to the previous item.**

[1] Slow speed setting

This mode sets the limited maximum travelling speed under the slow speed mode.

Make sure the turtle button is pushed and the turtle icon is flashed. Then, push (−) or (+) button to set the speed.
The maximum speed can be set to 8 steps of 2, 3, 4, 5, 6, 8, 10 and 12km/h.
After setting, push (R) button to move the cursor to the travel mode setting.
If push the (MODE) button, the normal screen is displayed.



121T208E

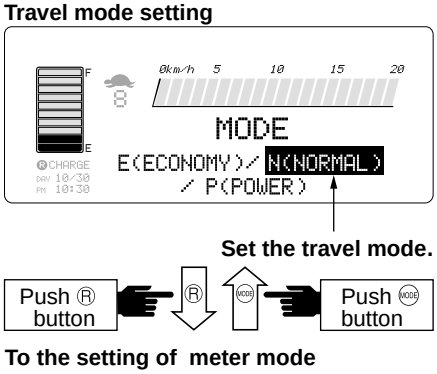
[2] Travel mode setting

This screen is used to set the travel mode.

Make sure that the current traveling mode indication is flashed. Push ⊖ or ⊕ to select the mode.
After selection, push Ⓡ button to move the cursor to the meter mode setting.
If pushing the MODE button, the cursor is moved to the slow speed mode setting.

The traveling mode can be set to the next three modes.

Travel mode setting



121T209E

E (ECONOMY)

This mode is convenient for the slow speed inching.
This mode saves the battery energy consumption also.

N (NORMAL)

This is the normal traveling mode. The quick acceleration and smooth inching can be realized.

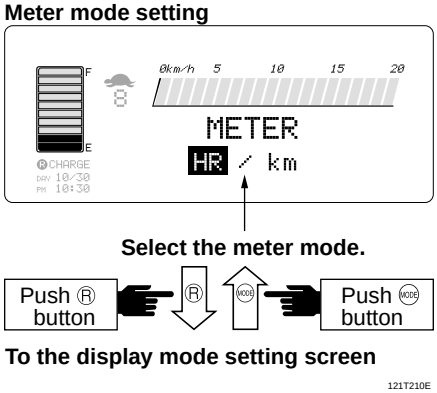
P (POWER)

This is the most powerful mode for acceleration.

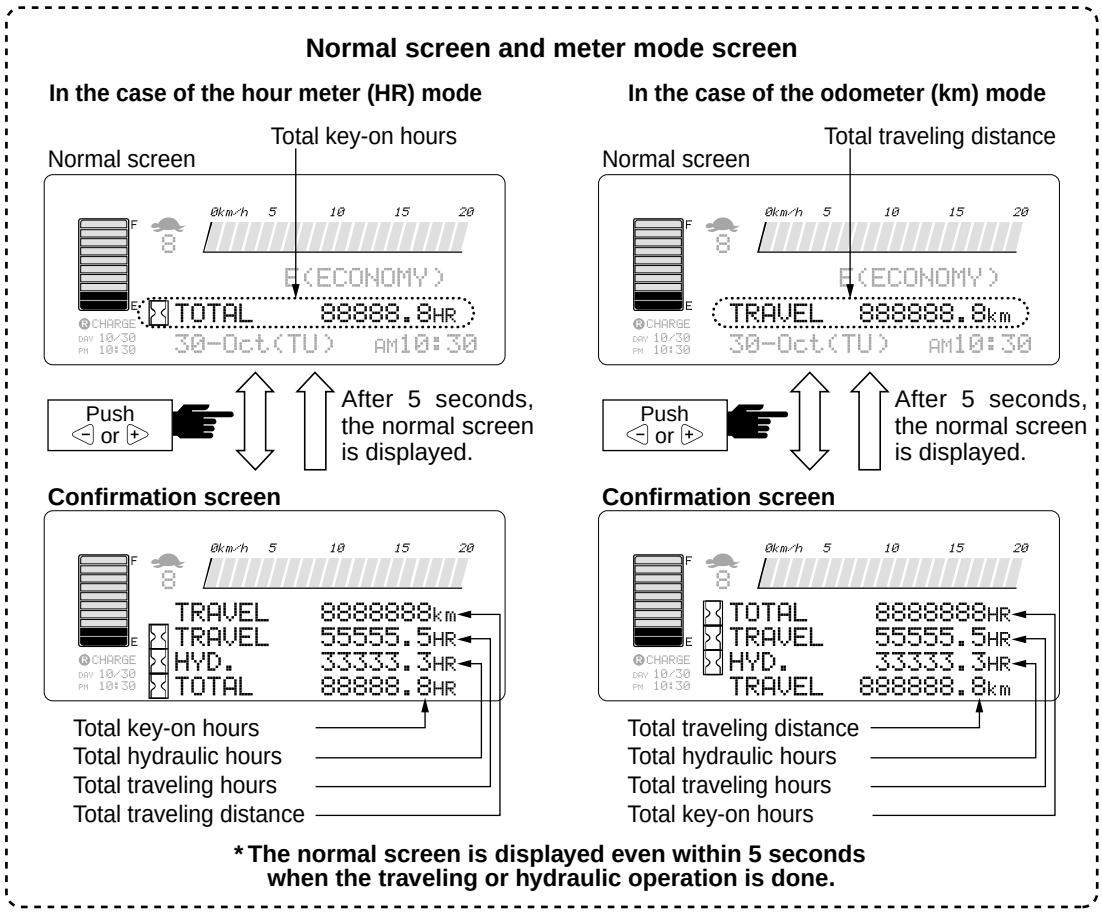
[3] Meter mode setting

The hour meter or odometer can be selected by this mode on the normal screen.
When the cursor is located on the meter mode, "HR" (hour meter) or "km" (odometer) can be selected by pushing ⊖ or ⊕ button.
After selection, push Ⓡ button to move the cursor to the display mode.
If pushing the MODE button, the cursor is returned to the traveling mode area.
The display is switched from the normal screen to the meter mode screen by pushing ⊖ or ⊕ button. The meter mode screen has 2 kinds. Refer below for details.

Meter mode setting



121T210E



121T211E

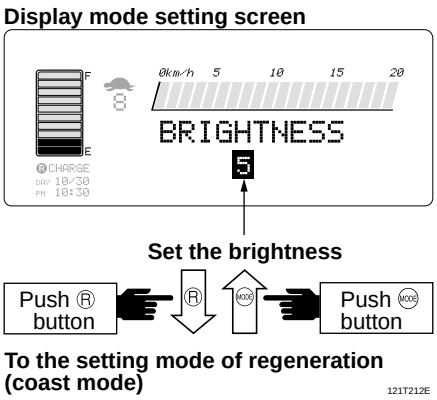
[4] Display mode setting

This mode sets the brightness of the screen.

Make sure that the cursor is located on the brightness setting area. Push ⊖ or ⊕ button to select the brightness for the best. It can be selected 7 steps (from 0 to 7).

After setting, push Ⓡ button to get the coast mode setting screen.

If pushing MODE button, the cursor is returned to the view (contrast) setting.



121T212E

NOTE

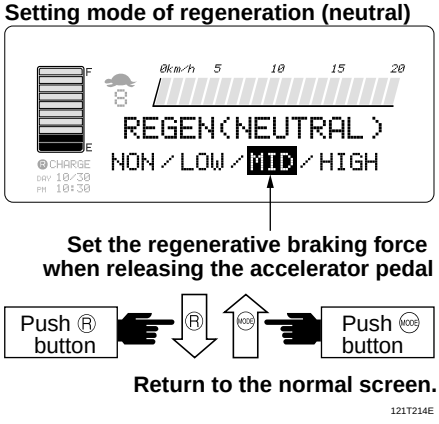
Refer the table below for the brightness settings.

BRIGHTNESS (Intensity of back light)		
1 Dark	⟷	**7** Bright

[5] Regeneration (Neutral) mode setting

This mode can be set the regenerative braking force when releasing the accelerator pedal while travelling.
Make sure that the REGEN(NEUTRAL) mode screen is displayed. Then push ⊖ or ⊕ button to select the strength.
The braking strength can be set to 4 steps of "NON" (No braking), "LOW", "MID" (Middle) and "HIGH".

Setting mode of regeneration (neutral)



NOTE **It is set to "MID" (Middle) as default.**

After setting, push Ⓡ button to return to the normal screen.
If pushing the MODE button, the display mode setting screen is displayed.

[6] How to set the date and time

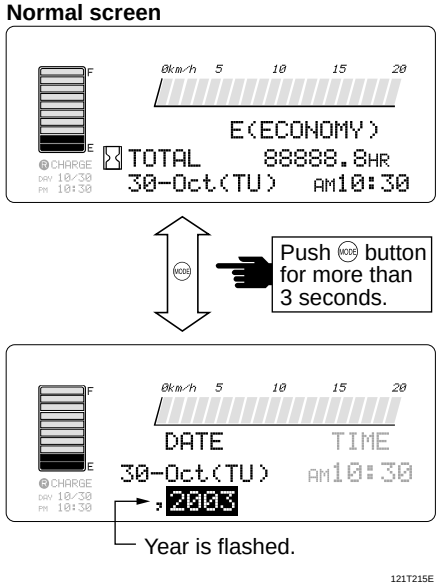
When the MODE button is pushed for more than 3 seconds, the date and time setting screen is displayed.
Push MODE button to return to the normal screen.

CAUTION **If traveling or hydraulic operation is done while setting, the display is returned to the normal screen immediately.**

NOTE **When setting the mode of next [1] to [6] , each button works as below.**

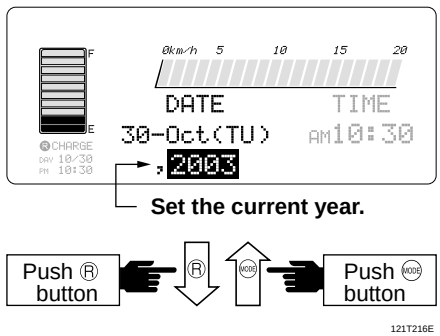
- **⊖ and ⊕ buttons : Move the cursor to select the value.**
- **Ⓡ button : Move the cursor to the next item.**
- **MODE button : Back the cursor to the previous item.**

Normal screen



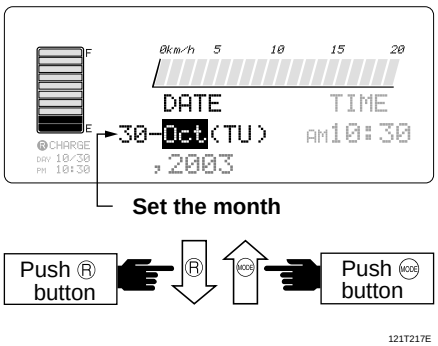
1. Set the year

Make sure the cursor is located on the year area.
Push ⊖ or ⊕ button to set the year. The year can be set from 2000 to 2999.
After setting, push Ⓡ button to move the cursor to the month area.
If push MODE button, the normal screen is displayed.



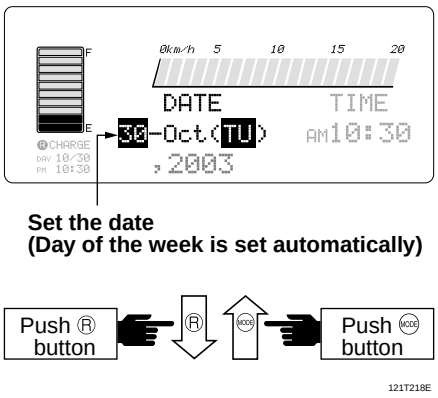
2. Set the month

Make sure the cursor is located on the month area.
Push ⊖ or ⊕ button to set the month. the month can be selected from 1 to 12.
After setting, push Ⓡ button for the date setting.
If pushing MODE button, the cursor is returned to the year area.



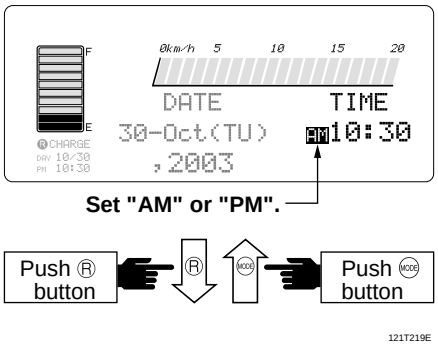
3. Set the date

Make sure the cursor is located on the date area.
push ⊖ or ⊕ button to set the date. The date can be set from 1 to 31. When setting the date, the day of the week is set automatically.
After setting, push Ⓡ button to move the cursor to the AM/PM area.
If pushing MODE button, the cursor is returned to the month area.



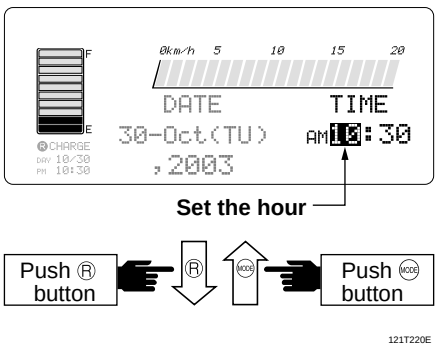
4. Set the AM or PM

Push ⊖ or ⊕ button to select the AM or PM.
After setting, push Ⓡ button to move the cursor to the hour area.
If pushing MODE button, the cursor is returned to the data area.



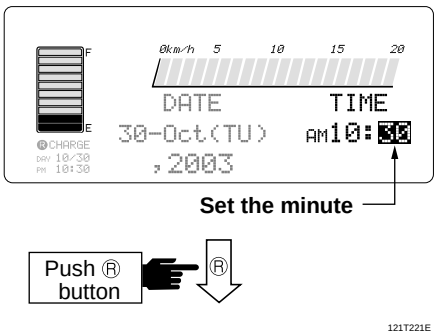
5. Set the hour

Push ⊖ or " ⊕ " button to set the hour. The hour can be set from 1 to 12.
After setting, push the " Ⓡ " button to move the cursor to the minute area.
If pushing " MODE " button, the cursor is returned to the AM or PM area.

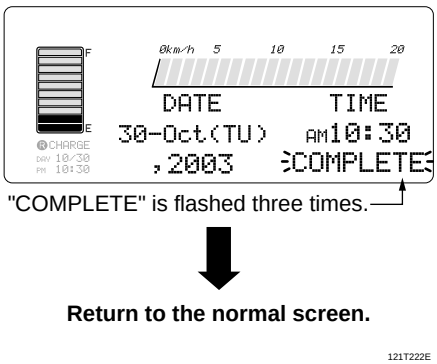


6. Set the minute

Push the "⊖" or "⊕" button to set the minute. The minute can be set from 00 to 59.



After setting, push the "Ⓡ" button.
Then “COMPLETE” message is flashed three times.
In any cases, push "MODE" button to get the previous step.



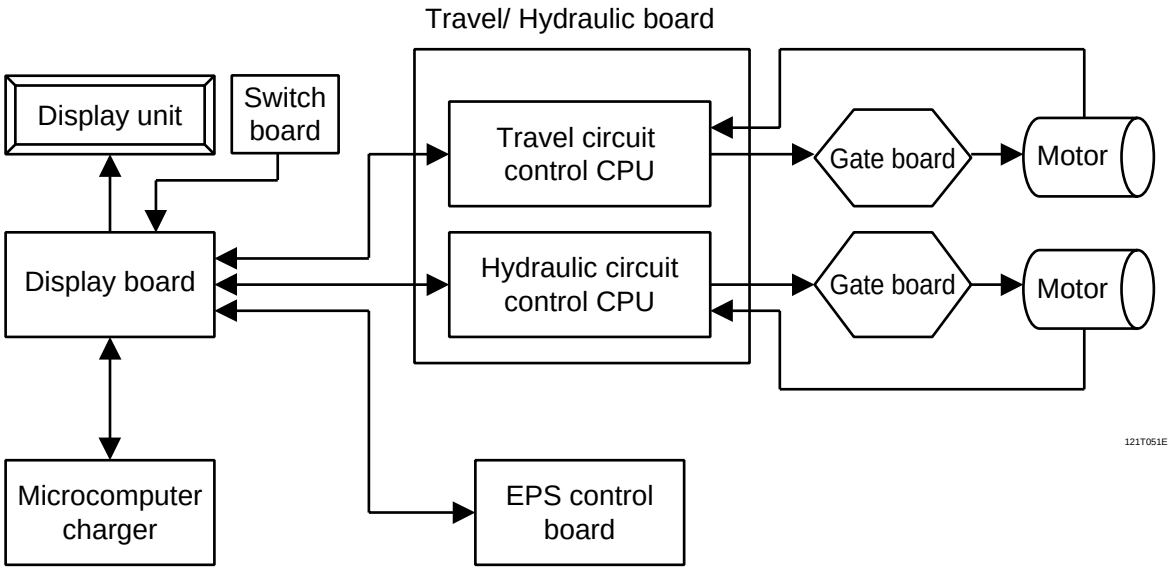
⚠CAUTION

- **When pushing the "⊖" or "⊕" button, the second is set to "00".**
- **After setting the minute and push the "Ⓡ" button, the second is set to "00".**
- **If set the date and time, the reserve charge setting is also renewed.**

2- 2. Explanation of the MPU board

2-2-1. Basic control board construction

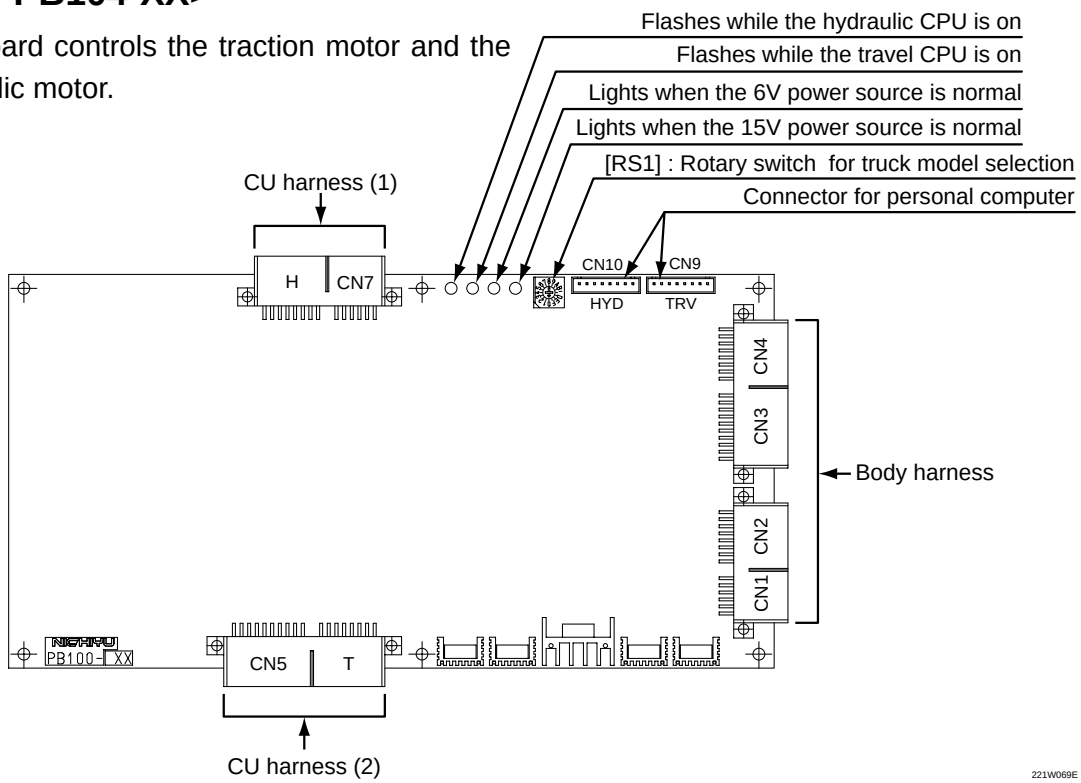
As shown in the figure below, the SICOS-AC uses the display board as the central point for connecting all other boards for the exchange of data. In addition, all control boards use a one-chip CPU (with flash ROM) as their main CPUs, so their ROM can not be removed.



2-2-2. Travel/ Hydraulic board

<Type : PB104-XX>

- This board controls the traction motor and the hydraulic motor.

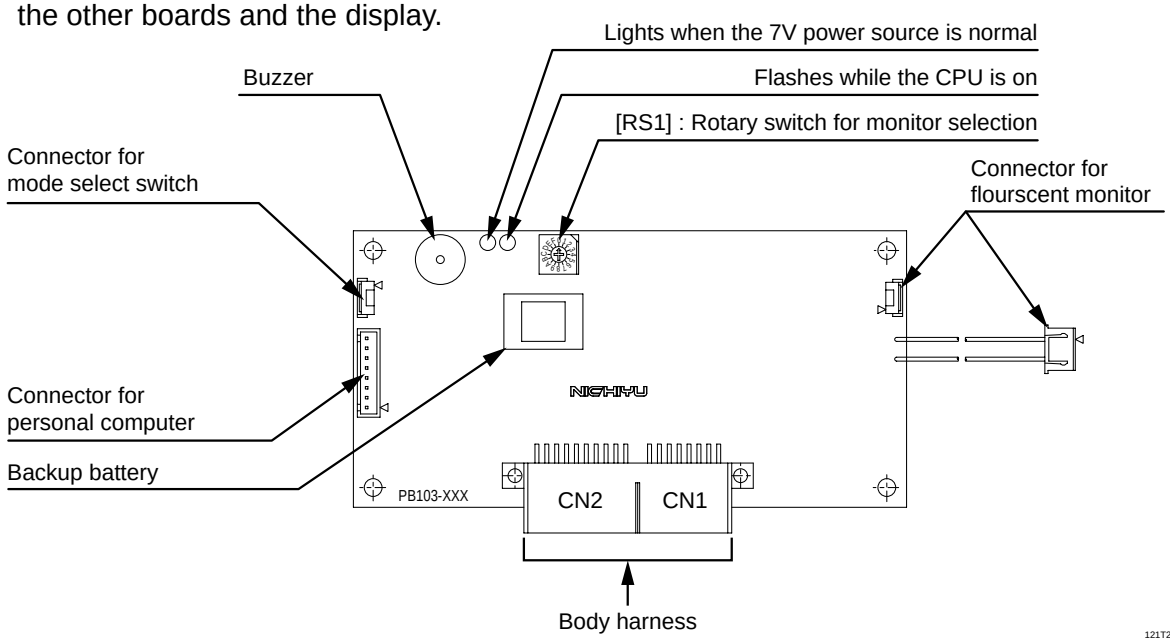


221W069E

2-2-3. Display board

<Type : PB103-XXX>

- This board controls both the data exchanged between the other boards and the display.



121T240E

⚠ CAUTION

Even when the key is turned off, voltage from the battery is still sent to the display board. Disconnect the battery plug before performing this work.

2-2-4. Rotary switch on the Travel/ Hydraulic board

The rotary switch (RS1) on the travel/hydraulic board is used to select forklift models. When replacing the travel/hydraulic board, be sure to refer to the table below to match it with the forklift.

● RS1 Setting forklift models.

RS1	Applicable forklift models
0	FB10P
1	FB14P・FB15P
2	FB18P
3	FB20P
4	FB25P
5	FB28P
6	FB30P
7	FB10P-U
8	FB14P-U・FB15P-U
9	FB18P-U
A	FB20P-U
B	FB25P-U
C	FBB15P
D	FBB20P・FBB25P
E	FBB30P
F	

Note: The standard board is not equipped with volumes.

Volume No.	Function	Remarks
VR1	Attachment 3 proportional control valve current adjustment	Turning the volume clockwise increases the current. (Only with optional proportional control valve)
VR2	Attachment 2 proportional control valve current adjustment	Turning the volume clockwise increases the current. (Only with optional proportional control valve)
VR3	Attachment 1 proportional control valve current adjustment	Turning the volume clockwise increases the current. (Only with optional proportional control valve)
VR4	Tilt proportional control valve current adjustment	Turning the volume clockwise increases the current. (Only with optional proportional control valve)
VR5	Lift proportional control valve current adjustment	Turning the volume clockwise increases the current. (Only with optional proportional control valve)

2-2-5. Rotary switch on the Display board

The rotary switch (RS1) on the display board is used for selecting the displays and adjustments shown in the table below.

● RS1 setting functions

RS1	Functions	Remarks
0	MONITORING OK	Turn the key switch ON.
	Normal monitor	Meters・・・・ etc. (See p.4.)
	Hour meter check	Total, travel, and hydraulic hour meters appear.
	Reserve charge screen	Specify when charging begins.
	Date and time setting	Set the date and time.
	Slow speed setting	Set the maximum speed under the slow speed mode. (2, 3, 4, 5, 6, 8, 10, 12km/h)
	Travel mode setting	Select ECONOMY, NORMAL, or POWER.
	Meter mode setting	Select the hour meter or odometer.
	Display mode setting	VIEW (contrast)・ BRIGHTNESS (0-F intensity of back light)
	Adjustment of regenerative power when accelerator is released	Select NON, LOW, MID, or HIGH
1	Monitor symbol setting	STEER, BATT, OIL, LOAD, BRAKE
2	Forklift model check	Displays the settings for the travel/hydraulic board
3	Plugging strength setting	0 – 32
	Brake strength setting	0 – 32
	Anti-slip setting	NON LOW MID HIGH
4	Maximum lift speed 1	0 – 32 (Fast) : For travel speeds of 0 – 5 Km/h
	Maximum lift speed 2	0 – 32 (Fast) : For travel speeds of 5 – 10 Km/h
	Maximum lift speed 3	0 – 32 (Fast) : For travel speeds of 10 Km/h
	Lift speed 1	0 – 32 (Fast) : 1st microswitch
	Lift speed 2	0 – 32 (Fast) : 2nd microswitch
	Tilt speed	0 – 32 (Fast)
	Reach speed	0 – 32 (Fast)
	Attachment 1 speed	0 – 32 (Fast)
	Attachment 2 speed	0 – 32 (Fast)
5	Display language selection	Six languages
6	Option setting	Set the options.
7	Voltage, current, and temperature check	
8	RAM and I/O memory data check	
9	Error history memory 1	Displays the details of the 10 latest cases
	Error history memory 2	Records all past errors
A	Battery voltage setting	Voltage settings for capacity standards
B	Turning speed reduction	0 – 16
C	AOS setting 1	Sets the lift/tilt end and others
D	AOS setting 2	Checks the lever switch
E	Memory initial	Clears the error history
F	Normal screen 2	No errors are displayed on the RS0 screen

* Refer to the Adjustment Standards List on page 22 for parameters.

Voltage [V]	Model	RS1 on TRV/ HYD board	RS1 on display board																					
			4									3		1							5			
			SPD-L LIFT	SPD-M LIFT	SPD-H LIFT	HYD LIFT-1	HYD LIFT-2	HYD TILT	HYD ATTAT. 1	HYD ATTAT. 2	HYD ATTAT. 3	PLUGG ING	BRAKE TRQ	TRAVEL	HYD	STEER	BATT	OIL	LOAD	BRAKE	Language	Travel speed (km/h)	Lift speed (mm/sec)	Plugging brake distance (m)
48V	FB10P	0	32	26	20	20	32	20	0	0	0	32	28	○	○	○				○	JAPAN	16.0/14.0	540/350	6.5−8.0
	FB14P	1	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑				↑	↑	16.0/14.0	540/330	6.5−8.0
	FB15P		↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑				↑	↑	16.0/14.0	540/320	6.5−8.0
	FB18P	2	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑				↑	↑	15.5/13.5	540/310	6.5−8.0
	FB20P	3	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑				↑	↑	16.0/14.0	470/280	6.8−8.3
	FB25P	4	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑				↑	↑	15.5/13.5	470/260	7.5−9.0
	FB28P	5	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑				↑	↑	15.0/13.0	410/250	7.5−9.0
72V	FB30P	6	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑				↑	↑	15.5/13.5	550/320	6.7−8.2
48V	FB10P-U	7	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑				↑	↑	18.0/16.0	650/470	8.1−9.6
	FB14P-U	8	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑				↑	↑	18.0/16.0	650/450	8.1−9.6
	FB15P-U		↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑				↑	↑	18.0/16.0	650/420	8.1−9.6
	FB18P-U	9	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑				↑	↑	17.5/15.5	650/400	8.1−9.6
	FB20P-U	A	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑				↑	↑	17.5/15.5	600/360	8.1−9.6
	FB25P-U	B	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑				↑	↑	17.0/15.0	600/340	9.0−10.5
48V	FBB15P	C	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑				↑	↑	16.0/14.0	650/420	6.5−8.0
72V	FBB20P	D	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑				↑	↑	16.0/14.0	600/360	7.0−8.5
	FBB25P		↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑				↑	↑	15.5/13.5	600/340	7.5−9.0
	FBB30P	E	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑				↑	↑	15.5/13.5	550/320	6.7−8.2
	Series-F	F																						

Plugging brake distance
- Flat, unladen, and full speed
- Specific gravity of electrolyte : more than 1.25 at 20
- Full acceleration

● Memory initial (display RS1=E)

Slow speed (turtle speed)	: 5km/h
Travel mode	: NORMAL
BRIGHTNESS	: 5
Neutral regenerative power	: MID
Meter mode	: Hour meter
Error history	: Clear

* When Japanese is not selected for display, "CHARGER" is automatically set to "OFF".
* Before the car inspection, set "POWER MODE" to "OFF".
* HOUR METER (hour meter count) setting
1: Key SW linked indication
2: Actual operation time indication

● Option setting (Display board RS1=6)

LIFT LOCK	: OFF	[Lift interrupt]
SPEED LIMIT	: OFF	[Speed limit at high lifting height]
SEAT SWITCH	: OFF fixed	[With seat switch]
FINGER TIP	: OFF fixed	[With finger tip]
AOS	: OFF	[With AOS]
POWER MODE	: ON fixed	[Power mode]
CHARGER	: ON	[Charger]
TILT STOP	: OFF	[Automatic tilt leveling]

* When Japanese is not selected for display, "CHARGER" is automatically set to "OFF".

● Language selection (Display board RS1=5)

JAPANESE	> モニタリング OK
ENGLISH	> MONITORING OK
FRENCH	> CONTROLEUR OK
GERMAN	> UEBERWACHUNG OK
SPANISH	> MONITOR OK
DUTCH	> MONITORING OK

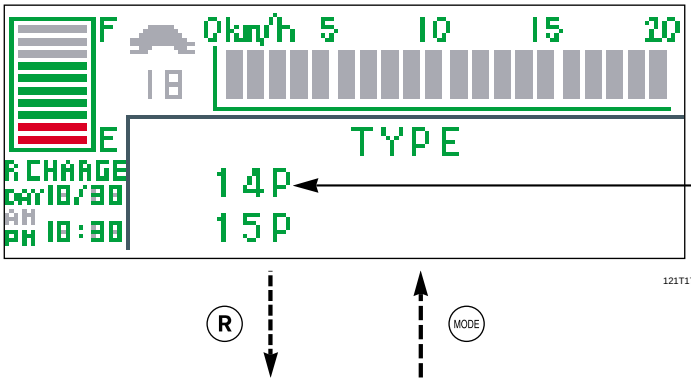
2-2-7. Confirmation of other services

Display

<Confirmation>

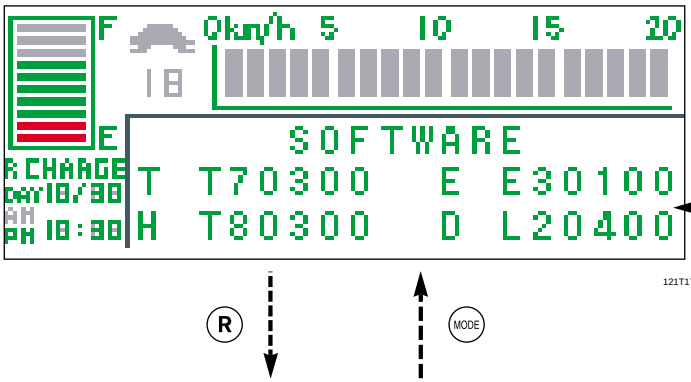
After pressing "Ⓡ" button for more than 3 seconds, it shows display as shown below.

● Model confirmation



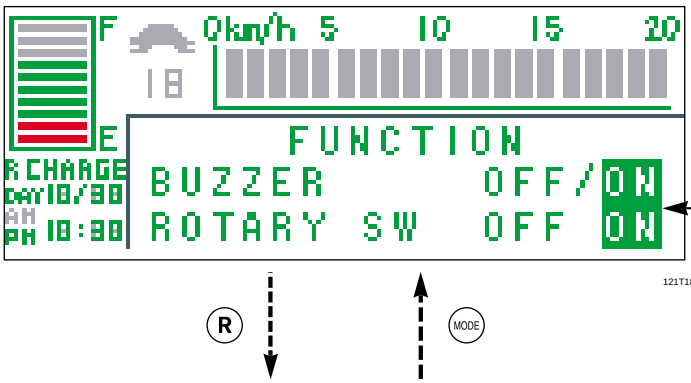
Shows the models set by RWS of travel, hydraulic board

● Software number confirmation



Shows the software numbers : T (travel), H (hydraulic), E (EPS), D (display)

● Buzzer mode, rotary SW mode setting



Shows buzzer mode setting by flashing

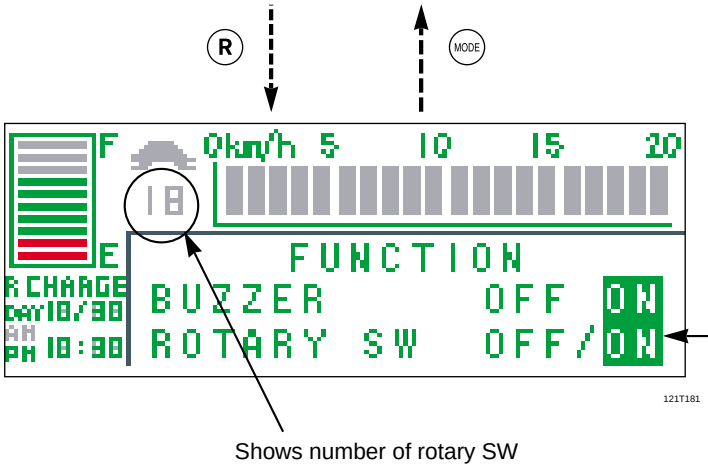
- Set buzzer mode by pressing "⊖" or "⊕" button (OFF/ON)

  ON: (Normal)

  OFF: (turns off all the buzzer except blinkers)
- Shows rotary SW mode setting turned over

(continues on next page)

(continued from previous page)



- Shows buzzer mode setting by flashing
- Set rotary SW mode by pressing "⊖" or "⊕" button (OFF/ ON)
  ON: normal
  OFF: ignores the RSW setting on display board and changes display mode change SW

⚠ CAUTION

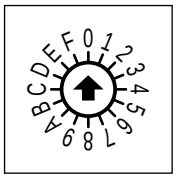
- **When unable to communicate between travel, hydraulic, EPS (broken wires etc.), software numbers are not displayed.**
- **If buzzer mode is set to OFF, all buzzer sounds are turned off except blinker sound.**
- **If rotary SW mode is set to OFF, the rotary SW is disabled on the board. You can rotate the rotary SW by "keeping pressing down ⊕ button for more than 3 seconds while pressing MODE button" or "keeping pressing down ⊖ button for more than 3 seconds while pressing MODE button.**

2- 3. SICOS-AC check and adjustment

⚠CAUTION

- **Even if the key is turned off, battery voltage is still supplied to the display board. Disconnect the battery plug before performing this work.**
- **After finishing the setting, be sure to return rotary switch RS1 to "0".**
- **When measuring the electric current, measure the motor current in AC mode and the battery current in DC mode.**

● Display board



Return RS1 to "0".

2-3-1. Chassis insulation check

<Checking procedure>

1. Disconnect the battery plug.
2. Remove the connector on the battery electrolyte level detection line (green/black) in the control unit.
   [Only models of electrolyte level detector is equipped]
3. Use a tester to measure the insulation resistance between positive (+) terminal of the chassis battery plug and chassis, and between negative (-) terminal of the chassis battery plug and chassis.

Standard value	1M Ω or greater

2-3-2. Battery voltage adjustment

<Measuring points>

- Pull the battery out and disconnect the plug. At the terminal section where the battery line appears, measure the battery voltage. Depending on the model setting, display for 24V or 48V is automatically selected.

<Measuring conditions>

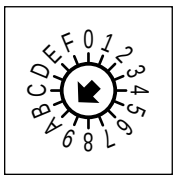
Specific gravity of the battery electrolyte : more than 1.25 at 20℃

<Measuring instrument>

Use a digital tester that can measure 1/100V.
Use Direct current (DC) mode.

<Adjusting procedure>

- Display board

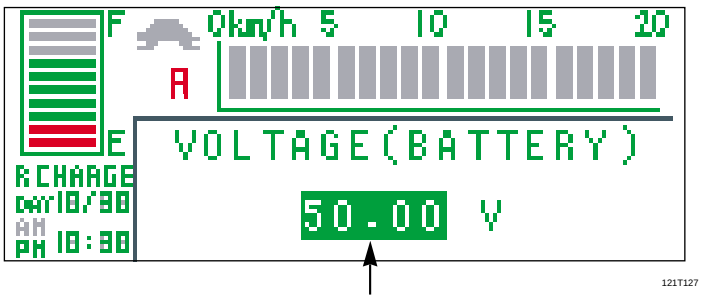


Set RS1 to "A".

1. Set rotary switch RS1 on the display board to "A".

2. Turn the key switch ON and the following screen appears.

- Battery voltage setting screen



Battery Voltage Parameter (flashing)

3. Set the parameter for battery voltage the same as the measured value for the tester.

NOTE **The allowable error is within ± 0.1 V.**

- Press (+) button to increase the parameter.
- Press (−) button to decrease the parameter.

2-3-3. Current detector check

Traction motor current check

<Measuring point>

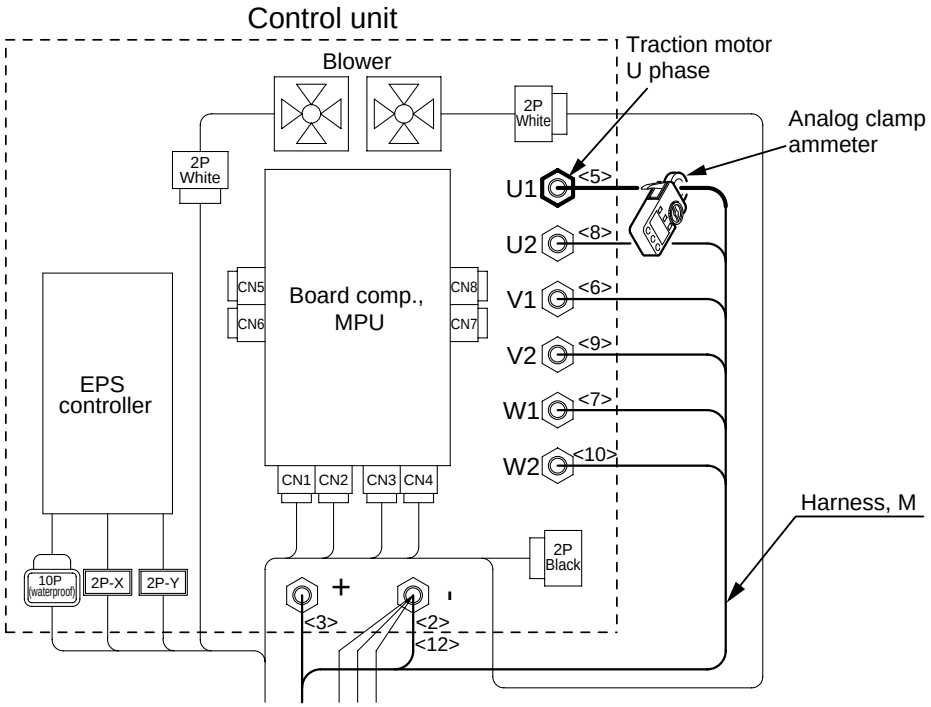
IU: traction motor U phase electric current (V phase and W phase are also possible.)

<Measuring conditions>

Specific gravity of the battery electrolyte : more than 1.25 at 20℃

<Measuring instrument>

Alternating current (AC) mode



⚠ CAUTION

When measuring AC motor current, use the recommended ammeter below:
Recommended ammeter :
Hioki 3109-01 (Analog)
Hioki 3209 AC/DC high tester (Digital)

⚠ CAUTION

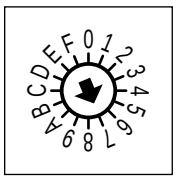
When measuring locked travel/hydraulic motor current using Hioki 3209 AC/DC (Digital), you need to:

1. **Use AC + DC mode**
2. **Use H mode (do not use AUTO range)**
3. **Use SLOW response**

<Checking procedure>

1. Set rotary switch RS1 on the display board to "7".

● Display board

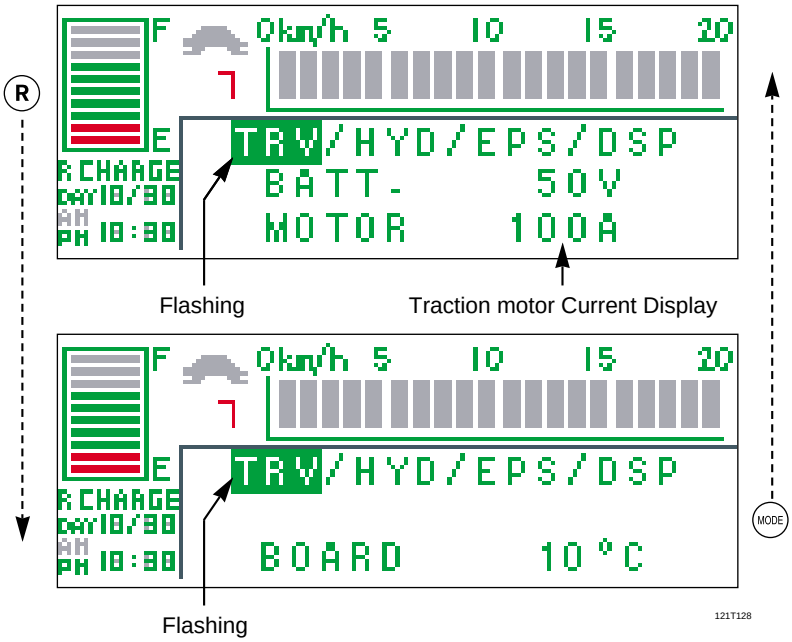


Set RS1 to "7".

