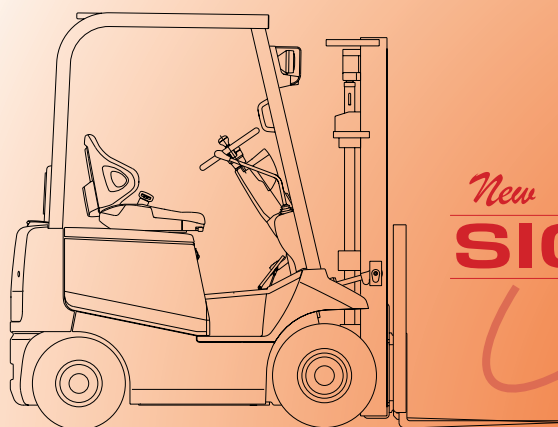


TROUBLESHOOTING MANUAL

FB-DC70 *SERIES*

FB 10P/15P/18P
20P/25P/30P



New
SICOS-60

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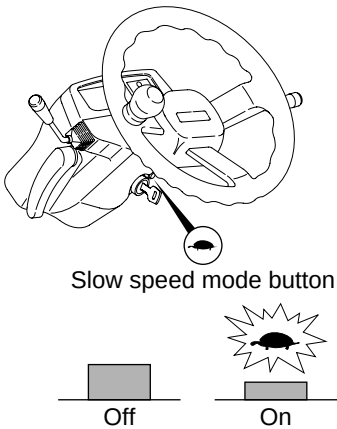
1. How to adjust SICOS60 (Major point only)

1-1 The name and function of mode select switch

① Slow speed mode button.

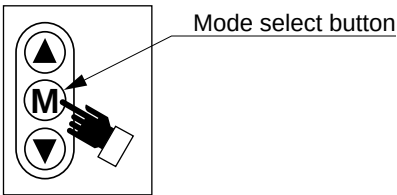
Change to traveling mode.
When the slow speed mode button is turned on, the speed is regulated to the preset speed. (5km/h–12km/h).

◆When the slow speed mode button is turned on, the turtle mark is displayed on the monitor.



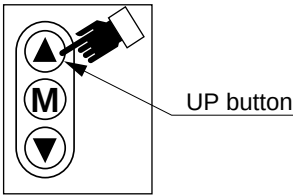
② Mode select button.

Change the select mode.
●Speed setting mode (SPEED)
●Power setting mode (POWER)
●Acceleration feeling mode (ACCEL)



③ Up button (2 functions)

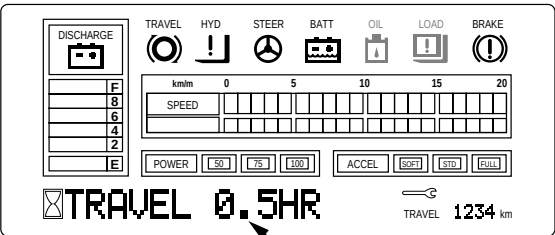
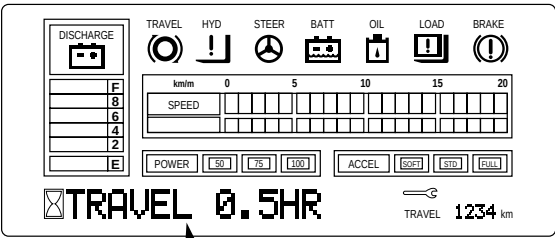
●Increase the parameter of each selected mode.



●Showing the travel hour meter.

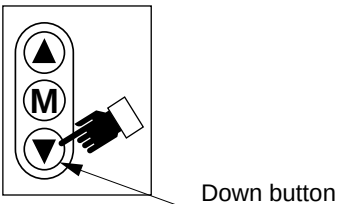


Be sure to check that the decimal point flashes when the hour meter counts by traveling or hydraulic operation.

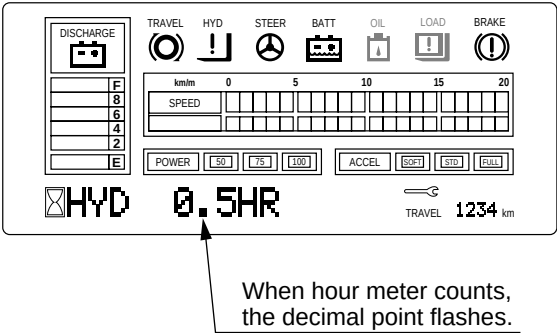
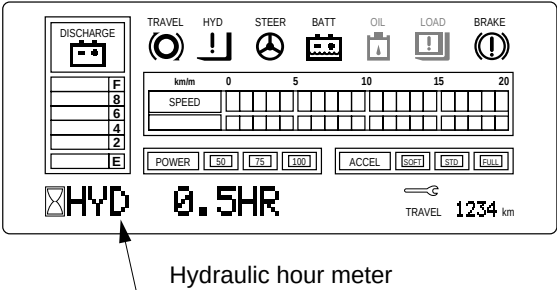


④ Down button (2 functions).

- Decrease the parameter of each selected mode.
- Showing the hydraulic hour meter.



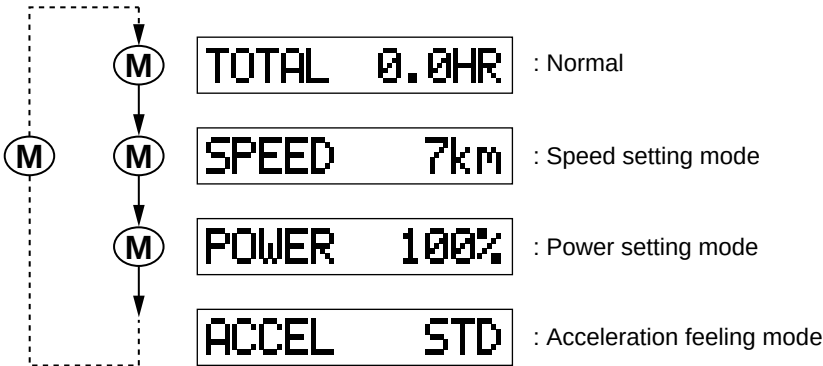
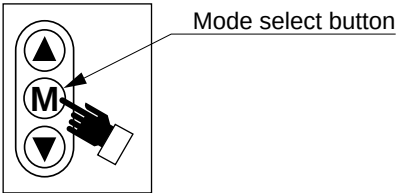
Be sure to check that the decimal point flashes when the hour meter counts by operating traveling or the hydraulic lever.



1-2 How to set the each mode

Press the mode select button (M) to adjust the each mode.

◇ The each mode can be changed by pressing the mode select button (M) as follows.



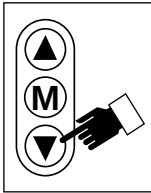
① Speed setting mode

The travel speed can be set at 5km/h through 12km/h by every 1km/h.

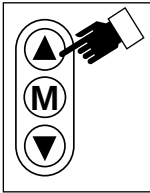
Up ▲ button for increasing, Down ▼ button for decreasing.