2. Turn the key switch ON and the following screen appears.

NOTE **If TRV is not flashing, press ◁ button to make it flash.**

● Voltage, current, and temperature checking screen.



3. With the electric current off, check if the traction motor current display (MOTOR) shows 000A.
4. Jack up the drive wheel and perform the following.

Idling

Idle away by applying the accelerator fully.

Locked

Release the brake pedal, turn the brake micro switch ON, strengthen the brake spring (up to the level which stops the revolution) and then apply the accelerator fully.

WARNING **Before measurement, be sure to jack up the drive wheel.**

5. Check if the traction motor current display (MOTOR) shows a traction motor current (IU) meter value within ±20A.

Hydraulic motor current check

<Measuring point>

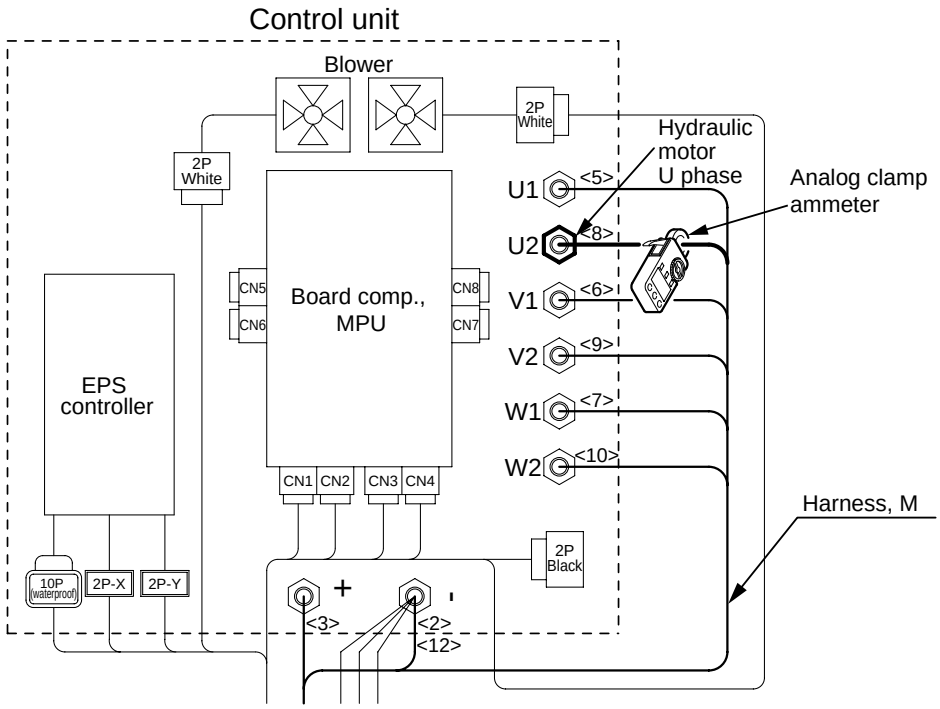
IU: hydraulic motor U phase electric current (V phase and W phase are also possible.)

<Measuring conditions>

Specific gravity of the battery electrolyte : more than 1.25 at 20℃

<Measuring instrument>

Alternating current (AC) mode



⚠ CAUTION

When measuring AC motor current, use the recommended ammeter below:
Recommended ammeter :
Hioki 3109-01 (Analog)
Hioki 3209 AC/DC high tester (Digital)

⚠ CAUTION

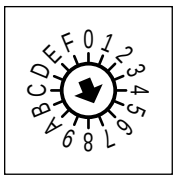
When measuring locked travel/hydraulic motor current using Hioki 3209 AC/DC (Digital), you need to:

1. **Use AC + DC mode**
2. **Use H mode (do not use AUTO range)**
3. **Use SLOW response**

<Checking procedure>

1. Set rotary switch RS1 on the display board to "7".

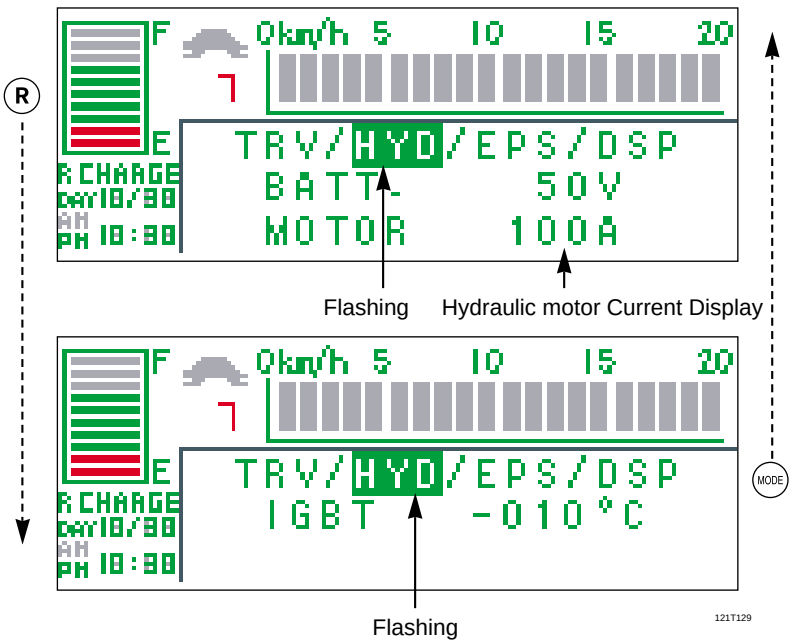
● Display board



Set RS1 to "7".

2. Turn the key switch ON and the following screen appears.
3. Press either ⊕ or ⊖ button to make HYD flash.

● Voltage, current, and temperature checking screen.



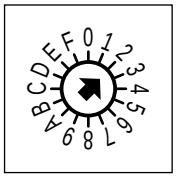
4. With the electric current off, check if the hydraulic motor current display (MOTOR) shows 000A.
5. Set the lift in the relief state.
6. Check if the hydraulic motor current display (MOTOR) shows a hydraulic motor current (IU) meter value within ±20A.

2-3-4. Forklift model setting check and adjustment

<Checking procedure 1>

1. Set rotary switch RS1 on the display board to "2".
2. Turn the key switch ON and the following screen appears.
3. Make sure the model is set correctly.

● Display board



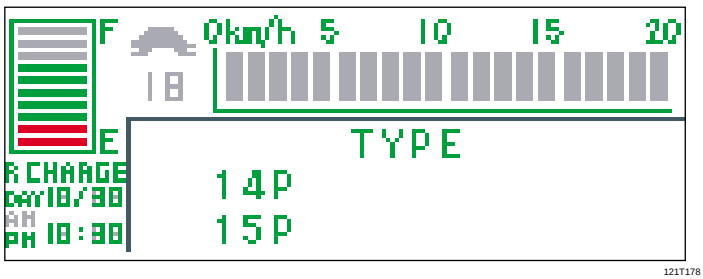
Set RS1 to "2".

<Checking procedure 2>

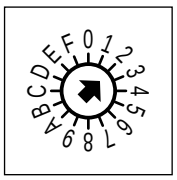
1. Keep pressing (R) button for 5 seconds.
2. The display changes as shown below.
3. Confirm the correct model is set.
4. After confirmation, press (R) button again to exit the checking.

● Forklift model checking screen

(If rotary switch RS1 on the travel/hydraulic board is set to "2")



● Travel/hydraulic board



RS1="2"

<Adjusting procedure>

1. Forklift model setting: set the model with rotary switch RS1 on the travel/ hydraulic board.

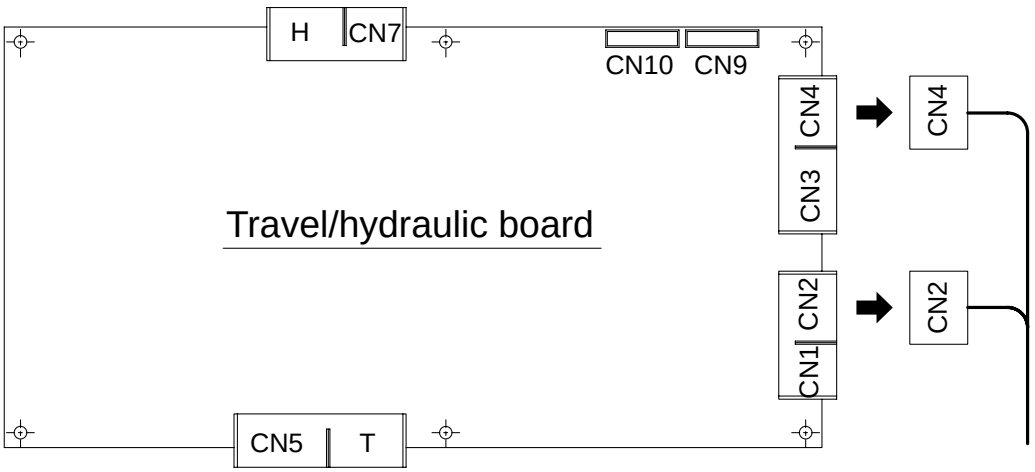
● RS1 setting forklift models (Travel/ Hydraulic board)

RS1	Applicable forklift models
0	FB10P
1	FB14P・FB15P
2	FB18P
3	FB20P
4	FB25P
5	FB28P
6	FB30P
7	FB10P-U
8	FB14P-U・FB15P-U
9	FB18P-U
A	FB20P-U
B	FB25P-U
C	FBB15P
D	FBB20P・FBB25P
E	FBB30P
F	

2-3-5. Safety circuit for control (contactor tripping) check

<Checking procedure>

1. Turn the key switch to OFF, and disconnect the battery plug.
2. Disconnect connectors of travel/hydraulic board (CN2 and CN4).



Disconnect CN2 and CN4 simultaneously.

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⚠ CAUTION

Do not travel or manipulate the hydraulic when only one end of CN2 or CN4 is disconnected. It may damage IGBT module.

3. Connect the battery plug and turn the key switch on.
4. Operate the accelerator, and make sure an alarm sounds, main contactor trips, and the error messages comes on as shown below.

● Error messages

B 11 : IGBT-TRAVEL
⁕FAIL OPERATION⁕
⁕TURN OFF KEY SWITCH⁕

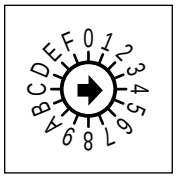
2-3-6. Hydraulic setting check and adjustment

<Checking procedure>

1. Set rotary switch RS1 on the display board to "4".

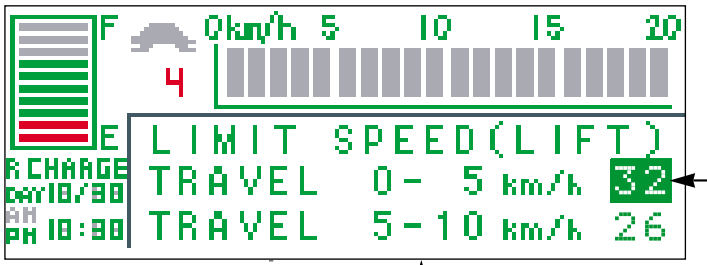
2. Turn the key switch ON and the following screen appears.
3. Make sure that the parameter items are set the same as the values on the Adjustment Standards List on page 22.

● Display board



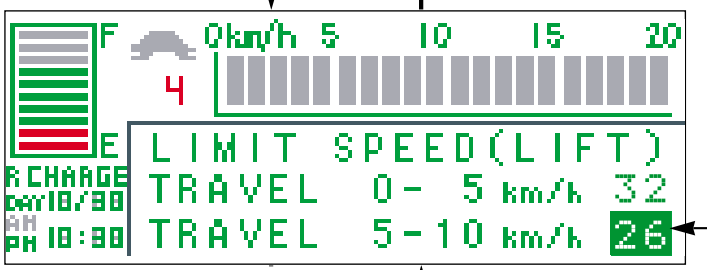
Set RS1 to "4".

● Hydraulic speed setting screen



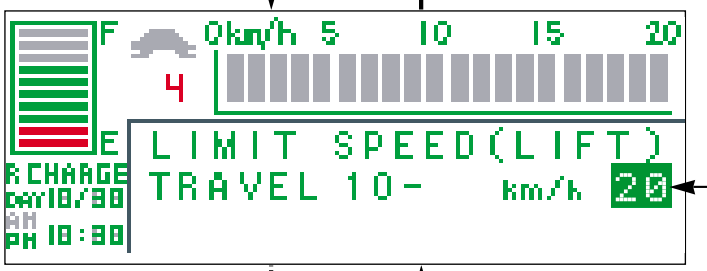
The parameters flash.
● Set hydraulic speed limit of traveling speed 0-5km/h by pressing ⊳ or ⊲ button (0 - 32).

R MODE



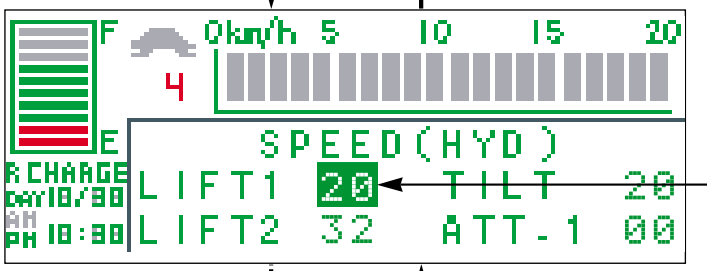
The parameters flash.
● Set hydraulic speed limit of traveling speed 5-10km/h by pressing ⊳ or ⊲ button (0 - 32).

R MODE



The parameters flash.
● Set hydraulic speed limit of traveling speed 10-km/h by pressing ⊳ or ⊲ button (0 - 32).

R MODE

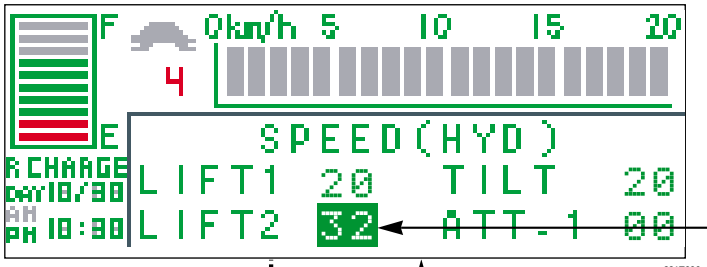


The parameters flash.
● Set LIFT1 hydraulic speed by pressing ⊳ or ⊲ button (0 - 32).

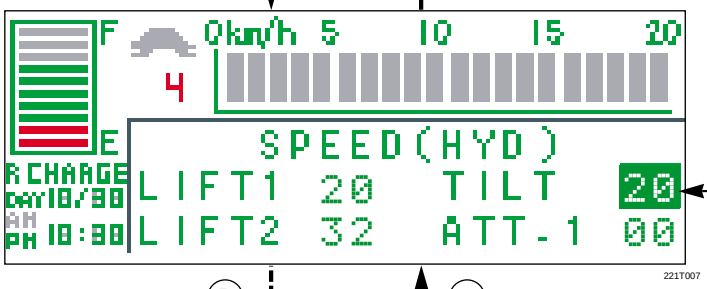
R MODE

(continues on next page)

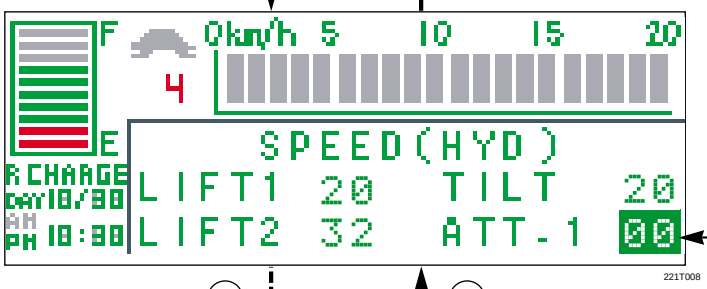
(continued from previous page)



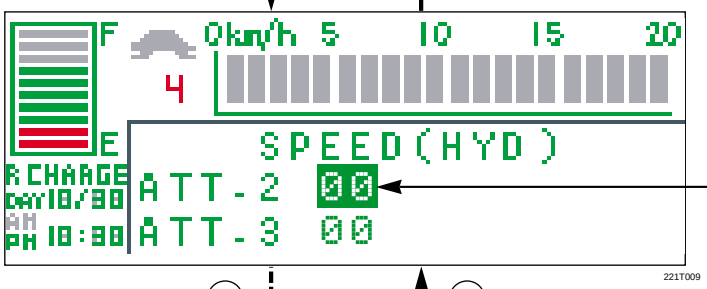
The parameters flash.
- Set LIFT2 hydraulic speed by pressing ⊕ or ⊖ button (0 - 32).



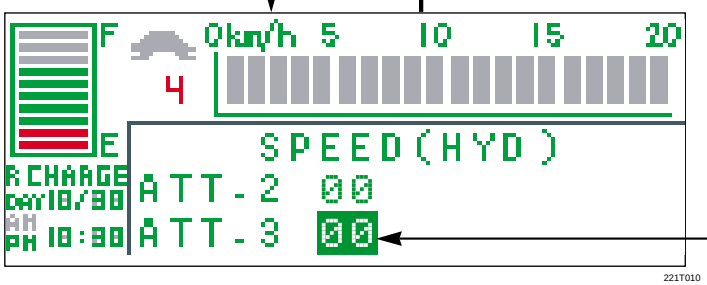
The parameters flash.
- Set TILT hydraulic speed by pressing ⊕ or ⊖ button (0 - 32).



The parameters flash.
- Set ATT.1 hydraulic speed by pressing ⊕ or ⊖ button (0 - 32).



The parameters flash.
- Set ATT.2 hydraulic speed by pressing ⊕ or ⊖ button (0 - 32).



The parameters flash.
- Set ATT.3 hydraulic speed by pressing ⊕ or ⊖ button (0 - 32).

<Adjusting procedure>

1. Press either (R) or (MODE) button to move the flashing icon to the parameter you want to change.
2. Press ⊕ button to increase the parameter.
3. Press ⊖ button to decrease the parameter.

<Attachment parameter>

Parameter of attachment is listed below.

Attachment	HYD ATTAT parameter
SF	09

2-3-7. Descending regeneration check

<Checking procedure>

1. Release the brake pedal to stop the truck on a slope.
2. Make sure that the truck descends the slope at a speed of 1 km/h ±0.5 when the brake pedal is stepped on.

2-3-8. Switch back (plugging/ regenerative) braking force adjustment

<Standard parameter>

- Refer to the Adjustment Standards List on page 22.

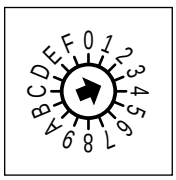
<Measuring conditions>

- Flat ground, unladen, and full speed
- Specific gravity of the battery electrolyte : more than 1.25 at 20℃

<Adjusting procedure>

1. Set rotary switch RS1 on the display board to "3".

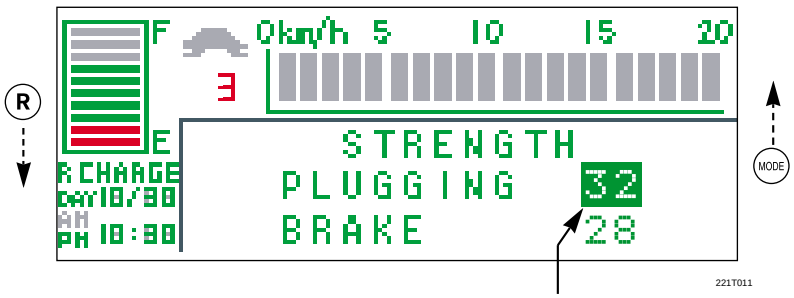
- Display board



Set RS1 to "3".

2. Turn the key switch ON and the following screen appears.

- Plugging and braking strength setting screen



Plugging Strength Parameter (flashing)

3. Check if the PLUGGING parameter is flashing.

NOTE

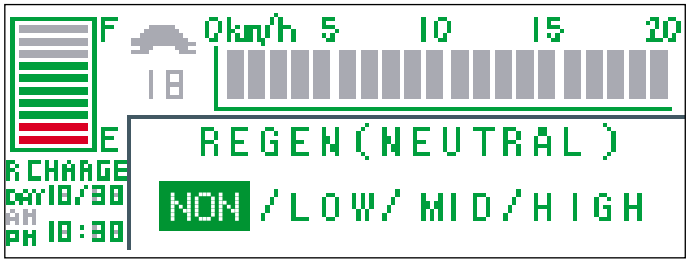
If the PLUGGING parameter is not flashing, press (MODE) button.

4. Press (+) button to increase the braking force.
5. Press (−) button to decrease the braking force.

2-3-9. Regenerative braking force check and adjustment

<Checking procedure>

1. Cancel the neutral (released accelerator) regeneration. Refer to "[5] Regeneration (Neutral) mode setting" on page 15.

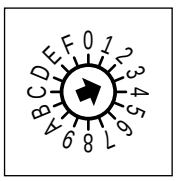


2. Travel forward at a moderate speed and return the accelerator lever to the neutral position.
3. Lightly depress the brake pedal.
4. Check if a light braking force (regenerative braking) is applied.

<Adjusting procedure>

1. Set rotary switch RS1 on the display board to "3".

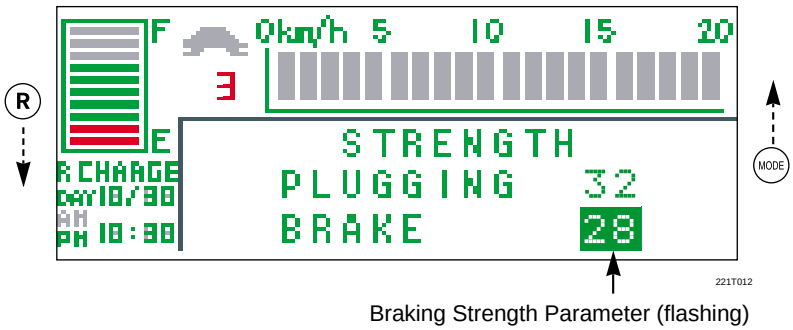
● Display board



Set RS1 to "3".

2. Turn the key switch ON and the following screen appears.

● Plugging and braking strength setting screen



Braking Strength Parameter (flashing)

3. Press (R) button to move the flashing icon to the BRAKE parameter.
4. Press (+) button to increase the braking force.
5. Press (−) button to decrease the braking force.

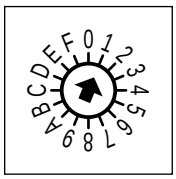
2-3-10. Safety monitor symbol check and adjustment

<Checking procedure>

1. Set rotary switch RS1 on the display board to "1".

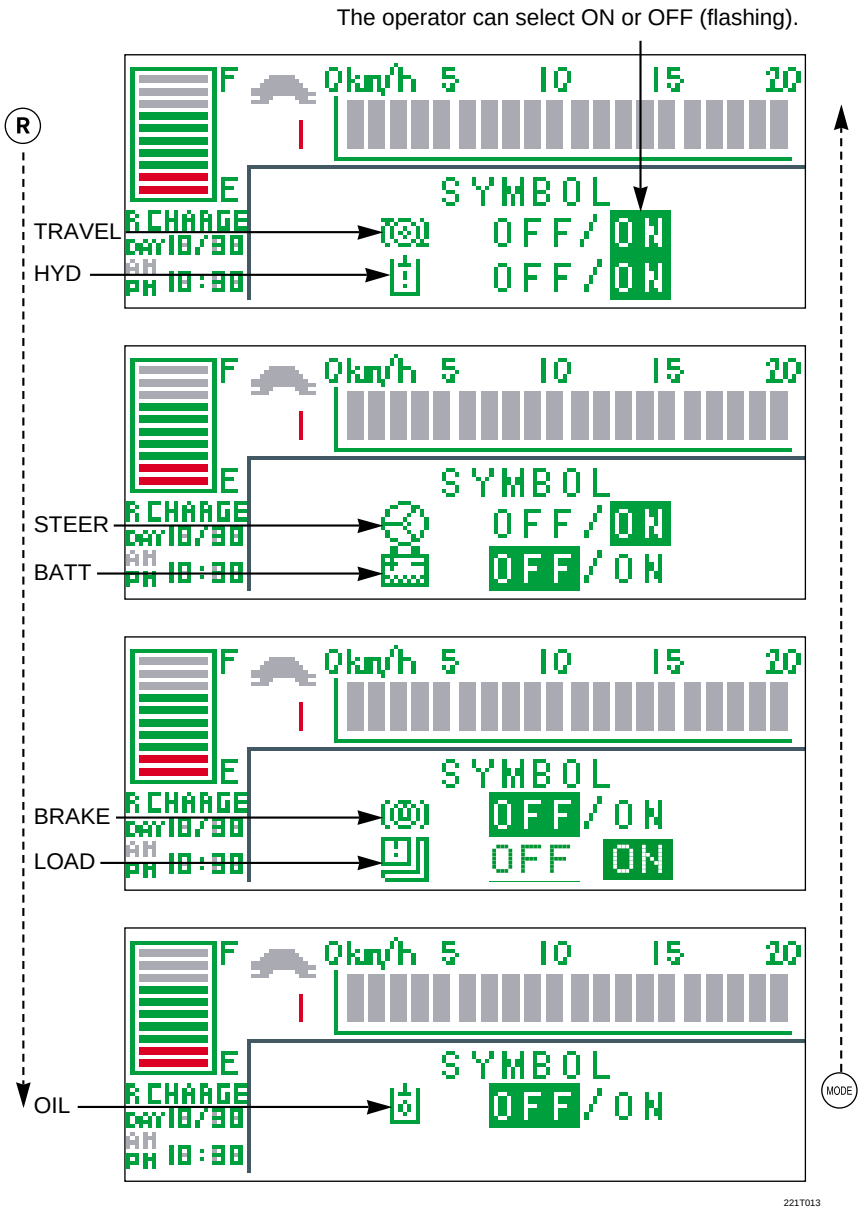
2. Turn the key switch ON and the following screen appears.
3. Make sure that the parameter items are set the same as the values on the Adjustment Standards List on page 22.

● Display board



Set RS1 to "1".

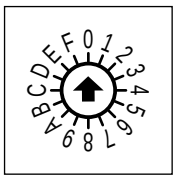
● Monitoring symbol setting screen



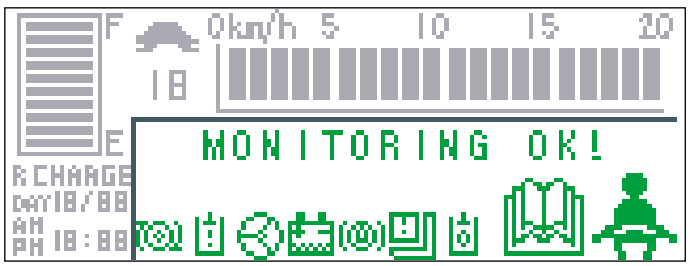
<Adjusting procedure>

1. Press either (R) or (MODE) button to move the flashing icon to the item you want to change.
2. Press (+) button to turn the item ON.
3. Press (−) button to turn the item OFF.
4. Turn the key switch OFF and return rotary switch RS1 to "0".
5. Turn the key on again.
   The symbol indicating that the monitoring symbol setting screen is set to ON is displayed.

● Display board



Return RS1 to "0".



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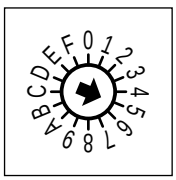
NOTE **When the display board is reset, TRAVEL, HYD, STEER and BRAKE are automatically turned ON.**

2-3-11. Display language check and adjustment

<Checking procedure>

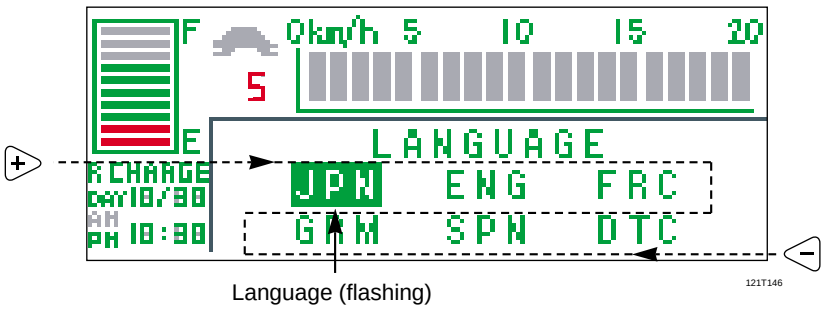
1. Set rotary switch RS1 on the display board to "5".
2. Turn the key switch ON and the following screen appears.
3. Check if the display language is set to your preference.

● Display board



Set RS1 to "5".

● Display language setting screen.



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Language (flashing)

<Adjusting procedure>

1. Press either (+) or (−) button to select your preferred language.

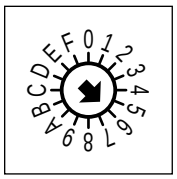
2-3-12. Optional setting check and adjustment

<Checking procedure>

1. Set rotary switch RS1 on the display board to "6".

2. Turn the key switch ON and the following screen appears.
3. Check if the options are set to your preferences.

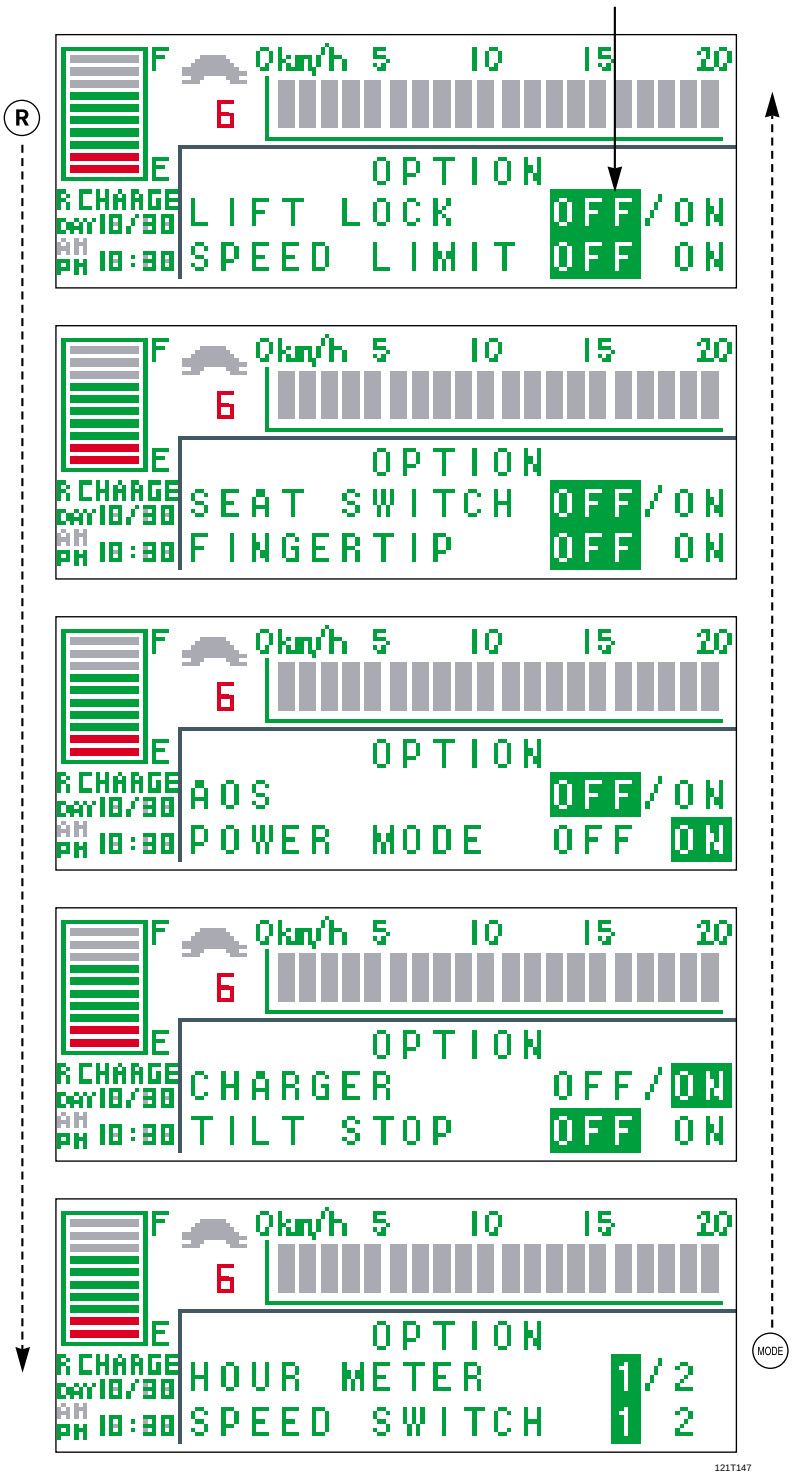
● Display board



Set RS1 to "6".

● Optional setting screen

The operator can select ON or OFF (flashing).



Optional setting mode		Standard setting	Remarks
LIFT LOCK	Lift interrupt	OFF	Lift locks when only one red segment is left on battery discharge indicator
SPEED LIMIT	High lift height	OFF	Need to install action switch separately
SEAT SWITCH	With seat switch	OFF	Need to install seat switch separately
FINGER TIP	With finger tip	OFF	Equipped with finger tip system hydraulic lever models
AOS	With AOS	OFF	Equipped with AOS function models
POWER MODE	Can change to travel mode	ON	ON fixed, for FB (disabled to set power mode)
CHARGER	Can set a timer for charging	ON	Does not show timer charging display
TILT STOP	Automatic tilt leveling	OFF	Equipped with Tilt Automatic Stop function models
HOUR METER 1		1	1: Key switch ON 2: Actual operation time (motor operation time) Changing view (both counting)
SPEED SWITCH 1		1	1: Using standard turtle switch 2: Using old turtle switch

NOTE

All modes on standard forklifts other than POWER MODE are set to OFF. An optional mode can only be turned ON if that option has been installed on the forklift.

<Adjusting procedure>

1. Press either (R) or (MODE) button to move the flashing icon to the item you want to change.
2. Press (+) button to turn the item ON.
3. Press (−) button to turn the item OFF.

2-3-13. Display brightness check and adjustment

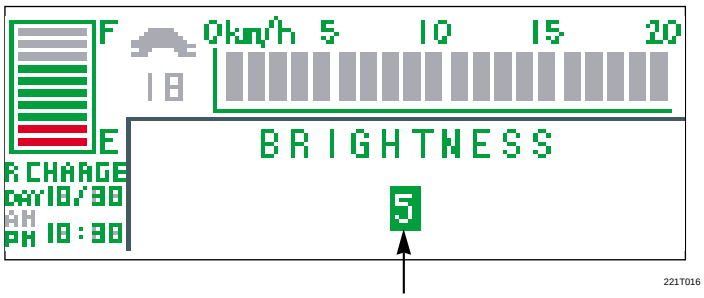
<Checking procedure>

- Make sure that the information on the display can be read clearly even indoors.

<Adjusting procedure>

1. Press (R) or (MODE) button repeatedly till the display adjustment screen appears.

- Display adjustment screen



Display brightness parameter (flashing)

2. Check if the BRIGHTNESS parameter is flashing.
3. Press (+) or (−) button to adjust the brightness (0-7).
   - Press (+) button to increase the parameter.
   - Press (−) button to decrease the parameter.

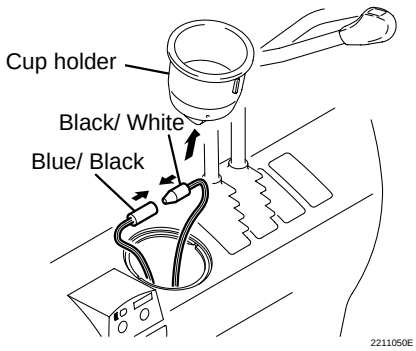
2-3-14. Hour meter working check

<Checking procedure>

1. Connect the following connector terminal.

NOTE

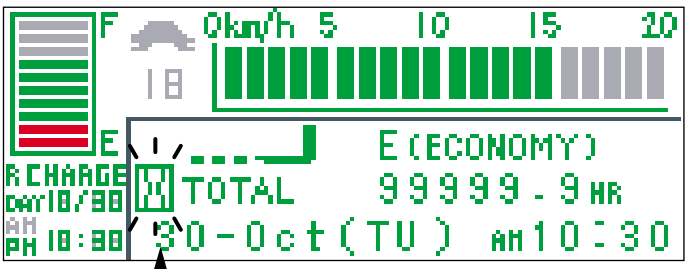
Connector terminal
Location : Inside the front cover, underneath the cup holder
Wire colors : Blue/black and black/white



2. Make sure that the hourglass symbol on the display flashes when the hydraulic or travel controls are operated.

CAUTION

- **After completing the check, be sure that the connector terminal is left unplugged until the forklift is delivered to the customer.**
- **When hour meter actual operation time is used, set HOUR METER to "2". ("1" is for Key SW linked indication)**



Normal : key SW ON (white)

Option : actual operation (colored)

2-3-15. Auto power off function working check

<Checking procedure>

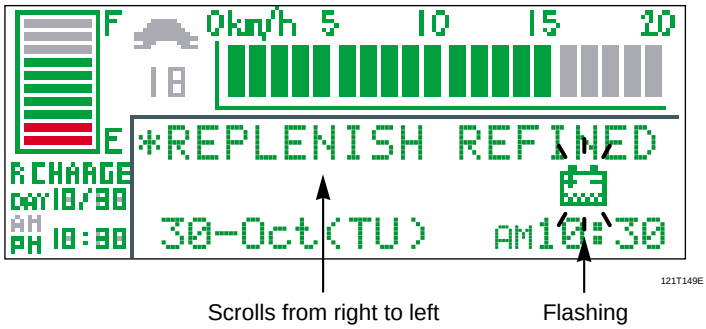
1. Turn the key switch ON.
2. Make sure that the key turns off automatically after about 15 minutes.

2-3-16. Battery electrolyte level (optional) working check (for GS battery only)

<Checking procedure>

1. Remove the battery electrolyte level sensor and make an electrolyte level drop status.
2. Make sure that "✻REPLENISH REFINED WATER FOR BATTERY✻" scrolls from right to left across the display.

● Battery electrolyte level



2-3-17. Turn signal lamp working check

<Checking procedure>

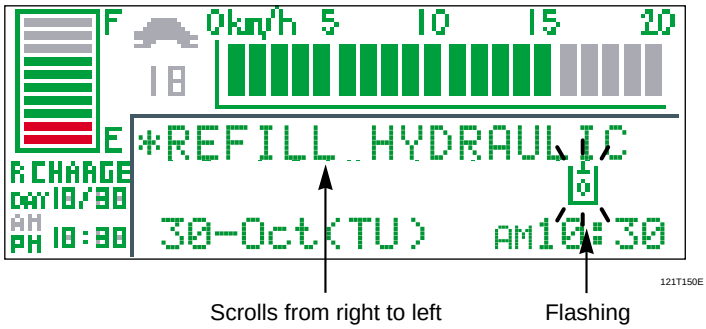
1. When the turn signal lever is operated, make sure that the turn signal lamp flashes and at the same time a buzzer sounds.
2. When the turn signal lever is operated in one direction and the steering wheel is turned in the other direction within 12 seconds, make sure that the turn signal lamp goes off. However, if the steering wheel is not turned within 12 seconds, the turn signal will go off automatically.

2-3-18. Hydraulic oil level (optional) working check

<Checking procedure>

1. Fully lift-up the lift and turn the key switch to ON.
2. Make sure that "✻REFILL HYDRAULIC OIL✻" scrolls from right to left across the display.

● Hydraulic oil (optional)

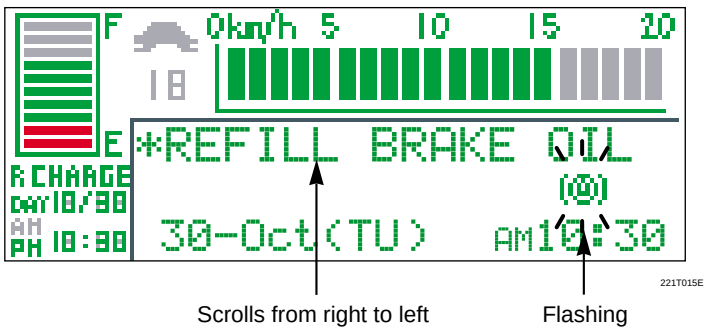


2-3-19. Brake oil level working check

<Checking procedure>

1. Remove the sensor and make an oil level drop status.
2. Make sure that "✻REFILL BRAKE OIL✻" scrolls from right to left across the display.
   (The display will appear different from below if a language other than English has been selected.)

● Brake oil

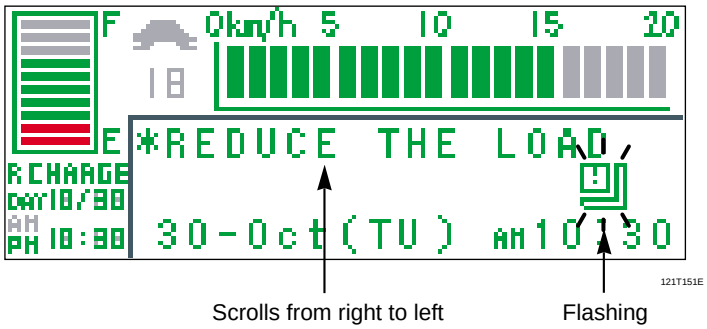


2-3-20. Overload (optional) working check

<Checking procedure>

1. Fully lift-up the fork and make a relief valve work.
2. Make sure that "✻REDUCE THE LOAD✻" scrolls from right to left across the display.