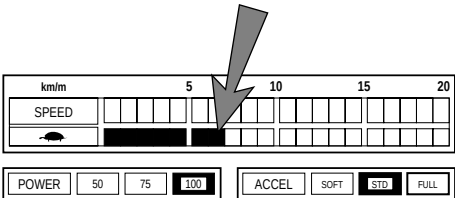
When the slow speed mode button is off, the travel speed can not be regulated even if it is set. Also no display of preset speed and the “turtle” mark.



Down button

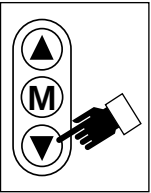


Up button

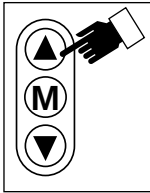


② Power setting mode

The power can be set at 3 steps, 100%, 75%, and 50% by pressing the Up button ▲ or Down button ▼ .



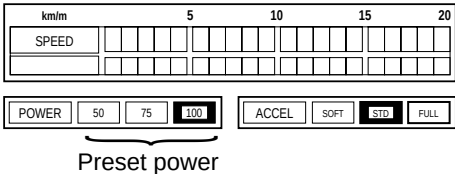
Down button



Up button

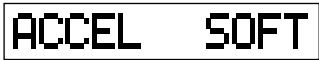
(50%–75%–100%)

The preset power is displayed at the “POWER” column on the display.



③ Acceleration feeling mode

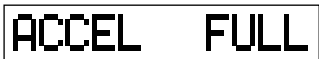
The acceleration feeling mode can be set at 3 modes, Soft, Std (standard) and Full.



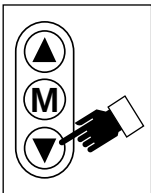
: Easy inching



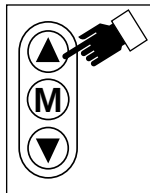
: Normal



: Quick accelerator response



Down button



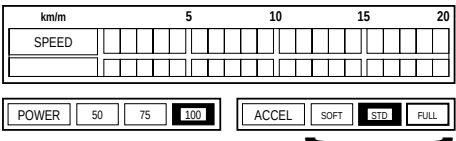
Up button

(SOFT–STD–FULL)



Better inching operation can be achieved by selecting the "soft" mode.

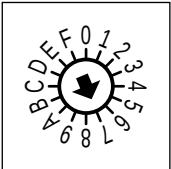
The preset accelerator feeling is displayed at the “ACCEL” column on the display.



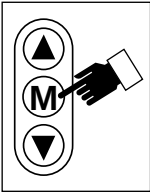
Preset accelerator feeling

④ Option setting

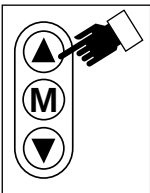
- 1) Set the rotary switch RS1 to “7”, and turn the key switch on.
- 2) Press the mode select button **M** to shift the setting position.
- ◆The setting position which flashes can be moved to the right by pressing the mode select button **M**.
- 3) Press,
 - the Up button **▲** to set : display “1”.
 - the Down button **▼** to reset : display “0”.for each optional specification.



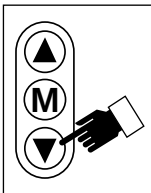
Set RS1 to “7”



Mode select button



Up button



Down button



After finishing to set or reset, be sure to turn off the key switch and to return the rotary switch RS1 to “0”.



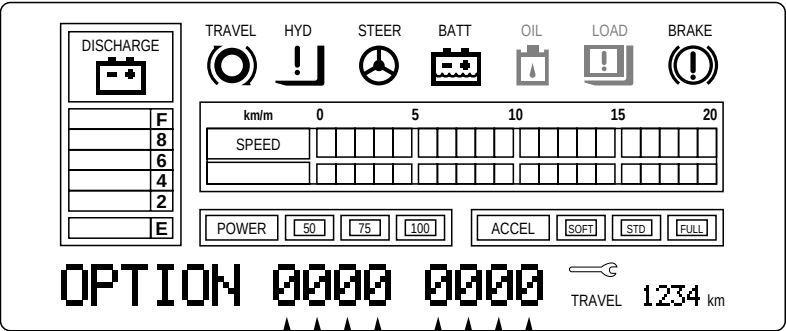
When replacing the MPU board, be sure to set the each function same as original setting.

Option Set	0	1
Not used	—	—
Over Drive (Option)	without	with
Hydraulic by-pass (Option)	without	with
Regenerative contactor	with	without
Monitoring	displayed	off
Seat switch	without	with
Lift lock at over discharge	off	on
Not used	—	—

If the bit of “Seat switch” is changed “0” to “1” on a standard truck, hydraulic system and indicator are normal, but the truck cannot travel.

If all bits is changed “0” to “1” on the standard truck, 4 error messages appear on the indicator.

A10 : FET7-OVER DRIVE
B20 : FET4-HYD. BY pass
D24 : PC. BOARD-AOS
* TURN OFF KEY SWITCH *



- Not used
- Over drive (Opt.)
- Hydraulic by-pass (Opt.)
- Regenerative contactor
- Monitoring
- Seat switch
- Lift lock at over discharge
- Not used



When replacing the MPU board, it is set “1” to each option setting for safety. Confirm the specification of the truck and set it properly.

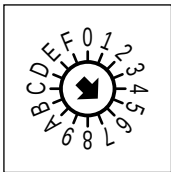


The option setting which is standard specification is set to “0”.
For example, Regenerative braking system is equipped as standard. Therefore, setting “0” means “with regenerative brake” “1” means “without regenerative brake”.

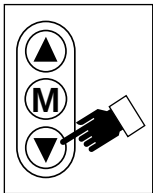
⑤ Language selection on LCD display

◇Each language can be selected by this operation.

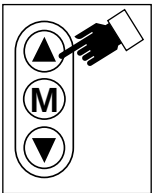
- 1) Set the rotary switch RS1 to “6” and turn the key switch on.
- 2) Choose the each language shown below by pressing Up button ▲ or Down button ▼ .



Set RS1 to “6”



Down button



Up button

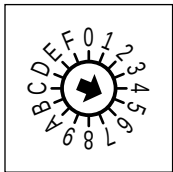
<Display on LCD>

Displayed language when turning key switch on.

0: JAPANESE	➔	モニタリング OK
1: ENGLISH	➔	MONITORING OK
2: FRENCH	➔	CONTROLEUR OK
3: GERMANY	➔	UEBERWACHUNG OK
4: SPANISH	➔	MONITOR OK
5: DUTCH	➔	MONITOR OK



After finishing to set or reset, be sure to turn the key switch off and to return the rotary switch RS1 to “0”.

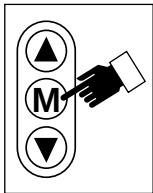


Set RS 1 to “5”

⑥ Safety monitor symbol.

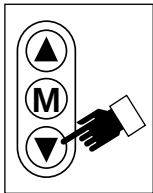
◇Each monitor symbol can be set by this operation

- 1) Set the rotary switch RS1 to “5”.
- 2) Use the mode select button (M) to shift the setting position.

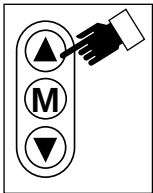


Mode select button

◇The setting position which flashes can be moved to the right by pressing the mode button (M).