● Over loading (optional)



2-3-21. Travel inhibitor (optional) working check

<Checking procedure>

1. Connect the [-] line of "Black/ White" to the connector of "CN5-2 pin" on the Travel/ Hydraulic board.
   (Refer to "4-1. FB-75 System wiring".)
2. Make sure that the truck does not start even if the accelerator pedal is operated.

2-3-22. Cooling fan working check

<Checking procedure>

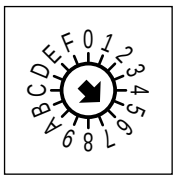
1. Make sure that the cooling fan operates during travel or hydraulic operation.
2. While travel and hydraulic operation are stopped, make sure that the cooling fan stops when the temperature inside the control unit is 35℃ or less, and that it operates at low speed when the temperature inside the control unit is 40℃ or higher.

2-3-23. Lift interrupt (optional) working check

<Checking procedure>

1. Set rotary switch RS1 on the display board to "6".
2. Turn the key switch ON.
3. Set "LIFT LOCK" mode to "ON".
   Refer to "2-3-12. Optional setting check and adjustment" on page 40.

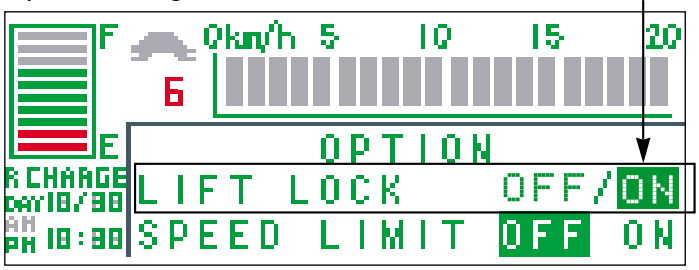
● Display board



Set RS1 to "6".

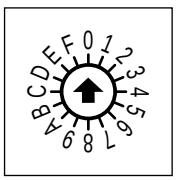
● Option setting screen

Set to ON (flashing)

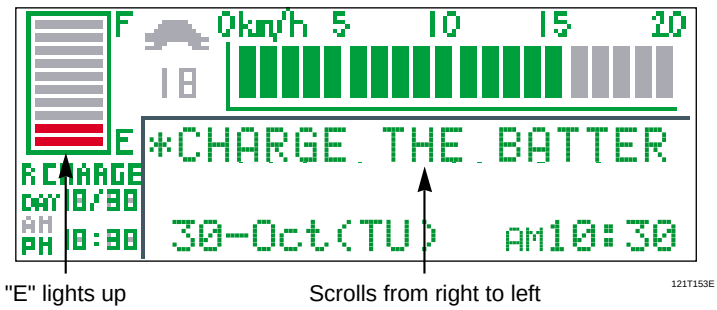


4. Turn the key switch OFF and return the rotary switch RS1 to "0".
5. Connect a 40 - 46V power supply to the battery plug.
6. Turn the key on again.
7. Make sure that "✻CHARGE THE BATTERY✻" scrolls from right to left across the display. (The display will appear different from below if a language other than English has been selected.)

● Display board



Return RS1 to "0".



"E" lights up

Scrolls from right to left

NOTE

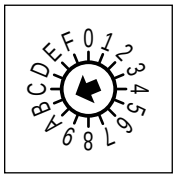
Under the above conditions, the lift speed will be 50%. If the battery discharge indicator flashes one segment, ✻CHARGE THE BATTERY✻ will scroll continuously across the display and the lift will stop (There is no need to check this).

2-3-24. Turning speed reduction (optional) adjustment and working check

<Adjusting procedure>

1. Set rotary switch RS1 on the display board to "B".

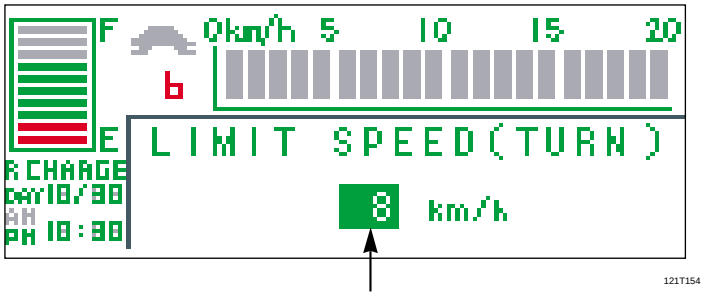
● Display board



Set RS1 to "B".

2. Turn the key switch ON and the following screen appears.

● Turning limit speed setting screen



Parameter (flashing)

3. Press either the ⊕ or ⊖ button to adjust the parameter (0-16km/h).
   - Press the ⊕ button to increase the parameter.
   - Press the ⊖ button to decrease the parameter.

<Checking procedure>

1. Turn the steering wheel all the way to either the right or the left.
2. Operate the accelerator lever.
3. Make sure that the speed limitation is applied and that the forklift does not accelerate excessively.

⚠CAUTION **A turning detection limit switch must be installed in order to use this option.**

2-3-25. Laser pointer (optional) working check

<Adjusting procedure>

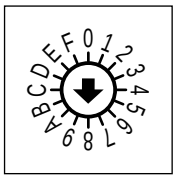
1. Turn on the laser pointer switch on the front panel.
2. Operate the tilt lever to tilt the mast horizontal.
3. Set the laser pointer horizon sensor to detect evenness.
4. In a horizontal position, the display shows the status and LD is output.

2-3-26. Accelerator potentiometer adjustment

<Adjusting procedure 1>

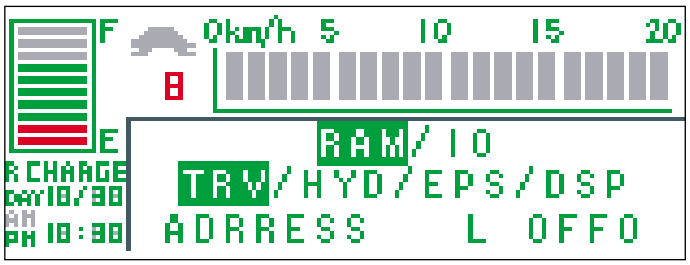
1. Set rotary switch RS1 on the display board to "8".

● Display board



Set RS1 to "8".

2. Turn the key switch ON and the following screen appears.



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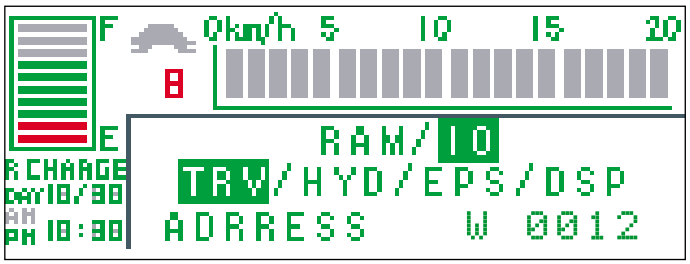
3. Press (MODE), (R), (+), or (−) to select "I/O", "TRV", and "W0012".
(See "3-3. I/O check" on page 62 to learn setting.)

4. Loosen and adjust the screw on the accelerator potentiometer to set "DATA" to AFH ±20H with the accelerator in the neutral position.

● I/O check mode



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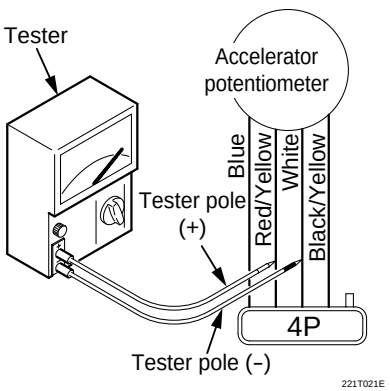
DATA
8F/0000000010001111
⬍
CF/0000000011001111

<Adjusting procedure 2>

1. Provide 5 V power supply to the accelerator potentiometer.
2. Unplug the connector and insert the voltage measuring adaptor.
3. Measure the voltage of the white cord by the tester.
4. Loosen and adjust the screw on the accelerator potentiometer to set output voltage to 0.85 ± 0.1 V with the accelerator in the neutral position.



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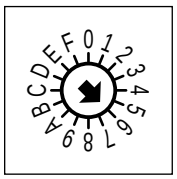
2-3-27. Seat switch (optional) working check

<Adjusting procedure>

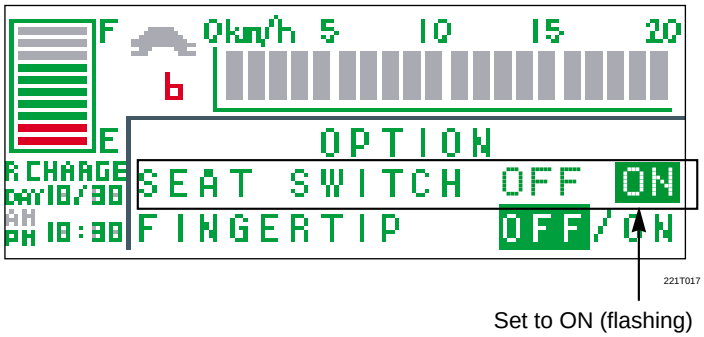
1. Set rotary switch RS1 on the display board to "6".

● Display board



Set RS1 to "6".

2. Turn the key switch ON and the following screen appears.



Set to ON (flashing)

3. Press ⊕ or ⊖ button to set "SEAT SWITCH" to "ON".

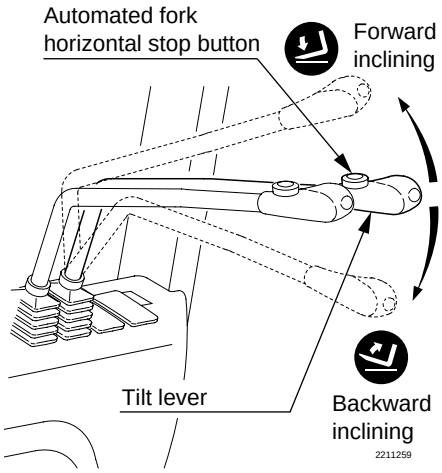
<Checking procedure>

1. Travel without taking a seat.
2. Make sure it is not traveling.

2-3-28. Automated fork horizontal stop (optional)

What is automated fork horizontal stop?

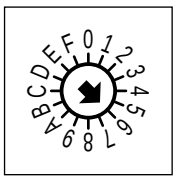
- It detects the mast's tilt angle by potentiometer. It also turns [ON/OFF] the oil flowing in the hydraulic circuit, and turns [ON/OFF] the hydraulic motor.
- If the fork is located upper than the horizontal position, pressing "automated fork horizontal stop" button and then inclining the tilt lever forward makes the fork to stop at the horizontal position.



Adjusting the potentio for tilt angle detection

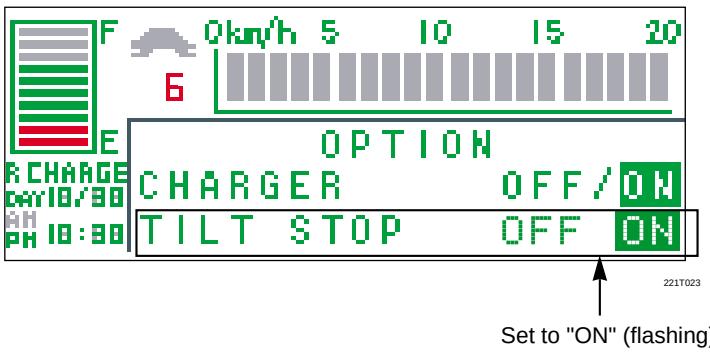
1. Set the rotary switch RS1 to "6" on the display board.
2. Turn the key switch ON.
3. Set the "TILT STOP" to "ON".

● Display board



Set RS1 to "6".

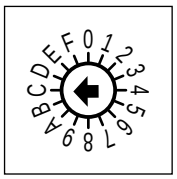
● Option setting screen



Set to "ON" (flashing)

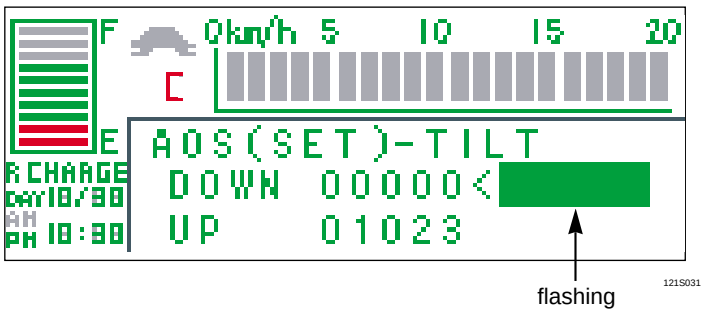
4. Turn the key switch OFF, and set the rotary switch RS1 to "C".
5. After turning the key switch ON, the following screen will appear.

● Display board



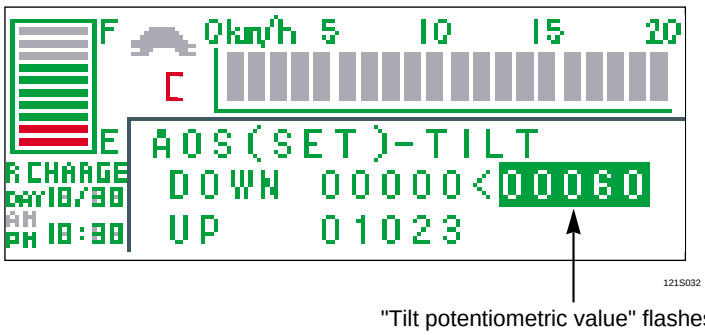
Set RS1 to "C".

● AOS setting screen



flashing

6. The tilt potentiometric value flashes after a while.



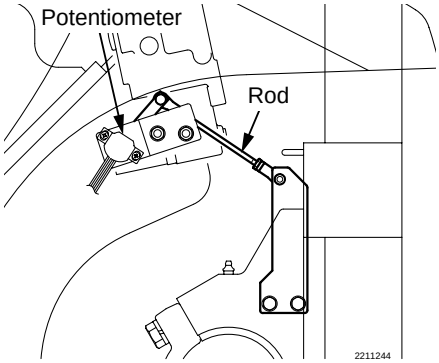
If the tilt potentiometric value does not appear

- "Display board" and "travel/hydraulic board" cannot correspond.

➡Check the wire breaks.

7. Operate the tilt lever and adjust the rod of the potentiometer for tilt angle detection so that the value is set as follows.

When the tilt is inclined most forward	Tilt potentiometric value ≧ 40
When the tilt is inclined most backward	Tilt potentiometric value ≦ 980

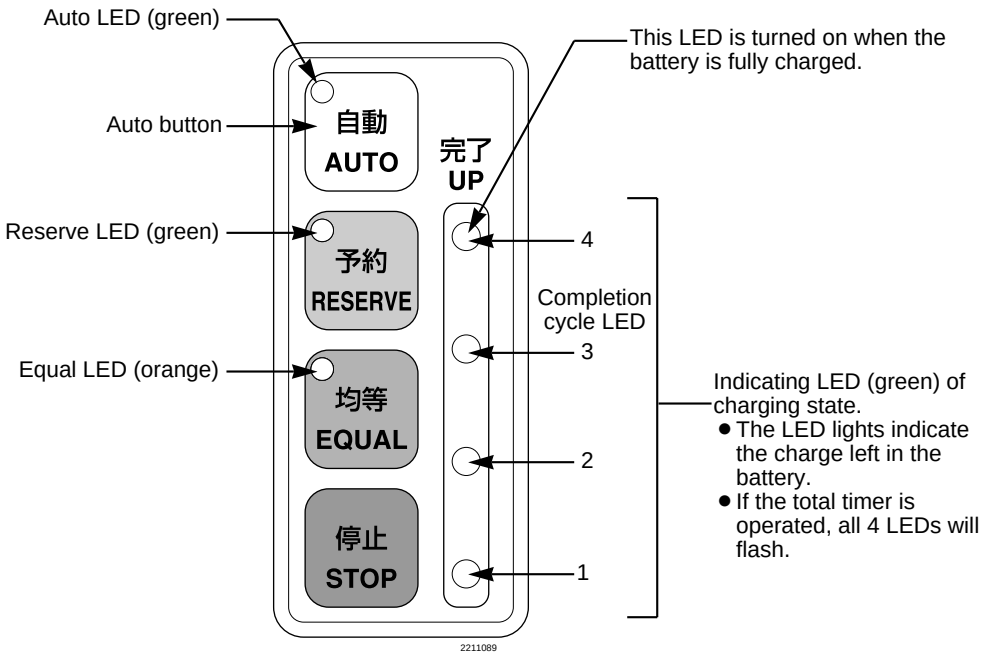


2-3-29. Built-in charger (optional) working check

<Total timer>

Checking procedure			Magnetic contactor	Auto LED	Reserve LED	Equal LED	Indicating LED of charging state	
							1–2	3–4
1	Connect the battery plug.		OFF	×	×	×	×	×
2	Connect the AC plug to wall outlet.		OFF	○	○	○	×	×
3	Press and hold the Auto Button for at least 5 seconds.	When pressed	ON	○	×	×	×	×
		5 seconds later	ON	△	×	×	□	□
4	The check will end approximately 1 minute and 36 seconds after Auto Button begins flashing.		OFF	×	×	×	△	△

○:On
×:Off
□:May be on
△:Flashing



⚠CAUTION

- **For a fully charged battery, check after performing approximately 2-3 minutes of hydraulic operation.**
- **If the charging state LEDs flash, they will not stop until the battery plug is unplugged.**

<Earth check>

Make sure the conductivity (0 Ω at "1x" range of the tester) between the chassis and the earth terminal in the receptacle on the charger panel.

☞NOTE

If the optional setting (display board RS1=6) CHARGER is set to OFF, the charging timer function will not work.

3. Troubleshooting

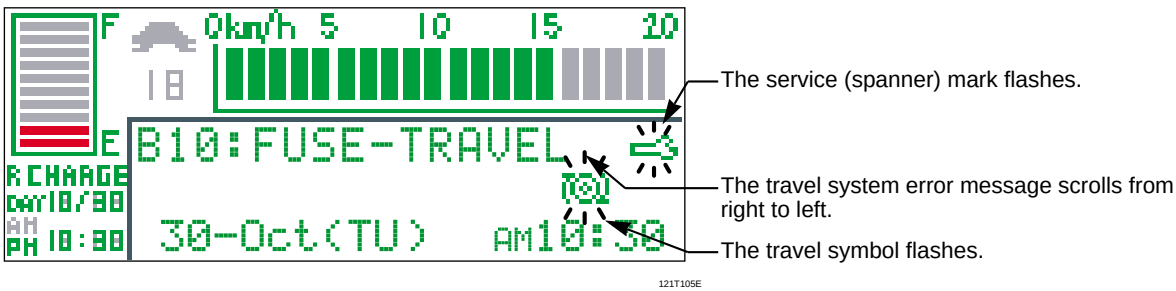
3- 1. Self diagnosis function

3-1-1. Display

If abnormalities or errors are detected with the self-diagnosis function, the following symbols and error messages will be displayed on the screen.

- The applicable abnormality and/or error symbol will flash on the display.
- The applicable error message will be displayed. (If multiple abnormalities and/or errors are detected, the applicable error messages will be displayed in order.)

Travel system errors



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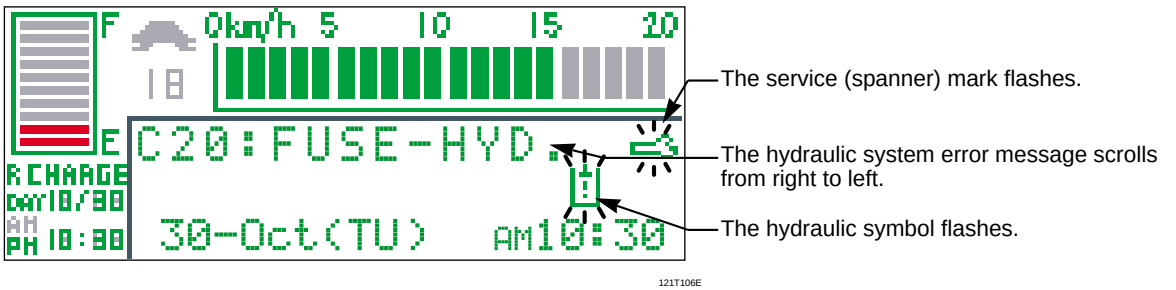
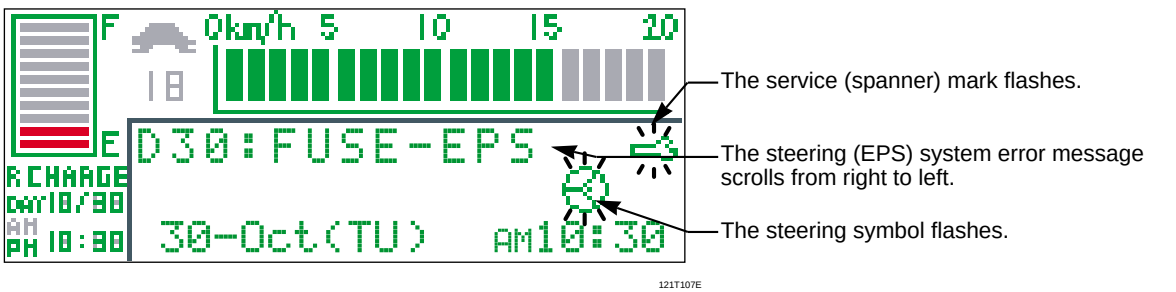
Hydraulic (including AOS) system errors



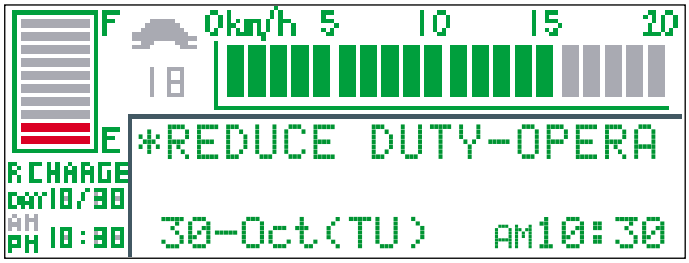
121T106E

Steering (EPS) system errors



121T107E

Other errors



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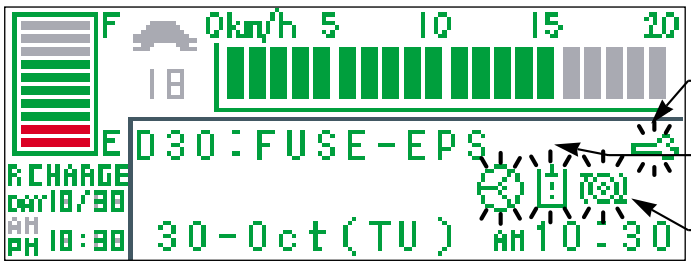
Multiple abnormalities and/or errors



121T109E

The service (spanner) mark flashes.

The detected error messages are scrolled in order from right to left.

All of the symbols for the abnormalities and/or errors detected flash from the right in the order they are detected.

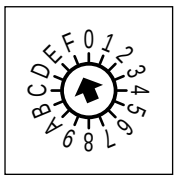
NOTE

- **If the following abnormalities and/or errors occur, travel, hydraulics, and EPS are interlocked.**

  B11 : IGBT-TRAVEL
  C21 : IGBT-HYD.
  ＊FAIL OPERATION＊

- **The (MODE), (R), (+), and (−) buttons are inoperable while the self-diagnosis screen is displayed. (You can not switch to the reserve charge screen.)**
- **If rotary switch RS1 on the display board is set to F, the self-diagnosis screen will not be displayed. (The normal screen will be displayed.)**
- **When the abnormalities and/or errors are resolved, the display will return to the basic screen.**

● Display board



RS="F"

3-1-2. Error messages and Display conditions

Error No.	Error Message	Probable Cause	Notes
1	A1 : CONTACTOR-MAIN	Poor contactor connection	
10	B10 : FUSE-MAIN	Blown main fuse	
11	B11 : IGBT-TRAVEL	Travel phase IGBT error	*FAIL OPERATION* *TURN OFF KEY SWITCH*
12	B12 : SENSOR-CURRENT TRAVEL	Electric current sensor (traction motor U phase, V phase) error	
15	B15 : ACCELERATOR	Accelerator error	*TURN OFF KEY SWITCH*
21	C21 : IGBT-HYD.	Hydraulic phase IGBT error	*FAIL OPERATION* *TURN OFF KEY SWITCH*
22	C24 : SENSOR-CURRENT HYD.	Electric current sensor (hydraulic motor U phase, V phase) error	
23	C25 : SWITCH-LIFT	Lift lever microswitch error	
24	C26 : POTENTIO-MAST	Tilt level or lift potentiometer error	
30	D30 : FUSE-EPS	Blown EPS fuse (Decelerates by half)	
31	D31 : SENSOR-EPS TORQUE	EPS torque sensor error (Decelerates by half)	*TURN OFF KEY SWITCH*
32	D32 : TR-EPS MAIN	EPS FET error (Decelerates by half)	*TURN OFF KEY SWITCH*
40	E40 : TR-AOS	Valve electric current error	*TURN OFF KEY SWITCH*
41	E41 : POTENTIO-HYD. LEVER	Error in the potentiometer for AOS control	
42	E42 : ENCODER-HYD MAST	Error in the encoder for lift height	
51	*FAIL CURRENT-TRAVEL*	Traction motor electric current error (F51)	*TURN OFF KEY SWITCH*
52	*FAIL CURRENT-HYD*	Hydraulic motor electric current error (F52)	*TURN OFF KEY SWITCH*
53	*FAIL VOLTAGE-TRAVEL*	Travel electric current error (F53)	
54	*FAIL VOLTAGE-HYD*	Hydraulic voltage error (F54)	
55	*REDUCE DUTY-OPERATION*	Board or IGBT temperature error	
58	*FAIL BUS SYSTEM*	Display transmission error	*TURN OFF KEY SWITCH* Transmission error between CPUs from the display

Error No.	Error Message	Probable Cause	Notes
	FAIL OPERATION	Travel/hydraulic operation tripping (W00)	Displayed when the error occurs
	TURN OFF KEY SWITCH	Significant error in travel/hydraulic operations (W01)	Displayed when the error occurs
	RELEASE PARKING BRAKE	The operator attempted to drive the forklift with the parking brake on. (W02)	When attempted to travel as the side brake key is on
	REPLENISH REFINED WATER FOR BATTERY	Replenish refined water to the battery (W03)	When the battery electrolyte gets below minimum level
	REFILL BRAKE OIL	Brake oil (W04)	When the brake oil gets below minimum level
	REDUCE THE LOAD	Overload (W05)	When overloaded
	REFILL HYDRAULIC OIL	Fork oil (W06)	When the fork oil gets below minimum level
	CHARGE THE BATTERY	The battery must be recharged. (W07)	When the battery is discharging
	RELEASE ACCEL TO NEUTRAL	The accelerator was depressed when the key was turned on. (W08)	When the travel CPU is in the neutral safety mode
	OFF HYD. LEVER TO NEUTRAL	The hydraulic lever was engaged when the key was turned on. (W09)	When the hydraulic CPU is in the neutral safety mode
	AOS FAIL OPERATION	No current on solenoid (W 10)	When the emergency stop switch is pressed
	RACK MISSET	Lift location is set in the wrong way (W 11)	When the lift location is set in the wrong way
	APPLY PARKING BRAKE	Dismounted from the truck without applying the parking brake (W12)	Seat switch is turned OFF without applying the parking brake

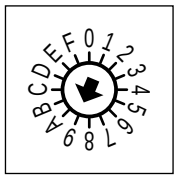
3- 2. Error history memory

3-2-1. Error history memory 1

<The 10 most recently detected errors/ abnormalities>

1. Set rotary switch RS1 on the display board to "9".
2. Turn the key switch ON and the following screen appears.

● Display board



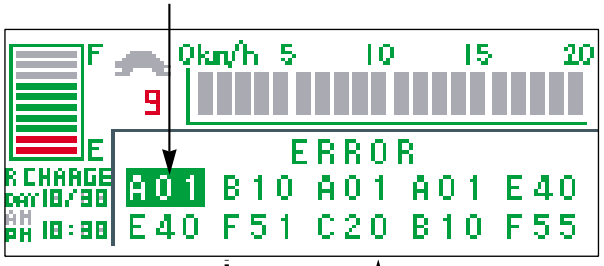
Set RS1 to "9".

NOTE

- **To view less than the ten most recent errors/ abnormalities, place the flashing cursor on the last error/abnormality and press (R) button to go to "Previously detected errors/abnormalities".**
- **If there are no errors/abnormalities, press (R) button to go to "Previously detected errors/ abnormalities".**

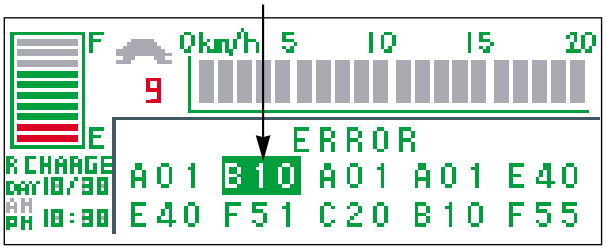
● The 10 most recently detected errors/abnormalities

The most recent error/abnormality flashes as "A01".



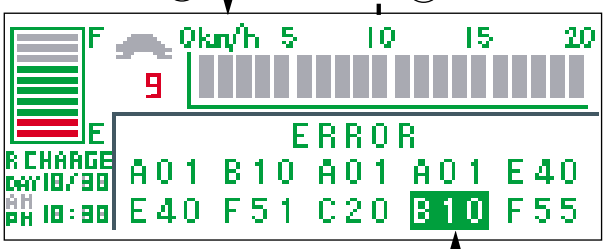
(R) (MODE)

The second error/abnormality flashes as "B10".



(R) (MODE)

(R) (MODE)



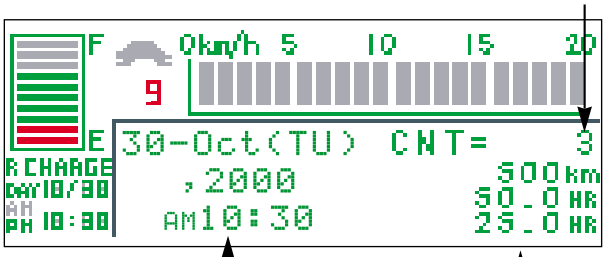
The ninth error/abnormality flashes as "B10".

(R) (MODE)

(To the next page)

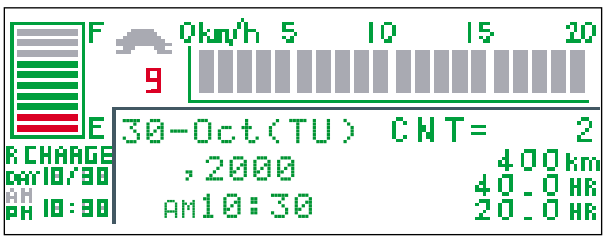
● Error/abnormality details

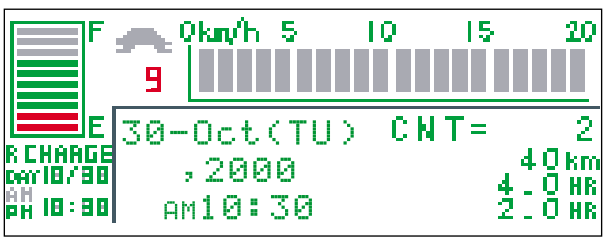
Number of times the error/abnormality occurred when it was detected



Year, month, day, and the time of the error occurrence

Error/abnormality detection date, time, travel distance, and travel and hydraulic hour meter





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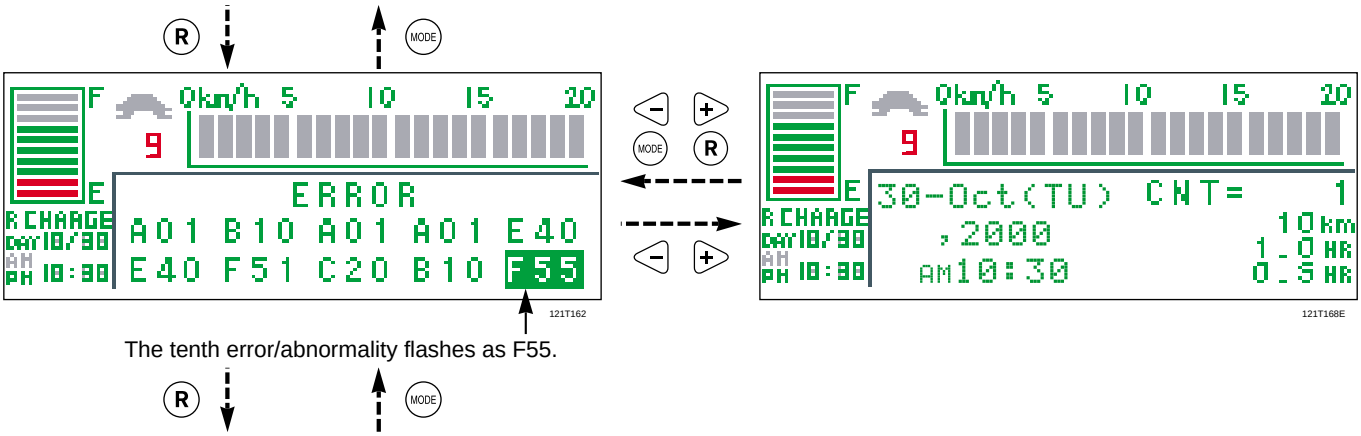


The tenth error/abnormality flashes as F55.

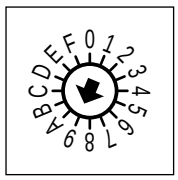
The next page is "Previously detected errors/abnormalities (1)".

3-2-2. Error history memory 2

<Previously detected errors/abnormalities (1)>

● Rotary switch RS1 on display board : 9

● Display board



RS1="9".

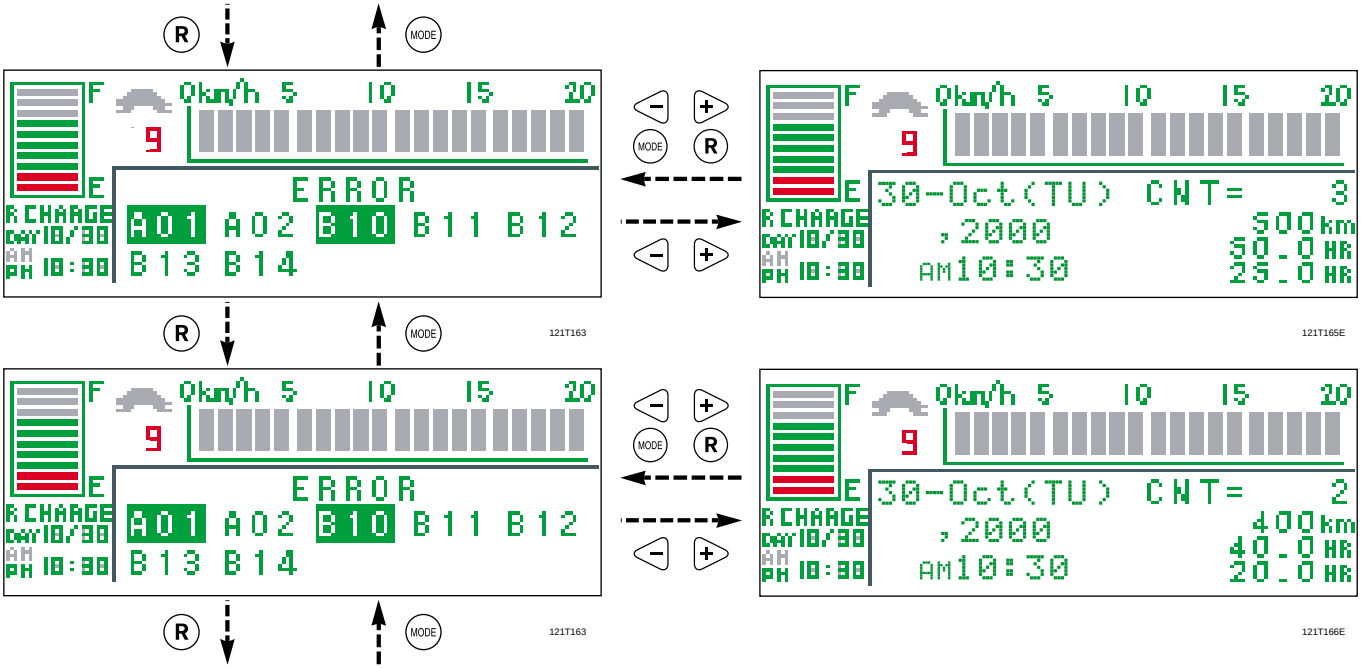
NOTE

- **If there are no previous errors/abnormalities displayed in the list, press (R) button to go to "Previously detected errors/abnormalities (2)".**
- **If the same error/abnormality was detected multiple times previously, the data of the most recent detection will be displayed under "Error/abnormality details".**
- **Flashing : Indicates the position of cursor.**
  Highlighted : Only highlighted numbers are memorized as error items.

● Previously detected errors/abnormalities (1)

The previous page is "The 10 most recently detected errors/abnormalities".

● Error/abnormality details

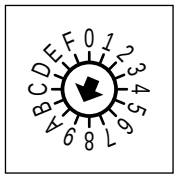


The next page is "Previously detected errors/abnormalities (4)".

<Previously detected errors/abnormalities (2)>

● Rotary switch RS1 on display board : 9

● Display board



RS1="9"

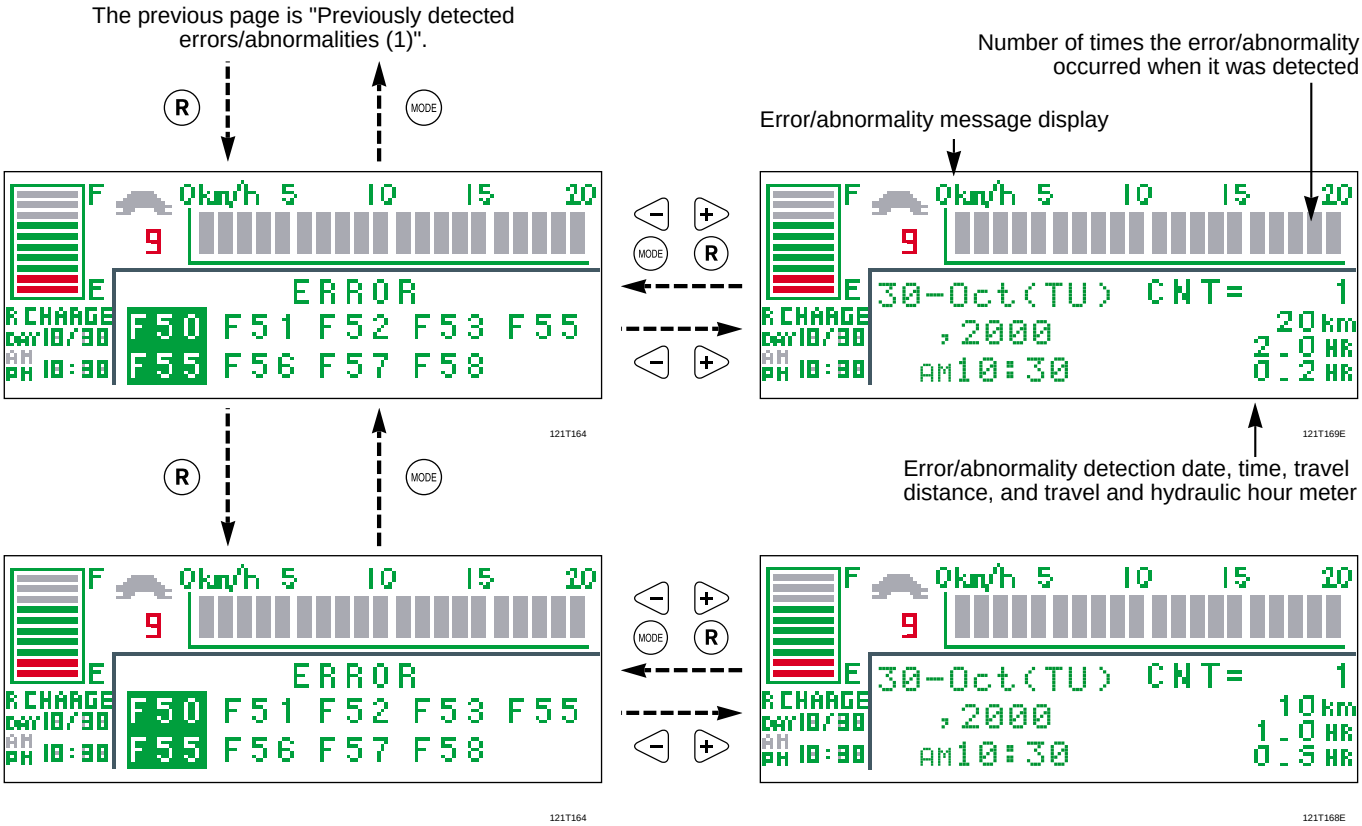
NOTE

If the same error/abnormality was detected multiple times previously, the data of the most recent detection will be displayed under "Error/abnormality details".

● Previously detected errors/abnormalities (2)

● Error/abnormality details

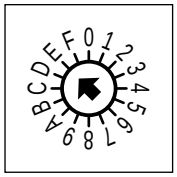
The previous page is "Previously detected errors/abnormalities (1)".



3-2-3. Clearing the error history memory (memory initialization)

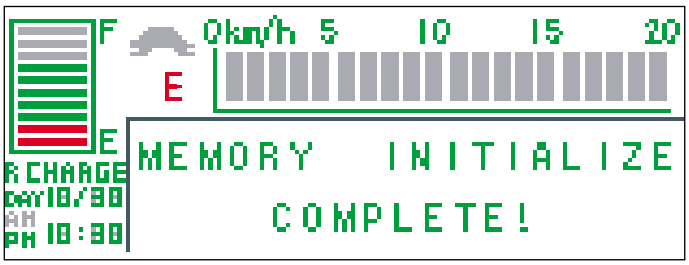
1. Set rotary switch RS1 on the display board to "E".
2. Turn the key switch ON.
3. When the screen shown below is displayed, memory initialization is complete.
4. Return rotary switch RS1 on the display board to "0".

● Display board



Set RS1 to "E".

● Memory Initialization Completion Screen



121T170

NOTE

The following items are returned to their initial values:

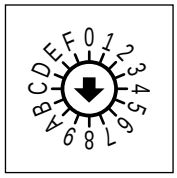
- **Slow speed (turtle) : 5km/h**
- **Travel mode : N (NORMAL)**
- **Meter mode : HR (hour meter)**
- **Accelerator released (neutral) regenerative force: MID**
- **Error history : All clear**
- **BRIGHTNESS (back light brightness): 5**

3- 3. I/O Check

3-3-1. I/O check mode display method

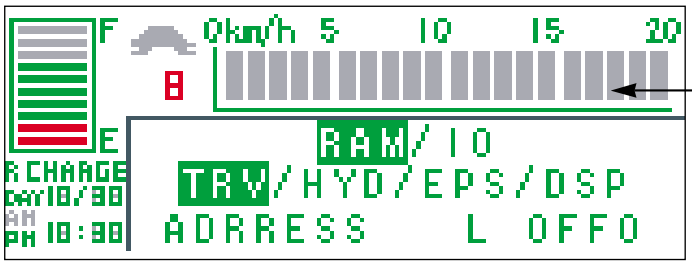
1. Set rotary switch RS1 on the display board to "8".
2. Turn the key switch ON and the following screen appears.
3. Press ⊕ button to enter the I/O check mode. The "I/O" icon will flash.

● Display board



Set RS1 to "8".

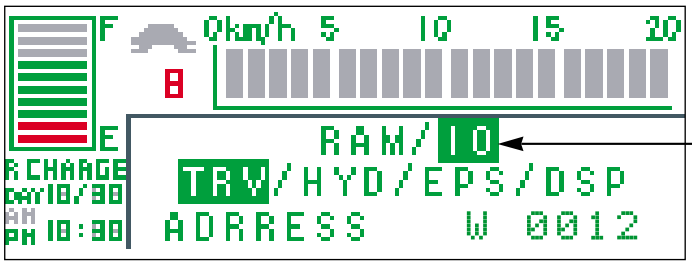
The RAM icon flashes.



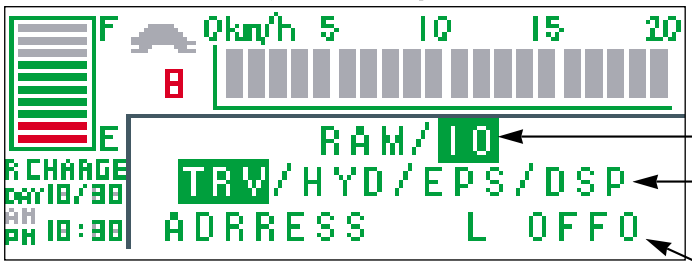
● CPU selection

TRV : Travel
HYD : Hydraulic
EPS : Power steering
DSP : Display

● I/O check mode



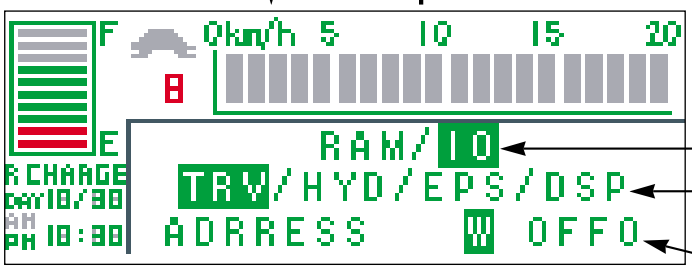
The I/O icon flashes.



The I/O icon is highlighted.

● The selected CPU is highlighted.
● Press either ⊕ or ⊖ button to select a CPU.

The currently selected data length is displayed.
The current data address setting is displayed.



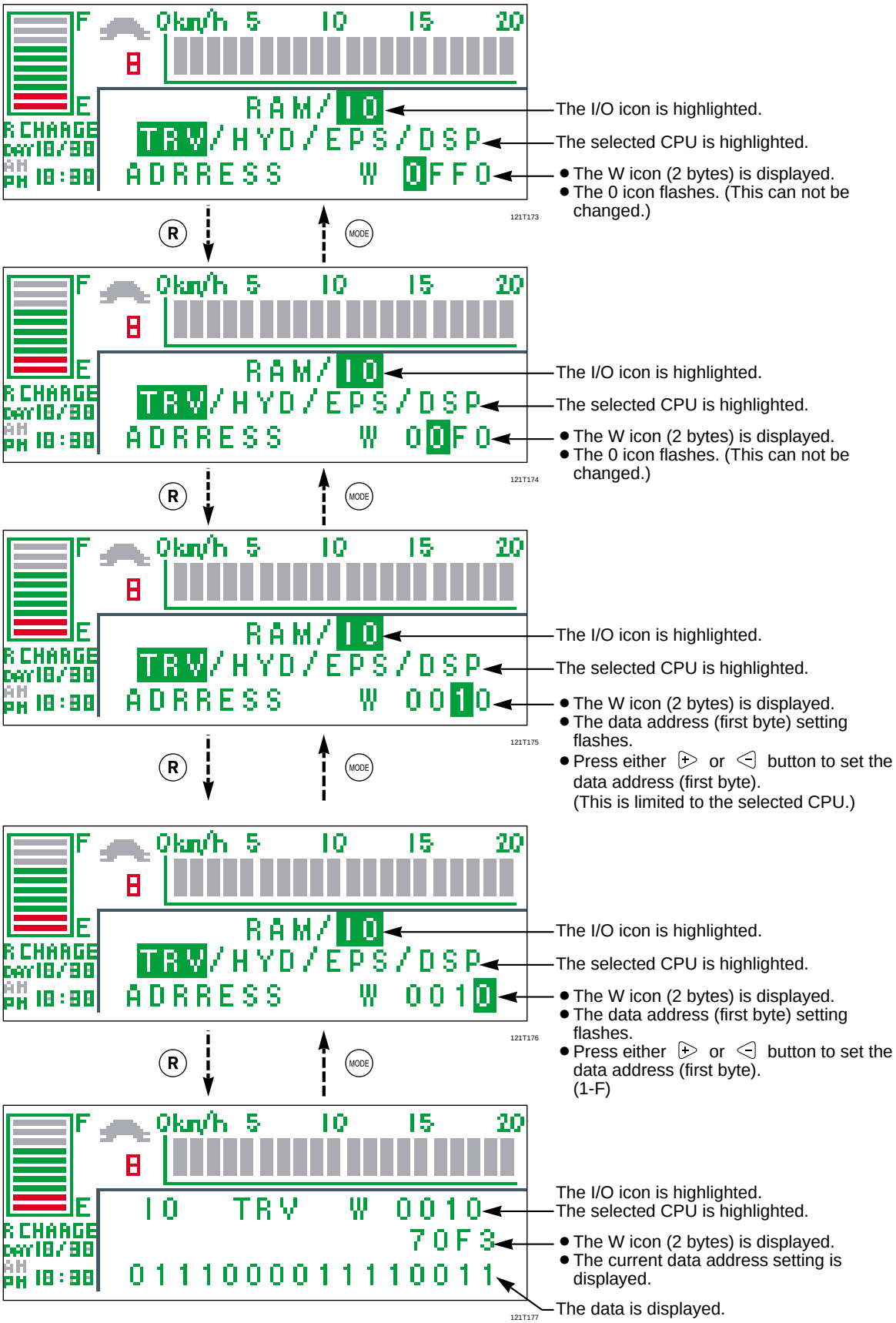
The I/O icon is highlighted.

The selected CPU is highlighted.

● The W icon (2 bytes) flashes.
● (This can not be changed.)

(To the next page)

(From the previous page)



NOTE

- **The data length is set to W (2 bytes), regardless of the CPU selected.**
- **The second byte of the data address is set to 00, regardless of the CPU selected.**

3-3-2. I/O port table

Travel CPU

● I/O port table (1)

PortNO.	Bit	IN/OUT	Contents	Remarks
PA (W0000)	2	OUT	CPU run LED for the traction motor	Flashes when the travel CPU is normal
	5	IN	Auxiliary input 1	0-5V input
	6	IN	Auxiliary input 2	0-5V input
	7	IN	Auxiliary input 3	0-5V input
	TCLKC	IN	Traction motor rotary encoder A	0-5V input
	TCLKD	IN	Traction motor rotary encoder B	0-5V input
	10	IN	Traction motor U phase voltage	0-5V input
	11	IN	Traction motor V phase voltage	0-5V input
	12	IN	Traction motor W phase voltage	0-5V input
PB (W0002)	POE0	IN	Traction motor gate signal open order 1	Gate OPEN when L
	POE1	IN	Traction motor gate signal open order 2	Gate OPEN when L
	POE2	IN	Traction motor gate signal open order 3	Gate OPEN when L
	POE3	IN	Traction motor gate signal open order 4	Gate OPEN when L
	6	IN	During hydraulic operation (transmission between CPUs)	When operating at H
	7	OUT	During travel operation (transmission between CPUs)	When operating at H
	8	IN	Hydraulic trip (transmission between CPUs)	Hydraulic trip at H
	9	OUT	Travel trip (transmission between CPUs)	Travel trip at H
PC (W0004)	0	IN	Accelerator voltage 0	FBR
	1	IN	Accelerator voltage 1	FBR
	2	IN	Accelerator voltage 2	FBR
	3	IN	Accelerator voltage 3	FBR
	4	IN	Neutral	H when in neutral
	5	IN	Forward	H when traveling forward
	6	IN	Backward	H when traveling backward
	8	IN	Seat switch	L when on
	9	IN	Travel inhibitor	L when on
	10	IN	Turning detector	L when on
	11	IN	Brake switch	L when the brake is on
	12	IN	Main contactor contact	H when on
	13	IN	Main fuse	L when open
	15	IN	EPS fuse	L when open
PD (W0006)	0	OUT	Forward output	Forward travel when L
	1	OUT	Backward output	Backward travel when L
	2	OUT	Fan output 1	Fan on when L
	3	OUT	Fan output 2	Fan on when L

● I/O port table (2)

PortNO.	Bit	IN/OUT	Contents	Remarks
PE (W0008)	TIOC0A	OUT	Contacter chopper signal	ON when H
	1	OUT	Main contacter output	ON when H
	2	OUT	Auxiliary contacter output	ON when H
	4	IN	Rotary switch 1	Truck model selection
	5	IN	Rotary switch 2	Truck model selection
	6	IN	Rotary switch 3	Truck model selection
	7	IN	Rotary switch 4	Truck model selection
	TIOC3B	OUT	Traction motor U phase lower gate signal	ON when L
	TIOC3D	OUT	Traction motor U phase upper gate signal	ON when L
	TIOC4A	OUT	Traction motor V phase lower gate signal	ON when L
	TIOC4B	OUT	Traction motor W phase lower gate signal	ON when L
	TIOC4C	OUT	Traction motor V phase upper gate signal	ON when L
	TIOC4D	OUT	Traction motor W phase upper gate signal	ON when L
(W000A)	AN0	A/D	Traction motor U phase electric current	2.5V±1.75V=±700A
(W000C)	AN1	A/D	Traction motor V phase electric current	2.5V±1.75V=±700A
(W000E)	AN2	A/D	Battery current	2.5V±1.75V=±700A
(W0010)	AN3	A/D	Battery voltage	0-5V=0-55V
(W0012)	AN4	A/D	Accelerator voltage 1	0-5V
(W0014)	AN5	A/D	Accelerator voltage 2	0-5V
(W0016)	AN6	A/D	Board temperature sensor	0-5V
(W0018)	AN7	A/D	Travel IGBT temperature sensor	0-5V
(W001A)	TCNT1	MTU	Auxiliary rotary encoder	Counter value
(W001C)	TCNT2	MTU	Traction rotary encoder	Counter value

Hydraulic CPU

● I/O port table (1)

PortNO.	Bit	IN/OUT	Contents	Remarks
PA (W0000)	2	OUT	CPU run LED for the hydraulic motor	Flashes when the hydraulic CPU is normal
	TCLKA	IN	Lift rotary encoder A	0-5V input
	TCLKB	IN	Lift rotary encoder A	0-5V input
	TCLKC	IN	Hydraulic motor rotary encoder A	0-5V input
	TCLKD	IN	Hydraulic motor rotary encoder B	0-5V input
	10	IN	Hydraulic motor U phase voltage	0-5V input
	11	IN	Hydraulic motor V phase voltage	0-5V input
	12	IN	Hydraulic motor W phase voltage	0-5V input
PB (W0002)	POE0	IN	Contents Hydraulic motor gate signal open order 1	Gate OPEN when L
	POE1	IN	Contents Hydraulic motor gate signal open order 2	Gate OPEN when L
	POE2	IN	Contents Hydraulic motor gate signal open order 3	Gate OPEN when L
	POE3	IN	Contents Hydraulic motor gate signal open order 4	Gate OPEN when L
	6	OUT	During hydraulic operation (transmission between CPUs)	When operating at H
	7	IN	During travel operation (transmission between CPUs)	When operating at H
	8	OUT	Hydraulic trip (transmission between CPUs)	Travel trip at H
	9	IN	Travel trip (transmission between CPUs)	Travel trip at H
PC (W0004)	0	IN	Lift 1 switch	FBR
	1	IN	Lift 2 switch	FBR
	2	IN	Tilt switch	FBR
	3	IN	Attachment 1 switch	FBR
	4	IN	Attachment 2 switch	H when in neutral
	5	IN	Attachment 3 switch	H when traveling forward
	6	IN	Auxiliary input 7	H when traveling backward
	7	IN	Auxiliary input 8	L when on
	12	IN	Main contactor contact	L when on
	14	IN	Hydraulic fuse (Auxiliary)	L when on
PC (W0004)	0	IN	Lift 1 switch	FBR
	1	IN	Lift 2 switch	FBR
	2	IN	Tilt switch	FBR
	3	IN	Attachment 1 switch	FBR
	4	IN	Attachment 2 switch	H when in neutral
	5	IN	Attachment 3 switch	H when traveling forward
	6	IN	Auxiliary input 7	H when traveling backward
	7	IN	Auxiliary input 8	L when on
	12	IN	Main contactor contact	L when on
	14	IN	Hydraulic fuse (Auxiliary)	L when on

● I/O port table (2)

PortNO.	Bit	IN/OUT	Contents	Remarks
PE (W0008)	TIOC0A	OUT	Gate board power chopper signal	
	1	OUT	AOS switching A/D input 1	0: Lift 1: Tilt
	2	OUT	AOS switching A/D input 2	2: Attachment 1 3: Attachment 2
	3	OUT	AOS switching A/D input 3	4: Attachment 3
	4	IN	Rotary switch 1	Truck model selection
	5	IN	Rotary switch 2	Truck model selection
	6	IN	Rotary switch 3	Truck model selection
	7	IN	Rotary switch 4	Truck model selection
	TIOC3B	OUT	Traction motor U phase lower gate signal	ON when L
	TIOC3D	OUT	Traction motor U phase upper gate signal	ON when L
	TIOC4A	OUT	Traction motor V phase lower gate signal	ON when L
	TIOC4B	OUT	Traction motor W phase lower gate signal	ON when L
	TIOC4C	OUT	Traction motor V phase upper gate signal	ON when L
	TIOC4D	OUT	Traction motor W phase upper gate signal	ON when L
(W000A)	AN0	A/D	Hydraulic motor U phase electric current	2.5V±1.75V=±700A
(W000C)	AN1	A/D	Hydraulic motor V phase electric current	2.5V±1.75V=±700A
(W000E)	AN2	A/D	Battery voltage	0-5V=0-55V
(W0010)	AN3	A/D	Hydraulic IGBT temperature sensor	0-5V
(W0012)	AN4	A/D	Tilt level potentiometer	0-5V
(W0014)	AN5	A/D	Auxiliary A/D input	0-5V AOS
(W0016)	ADS0	A/D	Lift lever potentiometer	0-5V AOS
(W0018)	ADS1	A/D	Tilt lever potentiometer	0-5V AOS
(W001A)	ADS2	A/D	Attachment 1 lever potentiometer	0-5V AOS
(W001C)	ADS3	A/D	Attachment 2 lever potentiometer	0-5V AOS
(W001E)	ADS4	A/D	Attachment 3 lever potentiometer	0-5V AOS
(W0020)	ADP0	A/D	Lift valve current	0-5V AOS
(W0022)	ADP1	A/D	Tilt valve current	0-5V AOS
(W0024)	ADP2	A/D	Attachment valve current 1	0-5V AOS
(W0026)	ADP3	A/D	Attachment valve current 2	0-5V AOS
(W0028)	ADP4	A/D	Attachment valve current 3	0-5V AOS
(W002A)	TCNT1	MTU	Lift rotary encoder	Counter value
(W002C)	TCNT2	MTU	Hydraulic rotary encoder	Counter value

Display CPU

● I/O port table (1)

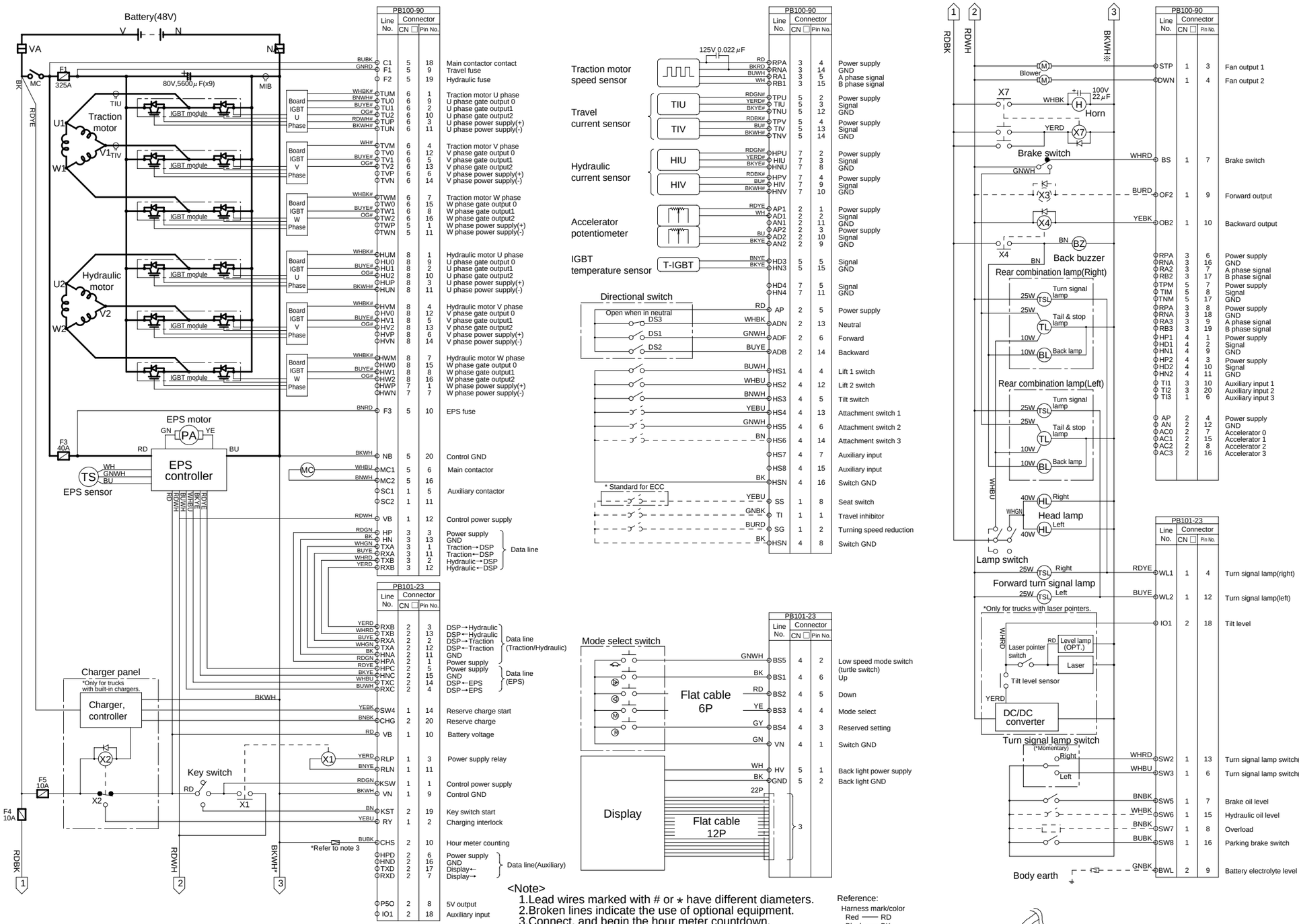
PortNO.	Bit	IN/OUT	Contents	Remarks
P1 (W0000)	0	IN	Switch 1 (up)	L when the switch is on
	1	IN	Switch 2 (down)	L when the switch is on
	2	IN	Switch 3 (mode)	L when the switch is on
	3	IN	Switch 4 (Reserved setting)	L when the switch is on
	4	IN	Hour meter count start	Count begins at L
	5	IN	Key switch start	H when the key is turned to start
	6	IN	Charging interlock relay B contact	H when the charging plug is on
	7	IN	Switch 5 (Turtle)	L when switch is ON
P3 (W0002)	IRQ4	IN	P5 power check	CPU sleep when L
	5	IN	Battery electrolyte level	When lowering 0/1=100/200ms
P7 (W0004)	0	IN	Rotary switch 1	
	1	IN	Rotary switch 2	
	2	IN	Rotary switch 3	
	3	IN	Rotary switch 4	
P9 (W0006)	0	IN	Slow speed mode switch (turtle)	H and B contact when the switch is on
	1	IN	Turn signal switch (right)	L when the switch is on
	2	IN	Turn signal switch (left)	L when the switch is on
	3	IN	Reserve charge start	L when starting
	4	IN	Brake oil level	Usually H
	5	IN	Hydraulic oil level	Usually H
	6	IN	Overload	L during overload
	7	IN	Parking brake	L when on
PE (W0008)	0	OUT	LCD reset	Reset when H
	1	OUT	Power source relay drive	On when L
	2	OUT	Turn signal lamp (right)	On when L
	3	OUT	Turn signal lamp (left)	On when L
	4	OUT	Reserve charge	Charging begins when L
	5	OUT	VFD power	ON when L
	6	IN	5V power source input	H when there are 5V
PF (W000A)	0	OUT	CPU stop	CPU run when the LED flashes
	1	OUT	Buzzer drive	4kHz when the buzzer is on
	7	IN	VFD icon flashing input	Lit up when H, Lit off when L
(W000C)	AN0	A/D	Battery voltage	0-5V=0-55V
(W000E)	AN1	A/D	VFD power	0-5V=0-70V
(W0010)	AN2	A/D	Auxiliary	0-5V

EPS CPU

● I/O port table (1)

PortNO.	Bit	IN/OUT	Contents	Remarks
PA (W0000)	0	IN	Motor current check	0: Electric current available 1: Electric current not available
	1	IN	K. S. check	0: K.S.ON 1: K.S.OFF
	2	OUT	Power source retention signal	0: Power source on 1: Power source off
	4	OUT	FET1, 3 gate signal	0: Correct direction (FET1:ON,FET3:OFF) 1: Reverse direction (FET1:OFF,FET3:ON)
	5	OUT	FET2, 4 gate signal	0: Correct direction (FET2:ON,FET4:OFF) 1: Reverse direction (FET2:OFF,FET4:ON)
	6	OUT	Lower level FET 1, 2 gate signal	0: Lower level FET off 1: Lower level FET chopper ok
	7	OUT	Upper level FET 3, 4 gate signal	0: Upper level FET off 1: Upper level FET chopper ok
PB (W0002)	TIOCA3	OUT	Lower level FET 1, 2 gate signal	0: OFF 1: ON
	TIOCA4	OUT	Upper level FET power source chopper signal	
(W0004)	IRQ0	IN	Abnormal electric current (overload current x 2) check	Interrupted at the startup edge
(W0006)	AN0	A/D	EPS motor current	0-2.25±0.35V=0-40A
(W0008)	AN1	A/D	EPS torque sensor	2.5V neutral

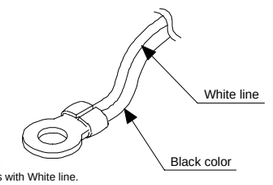
4. Wiring and main controller layout



<Note>
1.Lead wires marked with # or ⋆ have different diameters.
2.Broken lines indicate the use of optional equipment.
3.Connect, and begin the hour meter countdown.

Reference:
Harness mark/color
Red — RD
Black — BK
Green — GN
Yellow — YE
White — WH
Brown — BN
Blue — BU
Gray — GY
Pink — PK
Orange — OG

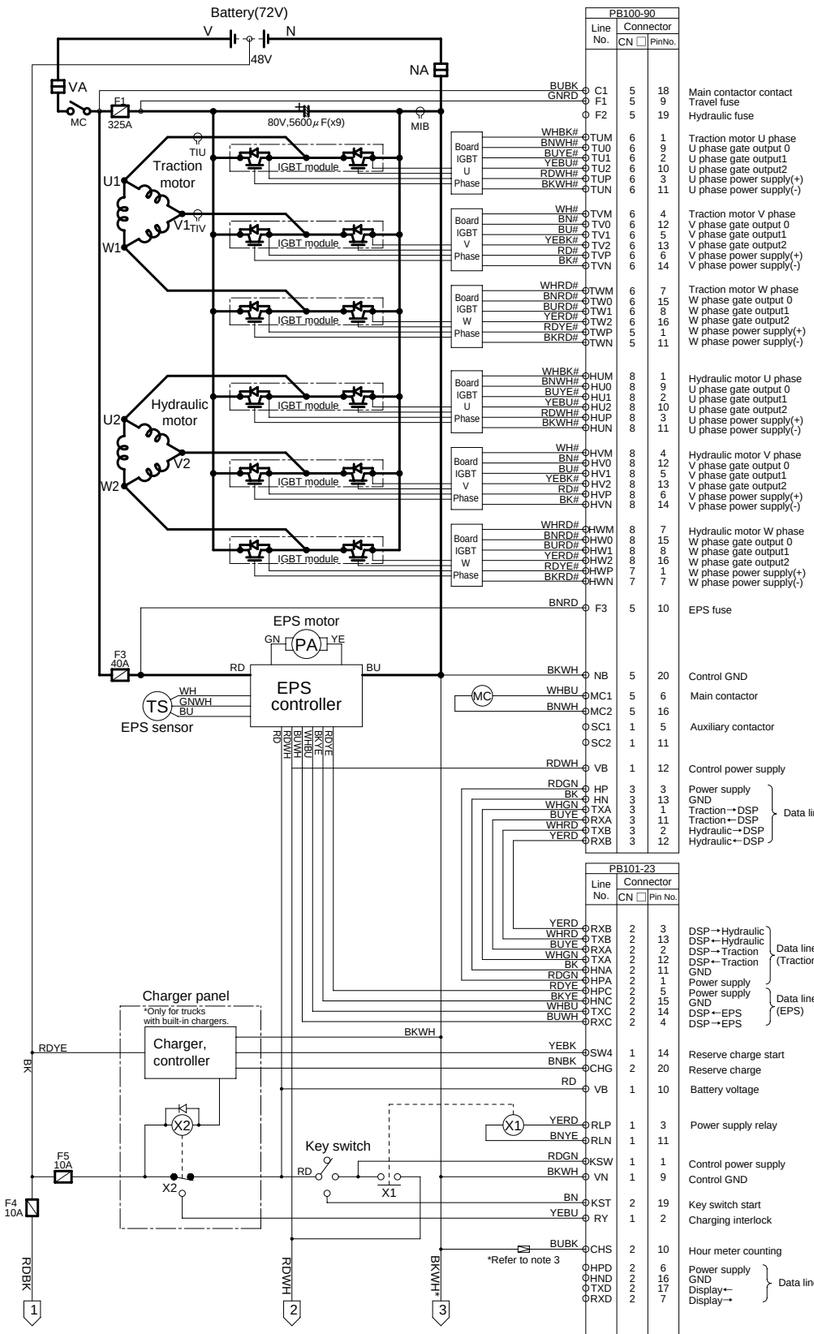
Ex) BKWH (=Black/White)
Black colored harness with White line.



FB-75 System wiring **4- 1.**

FB10P–28P-75 **4-1-1.**

54000-21401-0e

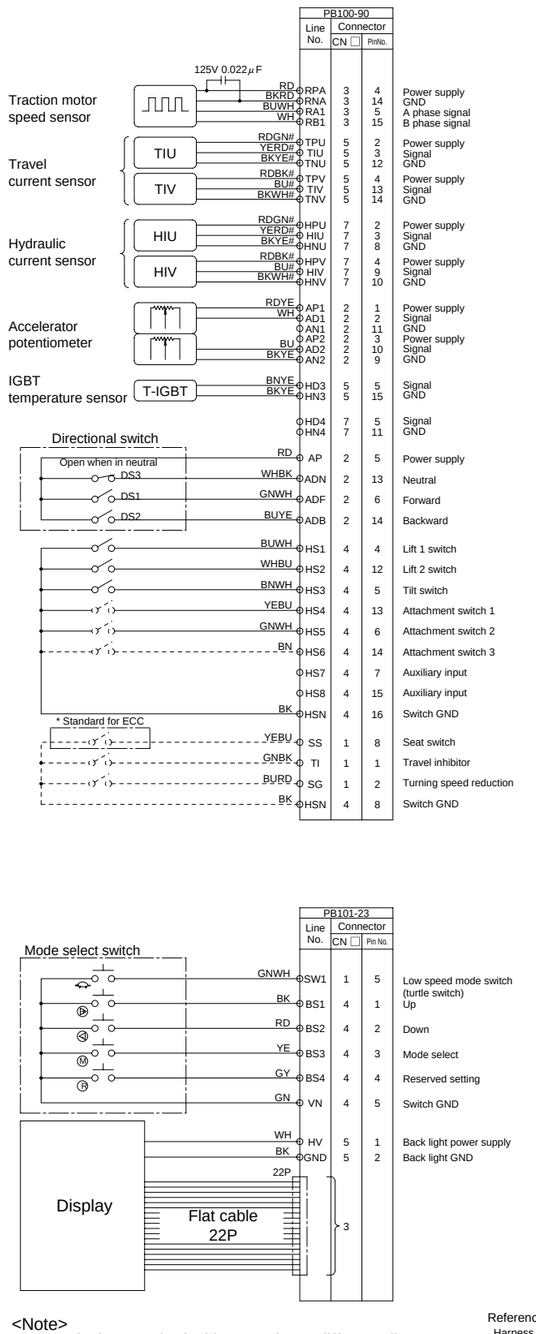


PB100-90 Line No.	Connector CN	PinNo.		
BUBK	C1	5	18	Main contactor contact
GNRD	F1	5	9	Travel fuse
	F2	5	19	Hydraulic fuse
WHBK#	TUM	6	1	Traction motor U phase
BNWH#	TU0	6	9	U phase gate output 0
BUYE#	TU1	6	2	U phase gate output1
YEBU#	TU2	6	10	U phase gate output2
RDWH#	TUP	6	3	U phase power supply(+)
BKWH#	TUN	6	11	U phase power supply(-)
WH#	TVM	6	4	Traction motor V phase
BN#	TV0	6	12	V phase gate output 0
BU#	TV1	6	5	V phase gate output1
YEBK#	TV2	6	13	V phase gate output2
RD#	TVP	6	6	V phase power supply(+)
BK#	TVN	6	14	V phase power supply(-)
WHRD#	TWM	6	7	Traction motor W phase
BNRD#	TW0	6	15	W phase gate output 0
BURD#	TW1	6	8	W phase gate output1
YERD#	TW2	6	16	W phase gate output2
RDYE#	TWP	5	1	W phase power supply(+)
BKRD#	TWN	5	11	W phase power supply(-)
WHBK#	HUM	8	1	Hydraulic motor U phase
BNWH#	HU0	8	9	U phase gate output 0
BUYE#	HU1	8	2	U phase gate output1
YEBU#	HU2	8	10	U phase gate output2
RDWH#	HUP	8	3	U phase power supply(+)
BKWH#	HUN	8	11	U phase power supply(-)
WH#	HVM	8	4	Hydraulic motor V phase
BN#	HV0	8	12	V phase gate output 0
BU#	HV1	8	5	V phase gate output1
YEBK#	HV2	8	13	V phase gate output2
RD#	HVP	8	6	V phase power supply(+)
BK#	HVN	8	14	V phase power supply(-)
WHRD#	HWM	8	7	Hydraulic motor W phase
BNRD#	HW0	8	15	W phase gate output 0
BURD#	HW1	8	8	W phase gate output1
YERD#	HW2	8	16	W phase gate output2
RDYE#	HWP	7	1	W phase power supply(+)
BKRD#	HWN	7	7	W phase power supply(-)
BNRD	F3	5	10	EPS fuse
BKWH	NB	5	20	Control GND
WHBU	MC1	5	6	Main contactor
BNWH	MC2	5	16	
	SC1	1	5	Auxiliary contactor
	SC2	1	11	
RDWH	VB	1	12	Control power supply
RDGN	HP	3	3	Power supply
BK	HN	3	13	GND
WHGN	TXA	3	1	Traction→DSP
BUYE	RXA	3	11	Traction←DSP
WHRD	TXB	3	2	Hydraulic→DSP
YERD	RXB	3	12	Hydraulic←DSP

Data line

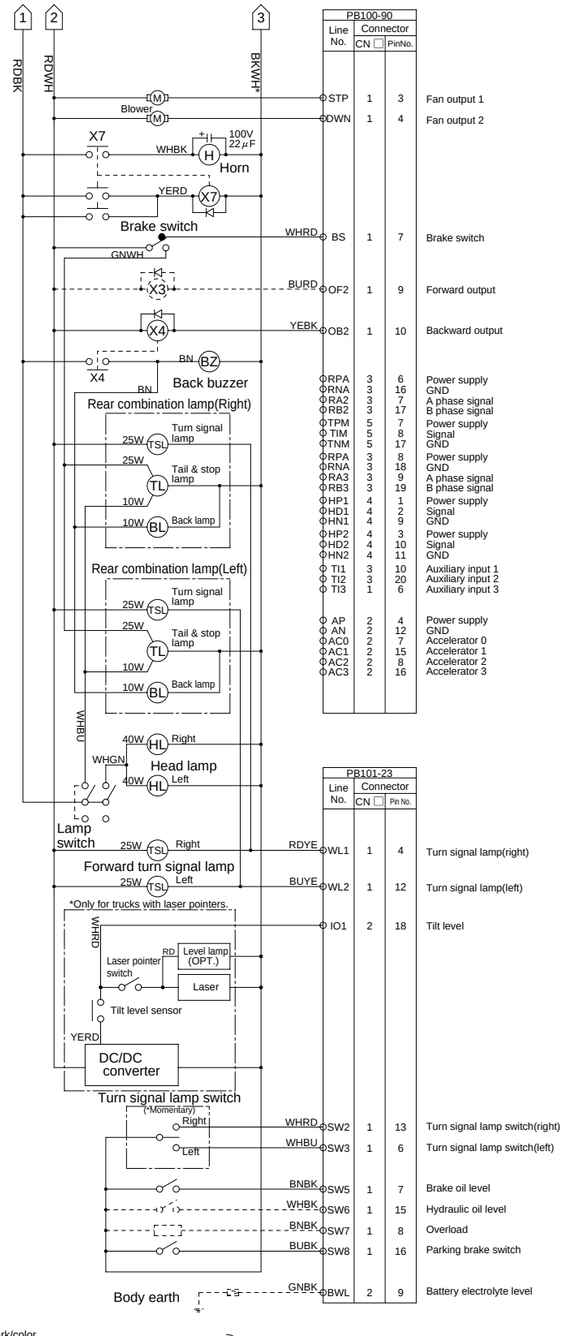
PB101-23 Line No.	Connector CN	Pin No.		
YERD	RXB	2	3	DSP→Hydraulic
WHRD	TXB	2	13	DSP←Hydraulic
BUYE	RXA	2	2	DSP→Traction
WHGN	TXA	2	12	DSP←Traction
BK	HNA	2	11	GND
RDGN	HPA	2	1	Power supply
RDYE	HPC	2	5	Power supply
BKYE	HNC	2	15	GND
WHBU	TXC	2	14	DSP←EPS
BUWH	RXC	2	4	DSP→EPS
BKWH				
YEBK	SW4	1	14	Reserve charge start
BNBK	CHG	2	20	Reserve charge
RD	VB	1	10	Battery voltage
YERD	RLP	1	3	Power supply relay
BNYE	RLN	1	11	
RDGN	KSW	1	1	Control power supply
BKWH	VN	1	9	Control GND
BN	KST	2	19	Key switch start
YEBU	RY	1	2	Charging interlock
BUBK	CHS	2	10	Hour meter counting
	HPD	2	6	Power supply
	HND	2	16	GND
	TXD	2	17	Display←*
	RXD	2	7	Display→*
	P5O	2	8	5V output
	IO1	2	18	Auxiliary input

Data line(Auxiliary)



PB100-90 Line No.	Connector CN	PinNo.		
RD	RPA	3	4	Power supply
BKRD	RNA	3	14	GND
BUWH	RA1	3	5	A phase signal
WH	RB1	3	15	B phase signal
RDGN#	TPU	5	2	Power supply
YERD#	TIU	5	3	Signal
BKYE#	TNU	5	12	GND
RDBK#	TPV	5	4	Power supply
BU#	TIV	5	13	Signal
BKWH#	TNV	5	14	GND
RDGN#	HPU	7	2	Power supply
YERD#	HIU	7	3	Signal
BKYE#	HNU	7	8	GND
RDBK#	HPV	7	4	Power supply
BU#	HIV	7	9	Signal
BKWH#	HNV	7	10	GND
RDYE	AP1	2	1	Power supply
WH	AD1	2	2	Signal
	AN1	2	11	GND
	AP2	2	3	Power supply
BU	AD2	2	10	Signal
BKYE	AN2	2	9	GND
BNYE	HD3	5	5	Signal
BKYE	HN3	5	15	GND
	HD4	7	5	Signal
	HN4	7	11	GND
RD	AP	2	5	Power supply
WHBK	ADN	2	13	Neutral
GNWH	ADF	2	6	Forward
BUYE	ADB	2	14	Backward
BUWH	HS1	4	4	Lift 1 switch
WHBU	HS2	4	12	Lift 2 switch
BNWH	HS3	4	5	Tilt switch
YEBU	HS4	4	13	Attachment switch 1
GNWH	HS5	4	6	Attachment switch 2
BN	HS6	4	14	Attachment switch 3
	HS7	4	7	Auxiliary input
	HS8	4	15	Auxiliary input
BK	HSN	4	16	Switch GND
YEBU	SS	1	8	Seat switch
GNBK	TI	1	1	Travel inhibitor
BURD	SG	1	2	Turning speed reduction
BK	HSN	4	8	Switch GND

PB101-23 Line No.	Connector CN	Pin No.		
GNWH	SW1	1	5	Low speed mode switch (turtle switch)
BK	BS1	4	1	Up
RD	BS2	4	2	Down
YE	BS3	4	3	Mode select
GY	BS4	4	4	Reserved setting
GN	VN	4	5	Switch GND
WH	HV	5	1	Back light power supply
BK	GND	5	2	Back light GND
22P			3	



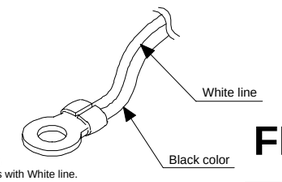
PB100-90 Line No.	Connector CN	PinNo.		
STP	1	3		Fan output 1
DWN	1	4		Fan output 2
WHRD	BS	1	7	Brake switch
BURD	OF2	1	9	Forward output
YEBK	OB2	1	10	Backward output
RPA	3	6		Power supply
RNA	3	16		GND
RA2	3	7		A phase signal
RB2	3	17		B phase signal
TPM	5	7		Power supply
TIM	5	8		Signal
TNM	5	17		GND
RPA	3	8		Power supply
RNA	3	18		GND
RA3	3	9		A phase signal
RB3	3	19		B phase signal
HP1	4	1		Power supply
HD1	4	2		Signal
HN1	4	9		GND
HP2	4	3		Power supply
HD2	4	10		Signal
HN2	4	11		GND
TI1	3	10		Auxiliary input 1
TI2	3	20		Auxiliary input 2
TI3	1	6		Auxiliary input 3
AP	2	4		Power supply
AN	2	12		GND
AC0	2	7		Accelerator 0
AC1	2	15		Accelerator 1
AC2	2	8		Accelerator 2
AC3	2	16		Accelerator 3

PB101-23 Line No.	Connector CN	Pin No.		
RDYE	WL1	1	4	Turn signal lamp(right)
BUYE	WL2	1	12	Turn signal lamp(left)
	IO1	2	18	Tilt level
WHRD	SW2	1	13	Turn signal lamp switch(right)
WHBU	SW3	1	6	Turn signal lamp switch(left)
BNBK	SW5	1	7	Brake oil level
WHBK	SW6	1	15	Hydraulic oil level
BNBK	SW7	1	8	Overload
BUBK	SW8	1	16	Parking brake switch
GNBK	BWL	2	9	Battery electrolyte level

<Note>
1.Lead wires marked with # or ⁎ have different diameters.
2.Broken lines indicate the use of optional equipment.
3.Connect, and begin the hour meter countdown.

Reference:
Harness mark/color
Red — RD
Black — BK
Green — GN
Yellow — YE
White — WH
Brown — BN
Blue — BU
Gray — GY
Pink — PK
Orange — OG

Ex) BKWH (=Black/White)
Black colored harness with White line.