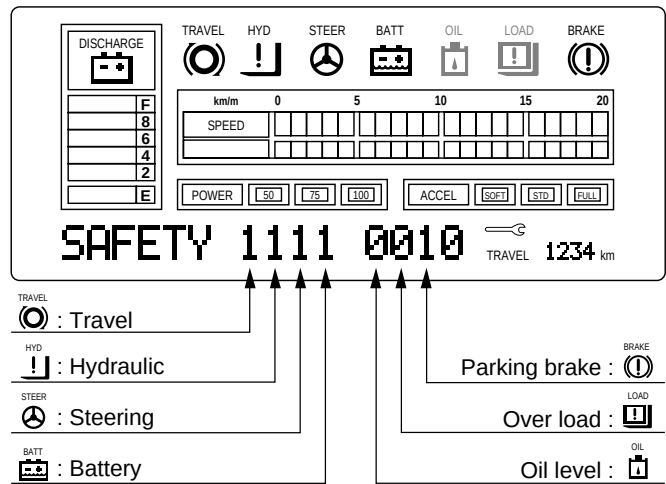


DOWN button



UP button

- 3) Press,
- the Up button to set : displayed “1”.
 - the Down button to reset : displayed “0”.
- for each safety monitor symbol.



* For having GS battery and GS electrolyte level sensor only.



The symbol for Travel, Hyd, Steer and Brake are preset as a standard at the factory.(displayed “1”)



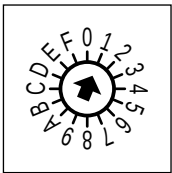
After finishing to set or reset, be sure to turn the key switch off and to return the rotary switch RS1 to “0”.

1-3 Adjustment of starting current and current limitation

- ① **Zero(0) adjusting for installed**
- Zero(0) adjusting is required for the installed current detector to adjust the starting current and current limitation correctly.

<Condition on checking>

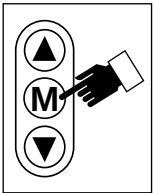
Battery electrolyte over 1.25 (at 20°C)



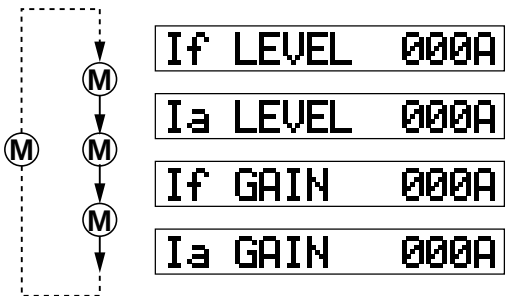
Set RS1 to “1”

<Adjusting procedure>

- 1) Set the rotary switch RS1 to “1”, and turn the key switch on.
- 2) The each mode can be changed by pressing the mode select button as follows.



Mode select button



- 3) Adjust If LEVEL, and Ia LEVEL to be “000A” at no motor current condition by pressing Up button ▲ or Down button ▼



As MPU board has an auto-zero level adjustment function, no need to re-adjust these mode normally. However, be sure to confirm it.

- 4) Press,
the Up button ▲ when the indication shows minus(-) value.
the Down button ▼ when the indication shows plus (+) value.
- 5) After adjusting If GAIN and Ia GAIN, be sure to turn the key switch off and to set back the rotary switch RS1 to “0”.

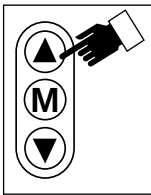
<Initializing (initial setting)>

Initializing should be done by pressing the Up button ▲ and Down button ▼ simultaneously for approx. three (3) seconds. Then, each setting (SPEED, POWER, ACCEL) will be initial setting mode with showing “INITIALIZED” and a beep sound.



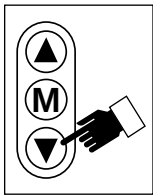
This "initialize" operation is also accepted by each manual setting of,

SPEED : to 7km/h
POWER : to 100%
ACCEL : to STD } = “INITIALIZED”
Initial setting mode



Up button

Press Up button when indication on monitor shows minus(-) value.



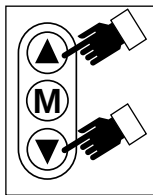
Down button

Press Down button when indication on monitor shows Plus (+) value.

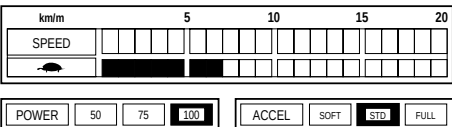


If LEVEL 000A

Ia LEVEL 000A



Press Up and Down button simultaneously for approx. 3 seconds.



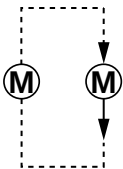
INITIALIZED

② Adjustment of starting current and current limitation

- 1) Be sure to check that the specific gravity of the battery electrolyte. It should be more than 1.25 at 20°C and the operation of “initialize” should be done, and initializing also finished.

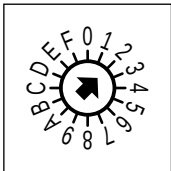
- 2) Set the rotary switch RS1 to “2”, and turn the key switch on.

◇The each mode can be changed by pressing the mode select button M as follows.

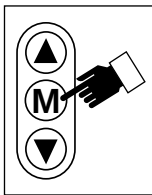


CURR START 000

CURR LIMIT 000



Set RS1 to “2”



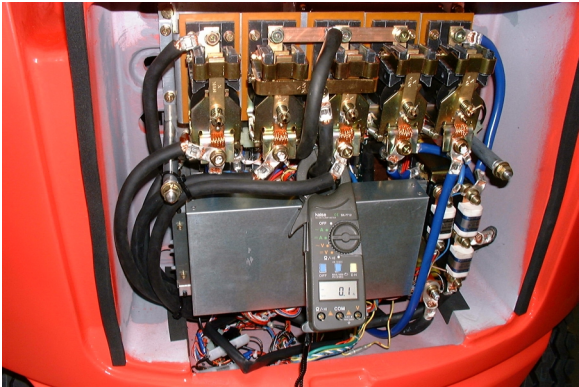
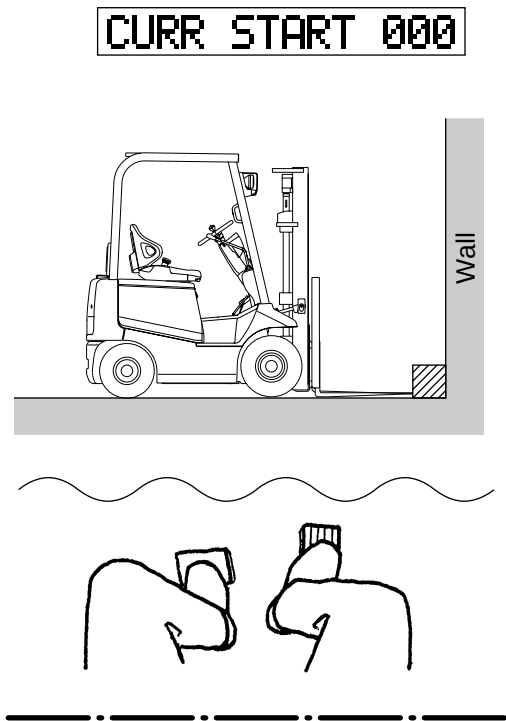
Mode select button

- 3) Adjusting staring current
The “CURR START” will be shown after key switch on.
- 4) Operate the directional switch to forward, depress the foot brake. Then depress the accelerator pedal until the regenerative contactor just goes on, and hold at that position.