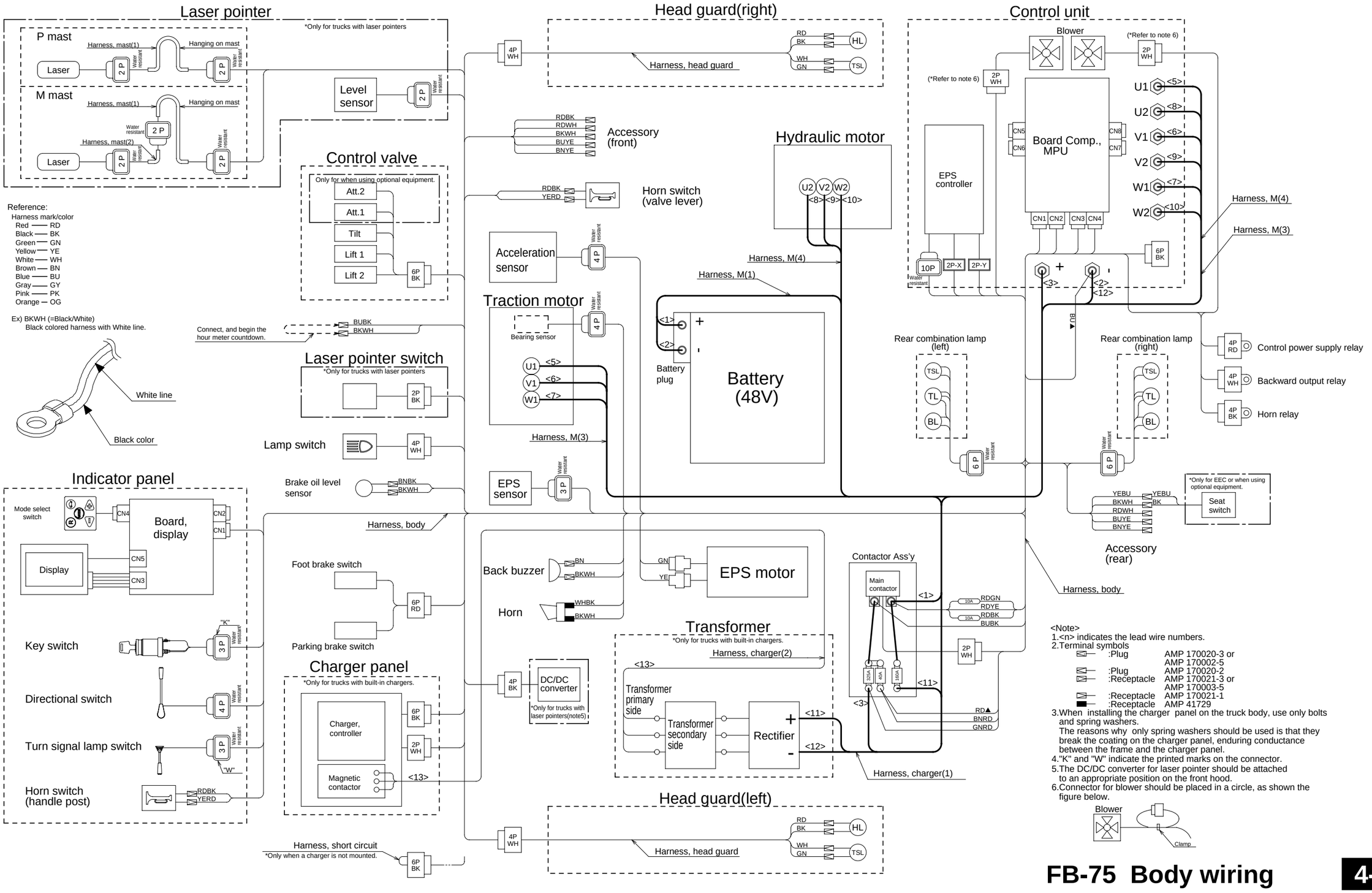


FB-75 System wiring

4- 1.

FB30P-75 | **4-1-2.**

54000-26880-0e



<Note>
1.<n> indicates the lead wire numbers.
2.Terminal symbols

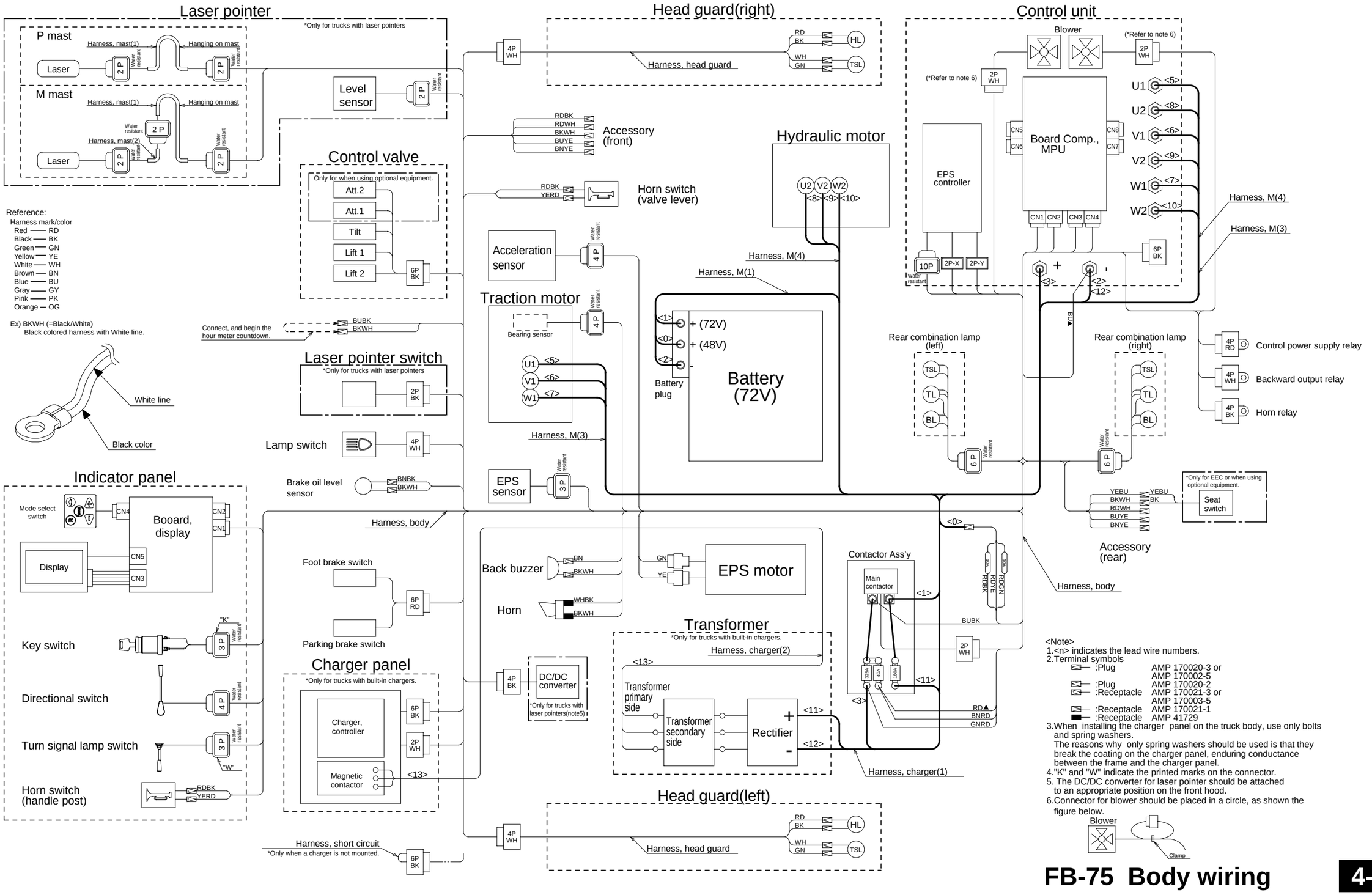
:Plug	AMP 170020-3 or AMP 170002-5
:Plug	AMP 170020-2
:Receptacle	AMP 170021-3 or AMP 170003-5
:Receptacle	AMP 170021-1
:Receptacle	AMP 41729

3.When installing the charger panel on the truck body, use only bolts and spring washers.
The reasons why only spring washers should be used is that they break the coating on the charger panel, enduring conductance between the frame and the charger panel, enduring conductance between the frame and the charger panel.
4."K" and "W" indicate the printed marks on the connector.
5.The DC/DC converter for laser pointer should be attached to an appropriate position on the front hood.
6.Connector for blower should be placed in a circle, as shown the figure below.

FB-75 Body wiring 4- 2.

FB10P–28P-75	4-2-1.

54000-26891-0e



<Note>
1.<n> indicates the lead wire numbers.
2.Terminal symbols

:Plug	AMP 170020-3 or AMP 170002-5
:Plug	AMP 170020-2
:Receptacle	AMP 170021-3 or AMP 170003-5
:Receptacle	AMP 170021-1
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The reasons why only spring washers should be used is that they break the coating on the charger panel, enduring conductance between the frame and the charger panel.
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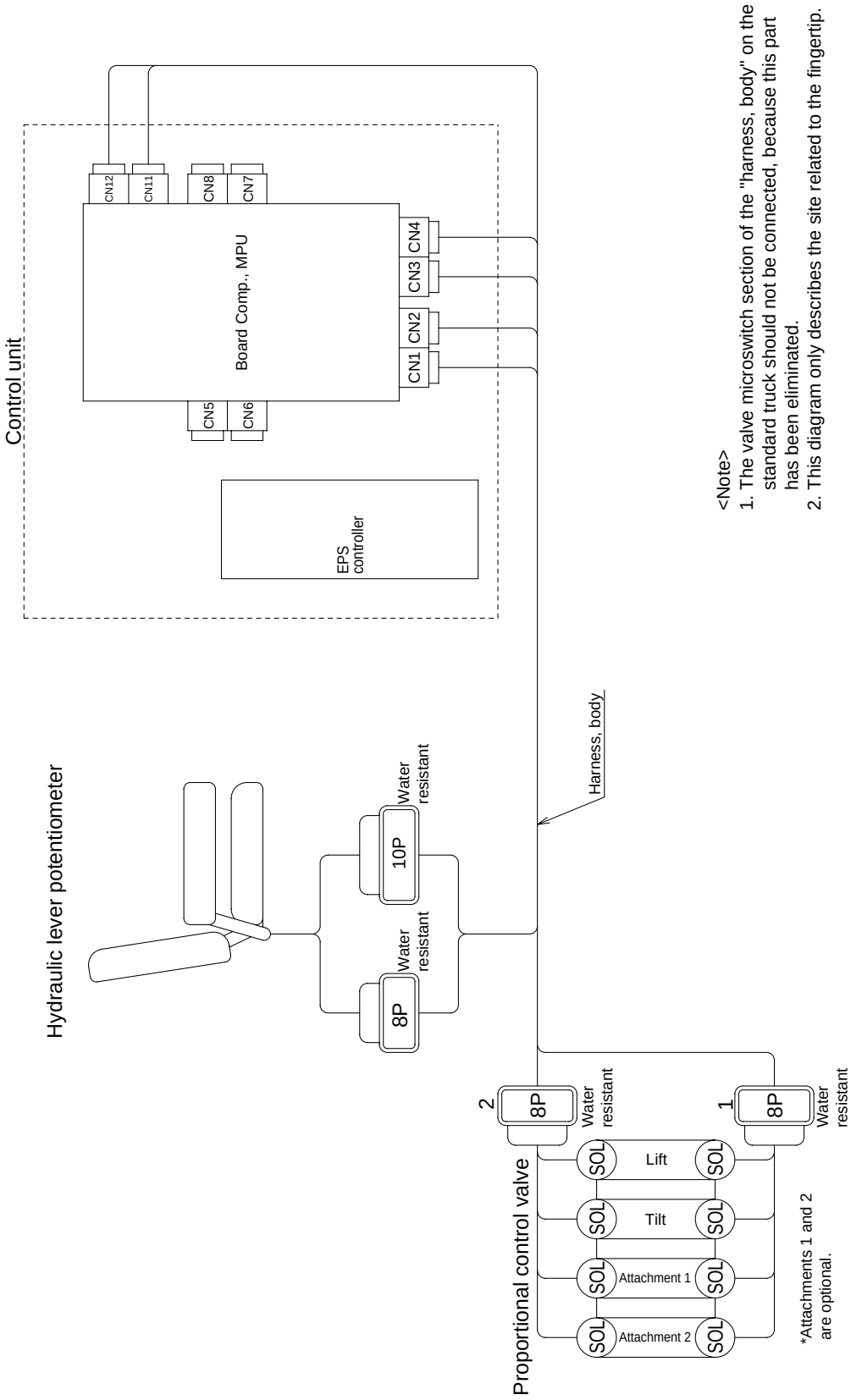
6.Connector for blower should be placed in a circle, as shown the figure below.

FB-75 Body wiring

4- 2.

FB30P-75	4-2-2.

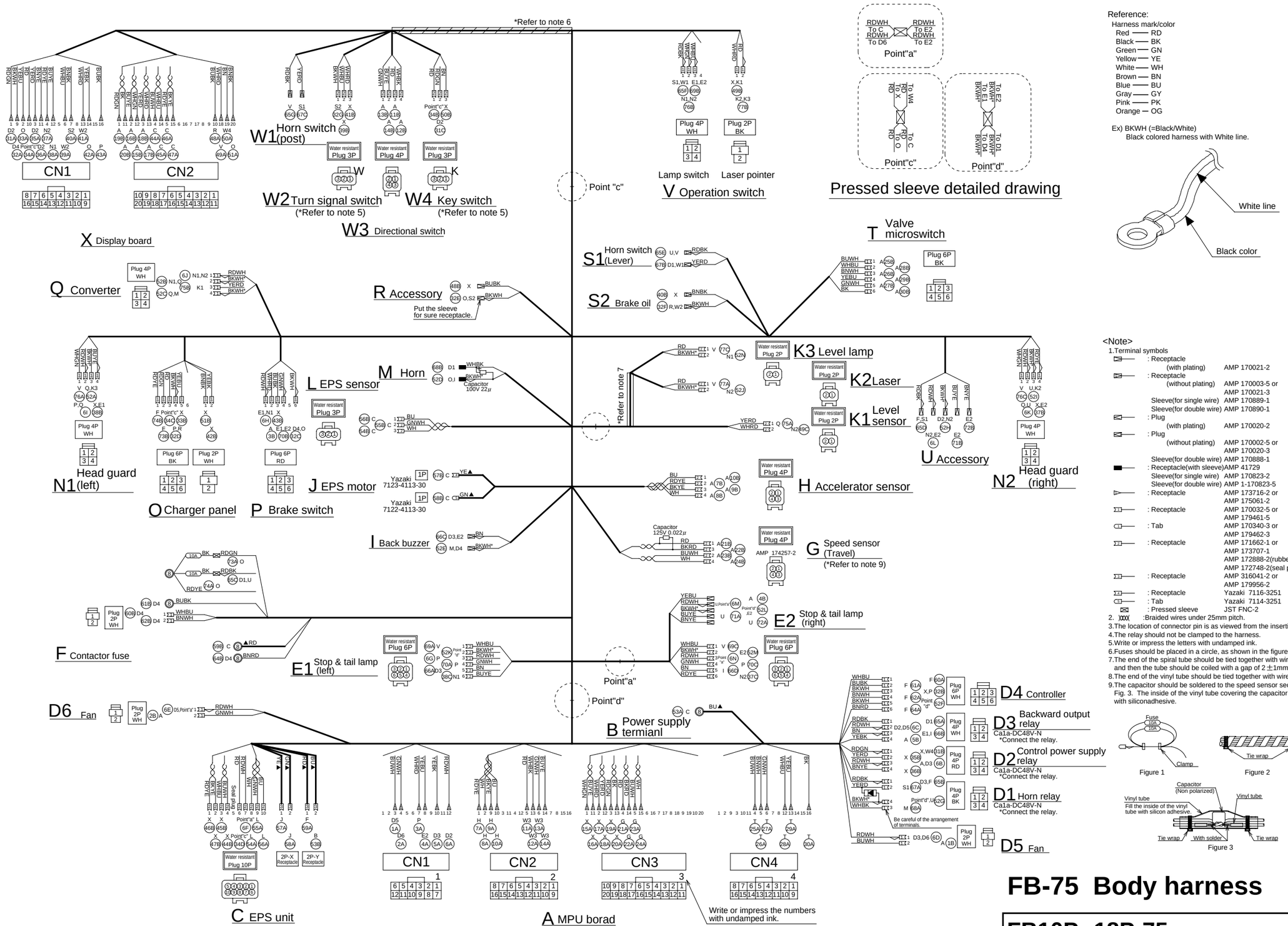
54000-26901-0e



FB-75 Body wiring 4- 2.

Fingertip specification 4-2-3.

54000-26910-0e



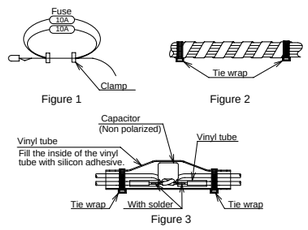
Reference:
Harness mark/color
Red —— RD
Black —— BK
Green —— GN
Yellow —— YE
White —— WH
Brown —— BN
Blue —— BU
Gray —— GY
Pink —— PK
Orange —— OG

Ex) BKWH (=Black/White)
Black colored harness with White line.

<Note>
1.Terminal symbols

: Receptacle (with plating)	AMP 170021-2
: Receptacle (without plating)	AMP 170003-5 or AMP 170021-3
Sleeve(for single wire)	AMP 170889-1
Sleeve(for double wire)	AMP 170890-1
: Plug (with plating)	AMP 170020-2
: Plug (without plating)	AMP 170002-5 or AMP 170020-3
Sleeve(for double wire)	AMP 170888-1
: Receptacle(with sleeve)	AMP 41729
Sleeve(for single wire)	AMP 170823-2
Sleeve(for double wire)	AMP 1-170823-5
: Receptacle	AMP 173716-2 or AMP 175061-2
: Receptacle	AMP 170032-5 or AMP 179461-5
: Tab	AMP 170340-3 or AMP 179462-3
: Receptacle	AMP 171662-1 or AMP 173707-1 AMP 172888-2(rubber plug) AMP 172748-2(seal plug)
: Receptacle	AMP 316041-2 or AMP 179956-2
: Receptacle	Yazaki 7116-3251
: Tab	Yazaki 7114-3251
: Pressed sleeve	JST FNC-2

2. :Braided wires under 25mm pitch.
3.The location of connector pin is as viewed from the inserting side.
4.The relay should not be clamped to the harness.
5.Write or impress the letters with undamped ink.
6.Fuses should be placed in a circle, as shown in the figure 1.
7.The end of the spiral tube should be tied together with wire ties, and then the tube should be coiled with a gap of 2±1mm.(Refer to Figure 2).
8.The end of the vinyl tube should be tied together with wire ties.
9.The capacitor should be soldered to the speed sensor section, as shown in Fig. 3. The inside of the vinyl tube covering the capacitor should be filled with siliconadhesive.



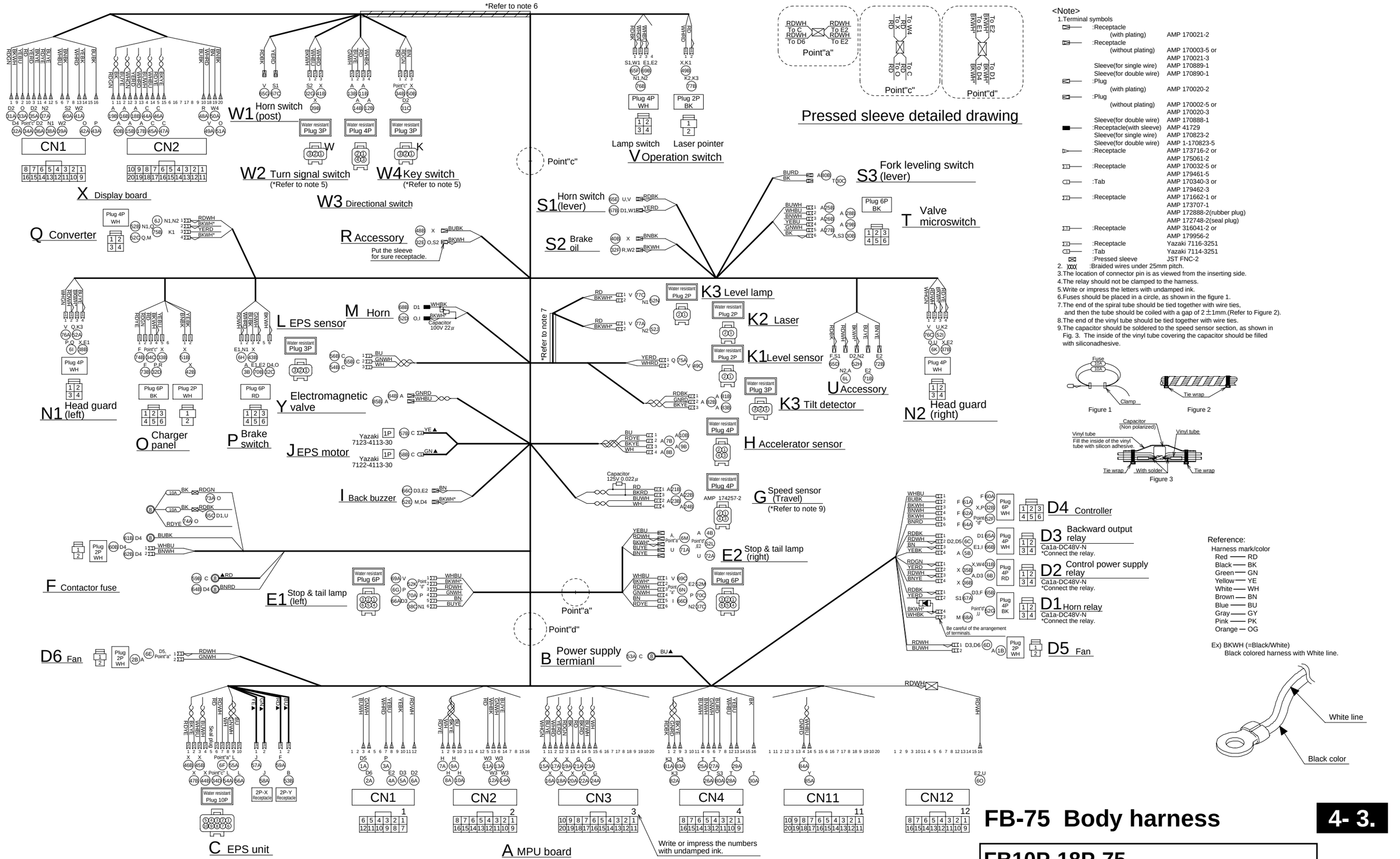
FB-75 Body harness

4- 3.

FB10P–18P-75 (Std/CS/FCS/RP/DRP)

4-3-1.

54000-19154-1e



<Note>

1.Terminal symbols

	:Receptacle (with plating)	AMP 170021-2
	:Receptacle (without plating)	AMP 170003-5 or AMP 170021-3
	Sleeve(for single wire)	AMP 170889-1
	Sleeve(for double wire)	AMP 170890-1
	:Plug (with plating)	AMP 170020-2
	:Plug (without plating)	AMP 170002-5 or AMP 170020-3
	Sleeve(for double wire)	AMP 170888-1
	:Receptacle(with sleeve)	AMP 41729
	Sleeve(for single wire)	AMP 170823-2
	Sleeve(for double wire)	AMP 1-170823-5
	:Receptacle	AMP 173716-2 or AMP 175061-2
	:Receptacle	AMP 170032-5 or AMP 179461-5
	:Tab	AMP 170340-3 or AMP 179462-3
	:Receptacle	AMP 171662-1 or AMP 173707-1 AMP 172888-2(rubber plug) AMP 172748-2(seal plug)
	:Receptacle	AMP 316041-2 or AMP 179956-2
	:Receptacle	Yazaki 7116-3251
	:Tab	Yazaki 7114-3251
	:Pressed sleeve	JST FNC-2

2. XXX :Braided wires under 25mm pitch.
3. The location of connector pin is as viewed from the inserting side.
4. The relay should not be clamped to the harness.
5. Write or impress the letters with undamped ink.
6. Fuses should be placed in a circle, as shown in the figure 1.
7. The end of the spiral tube should be tied together with wire ties, and then the tube should be coiled with a gap of 2±1mm.(Refer to Figure 2).
8. The end of the vinyl tube should be tied together with wire ties.
9. The capacitor should be soldered to the speed sensor section, as shown in Fig. 3. The inside of the vinyl tube covering the capacitor should be filled with siliconadhesive.

Figure 1

Figure 2

Figure 3

Reference:

Harness mark/color

- Red — RD
- Black — BK
- Green — GN
- Yellow — YE
- White — WH
- Brown — BN
- Blue — BU
- Gray — GY
- Pink — PK
- Orange — OG

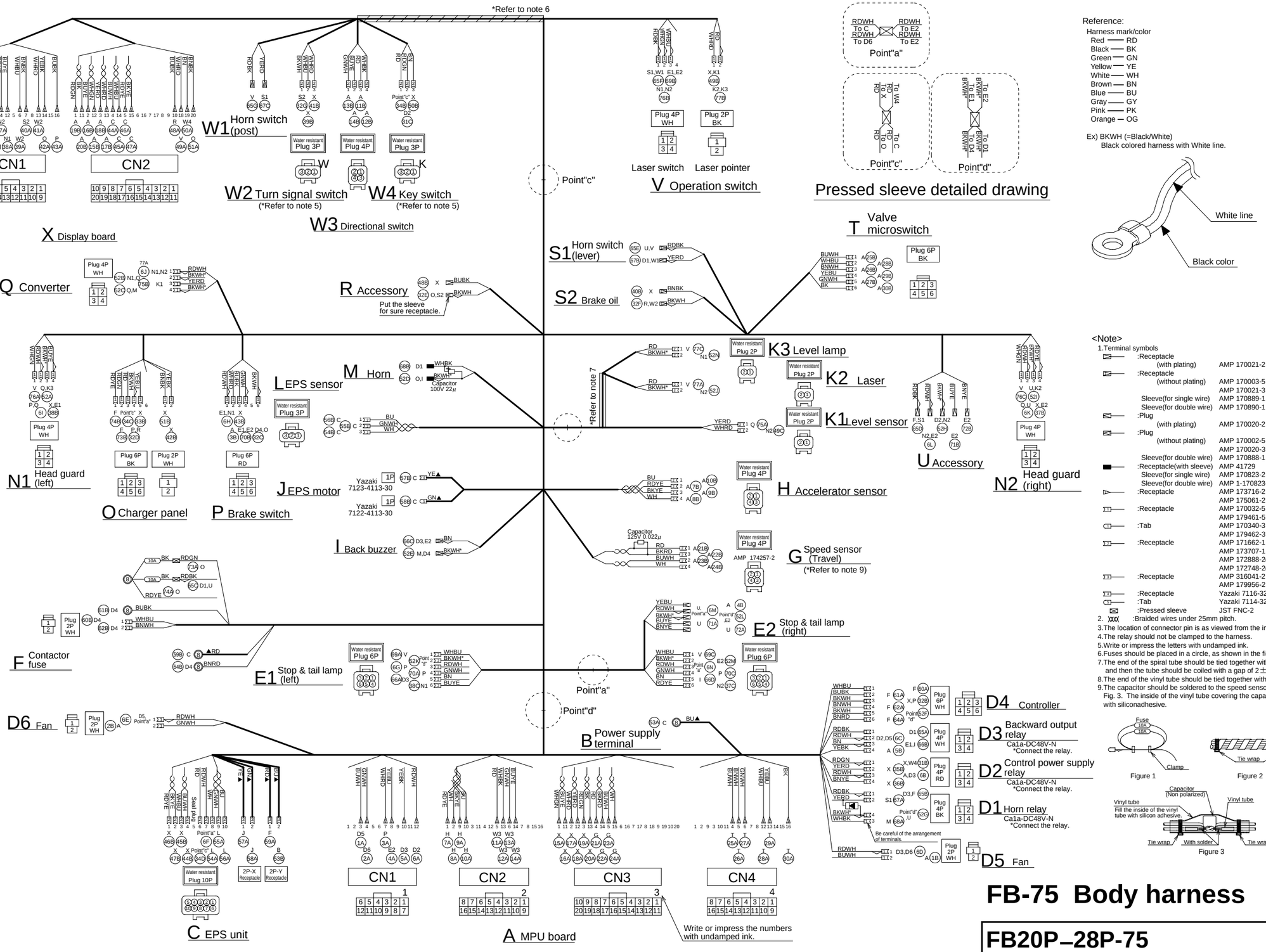
Ex) BKWH (=Black/White)
Black colored harness with White line.

FB-75 Body harness

4- 3.

FB10P-18P-75 (Automated fork horizontal stop) **4-3-2.**

54000-19182-0e



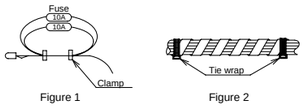


Figure 1 Figure 2

Figure 3

<Note>

1.Terminal symbols

:Receptacle (with plating)	AMP 170021-2
:Receptacle (without plating)	AMP 170003-5 or AMP 170021-3
Sleeve(for single wire)	AMP 170889-1
Sleeve(for double wire)	AMP 170890-1
:Plug (with plating)	AMP 170020-2
:Plug (without plating)	AMP 170002-5 or AMP 170020-3
Sleeve(for double wire)	AMP 170888-1
:Receptacle(with sleeve)	AMP 41729
Sleeve(for single wire)	AMP 170823-2
Sleeve(for double wire)	AMP 1-170823-5
:Receptacle	AMP 173716-2 or AMP 175061-2
:Receptacle	AMP 170032-5 or AMP 179461-5
:Tab	AMP 170340-3 or AMP 179462-3
:Receptacle	AMP 171662-1 or AMP 173707-1 AMP 172888-2(rubber plug) AMP 172748-2(seal plug)
:Receptacle	AMP 316041-2 or AMP 179956-2
:Receptacle	Yazaki 7116-3251
:Tab	Yazaki 7114-3251
:Pressed sleeve	JST FNC-2

2. :Braided wires under 25mm pitch.
3.The location of connector pin is as viewed from the inserting side.
4.The relay should not be clamped to the harness.
5.Write or impress the letters with undamped ink.
6.Fuses should be placed in a circle, as shown in the figure 1.
7.The end of the spiral tube should be tied together with wire ties, and then the tube should be coiled with a gap of 2±1mm.(Refer to Figure 2).
8.The end of the vinyl tube should be tied together with wire ties.
9.The capacitor should be soldered to the speed sensor section, as shown in Fig. 3. The inside of the vinyl tube covering the capacitor should be filled with siliconadhesive.

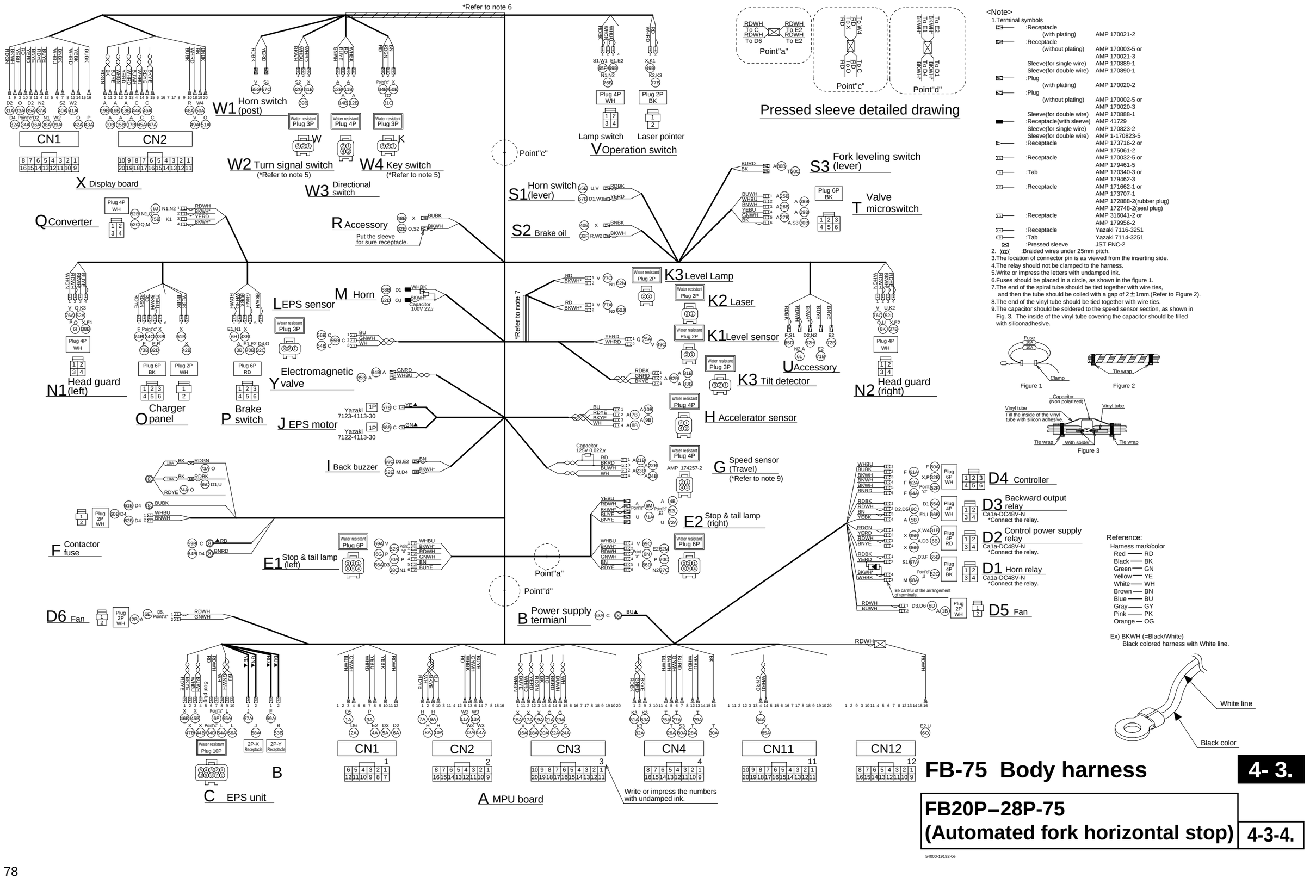
FB-75 Body harness

4- 3.

FB20P–28P-75 (Std/CS/FCS/RP/DRP)

4-3-3.

54000-19164-1e



<Note>

1.Terminal symbols

	:Receptacle (with plating)	AMP 170021-2
	:Receptacle (without plating)	AMP 170003-5 or AMP 170021-3
	Sleeve(for single wire)	AMP 170889-1
	Sleeve(for double wire)	AMP 170890-1
	:Plug (with plating)	AMP 170020-2
	:Plug (without plating)	AMP 170002-5 or AMP 170020-3
	Sleeve(for double wire)	AMP 170888-1
	:Receptacle(with sleeve)	AMP 41729
	Sleeve(for single wire)	AMP 170823-2
	Sleeve(for double wire)	AMP 1-170823-5
	:Receptacle	AMP 173716-2 or AMP 175061-2
	:Receptacle	AMP 170032-5 or AMP 179461-5
	:Tab	AMP 170340-3 or AMP 179462-3
	:Receptacle	AMP 171662-1 or AMP 173707-1 AMP 172888-2(rubber plug) AMP 172748-2(seal plug)
	:Receptacle	AMP 316041-2 or AMP 179956-2
	:Receptacle	Yazaki 7116-3251
	:Tab	Yazaki 7114-3251
	:Pressed sleeve	JST FNC-2

2. :Braided wires under 25mm pitch.
3.The location of connector pin is as viewed from the inserting side.
4.The relay should not be clamped to the harness.
5.Write or impress the letters with undamped ink.
6.Fuses should be placed in a circle, as shown in the figure 1.
7.The end of the spiral tube should be tied together with wire ties, and then the tube should be coiled with a gap of 2±1mm.(Refer to Figure 2).
8.The end of the vinyl tube should be tied together with wire ties.
9.The capacitor should be soldered to the speed sensor section, as shown in Fig. 3. The inside of the vinyl tube covering the capacitor should be filled with siliconadhesive.

Figure 1

Figure 2

Figure 3

Reference:
Harness mark/color
Red — RD
Black — BK
Green — GN
Yellow — YE
White — WH
Brown — BN
Blue — BU
Gray — GY
Pink — PK
Orange — OG

Ex) BKWH (=Black/White)
Black colored harness with White line.

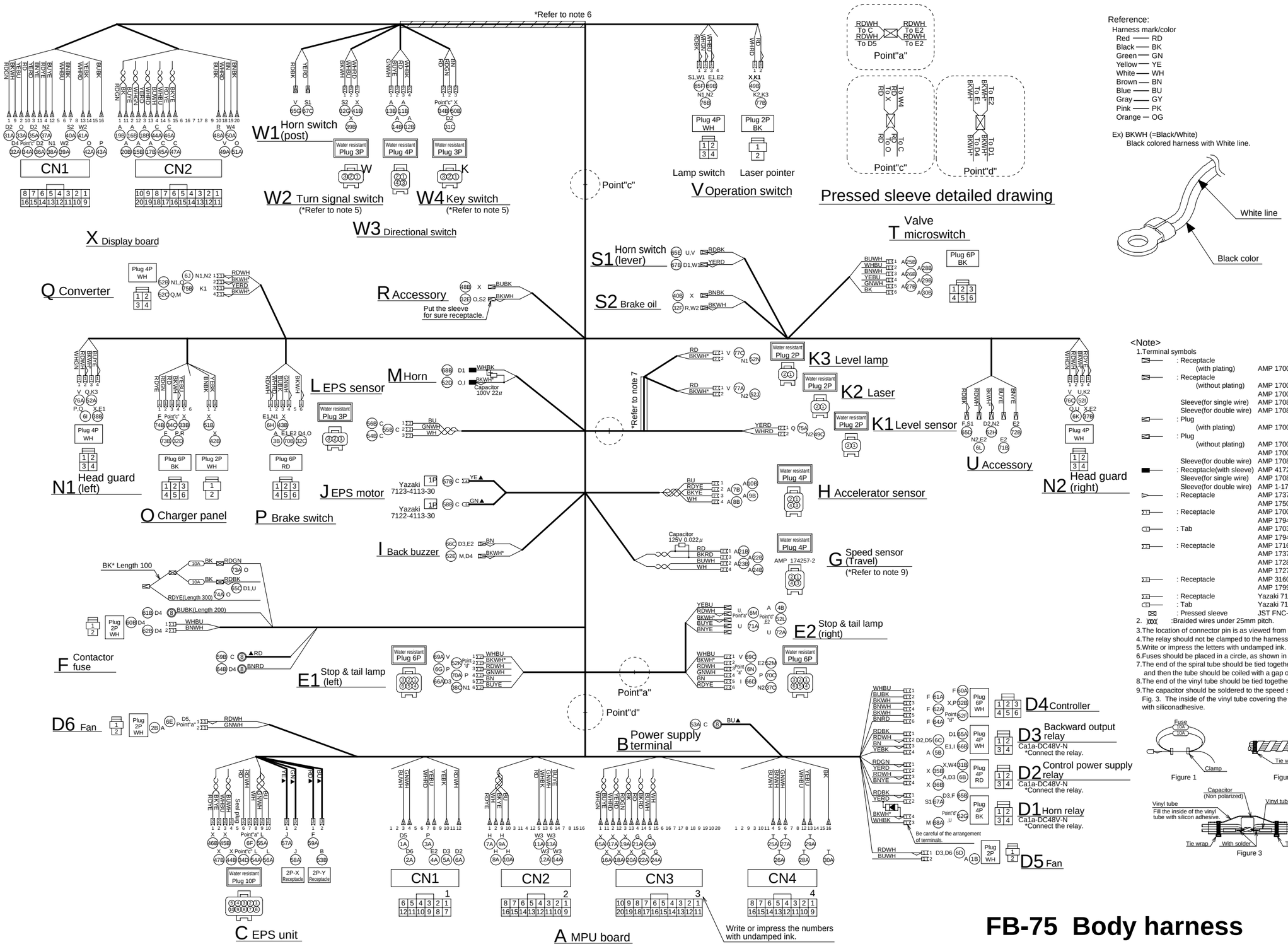
FB-75 Body harness

4- 3.

FB20P–28P-75
(Automated fork horizontal stop)

4-3-4.