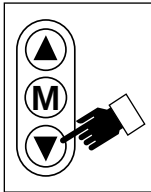
When adjusting the starting current and current limitation, lock the traveling motor by operating as follows.

- Park the truck against a wall, and touch the tip of forks to the wall.
- Then apply the parking brake lever.
- Depress the foot brake pedal.



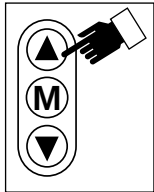
- 5) Adjust the starting current on the monitor with- in specified range by pressing Up button ▲ or Down button ▼ .

Model	Starting Current (A)
FB10P	35 ± 5
FB15P, 18P	45 ± 5
FB20P, 25P	50 ± 5
FB30P	45 ± 5



Down button

Press Down button when monitor indication shows higher than the specified value.



Up button

Press Up button when monitor indication shows lower than the specified value.



CURR START 045A

- 6) Adjusting current limitation
- Set the “CURR LIMIT” mode by pressing mode select button **M**.
- 7) Operate the directional switch to forward, depress the foot brake. Then depress the accelerator pedal all the way down and hold it.



The current limitation should be read and adjusted within two (2) seconds, otherwise it will be increased by 130% for the automatic torque increase function. Then the forcible bypass contactor will be turned on.



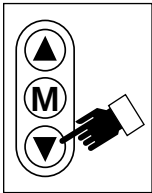
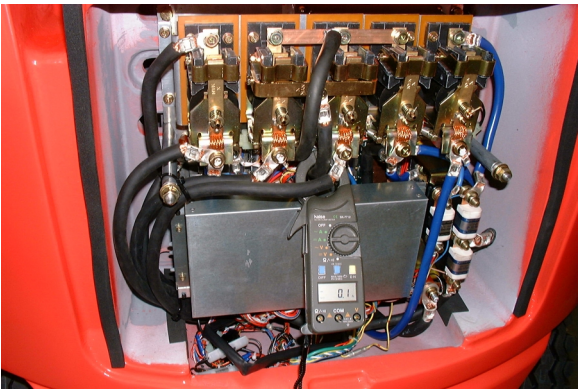
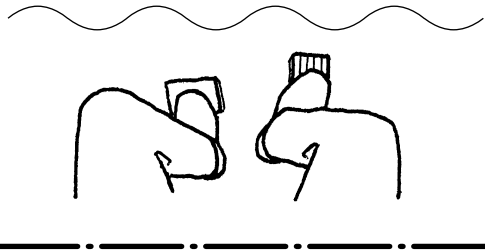
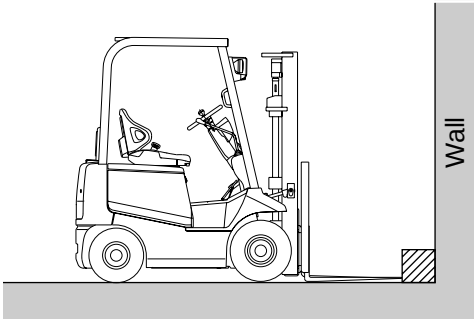
When adjusting the starting current and current limitation, lock the traveling motor by operating as follows.

- Park the truck against a wall, and touch the tip of forks to the wall.
- Then apply the parking brake lever.
- Depress the foot brake pedal.

- 8) Adjust the current limitation on the monitor within specified range by pressing Up button **▲** or Down button **▼**.

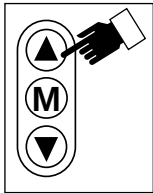
Model	Current limitation (A)
FB10P	280 ± 5
FB15P, 18P	330 ± 5
FB20P, 25P	380 ± 5
FB30P	330 ± 5

CURR LIMIT 000



Down button

Press Down button when monitor indication shows higher than the specified value.



Up button

Press Up button when monitor indication shows lower than the specified value.



CURR LIMIT 330A



Use the clamp on meter as a reference when checking and adjusting. There may be some difference between the current value on monitor and the reading by the clamp on meter.



After finishing the adjustment, be sure to return the rotary switch RS1 to “0”.

The specification of each adjustment for FB-DC70

Voltage (V)	Model	(Confirmation)		Setting of rotary switch																				Traveling speed Unladen /Laden (km/h)		
				RS0	RS1																					
					3						4						5						6			
					SPD-L LIFT	SPD-M LIFT	SPD-H LIFT	HYD LIFT-1	HYD LIFT-2	HYD TILT	HYD ATT.1	HYD ATT.2	HYD ATT.3	PLUGG- ING	REGENE RATE	BRAKE TRQ	OVER DRIVE	TRAVEL	HYD	STEER	BATT	OIL			LOAD	BRAKE
			Starting current (A)	Current limitation (A)	Plugging brake distance (m)	Speed L lift	Speed M lift	Speed H lift	Lift 1	Lift 2	Attach- ment 1	Attach- ment 2	Attach- ment 3	Switch back brake force Plugging	Regeneration	Braking force	Over drive								Language	
	FB10P		35 ± 5	280 ± 10	5.0 - 6.0	64	48	32	50	64	56	32	32	32	060	046	020	060	○	○	○	○	○	○	○	0
	FB15P, 18P		45 ± 5	330 ± 10	5.0 - 6.0	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑
	FB20P, 25P		50 ± 5	380 ± 10	5.0 - 6.0	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	064	↑	↑	↑	↑	↑	↑	↑	↑
	FB30P		45 ± 5	330 ± 10	5.0 - 6.0	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑
48V	Not used																									
	Not used																									
	Not used																									
	Not used																									

Starting current /Current limitation

- Motor current
- Power 100%
- Specific gravity of electrolyte more than 1.25 at 20°C

Switch back brake distance

- Flat, Unladen, Full speed
- Specific gravity of electrolyte more than 1.25 at 20°C
- Full acceleration

For having GS battery and GS electrolyte level sensor only.

RS1-7 (Option setting)

0000000000000000

Not used

Over drive (Opt.)

Hydraulic by-pass (Opt.) regenerative contactor

Monitoring

Seat switch

Over discharge lift lock

Not used

For having GS battery and GS electrolyte level sensor only.

RS1-5 (monitoring setting)

111110010

TRAVEL

HYD

STEER

BATT

BRAKE

LOAD

OIL

For having GS battery and GS electrolyte level sensor only.

RS1-6

0 : JAPANESE

1 : ENGLISH

2 : FRENCH

3 : GERMAN

4 : SPANISH

5 : DUTCH

Language

Indication of key switch on

モニタリングOK

MONITORING OK

CONTROLEUR OK

UEBERWACHUNG OK

MONITOR OK

MONITORING OK

* In case of no indication display language

JAPANESE Domestic : 0 : JAPANESE

ENGLISH : 1 : ENGLISH

Except for Japan

- 10 -

2. Adjustment for other functions

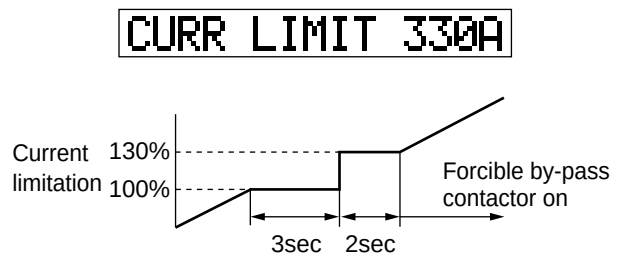
① Auto-torque up

<Condition on checking>

- A: Specific gravity of the battery electrolyte:
more than 1.25 at 20°C
- B: Make an initializing (Initialize mode setting)

<Confirming procedure>

- 1) Check the current limitation.
- 2) Confirm that the current limitation should be increased by 130% of the value of current limitation after 3 seconds.



② Safety circuit for out of control (contactor tripping)

<Confirming procedure>

- 1) Be sure to check that the forward and backward contactor has not gone in.
- 2) Make a jumper wire between a main terminal of bypass contactor. (Wire size about 0.5mm²)
- 3) Be sure to check the warning beep sound and the error message on the display.
- 4) Confirm that even though operate the accelerator, after that the forward (backward) contactor will not go in.

③ Power setting

<Condition on checking>

- Specific gravity of the battery electrolyte:
more than 1.25 at 20°C
- Set the power setting to 50%

<Confirming procedure>

- 1) Check the current limitation.
- 2) Be sure to check that the motor current becomes to about 70% of the current limitation.

CURR LIMIT 231A

④Hydraulic setting

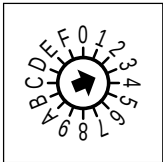
Be sure to check that the each setting is set as listed on “The specification of each adjustment for FB-DC70” (p.10).

<Adjustment procedure>

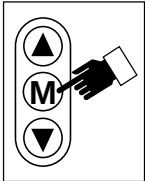
- 1) Set the rotary switch RS1 to “3”.
- 2) The each mode can be changed by pressing the mode select button  and adjust the setting by up button  or down button .



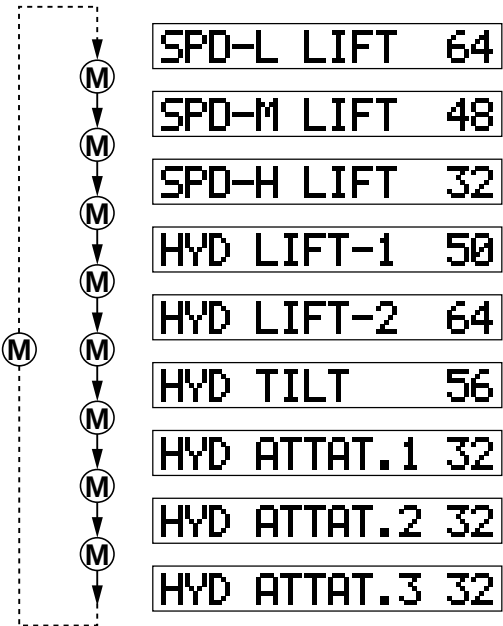
After finishing the adjustment, be sure to return the rotary switch RS1 to “0”.



Set the rotary switch RS1 to “3”



Mode select button



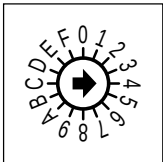
⑤Switch back braking distance (Plugging/Regenerative braking)

<Condition on checking>

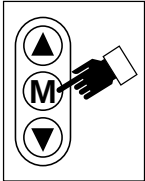
- A: Specific gravity of the battery electrolyte: more than 1.25 at 20°C
- B: Flat ground, Unladen, Full speed

<Adjustment procedure>

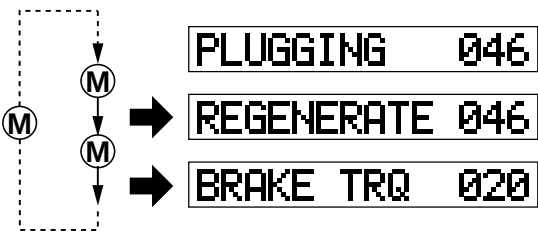
- 1) Set the rotary switch RS1 to “4”, and adjust the braking force by pressing up button  or down button . The each mode can be changed by pressing the mode select button . (either plugging or Regenerative brake)
- 2) Be sure to check the regenerative contactor goes off when switch back braking operation is done, and goes on just before starting on reverse.



Set the rotary switch RS1 to “4”



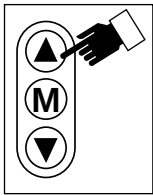
Mode select button



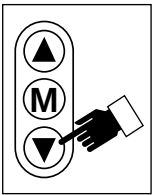
- 3) Adjust the plugging braking distance by pressing up button ▲ or down button ▼ .
The braking distance will be,
● shorten by pressing up button ▲ .
● longer by pressing down button ▼ .



After finishing the adjustment, be sure to return the rotary switch RS1 to “0”.



Up button
For shorter distance.



Down button
For longer distance.

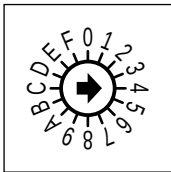
⑥Regenerative braking force

<Condition on checking>

- A: Specific gravity of the battery electrolyte:
more than 1.25 at 20°C
B: Flat ground, Unladen, Full speed

<Adjustment procedure>

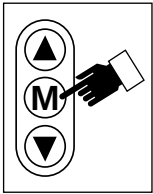
- 1) Traveling forward with middle speed and release the foot from the accelerator pedal.
2) Depress the foot brake pedal lightly.
3) Be sure to check the forward contactor is off and reverse contactor is on, Then regenerative braking is worked.



Set the rotary switch
RS1 to “4”

<Adjustment procedure>

- 1) Set the rotary switch RS1 to “4”, and change the mode of “BRAKE TRQ” by pressing mode select button M.

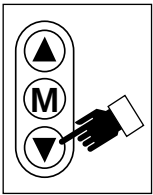
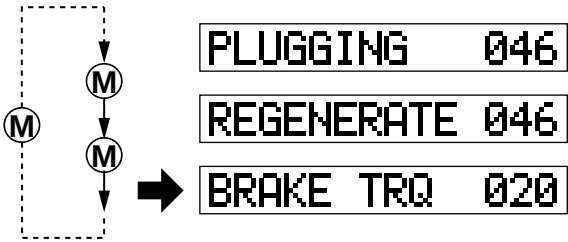


Mode select button

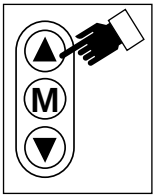
- 2) Adjust the regenerative braking force by pressing up button ▲ or down button ▼ .
The braking force will be,
● Strong by pressing up button ▲ .
● Poor by pressing down button ▼ .



After finishing the adjustment, be sure to return the rotary switch RS1 to “0”.



Down button
For poor braking effect.

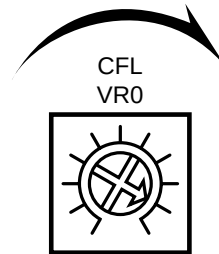


Up button
For strong braking effect.

⑦ Adjustment of brightness of the back light on monitor

Adjust the brightness of the back light on monitor by the volume VR0. Turning it clockwise for bright contrast.

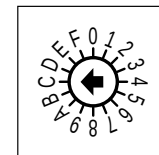
Turning it clockwise for bright contrast.