54000-19192-0e



<Note>

1.Terminal symbols

	: Receptacle (with plating)	AMP 170021-2
	: Receptacle (without plating)	AMP 170003-5 or AMP 170021-3
	Sleeve(for single wire)	AMP 170889-1
	Sleeve(for double wire)	AMP 170890-1
	: Plug (with plating)	AMP 170020-2
	: Plug (without plating)	AMP 170002-5 or AMP 170020-3
	Sleeve(for double wire)	AMP 170888-1
	: Receptacle(with sleeve)	AMP 41729
	Sleeve(for single wire)	AMP 170823-2
	Sleeve(for double wire)	AMP 1-170823-5
	: Receptacle	AMP 173716-2 or AMP 175061-2
	: Receptacle	AMP 170032-5 or AMP 179461-5
	: Tab	AMP 170340-3 or AMP 179462-3
	: Receptacle	AMP 171662-1 or AMP 173707-1 AMP 172888-2(rubber plug) AMP 172748-2(seal plug)
	: Receptacle	AMP 316041-2 or AMP 179956-2
	: Receptacle	Yazaki 7116-3251
	: Tab	Yazaki 7114-3251
	: Pressed sleeve	JST FNC-2

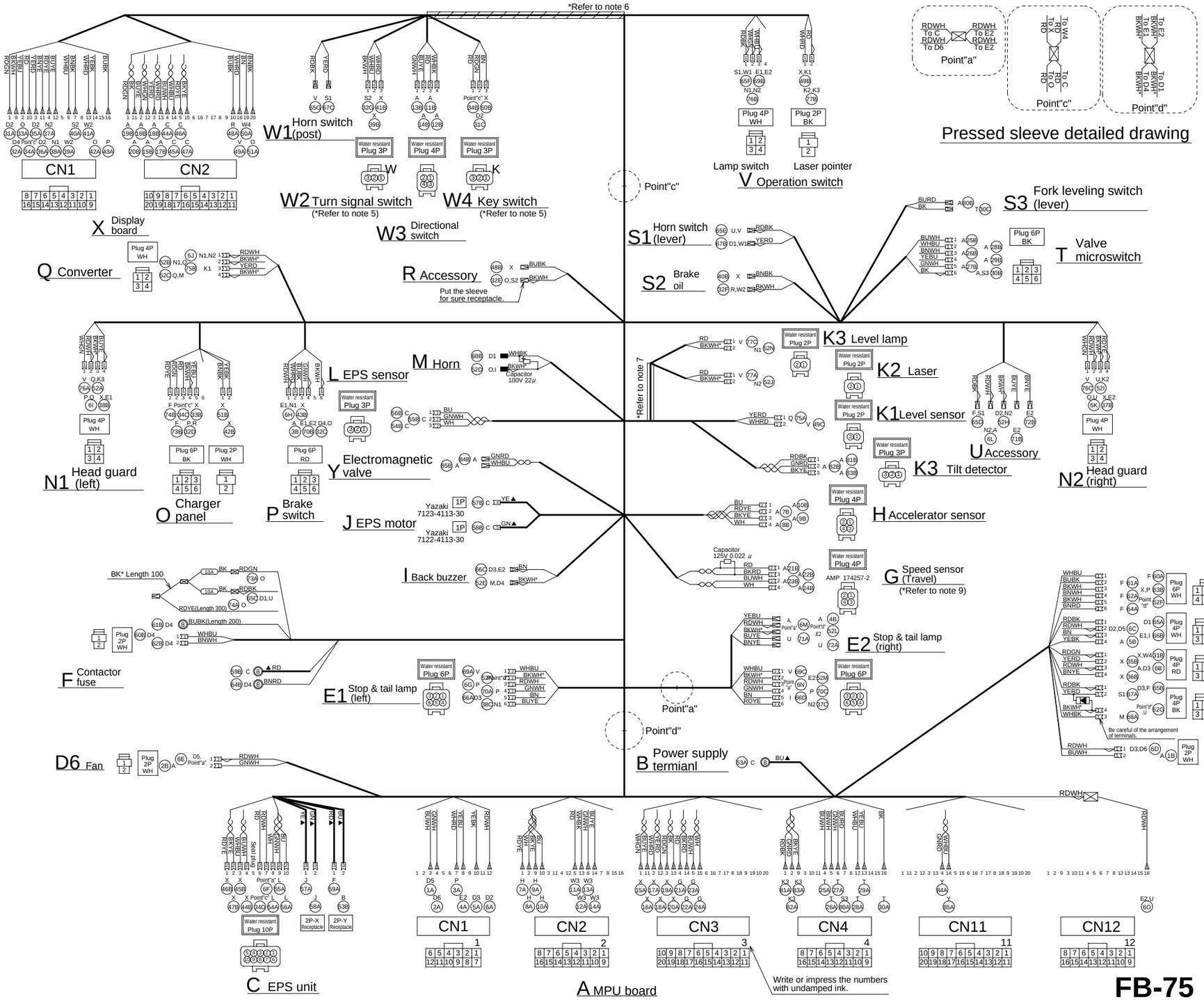
2. :Braided wires under 25mm pitch.
3.The location of connector pin is as viewed from the inserting side.
4.The relay should not be clamped to the harness.
5.Write or impress the letters with undamped ink.
6.Fuses should be placed in a circle, as shown in the figure 1.
7.The end of the spiral tube should be tied together with wire ties, and then the tube should be coiled with a gap of 2±1mm.(Refer to Figure 2).
8.The end of the vinyl tube should be tied together with wire ties.
9.The capacitor should be soldered to the speed sensor section, as shown in Fig. 3. The inside of the vinyl tube covering the capacitor should be filled with siliconadhesive.

FB-75 Body harness

4- 3.

FB30P-75 (Std/CS/FCS/RP/DRP)	4-3-5.

54000-19174-1e

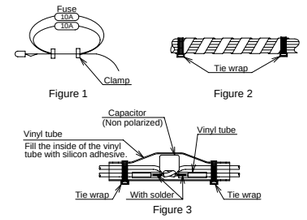


<Note>

1.Terminal symbols

	:Receptacle (with plating)	AMP 170021-2
	:Receptacle (without plating)	AMP 170003-5 or AMP 170021-3
	Sleeve(for single wire)	AMP 170889-1
	Sleeve(for double wire)	AMP 170890-1
	:Plug (with plating)	AMP 170020-2
	:Plug (without plating)	AMP 170002-5 or AMP 170020-3
	Sleeve(for double wire)	AMP 170888-1
	:Receptacle(with sleeve)	AMP 41729
	Sleeve(for single wire)	AMP 170823-2
	Sleeve(for double wire)	AMP 1-170823-5
	:Receptacle	AMP 173716-2 or AMP 175061-2
	:Receptacle	AMP 170032-5 or AMP 179461-5
	:Tab	AMP 170340-3 or AMP 179462-3
	:Receptacle	AMP 171662-1 or AMP 173707-1
		AMP 172889-2(rubber plug)
		AMP 172748-2(seal plug)
	:Receptacle	AMP 316041-2 or AMP 179956-2
	:Receptacle	Yazaki 7116-3251
	:Tab	Yazaki 7114-3251
	:Pressed sleeve	JST FNC-2

2. :Braided wires under 25mm pitch.
3.The location of connector pin is as viewed from the inserting side.
4.The relay should not be clamped to the harness.
5.Write or impress the letters with undamped ink.
6.Fuses should be placed in a circle, as shown in the figure 1.
7.The end of the spiral tube should be tied together with wire ties, and then the tube should be coiled with a gap of 2±1mm.(Refer to Figure 2).
8.The end of the vinyl tube should be tied together with wire ties.
9.The capacitor should be soldered to the speed sensor section, as shown in Fig. 3. The inside of the vinyl tube covering the capacitor should be filled with siliconadhesive.



FB-75 Body harness

4- 3.

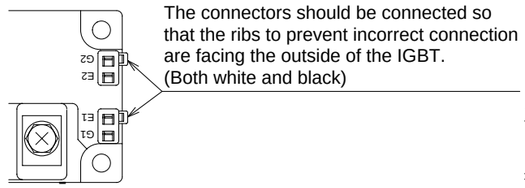
FB30P-75
(Automated fork horizontal stop) **4-3-6.**

54000-19202-0e

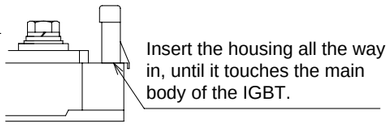
<Note>
1. This diagram shows that IGBT is a 400A item. When it is a 600A item, even though the size of the IGBT is different, the wiring is all the same.
2.Terminal symbols

(6) :Terminal 1.25-6

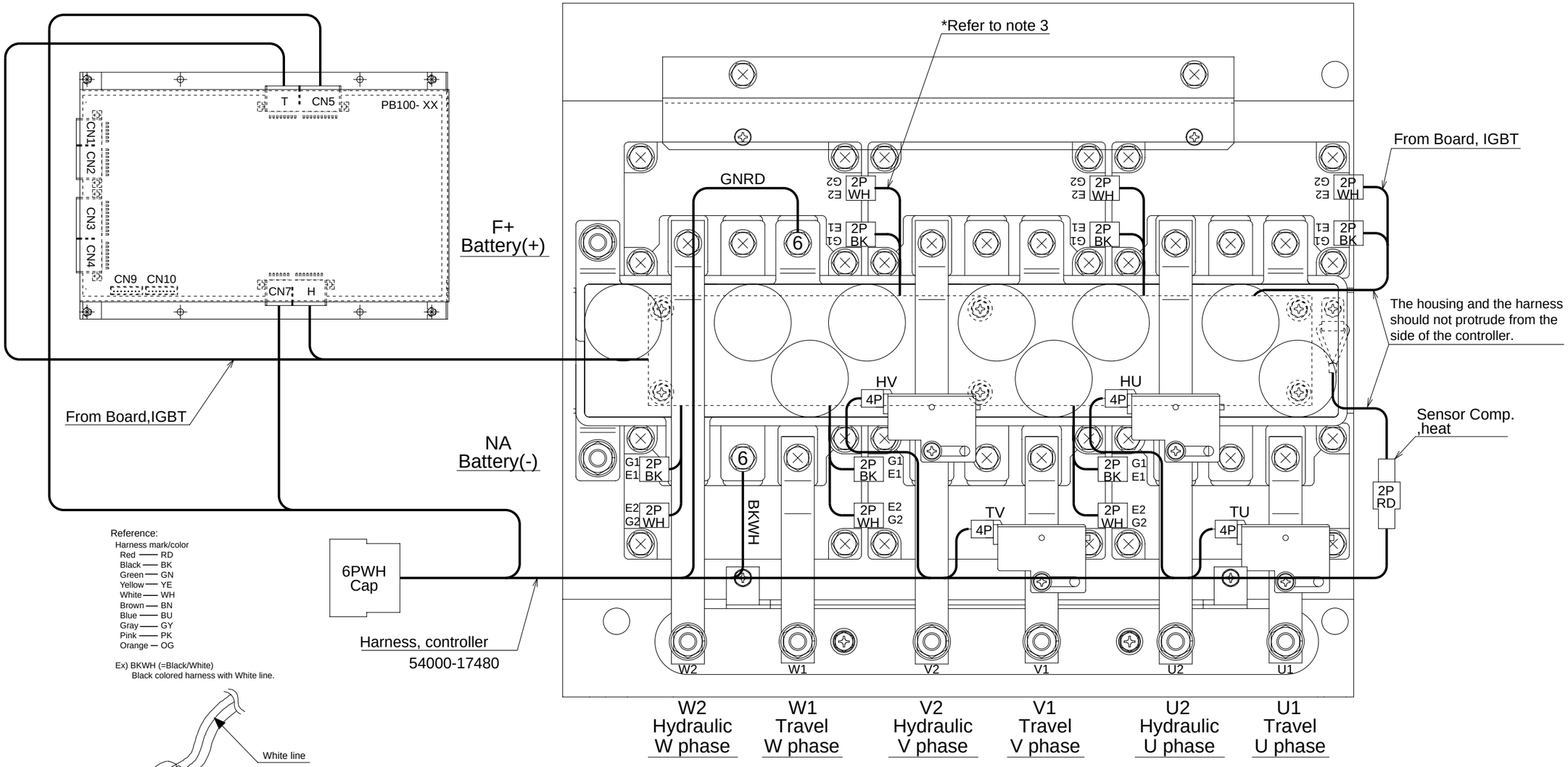
3. The connection of the IGBT gate connectors should be made according to the following drawings.



The top view

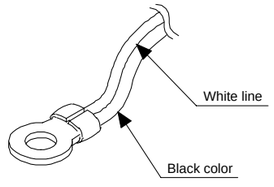


The side view



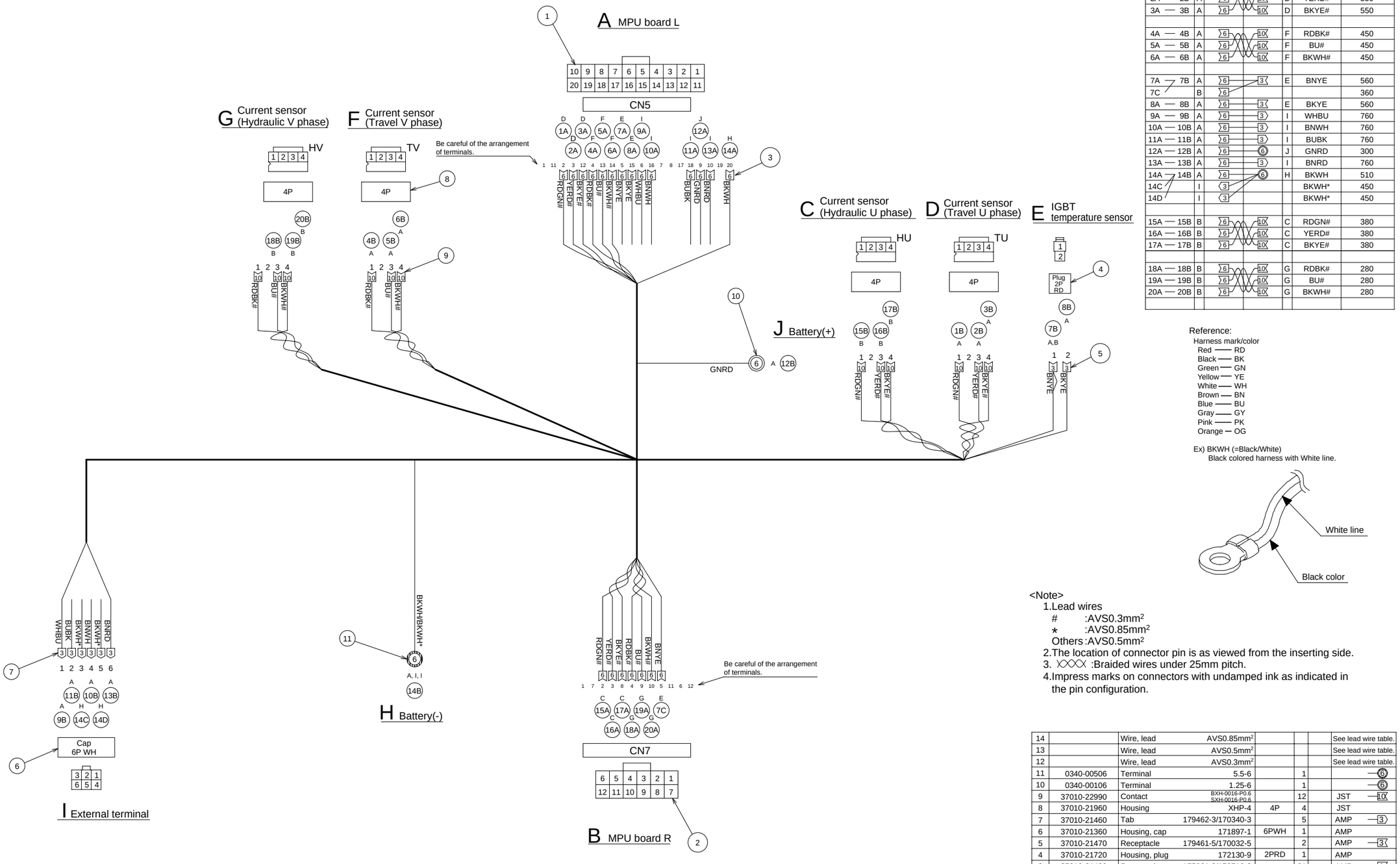
Reference:
Harness mark/color
- Red — RD
- Black — BK
- Green — GN
- Yellow — YE
- White — WH
- Brown — BN
- Blue — BU
- Gray — GY
- Pink — PK
- Orange — OG

Ex) BKWH (=Black/White)
Black colored harness with White line.



FB-75 Controller wiring

4- 4.



Line No.		From	To		Color	Length(mm)
1A — 1B	A	6	10	D	RDGN#	550
2A — 2B	A	6	10	D	YERD#	550
3A — 3B	A	6	10	D	BKYE#	550
4A — 4B	A	6	10	F	RDBK#	450
5A — 5B	A	6	10	F	BU#	450
6A — 6B	A	6	10	F	BKWH#	450
7A — 7B	A	6	3	E	BNYE	560
7C	B	6				360
8A — 8B	A	6	3	E	BKYE	560
9A — 9B	A	6	3	I	WHBU	760
10A — 10B	A	6	3	I	BNWH	760
11A — 11B	A	6	3	I	BUBK	760
12A — 12B	A	6	6	J	GNRD	300
13A — 13B	A	6	3	I	BNRD	760
14A — 14B	A	6	6	H	BKWH	510
14C	I	3			BKWH*	450
14D	I	3			BKWH*	450
15A — 15B	B	6	10	C	RDGN#	380
16A — 16B	B	6	10	C	YERD#	380
17A — 17B	B	6	10	C	BKYE#	380
18A — 18B	B	6	10	G	RDBK#	280
19A — 19B	B	6	10	G	BU#	280
20A — 20B	B	6	10	G	BKWH#	280

Reference:
Harness mark/color
Red — RD
Black — BK
Green — GN
Yellow — YE
White — WH
Brown — BN
Blue — BU
Gray — GY
Pink — PK
Orange — OG

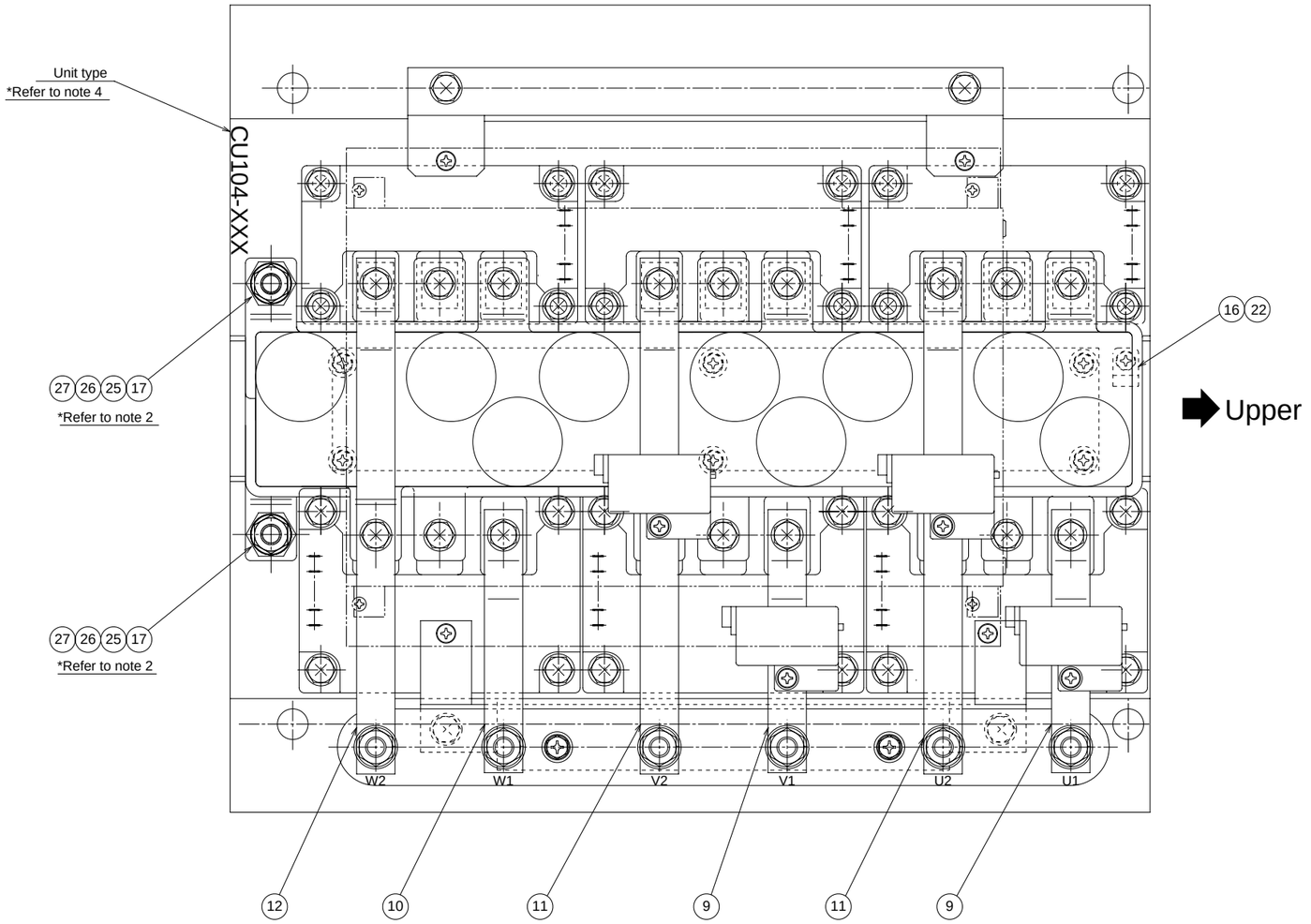
Ex) BKWH (=Black/White)
Black colored harness with White line.

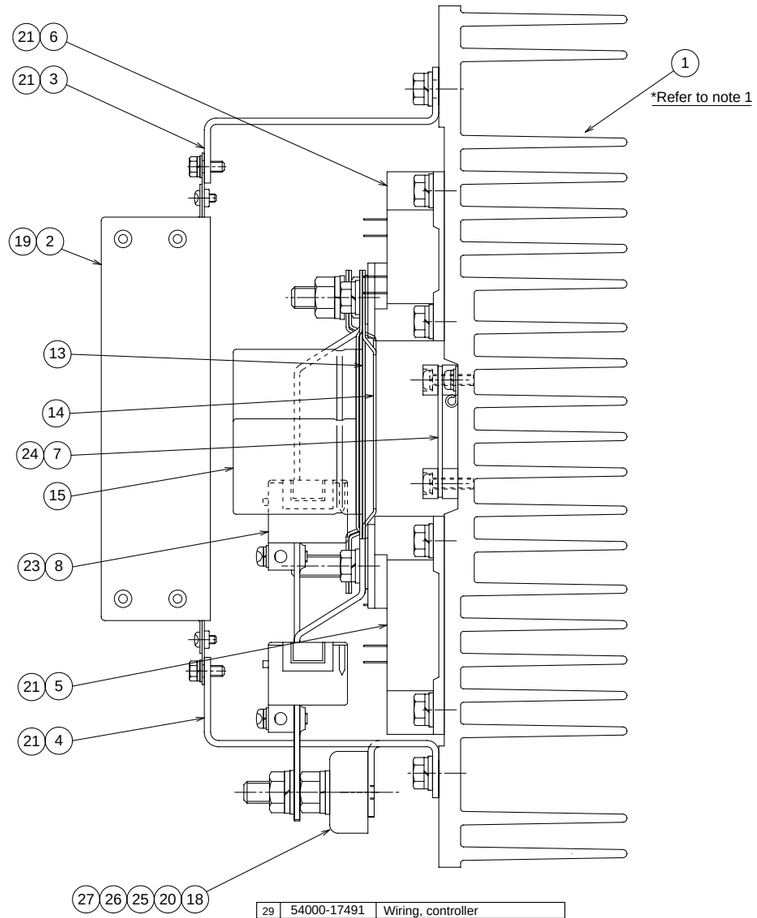
<Note>
1.Lead wires
:AVS0.3mm²
∗ :AVS0.85mm²
Others :AVS0.5mm²
2.The location of connector pin is as viewed from the inserting side.
3. ⋁⋁⋁ :Braided wires under 25mm pitch.
4.Impress marks on connectors with undamped ink as indicated in the pin configuration.

SYM	PART NO.	PART NAME	SIZE	MATERIAL	QTY	MASS	REMARKS
14		Wire, lead	AVS0.85mm²				See lead wire table.
13		Wire, lead	AVS0.5mm²				See lead wire table.
12		Wire, lead	AVS0.3mm²				See lead wire table.
11	0340-00506	Terminal	5.5-6		1		6
10	0340-00106	Terminal	1.25-6		1		6
9	37010-22990	Contact	BXH-0016-P0.6 SXH-0016-P0.6		12		JST 10
8	37010-21960	Housing	XHP-4	4P	4		JST
7	37010-21460	Tab	179462-3/170340-3		5		AMP 3
6	37010-21360	Housing, cap	171897-1	6PWH	1		AMP
5	37010-21470	Receptacle	179461-5/170032-5		2		AMP 3
4	37010-21720	Housing, plug	172130-9	2PRD	1		AMP
3	37010-21490	Receptacle	175061-2/173716-2		21		AMP 6
2	37010-21870	Housing, plug	175965-2	12P	1		AMP
1	37010-21020	Housing, plug	175967-2	20P	1		AMP

FB-75 Controller harness 4- 5.

54000-17483-0e





29	54000-17491	Wiring, controller
28	54000-17483	Harness, controller
27	0000-00008	Nut
26	0000-70008	Washer, lock
25	0000-72008	Washer, plain
24	0077-04016	Screw, w/washer
23	0075-04016	Screw, w/washers
22	0075-04008	Screw, w/washers
21	0016-06012	Bolt, w/washers
20	0016-05014	Bolt, w/washers
19	0016-04010	Bolt, w/washers
18	24200-66340	Terminal Comp.
17	24200-63030	Terminal
16	24200-56850	Sensor Comp., heat
15	54000-19620	Capacitor Comp.
14	54000-15680	Bar, lead(8)
13	54000-15670	Bar, lead(7)
12	54000-14130	Bar, lead(4)
11	54000-14120	Bar, lead(3)
10	54000-14110	Bar, lead(2)
9	54000-14100	Bar, lead(1)
8	39530-02180	Sensor, current
7	54000-19610	Board Comp., IGBT
6	35030-00780	Module, IGBT
5	35030-00790	Module, IGBT
4	54000-19601	Bracket, board(2)
3	54000-20691	Bracket, board(1)
2	⟷	Board Comp., MPU
1	54000-19490	Sink, heat

Note
1. When installing a " ⑤ ⑥ Module ,IGBT" to the " ① Sink, heat", be sure to apply condition compund[G-747] (Shin-Etsu silicones) to the entire contact surface.
2. Insert washers in the " ⑰ terminal", as shown in Figure A, and then installing the " ⑰ terminal", apply LOCTITE[242] or a similar material to the screws to prevent looseness.
3. Recommended tightening torque for the IGBT.
   Main terminal(M6) and mounting(M6) : 3.5-4.5N·m(0.36-0.49kg·m)
4. Impress a Unit type to the specified position with undamped ink.
5. Use the terminal bolt included for the "IGBT module" .
6. In order to improve vibration resistance, apply to the "capacitor comp." a silicone adhesive agent on the bottom to fix it into place.

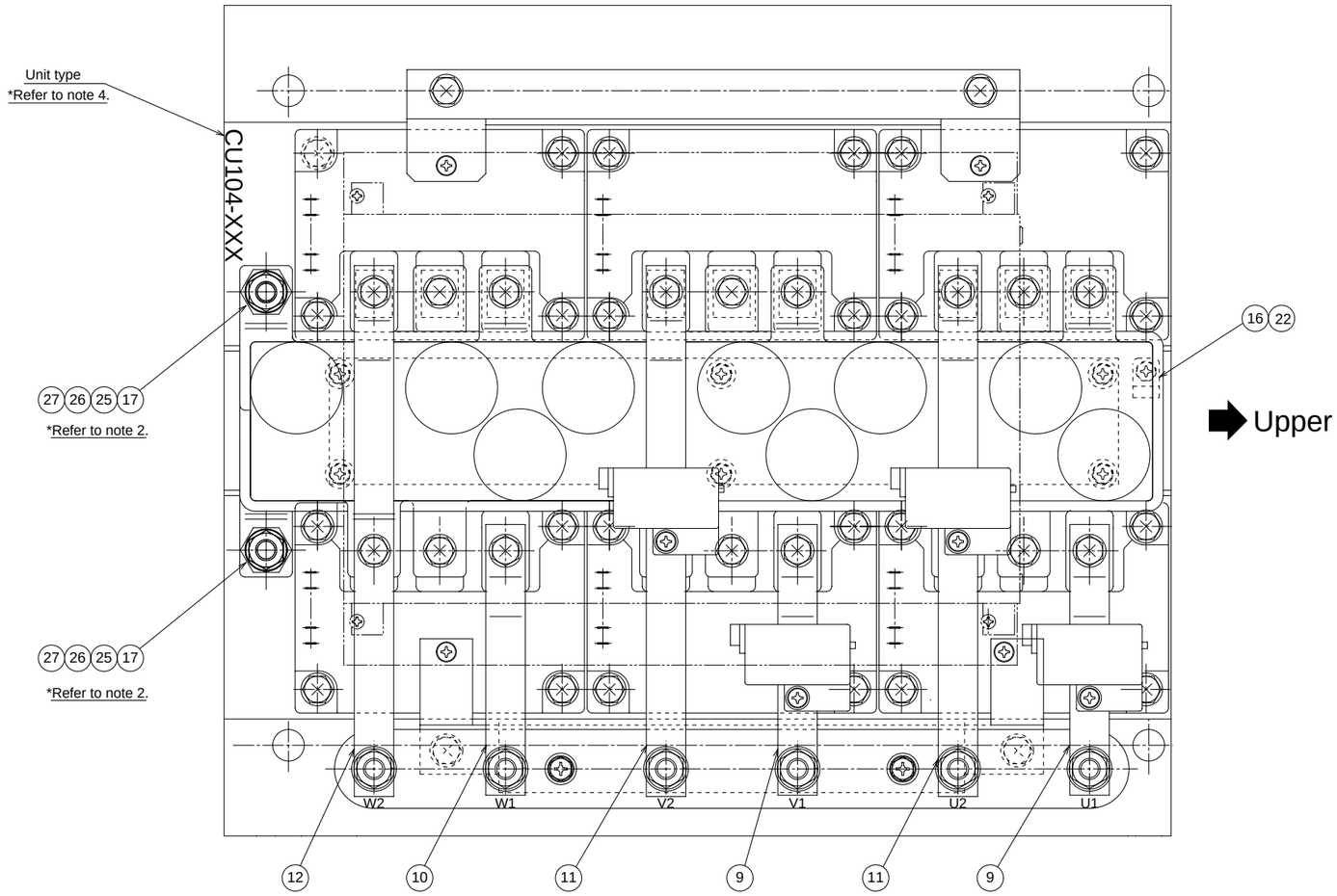

Figure A

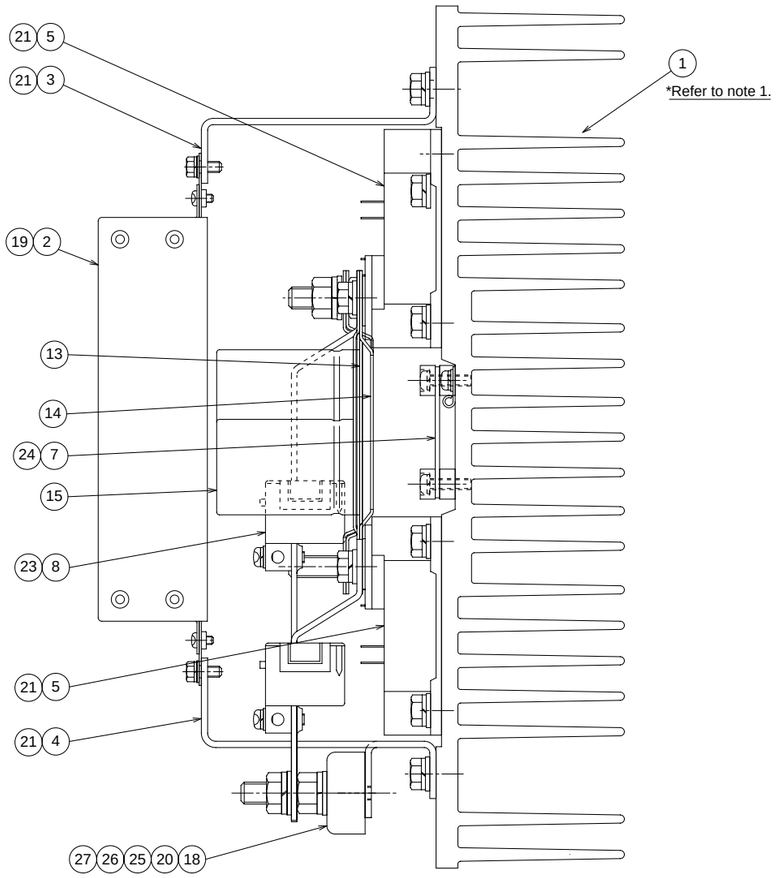
Applicable models	Part No.	Type	Maximum current (IGBT rating)		② Board comp., MPU		Remarks
			Travel	Hydraulic	Part No.	Type	
STD	54000-15491-1	CU104-50	600A (250V)	400A (250V)	54000-20411	PBC104-00	When installing, make sure the arrow points up.
OPT	54000-19351-1	CU104-53	↑	↑	54000-20431	PBC104-02	

FB-75 Main controller 4- 6.

FB10P–28P-75 4-6-1.

E0000-04271-1e





29	54000-17491	Wiring, controller
28	54000-17483	Harness, controller
27	0000-00008	Nut
26	0000-70008	Washer, lock
25	0000-72008	Washer, plain
24	0077-04016	Screw, w/washer
23	0075-04016	Screw, w/washers
22	0075-04008	Screw, w/washers
21	0016-06012	Bolt, w/washers
20	0016-05014	Bolt, w/washers
19	0016-04010	Bolt, w/washers
18	24200-66340	Terminal Comp.
17	24200-63030	Terminal
16	24200-56850	Sensor comp., heat
15	54000-19630	Capacitor Comp.
14	54000-15680	Bar, lead(8)
13	54000-15670	Bar, lead(7)
12	54000-14130	Bar, lead(4)
11	54000-14120	Bar, lead(3)
10	54000-14110	Bar, lead(2)
9	54000-14100	Bar, lead(1)
8	39530-02180	Sensor, current
7	54000-19610	Board Comp., IGBT
6		
5	35030-00790	Module, IGBT
4	54000-19601	Bracket, board(2)
3	54000-20690	Bracket, board(1)
2	<——>	Board Comp., MPU
1	54000-15480	Sink, heat

Note
1. When installing a " ⑤ ⑥ Module ,IGBT" to the " ① Sink, heat", be sure to apply condition compund[G-747] (Shin-Etsu silicones) to the entire contact surface.
2. Insert washers in the " ⑰ terminal", as shown in Figure A, and then installing the " ⑰ terminal", apply LOCTITE[242] or a similar material to the screws to prevent looseness.
3. Recommended tightening torque for the IGBT.
   Main terminal(M6) and mounting(M6) : 3.5-4.5N·m(0.36-0.49kg·m)
4. Impress a Unit type to the specified position with undamped ink.
5. Use the terminal bolt included for the "IGBT module" .
6. In order to improve vibration resistance, apply to the "capacitor comp." a silicone adhesive agent on the bottom to fix it into place.

Figure A

Applicable models	Part No.	Type	Maximum corrent (IGBT rating)		② Board comp., MPU		⑮ Capacitor comp.		Remarks
			Travel	Hydraulic	Part No.	Type	Part No.	Rating	
FB30-75 STD	54000-19361-1	CU104-51	600A (250V)	600A (250V)	54000-20421	PBC104-01	54000-19630	100V 4700μF	When installing, make sure the arrow points up.
FB-U75 STD	54000-20731-1	CU104-52	↑	↑	↑	↑	54000-19620	80V 5600μF	
FB30-75 OPT	54000-19371-1	CU104-54	↑	↑	54000-20441	PBC104-03	54000-19630	100V 4700μF	
FB-U75 OPT	54000-20991-1	CU104-55	↑	↑	↑	↑	54000-19620	80V 5600μF	

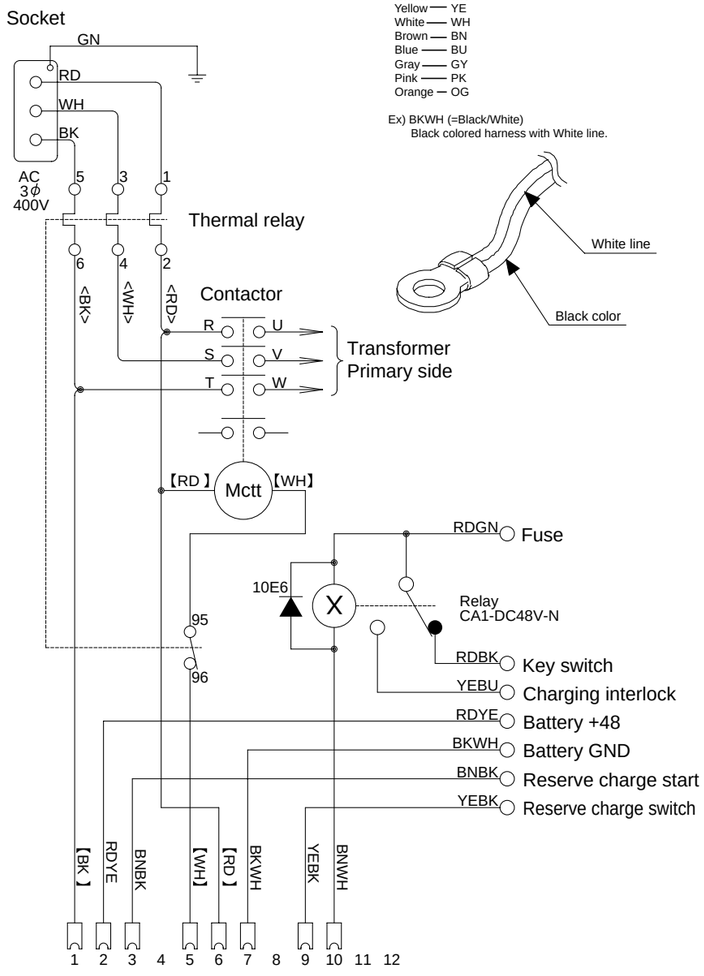
FB-75 Main controller 4- 6.

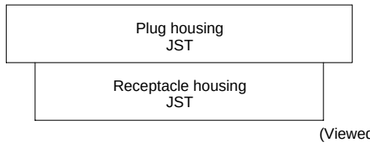
FB10P–25P-U75/FB30P-75 | **4-6-2.**

E0000-04281-1e

Reference:
Harness mark/color
Red — RD
Black — BK
Green — GN
Yellow — YE
White — WH
Brown — BN
Blue — BU
Gray — GY
Pink — PK
Orange — OG

Ex) BKWH (=Black/White)
Black colored harness with White line.

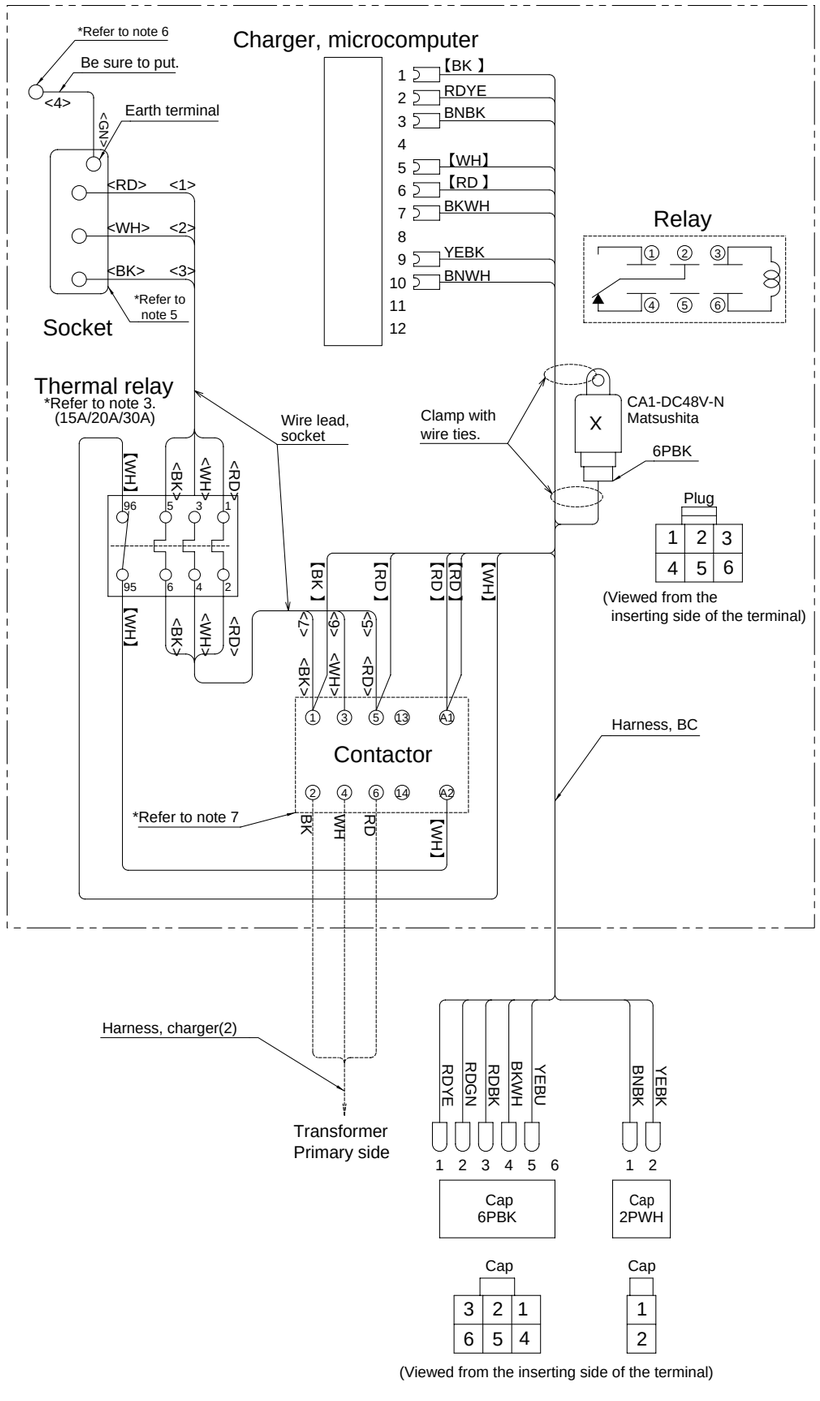




1	2	3	4
GND	VB1	CST	
5	6	7	8
MC	AC4	NB	
9	10	11	12
RSW	DCR		

(Viewed from the inserting side of the terminal)

Panel, charger



(Viewed from the inserting side of the terminal)

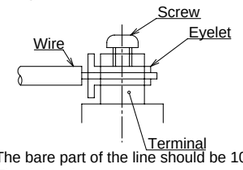
<Note>
1.Lead wire
Others :AV/AVS0.5mm²
【 】 :F-KIV/KIV/LV 1.25mm² /0.75mm²
< > :F-KIV/KIV/LV 2.0mm²
2.Terminal symbols
:Tab 179462-3 or 170340-3
:Contact, socket SLF-41T-1.3E

3.Thermal relay setting value

Capacity	Setting value
5.2kVA	7.5A
6.4kVA	10.0A
7.0kVA	11.0A
10.0kVA	15.0A
12.0kVA	18.0A

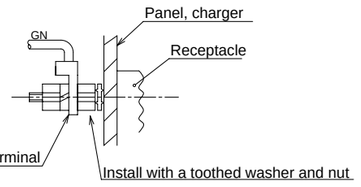
4.Use pressed terminal without sleeve.

5.Connecting wires around socket is as below figure.



a.The bare part of the line should be 10–1mm
b.The tightening torque for the screws is 0.98-1.18N·m(10-12kgf·cm)

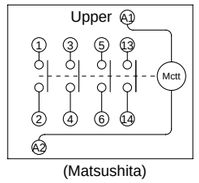
6.Detail of connecting the earth terminal is as below figure.



(You can not use a "washer, plain" or a "washer, lock")

The ground terminal (GN) for the receptacle should be installed in the panel (as shown in the figure above).
After assembly, check for conduction between the ground terminal and "bracket, panel".

7.The contactor terminal should be wired with the topside up, as shown in the figure below.



(Matsushita)

FB-75 BC wiring

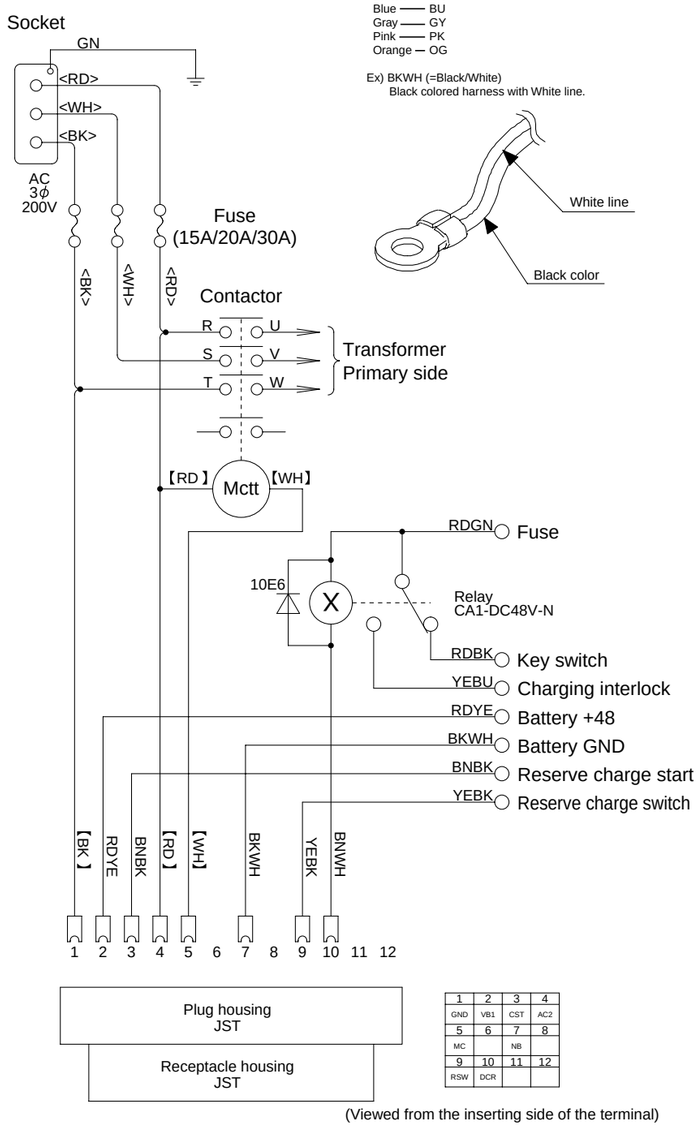
4- 7.

400V | **4-7-1.**

24900-30280-0e

Reference:
Harness mark/color
Red — RD
Black — BK
Green — GN
Yellow — YE
White — WH
Brown — BN
Blue — BU
Gray — GY
Pink — PK
Orange — OG

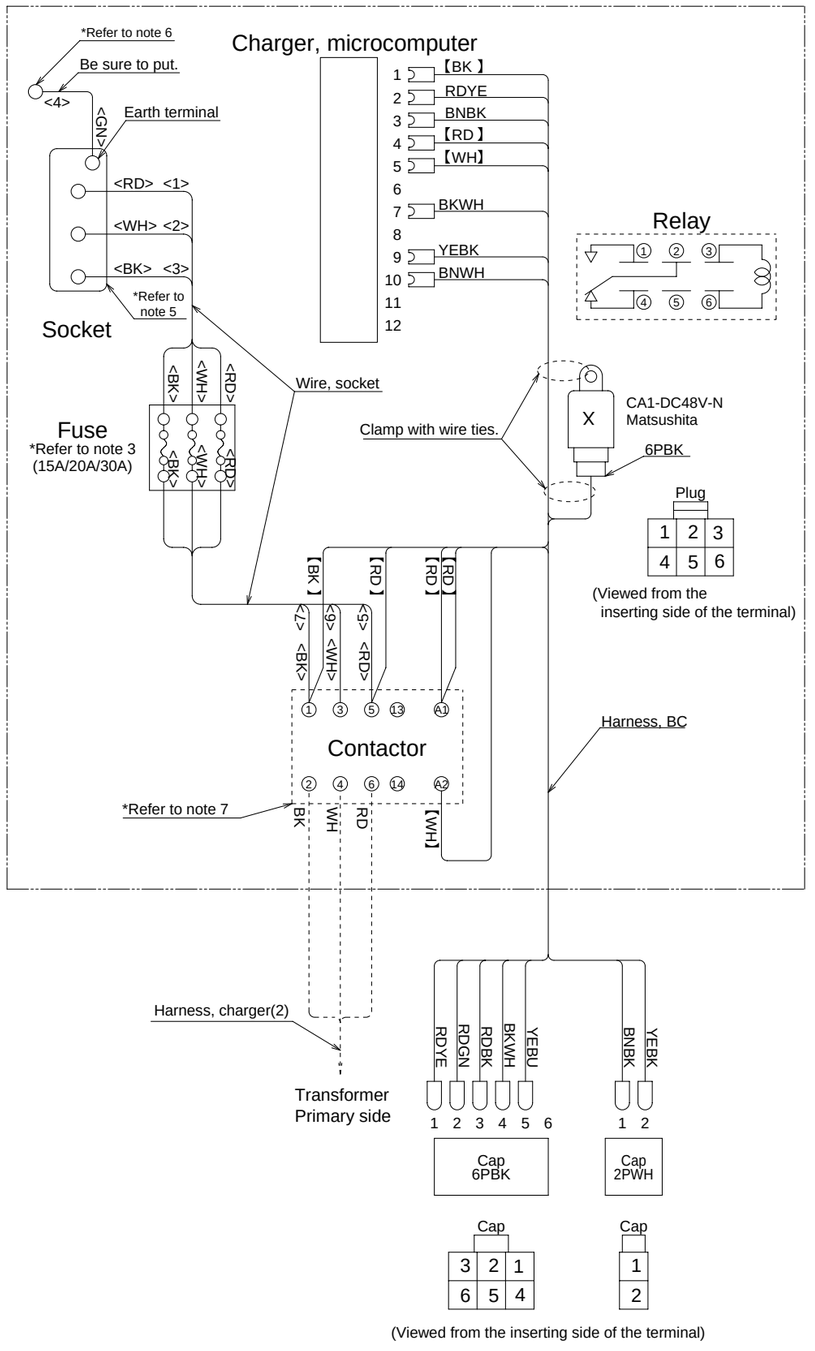
Ex) BKWH (=Black/White)
Black colored harness with White line.



1	2	3	4
GND	VB1	CST	AC2
5	6	7	8
MC		NB	
9	10	11	12
RSW	DCR		

(Viewed from the inserting side of the terminal)

Panel, charger



(Viewed from the inserting side of the terminal)

<Note>

1.Lead wire
Others :AV/AVS0.5mm²
【】 :F-KIV/KIV/LV 1.25mm² /0.75mm²
< > :Refer to below table.

Capacity \ Lead wire	F-KIV/KIV/LV 3.5mm²	F-KIV/KIV/LV 5.5mm²
5.2 kVA	○	
6.4/7.0 kVA	○	
10.0/12.0 kVA		○

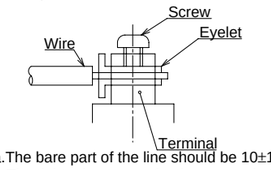
2.Terminal symbols
:Tab 179462-3 or 170340-3
:Contact, socket SLF-41T-1.3E

3.Using fuse

Capacity \ Fuse	FA-6-15 15A	FA-6-20 20A	FA-6-30 30A
5.2 kVA	○		
6.4/7.0 kVA		○	
10.0/12.0 kVA			○

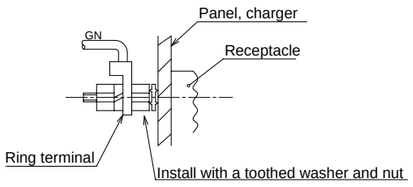
4.Use pressed terminal without sleeve.

5.Connecting wires around socket is as below figure.



a.The bare part of the line should be 10±1mm
b.The tightening torque for the screws is 0.98-1.18N·m(10-12kgf·cm)

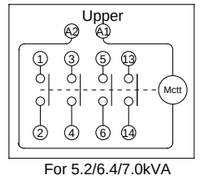
6.Detail of connecting the earth terminal is as below figure.



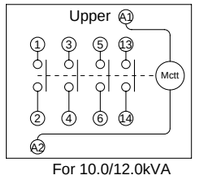
(You can not use a "washer, plain" or a "washer, lock")

The ground terminal (GN) for the receptacle should be installed in the panel (as shown in the figure above).
After assembly, check for conduction between the ground terminal and "bracket, panel".

7.The contactor terminal should be wired with the topside up, as shown in the figure below.



For 5.2/6.4/7.0kVA
(Mitsubishi)



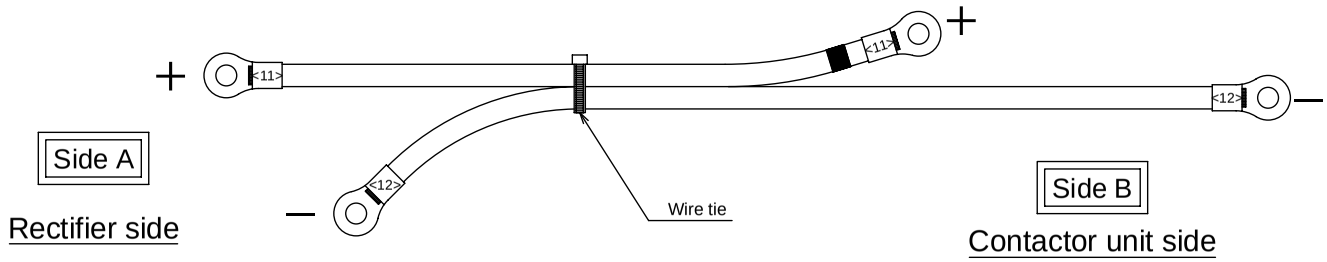
For 10.0/12.0kVA
(Matsushita)

FB-75 BC wiring

4- 7.

200V | **4-7-2.**

24900-29962-1e



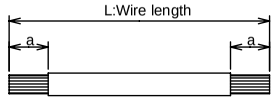
FB-75	Applicable models and battery capacity	FB10	10_330	10_400-				
		FB14	14_330	14_400-				
		FB15		15_ALL				
		FB18		18_ALL				
		FB20			20_-600	20_650-		
		FB25			25_-600	25_650-		
		FB28			28_-600	28_650-		
		FB30					30_ALL	

	Part No.	54000-	21170-0	21180-0	21190-0	21200-0	21210-0	
Terminal	22-S8	1912-04029	4 pieces					
	38-S8	37950-00840		4 pieces	←	←	←	

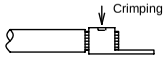
Wire	Side A		Side B		Wire type	Wire size	Length	Length	Length	Length	Length	Remarks
No.	Terminal	Mark	Terminal	Mark								
<11>	22-S8 *Note 4	+	22-S8	+	LV	22	550					Connecting Rectifier positive (+) side with Contactor
	38-S8 *Note 4	↑	38-S8	↑	LV	30		550	550			
	38-S8 *Note 4	↑	38-S8	↑	WCT	38				550	550	
<12>	22-S8 *Note 4	-	22-S8	-	LV	22	1750					Connecting Rectifier negative (-) side with Unit
	38-S8 *Note 4	↑	38-S8	↑	LV	30		1750	1800			
	38-S8 *Note 4	↑	38-S8	↑	WCT	38				1800	1900	

(Note)

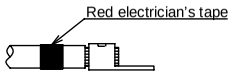
1.Wire length means the length to the tip of the wire. The length of the bare section of the lead wire is a=22mm^2, and a=15mm for 30 or 38mm^2.



2.Refer to the figure below for the crimping direction.



3.Wrap red electrician's tape around the B side of the positive (+) terminal on the lead wire to indicate polarity.(See the figure below)



4.Install a TCV cap on the A side terminal. The positive (+) side is red, and the negative (-) side is red, and the negative (-) side is blue.

5.Wire No. <n> does not need to be indicated.

FB-75 Charger harness 4- 8.

Charger harness(1) 4-8-1.

4- 8. FB-75 Charger harness

4-8-2. Charger harness(2)

Side A

Transformer primary side

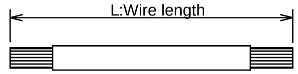
Side B

Magnetic contactor side

FB-75		Applicable models and battery capacity									
						FB10	10 ALL				
						FB14	14 ALL				
						FB15	15 ALL				
						FB18	18 ALL				
						FB20		20 -600	20 650-		
						FB25		25 -600	25 650-		
						FB28		28 -600	28 650-		
						FB30				30 ALL	
			Part No.			54000-	21220-0	21230-0	21380-0	21390-0	
Terminal			5.5-5			37910-01550	3 pieces	←	←	←	
			5.5-S4X			37910-02170	3 pieces	←	←	←	
			R8-6 or an equivalent product			37910-02270	6 pieces				
Wire No.	Side A Terminal	Side A Mark	Side B Terminal	Side B Mark	Wire type	Wire size	Length	Length	Length	Length	Remarks
<13>	5.5-5		5.5-S4X		VCT(3pieces)	3.5	2700	2900			Connecting Transformer primary side with Magnetic contactor
	↑		↑		↑	5.5			2900	3150	
	R8-6		R8-6		VCT(3pieces)	8					

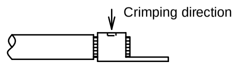
(Note)

1.Wire length means the length to the tip of the wire.
(See the figure below.)



2.The indicated wire length refers to the length of the red wire.

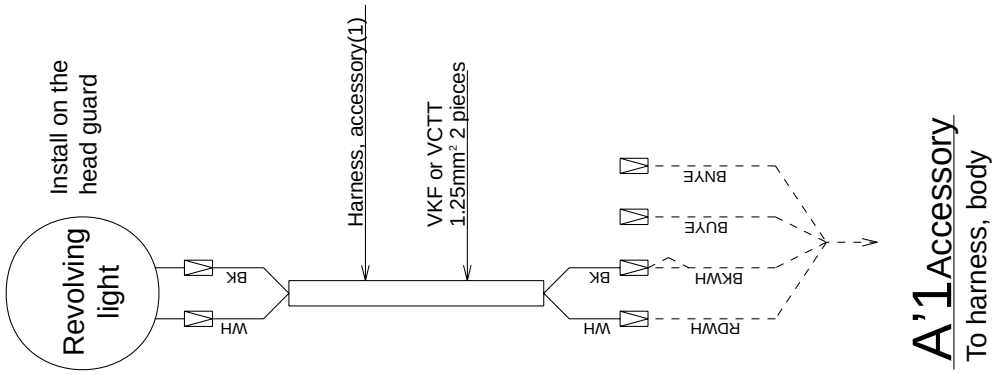
3.Refer to the figure below for the crimping direction.

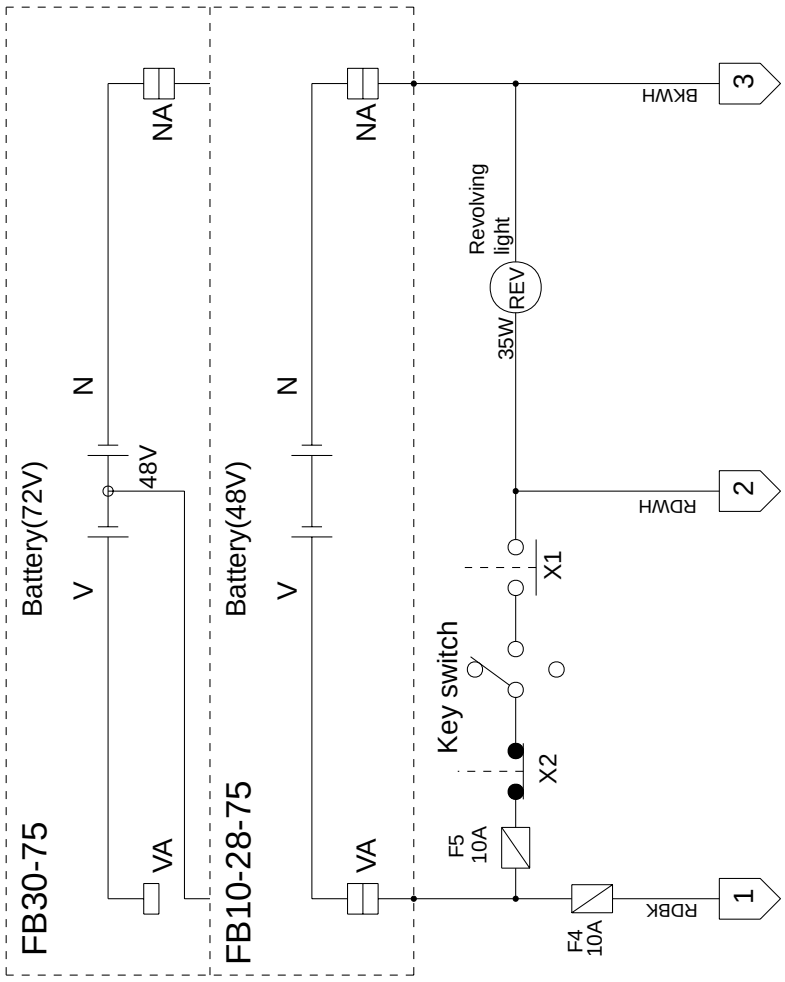


4.Wire No.<N> does not need to be indicated.

5.Use R8-6 type terminal or an equivalent product.

E0000-04530-0e



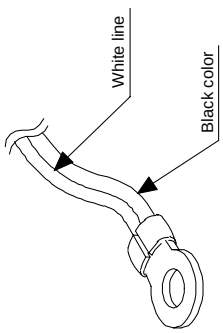


System wiring

<Note>
1. Terminal symbols
:Receptacle AMP 170021-2
(with plating)
Sleeve(for single wire) AMP 170889-1
:Plug AMP 170020-2
(with plating)
Sleeve(for single wire) AMP 170897-1

Reference:
Harness mark/color
Red — RD
Black — BK
Green — GN
Yellow — YE
White — WH
Brown — BN
Blue — BU
Gray — GY
Pink — PK
Orange — OG

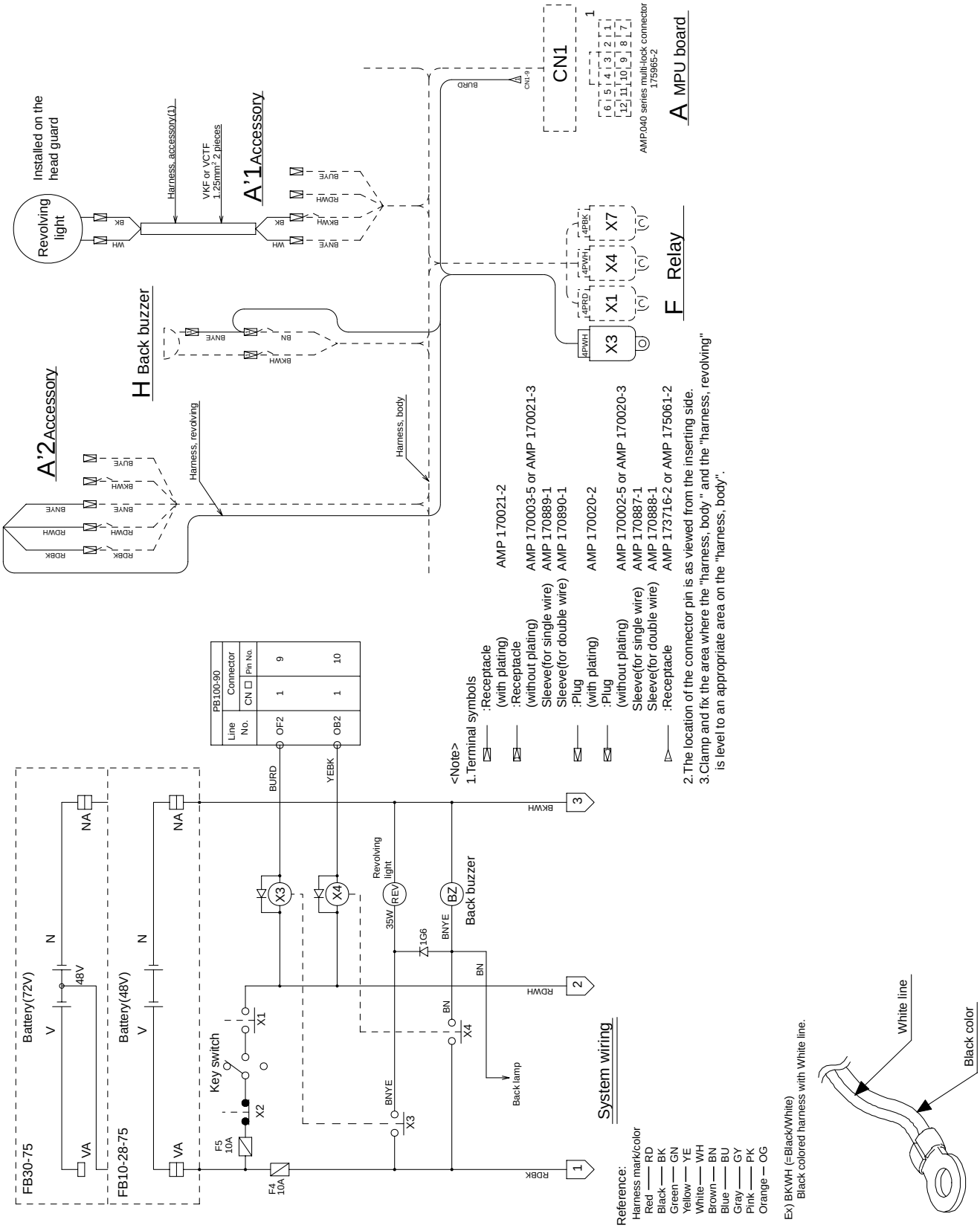
Ex) BKWH (=Black/White)
Black colored harness with White line.



FB-75
Wiring, revolving light 4- 9.

Key switch interlock	4-9-1.

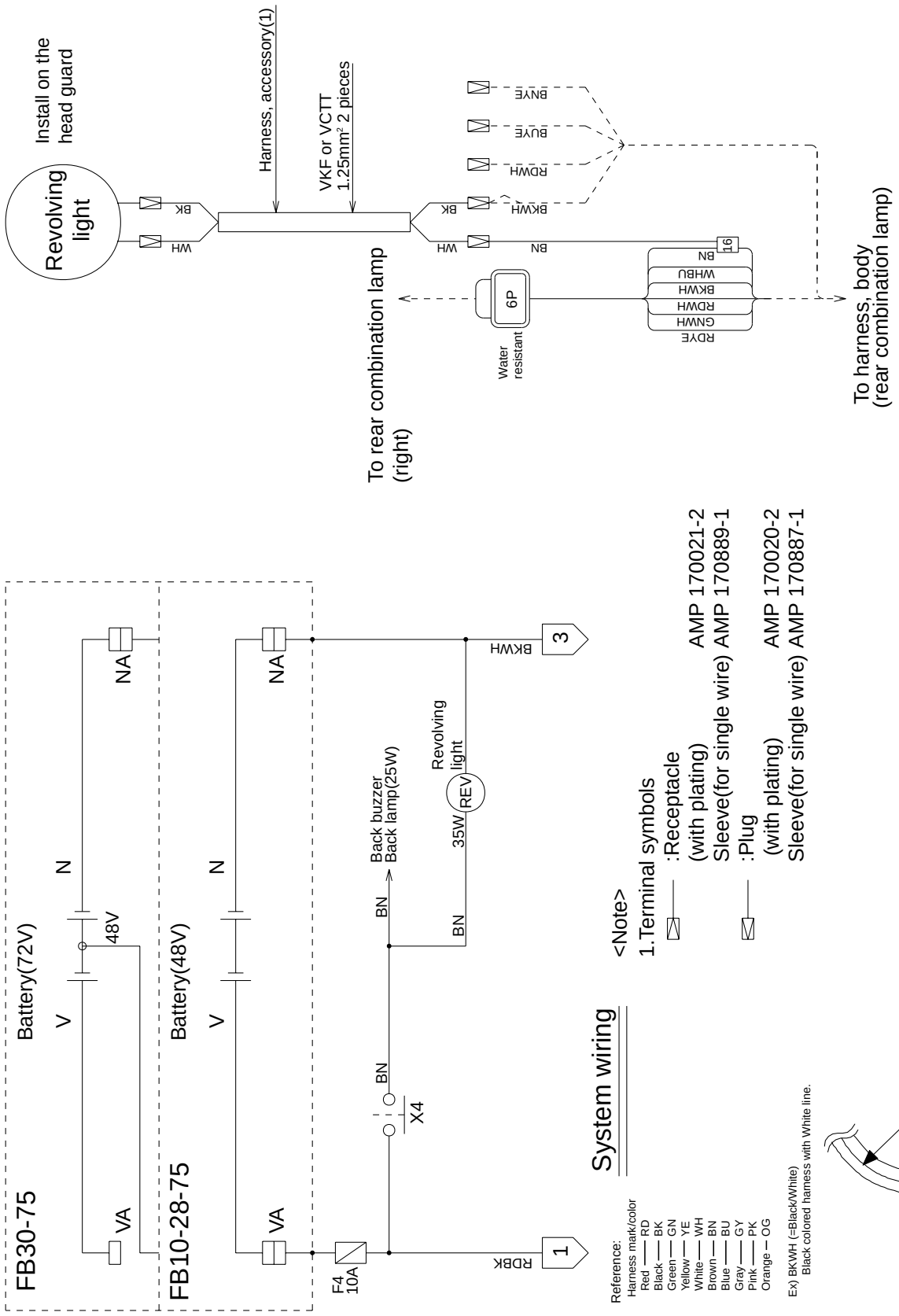
24801-10760-1(75)e



FB-75
Wiring, revolving light 4- 9.

Forward/backward directional interlock 4-9-2.

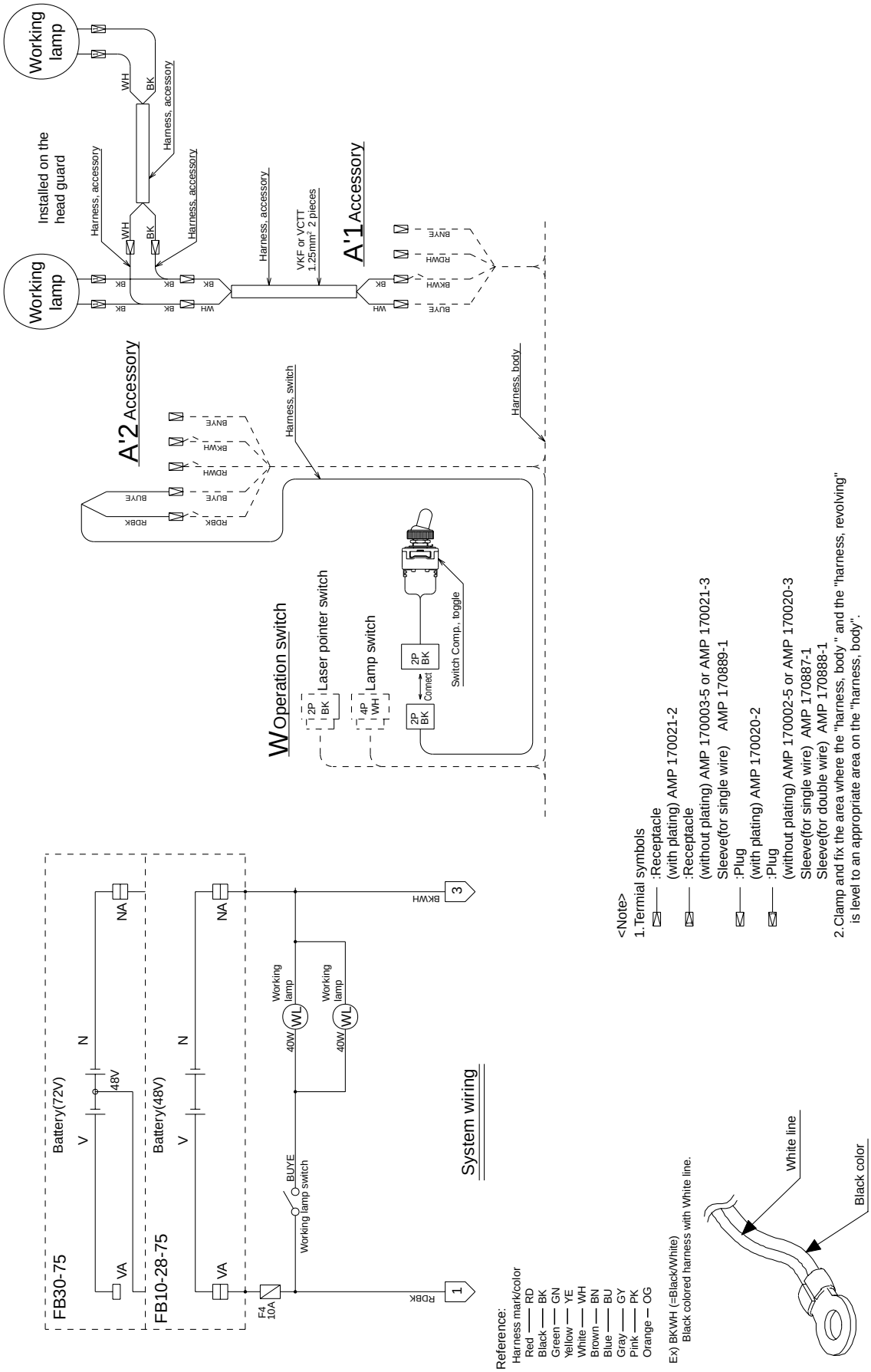
24801-10770-1(75)e



FB-75
Wiring, revolving light 4- 9.

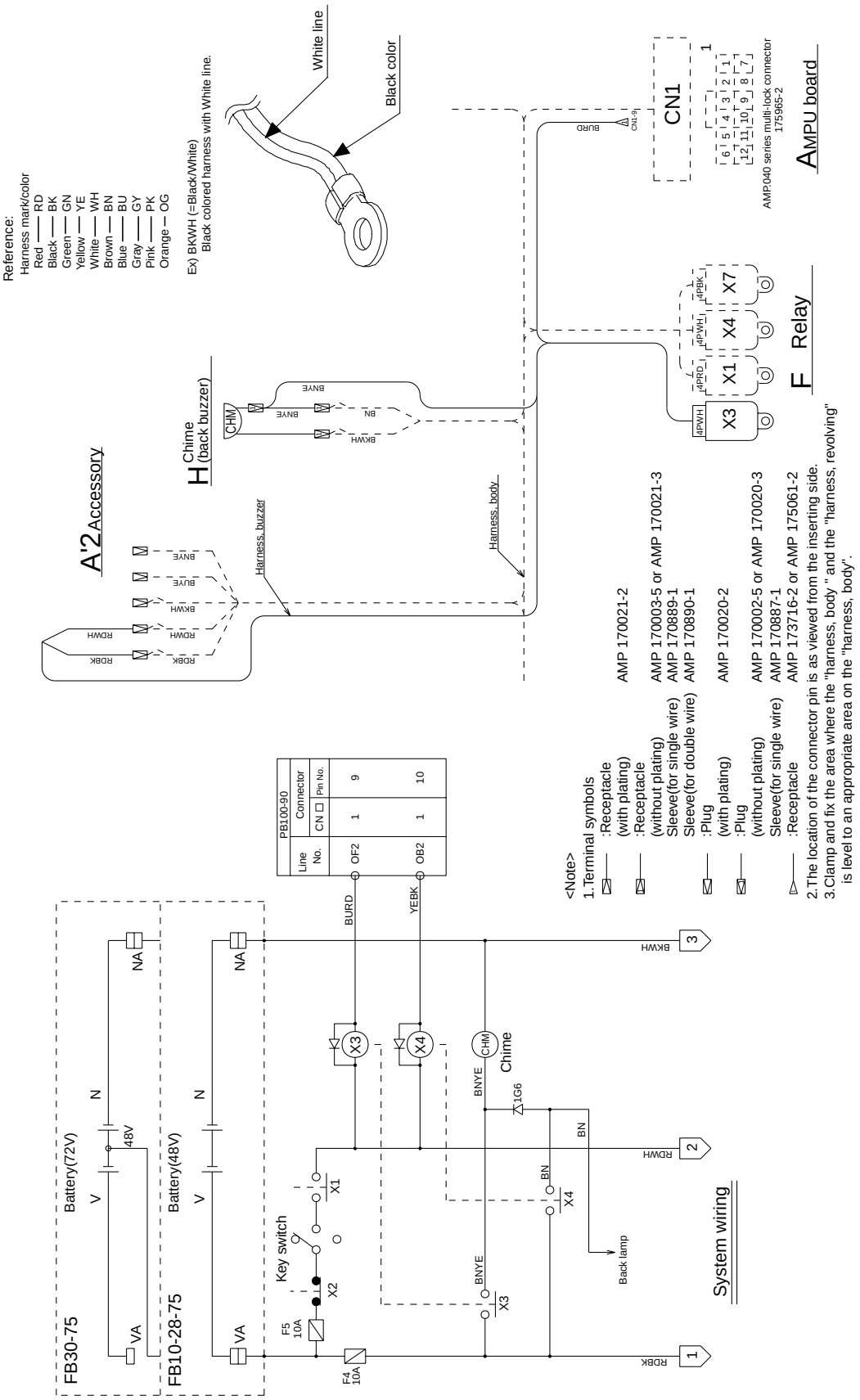
Backward directional interlock 4-9-3.

24801-10781-0(75)e



FB-75
Wiring, working lamp 4-10.

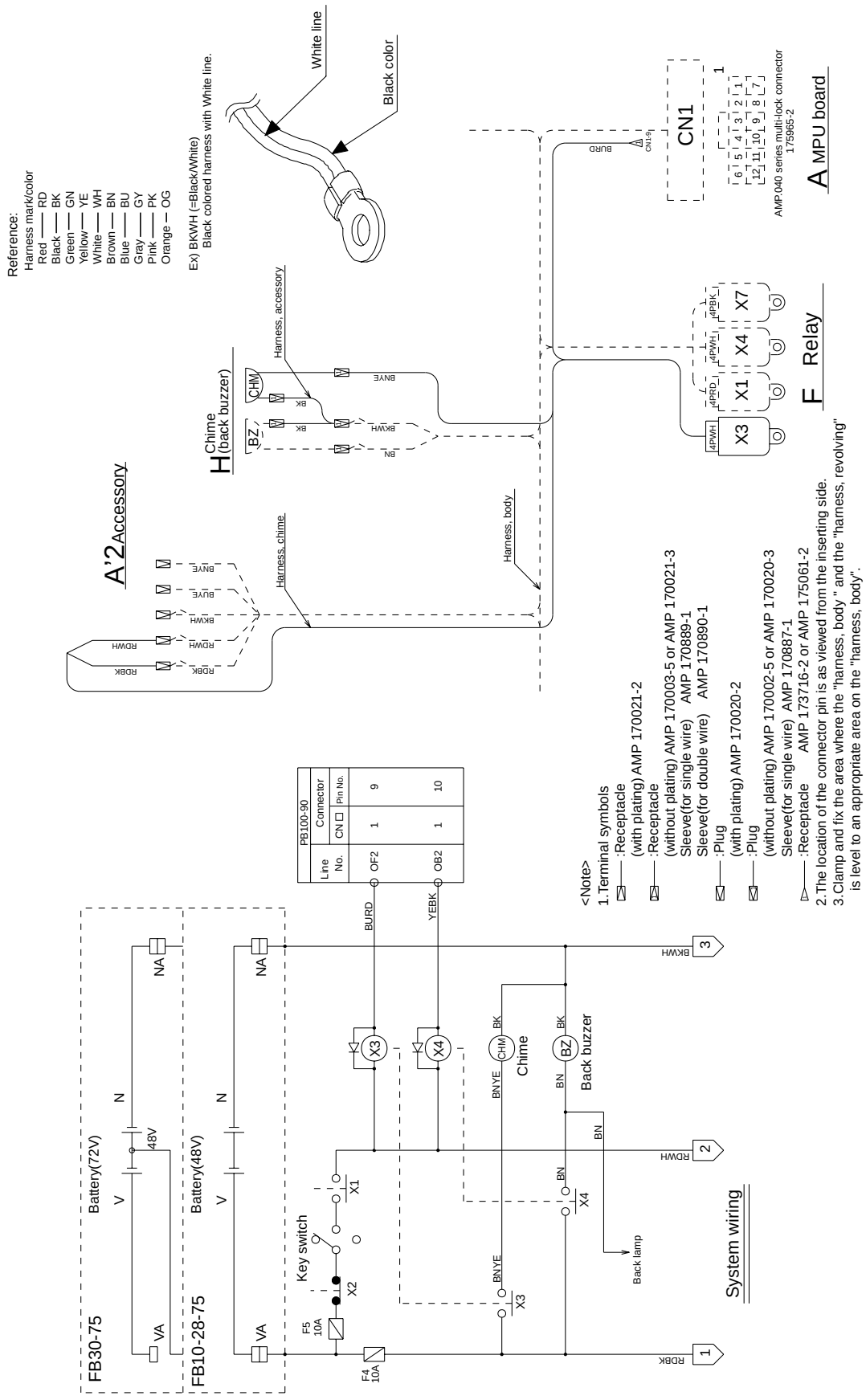
24801-10910-1(75)e



FB-75 Wiring, chime 4-11.

Forward/backward chime 4-11-1.

24801-11000-1(75)e



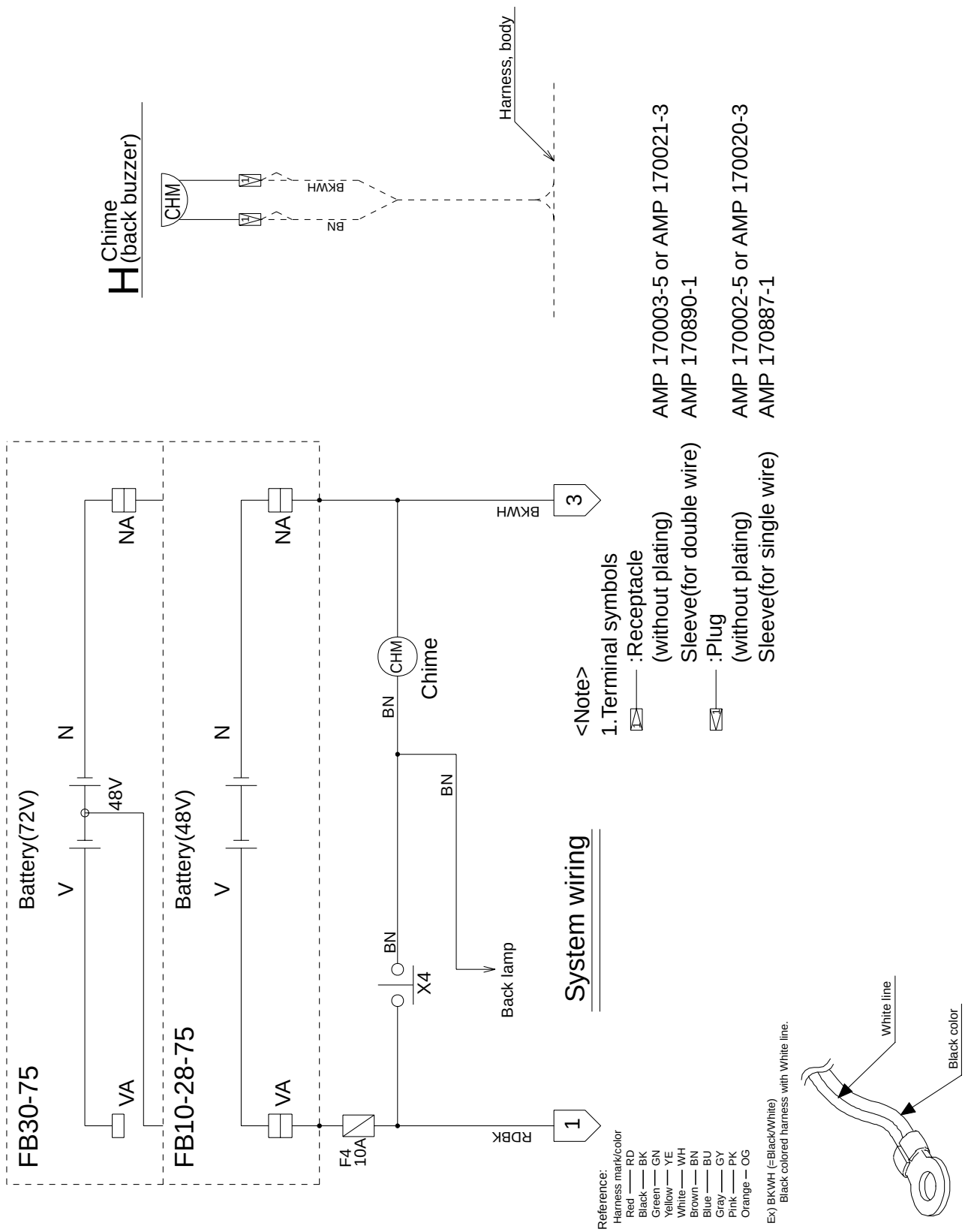
FB-75 Wiring, chime

4-11.