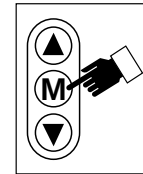
⑧ Checking of speed sensor output

<Adjustment procedure>

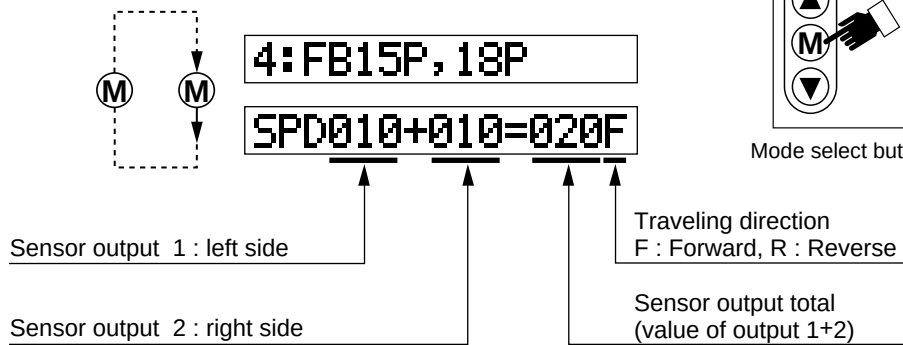
- 1) Set the rotary switch RS1 to "C" and turn the key switch on. The each mode can be changed by pressing the mode select button **(M)** as follows.



Set the rotary switch RS1 to "C"



Mode select button



- 2) Set the "SPD" (Speed sensor checking) mode.
- 3) Check the indication of sensor output by traveling.

◆ Normally, the value of sensor output 1 and 2 should be the same when traveling.

- In case that the value of sensor output 1 or 2 is not varied when traveling. (=always shown "0")
→ Check the sensor or its wire harness connected to MPU board.
- In case that the value of sensor output 1 and 2 are the same with no changing.
→ Check and adjust the potentiometer for sensor 1 or 2 by the shims.
- In case that the value of sensor output 1 plus 2 does not make a sensor output total.
(=output 1+2≠total)
→ It may be influenced by the noise. Please check some wire near the wire of sensor 1 and 2.
- In case that the indication of traveling direction is opposite from the actual moving direction.
→ Check the connection of sensor 1 and 2, They may be opposite.



After confirming the working, be sure to turn the key switch off and return the rotary switch RS1 to "0".

⑨Hour meter working

<Confirming procedure>

- 1) Connect the wireharness of [Blue/Red 1] and [Black] located inside the front cover.
- 2) Be sure to check that the decimal point flashes when the hour meter counts by traveling or hydraulic operation.

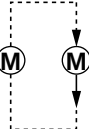


⑩Confirming the working of auto-power cut off function

<Confirming procedure>

- 1) Turn the key switch on.
- 2) Be sure to check that the main power will be cut off after approx.15minutes automatically if there is no operation either traveling or hydraulic operation.

⑪Adjusting of battery voltage

Item (function)	Condition for checking	Check and adjustment procedure
Battery voltage (for battery capacity indicator)	☐ Specific gravity : more than 1.25 at 20°C	1) Check the battery voltage at, ⊕ : Hyd. fuse, ⊖ : Minus (–) terminal in the control unit. 2) Set the rotary switch RS1 to “A”, and turn the key switch on. 3) Set to “VB LEVEL” mode by pressing mode select button .  VOLTAGE > 50 V VB LEVEL>50.00V 4) Adjust the “VB LEVEL” to be the same value checked at 1) by pressing Up  or Down  button.  The VOLTAGE figure will not be changed even if adjusting the VB LEVEL.

3. Option

① Confirming Over loading

<Confirming procedure>

- 1) Lift up to the end and make a relief condition.
- 2) Confirm the display *REDUCE THE LOAD*.

② Confirming the travel inhibit

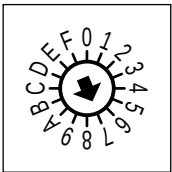
<Confirming procedure>

- 1) Connect the ⊖ line (black) to the connector [CN4-4pin] on the MPU board.
- 2) Confirm that the tuck does not travel when operating the traveling.

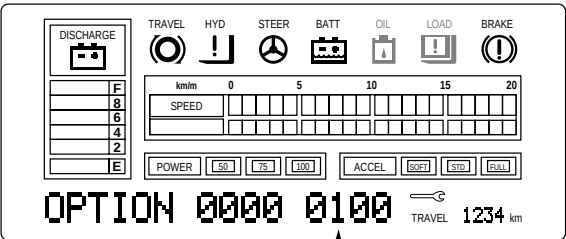
③ Confirming the lift locking working at over discharge

<Adjusting procedure>

- 1) Set the rotary switch RS1 to “7” and turn the key switch on.
- 2) Set 2nd bit of the lift lock at over discharge to “1”.
- 3) Supply the voltage of 30–36V to the battery plug.
- 4) Confirm
 - Battery capacity indicator : [Red] lamp turning on.
 - Indication on display : *CHAGE THE BATTERY*



Set the rotary switch RS1 to “7”



The lift locking at over discharge (2nd bit)



Lifting speed will be half. Then after ten minutes operation,

- Battery capacity indicator : [Red] lamp flashes.
- Indication on display : *CHARGE THE BATTERY* and lifting will be suspended.



After confirming the working, be sure to turn the key switch off and return the rotary switch RS1 to “0”.

④Confirming the seat switch working

<Setting procedure>

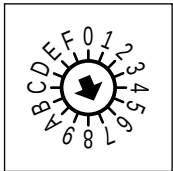
- 1) Set the rotary switch RS1 to “7” and turn the key switch on.
- 2) Set 1st bit of the seat switch to “1”.

<Confirming procedure>

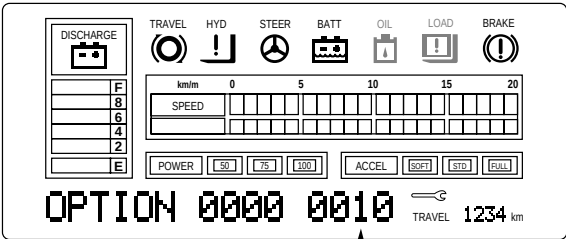
- 1) Operate the traveling without sitting on the seat.
- 2) Confirm the truck does not travel.



After confirming the working, be sure to turn the key switch off and return the rotary switch RS1 to “0”.