Forward chime

4-11-2.

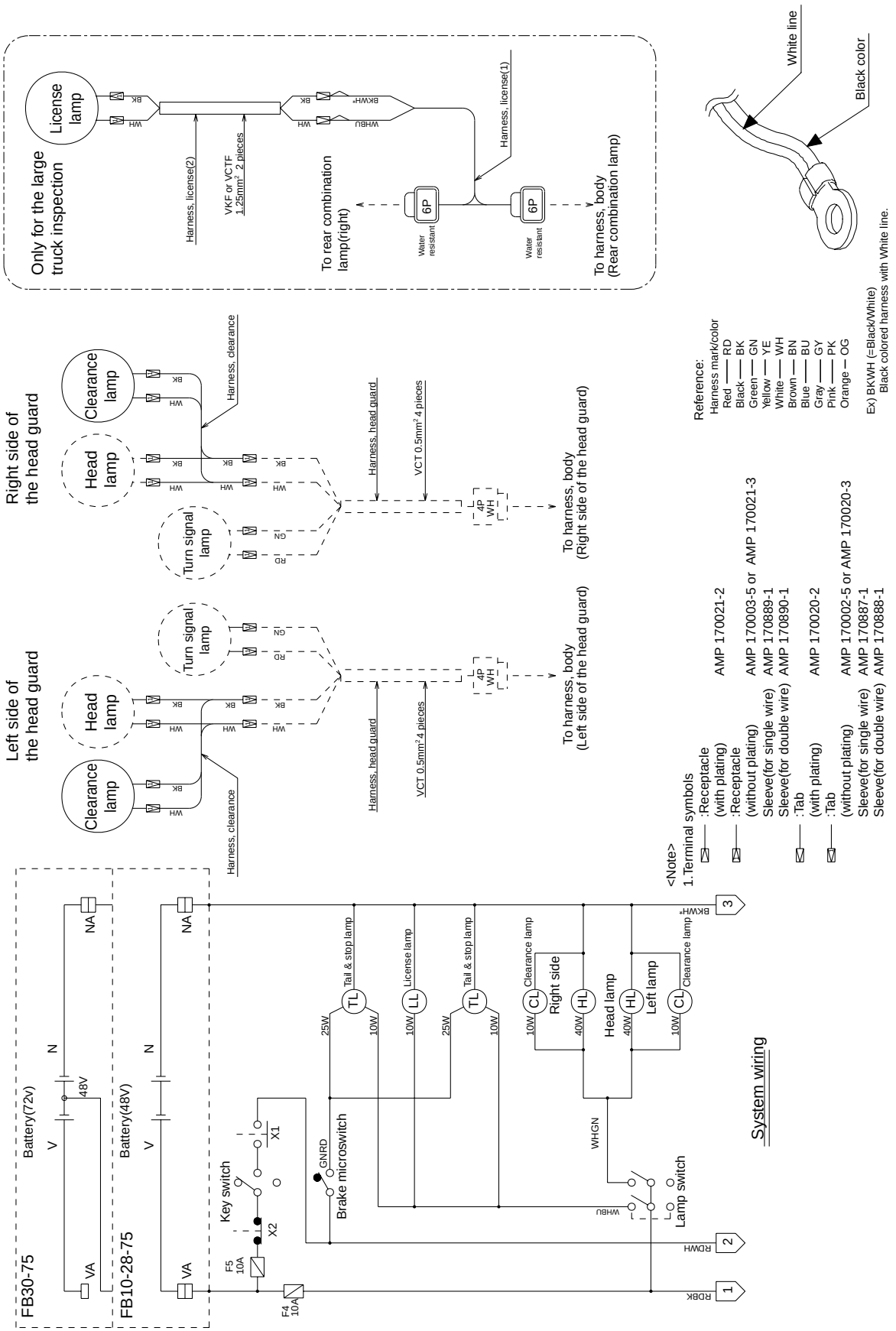
24801-11010-1(75)e



FB-75 Wiring, chime 4-11.

Backward chime 4-11-3.

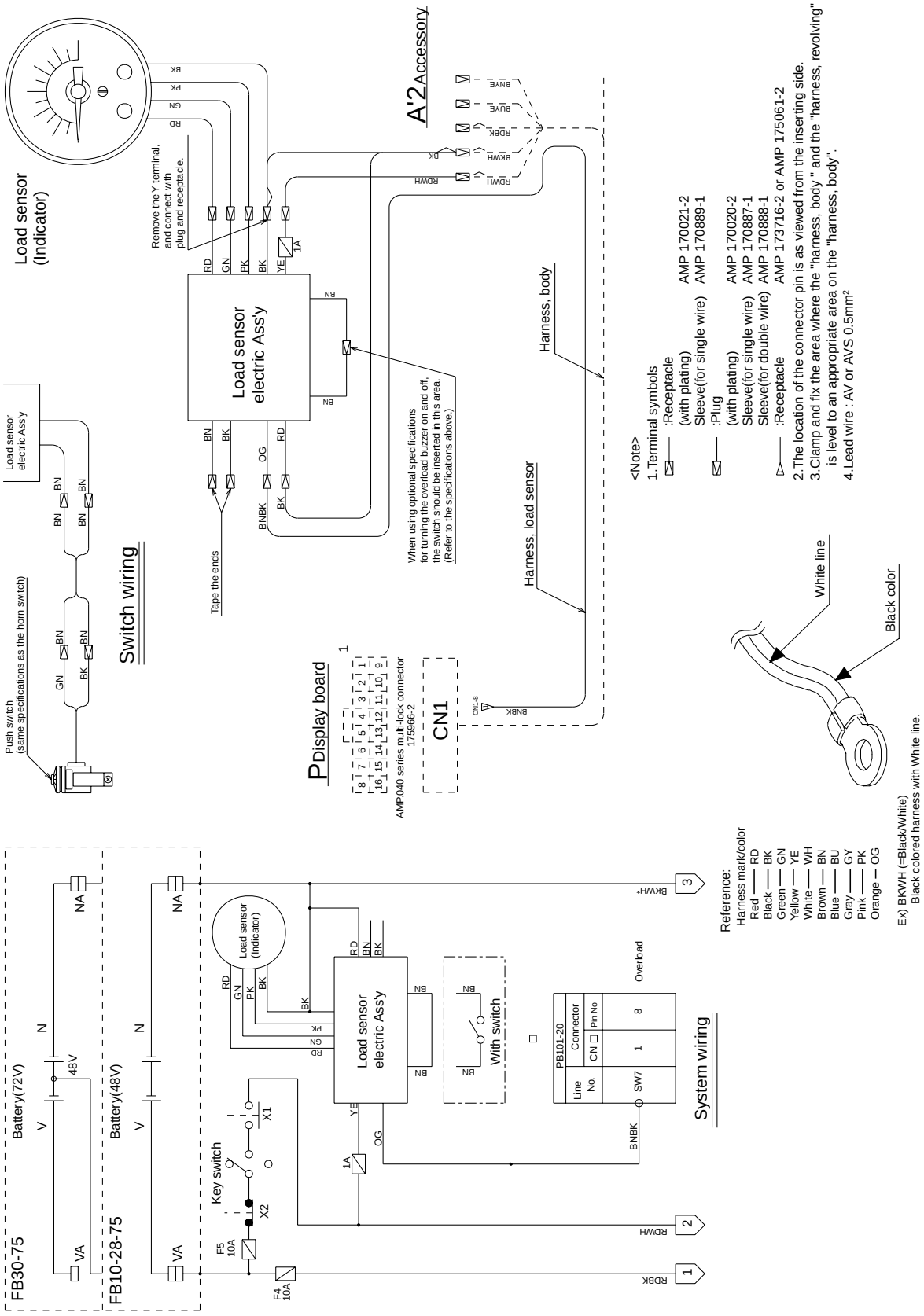
24801-11020-0(75)e



FB-75 Wiring, license 4-12.

Large truck inspections, new small truck inspections 4-12-1.

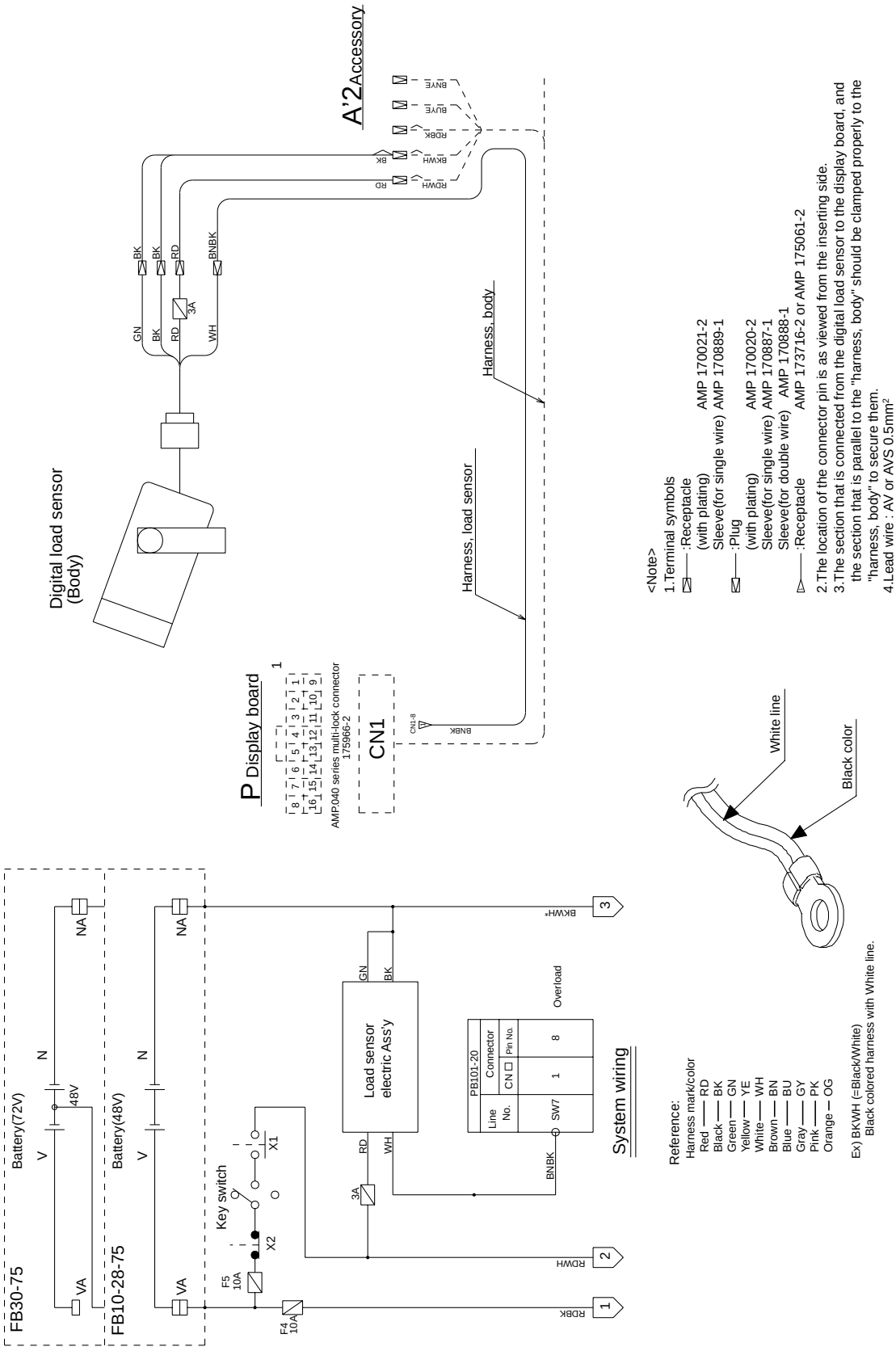
24801-11060-0(75)e



FB-75
Wiring, load sensor 4-13.

Analog type 4-13-1.

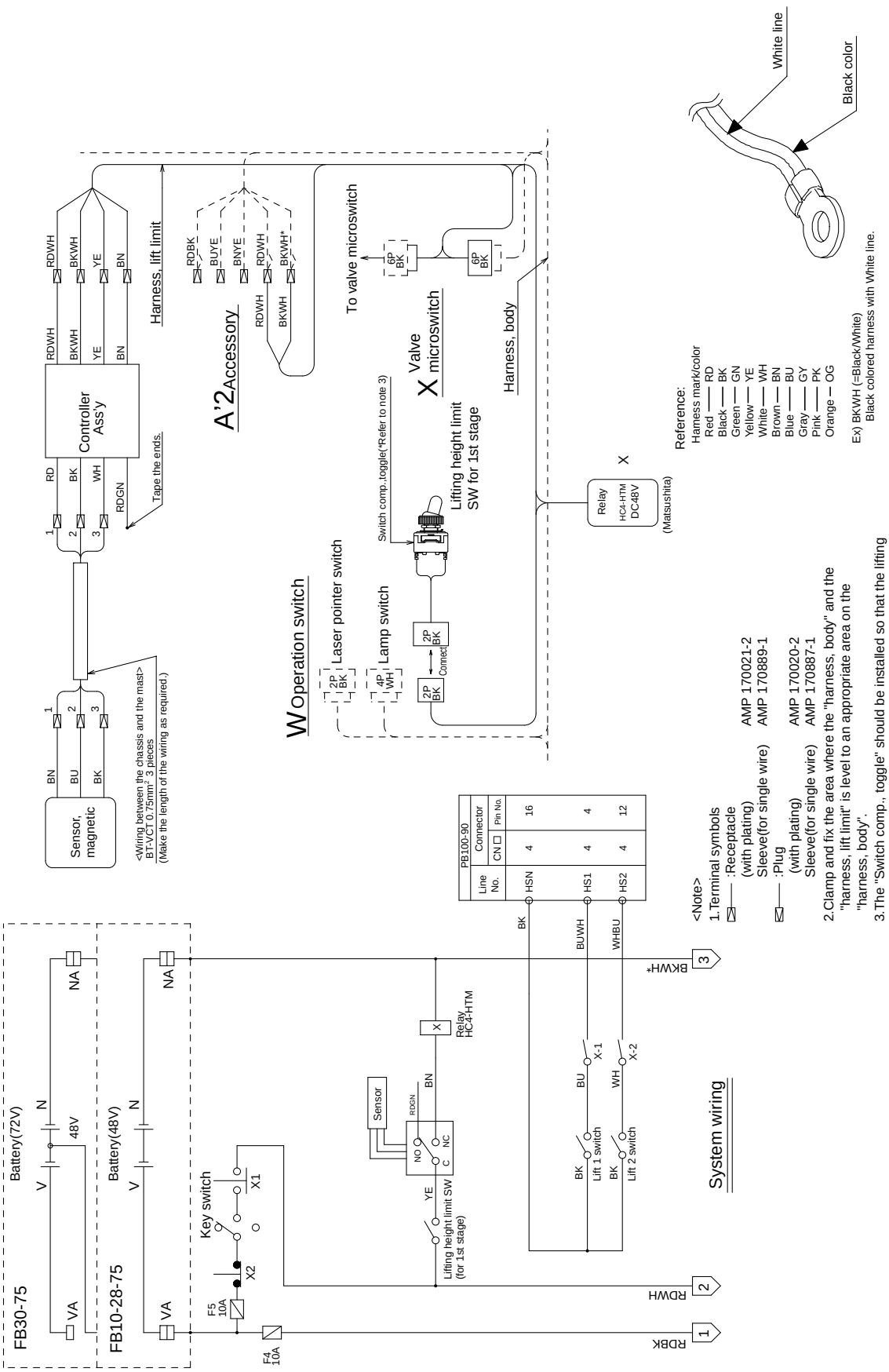
24801-11180-1(75)e



FB-75
Wiring, load sensor 4-13.

Digital type 4-13-2.

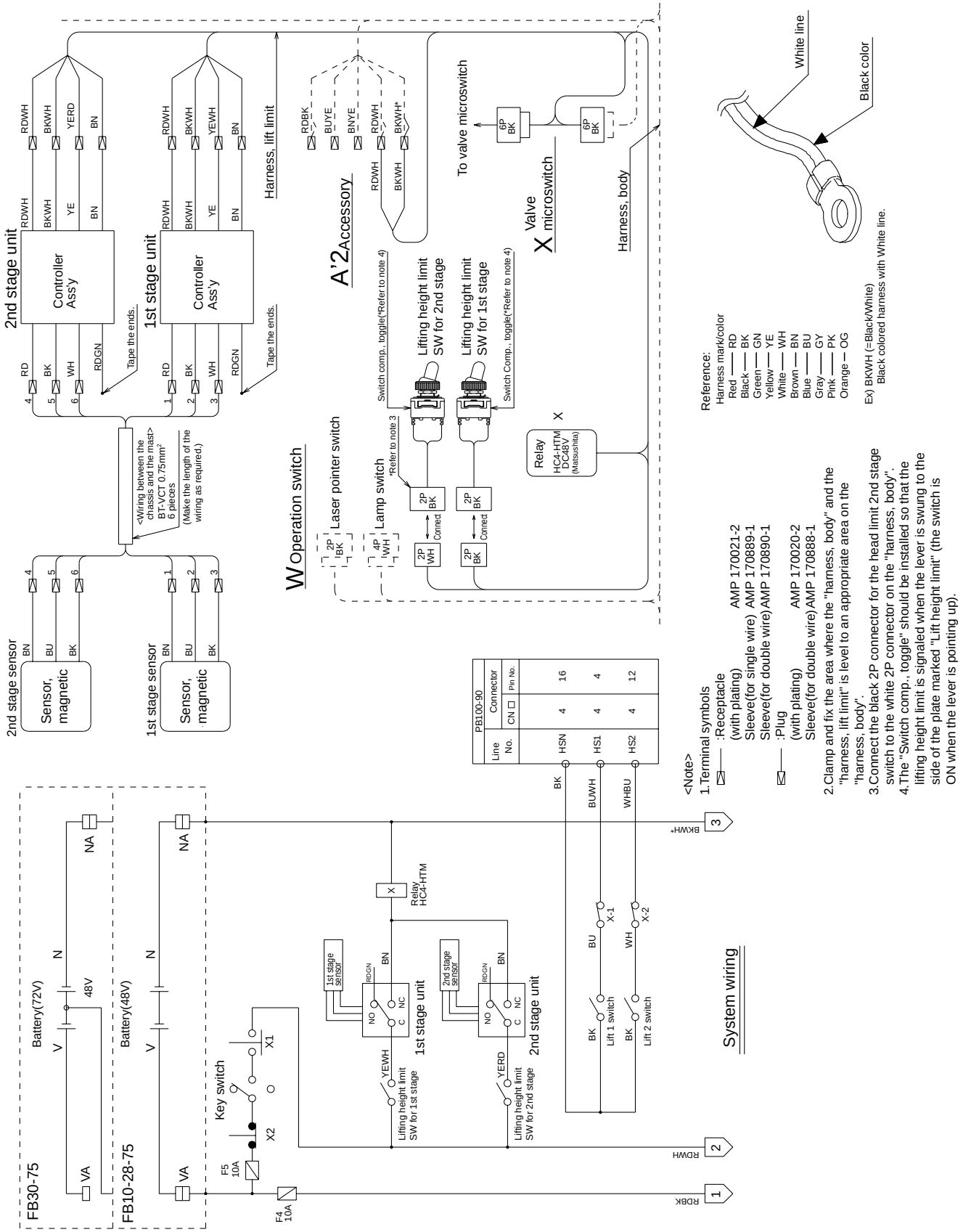
24801-11190-1(75)e



FB-75 Wiring, lift limit 4-14.

Lift limit for 1st stage 4-14-1.

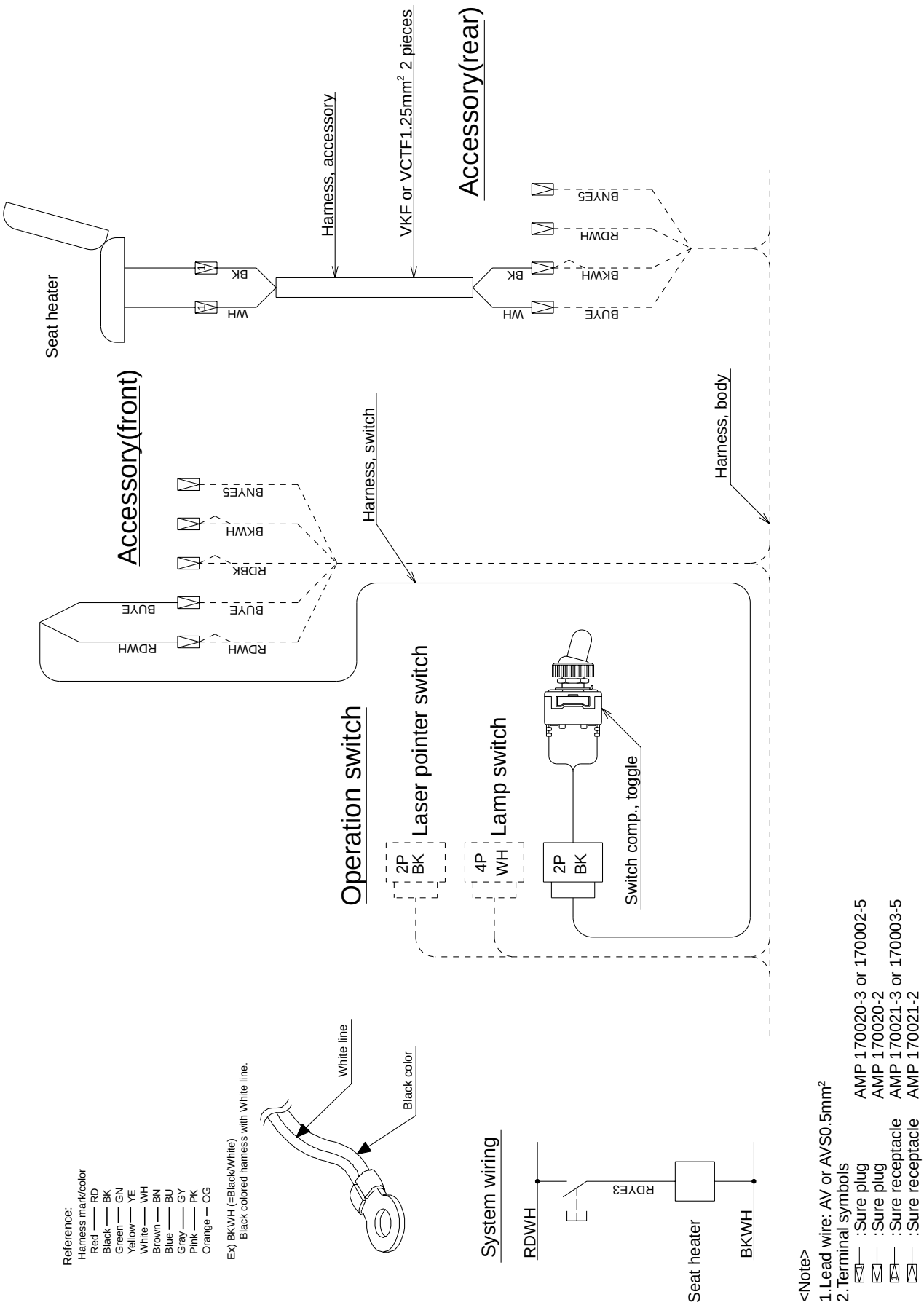
24801-11421-0(75)e



FB-75 Wiring, lift limit 4-14.

Lift limit for 2nd stages 4-14-2.

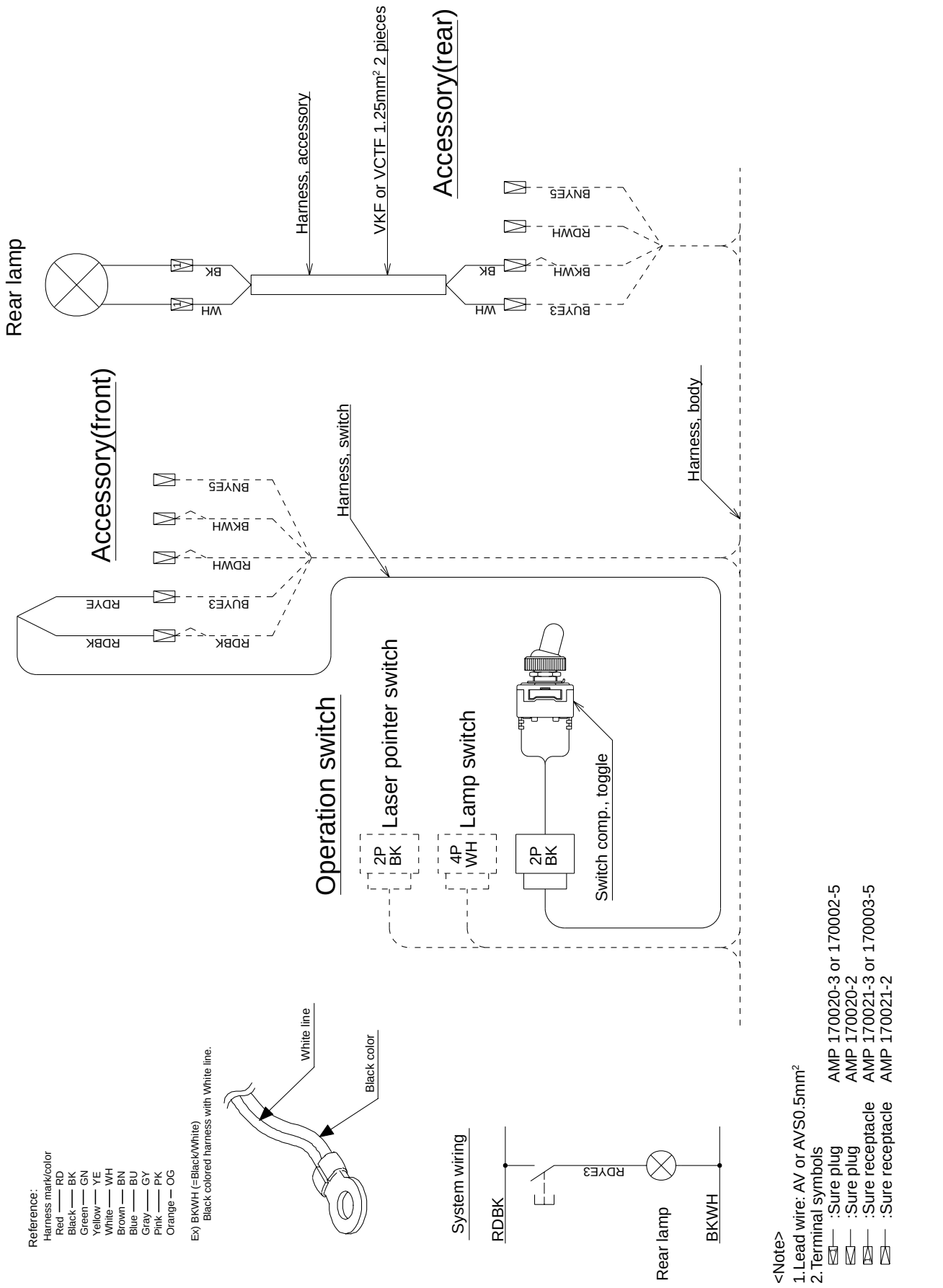
24801-11431-0(75)e



FB-75

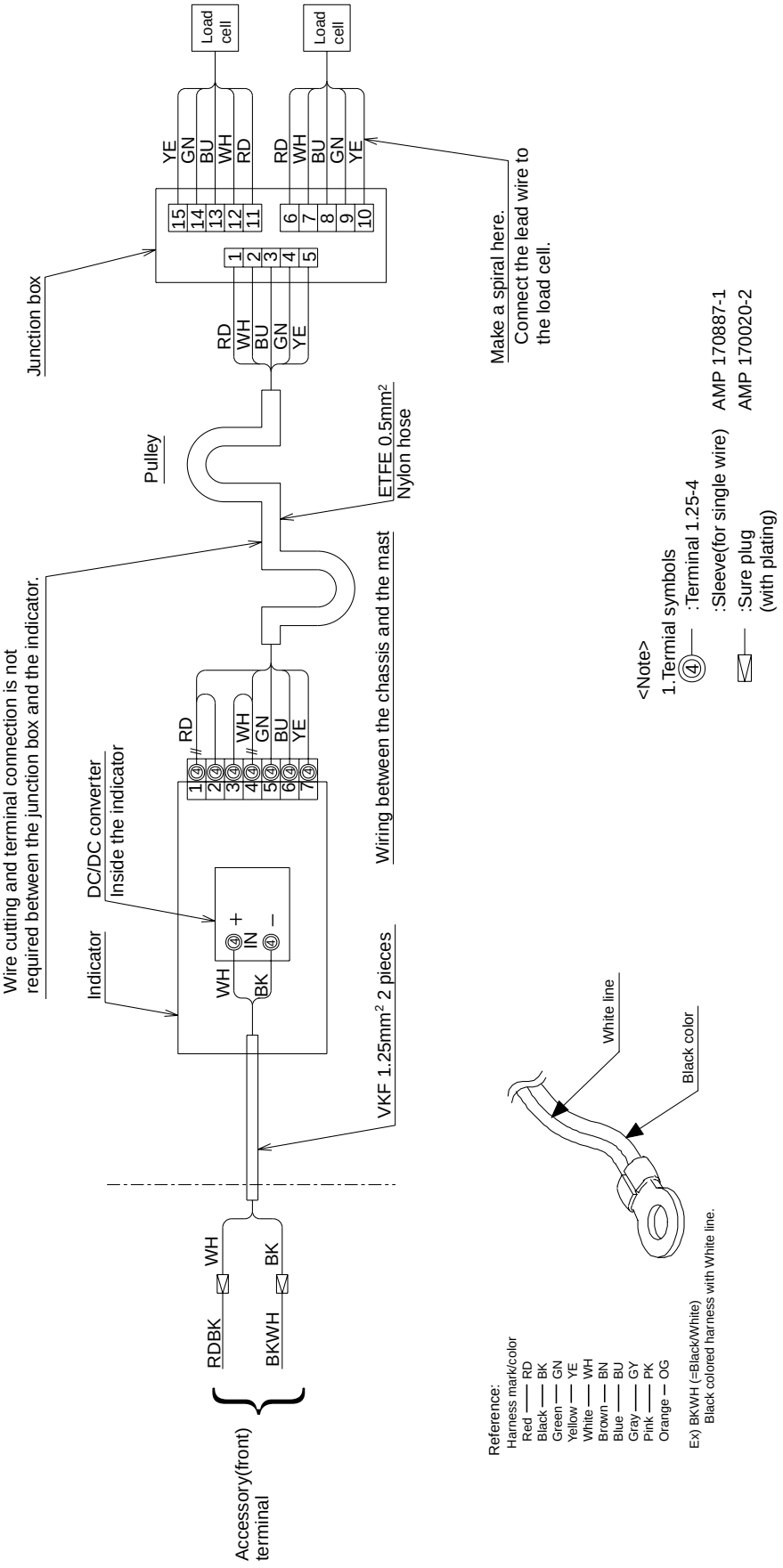
Wiring, seat heater 4-15.

24801-11740-1(75)e



FB-75 Wiring, rear lamp 4-16.

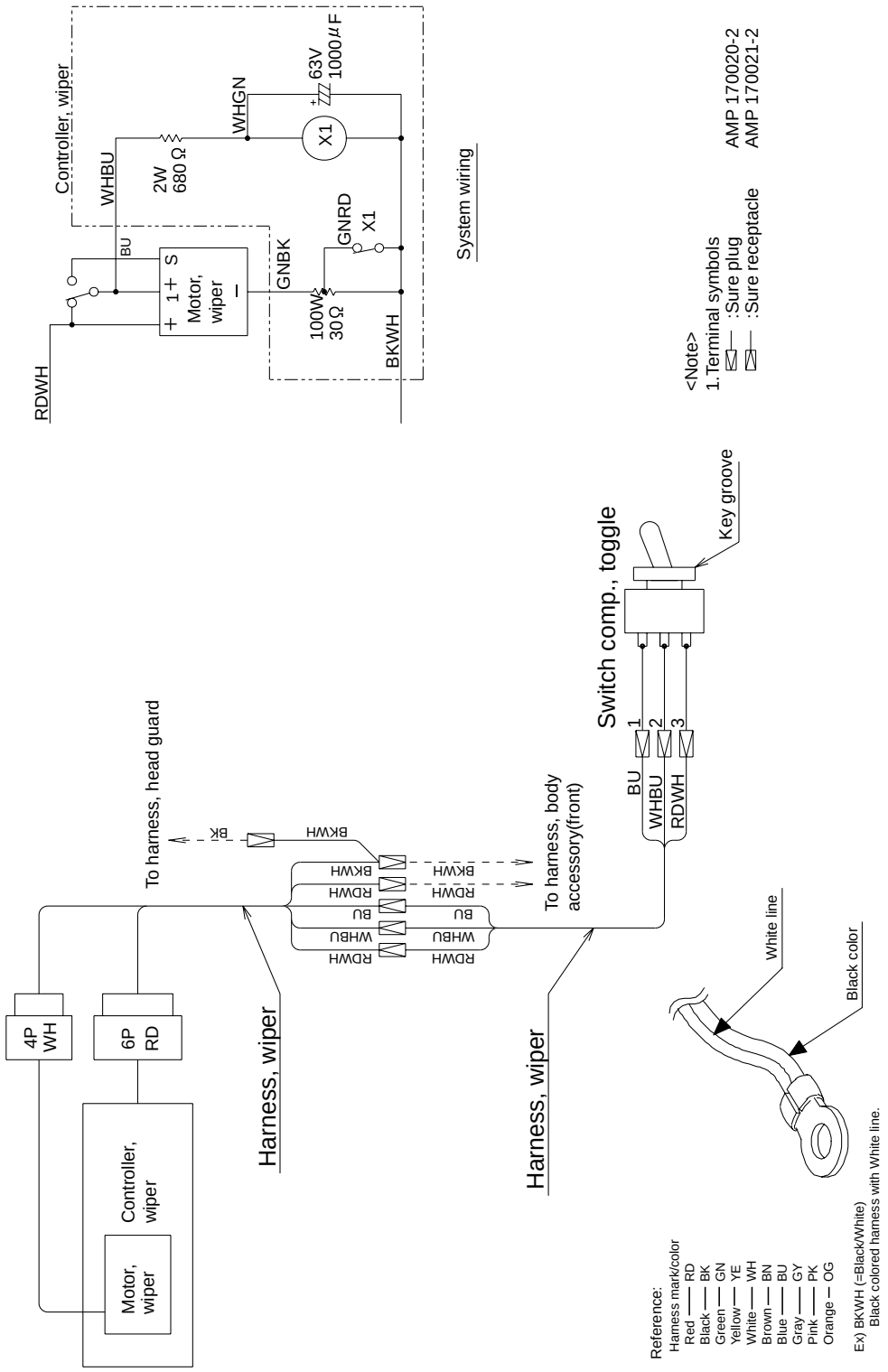
24801-11750-0e



FB-75 Wiring, FS

4-17.

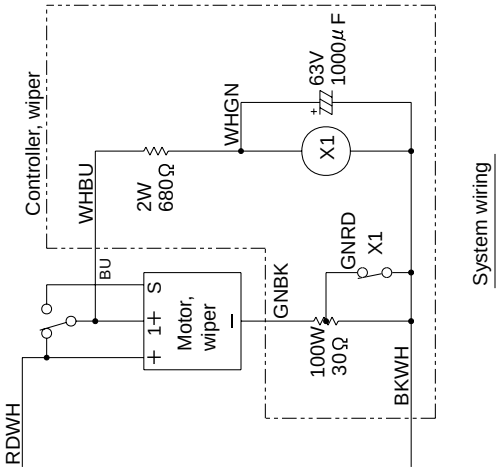
24801-11760-1(75)e

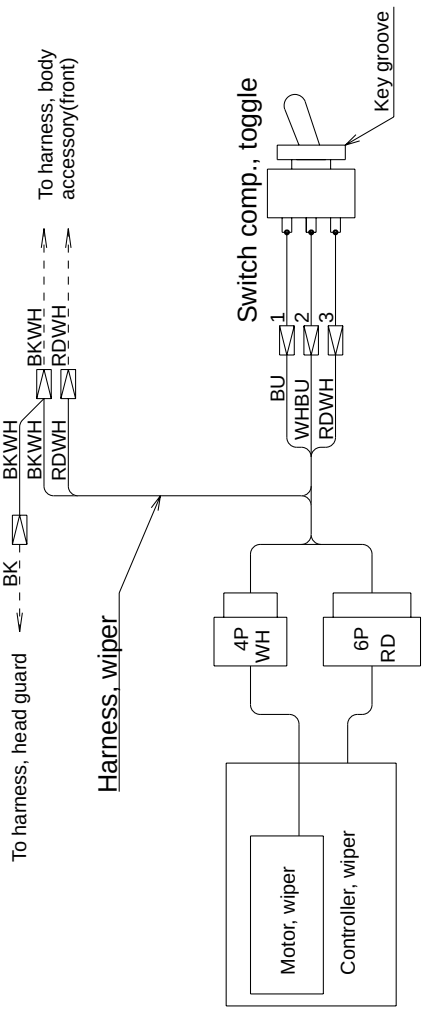


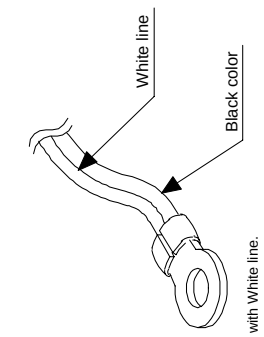
FB-75 Wiring, wiper 4-18.

Wiper 4-18-1.

24801-16840-0e







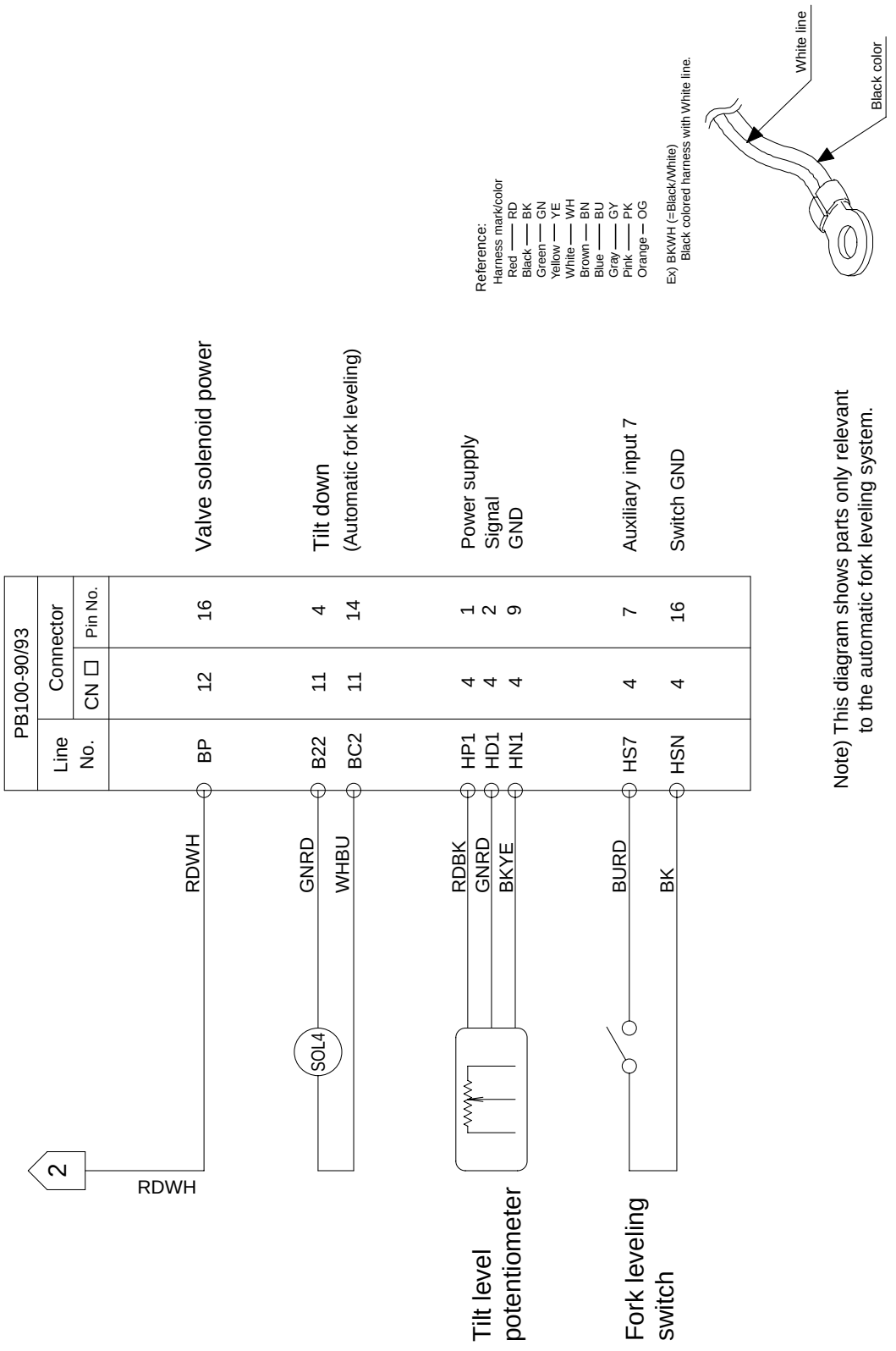
Reference:
Harness mark/color
Red — RD
Black — BK
Green — GN
Yellow — YE
White — WH
Brown — BN
Blue — BU
Gray — GY
Pink — PK
Orange — OG

Ex) BKWH (=Black/White)
Black colored harness with White line.

FB-75 Wiring, wiper 4-18.

Lower wiper 4-18-2.

24801-17450-0e



FB-75 Automated fork horizontal stop System wiring

4- 19.

24900-31290-0e

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