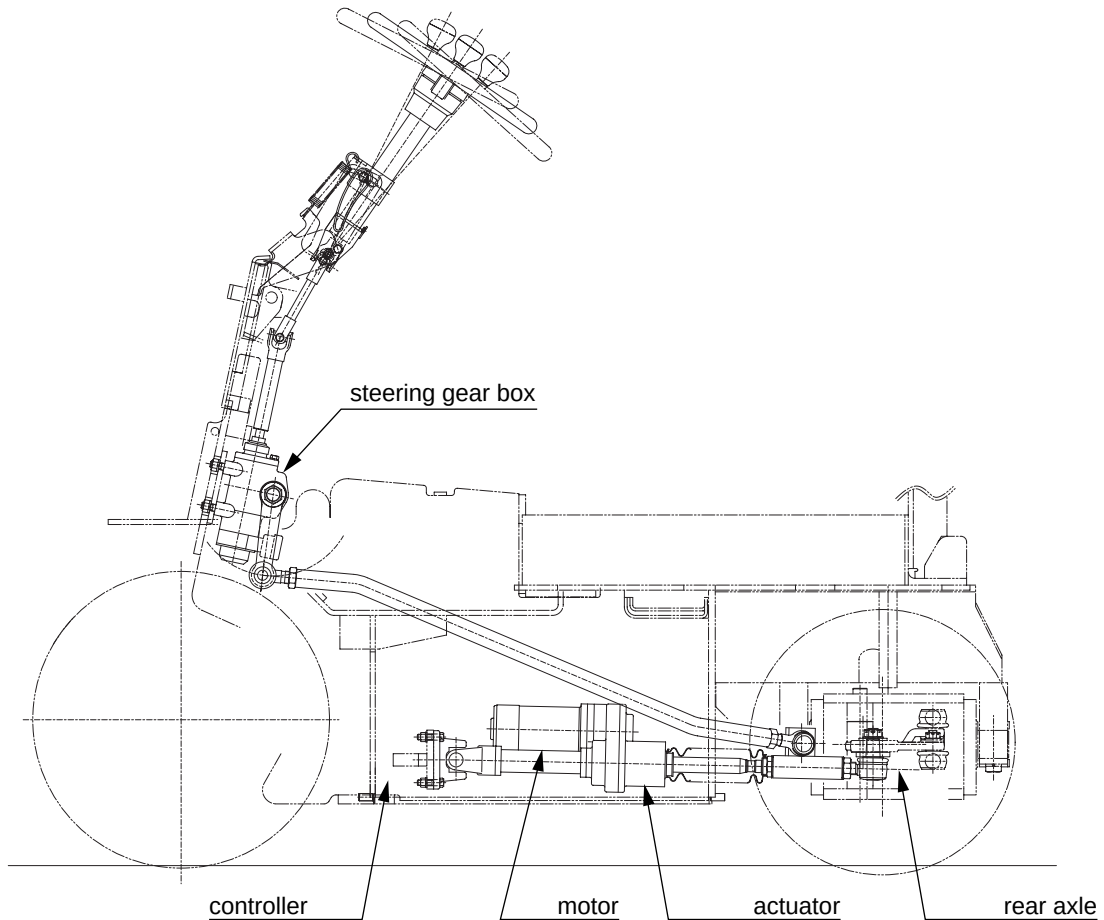
Set the rotary switch RS1 to “7”



Seat switch
(1st bit)

4. Outline of New EPS system for FB-DC70

4-1 Outline of New EPS system

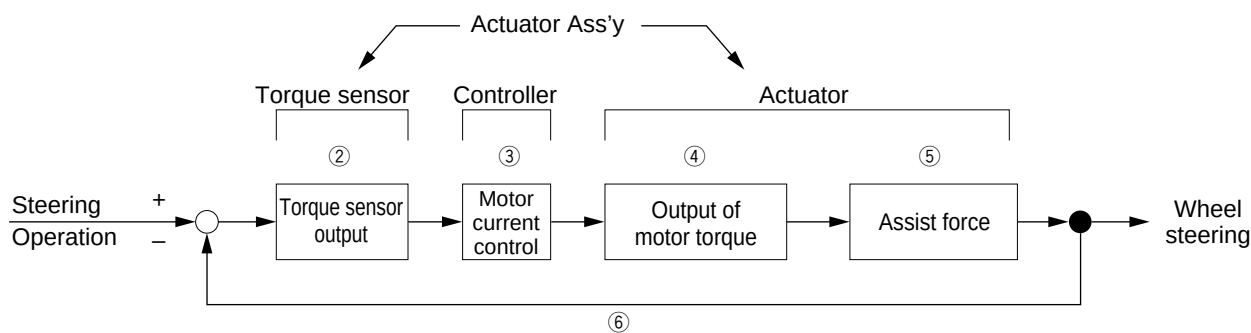


The EPS system is constructed with steering gear box, new design potentiometer actuator, and controller (new design) above. The torque sensor in the steering gear box detects the opposite force from the steering tire when the steering wheel is operated, and send the signal which is proportioned with the force and direction to the controller. The controller controls the magnitude and direction of the steering motor current.

The steering motor creates the force by this current to assist the steering operation.

When the shock is applied to the tire, the torque sensor detects it and the actuator creates the equivalent force against it. So, no kick back force is applied to the steering wheel.

4-2 Operation



- 1) When the key switch is turned on, the contactor is activated and the power is supplied.
- 2) When the steering wheel is operated, the steering force is detected by the torque sensor and output the voltage corresponded for it.
- 3) The output voltage from the torque sensor is applied to the controller and converted to the current for the motor on the actuator.
- 4) The motor creates the output torque which is proportioned with the input current.
- 5) The output force of the actuator assists to steer the wheels.
- 6) The steering force is reduced by this assist force.

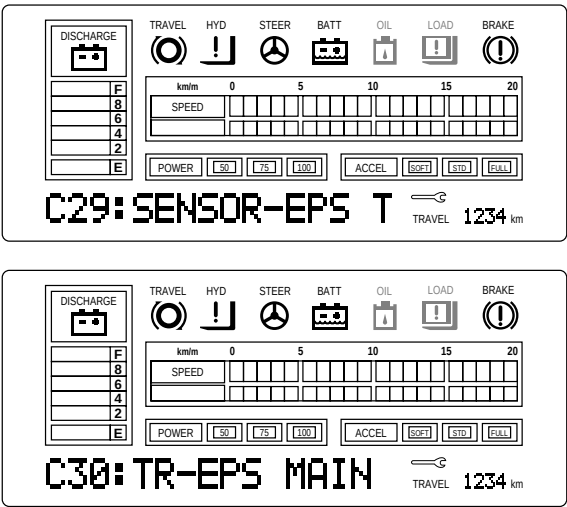
4-3 Feature

① Protection of overheat for motor

When the motor current continues over 25A for about 5 seconds, the motor output will be turned off automatically. When put back the input of torque sensor to neutral, it returns at normal control condition.

② Self diagnosis function

- 1) If the problem is occurred at the torque sensor, scrolls the message of [C29:SENSOR-EPS TORQUE] on the display (Torque sensor error).
- 2) If the problem is occurred at a main FET circuit in the EPS controller, scrolls the message of [C30: TR-EPS MAIN] on the display (chopper error).

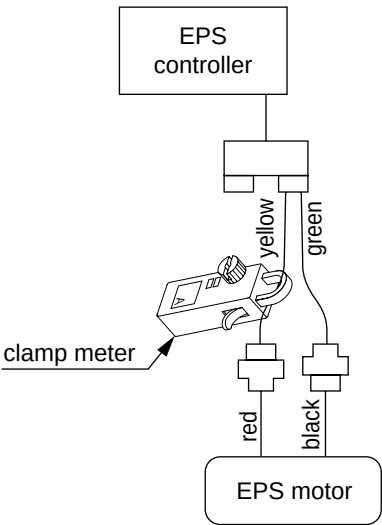


4-4 Checking and Adjustment

① Neutral adjustment of torque sensor

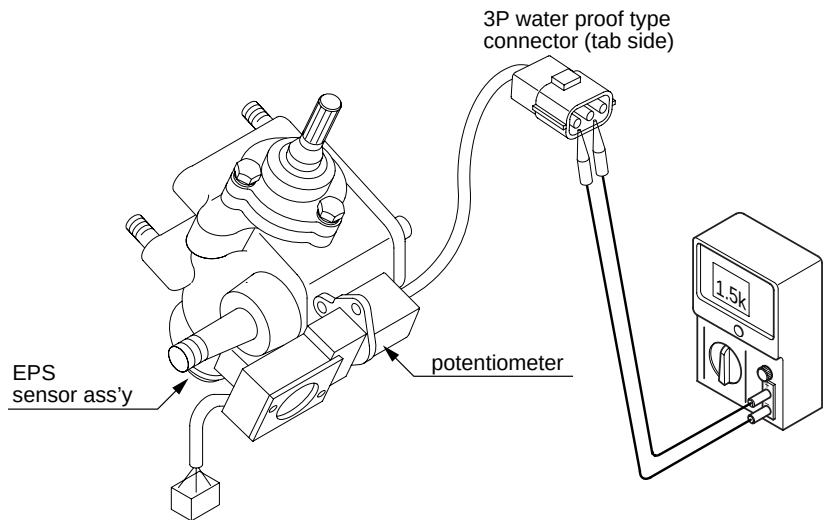
<Checking procedure>

- 1) Turn the key switch off.
- 2) Jack up the rear wheels from the ground.
- 3) Open the side cover at right side.
- 4) Put the clamp meter to the wire [yellow] or [green] between EPS controller and EPS motor [DC range]
- 5) Turn the key switch on and measure the indication at the clamp meter without steering operation. (= at neutral steer) If the indication shows 0A, it is normal.
- 6) If any current is flown, adjust the potentiometer by the following procedure.



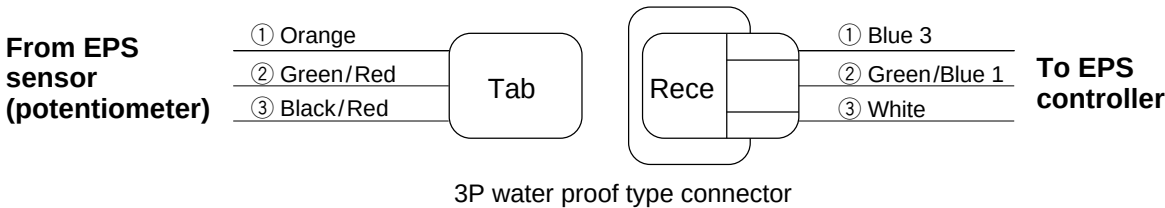
<Adjusting procedure>

- 1) Turn the key switch off and disconnect the battery plug.
- 2) Disconnect the 3P water proof type connector of EPS sensor.



- 3) Check the resistance at sensor side (tab side) between,
<standard value>

- ① pin (Orange) and ③ pin (Black/Red) = Approx. 5k ①
 - ① pin (Orange) and ② pin (Green/Red) = Approx. 2.5k ②
 - ② pin (Green/Red) and ③ pin (Black/Red) = Approx. 2.5k ③
- These should be even value.



- 4) Adjust it by removing or inserting a shim to be the even value between ② and ③ above.



The resistance value may depend on the type of tester and each unit.

5) Connect the battery plug and turn the key switch on. Check and confirm that there is no EPS motor current at the neutral steer by the above procedure, <Checking procedure>.

②Checking by voltage

When it is difficult to adjust the torque sensor very precisely. Use this method.
Neutral adjustment of the potentiometer can be checked by its output voltage.

<Checking procedure>

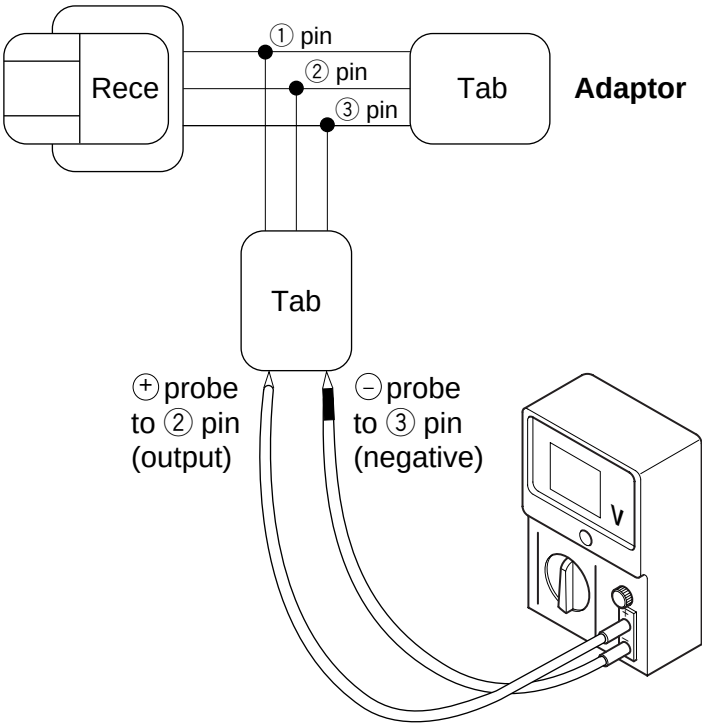
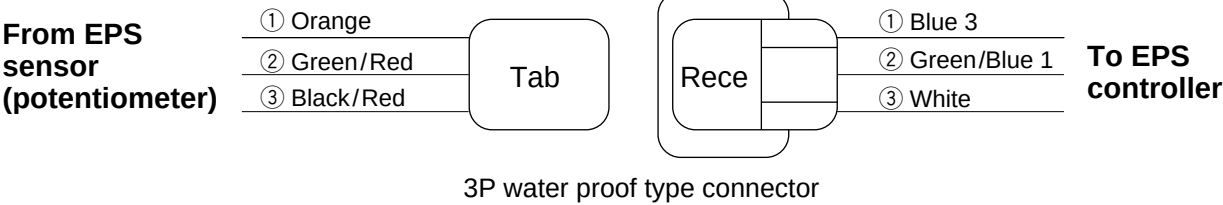
- 1) Turn the key switch off.
- 2) Disconnect the connector of the torque sensor and put the adaptor for measuring voltage.



As the connector of the torque sensor is waterproof type, it is impossible to put the tester probe. Make an adaptor by using the same type adapter.

- 3) Check the voltage at ② pin [Green/Red or Green/Blue 1] of the adaptor.
- 4) Turn the key switch on and operate the steering wheel from right side end to left side end, then check the voltage. The following values are the standard.

right side end	0.8 V ± 0.3
neutral	2.5 V ± 0.3
left side end	4.2 V ± 0.3



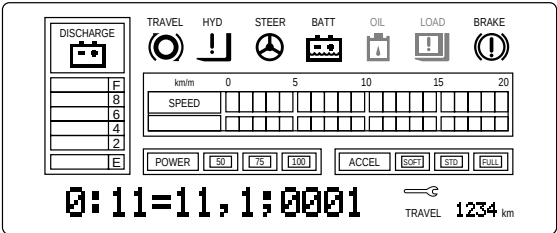
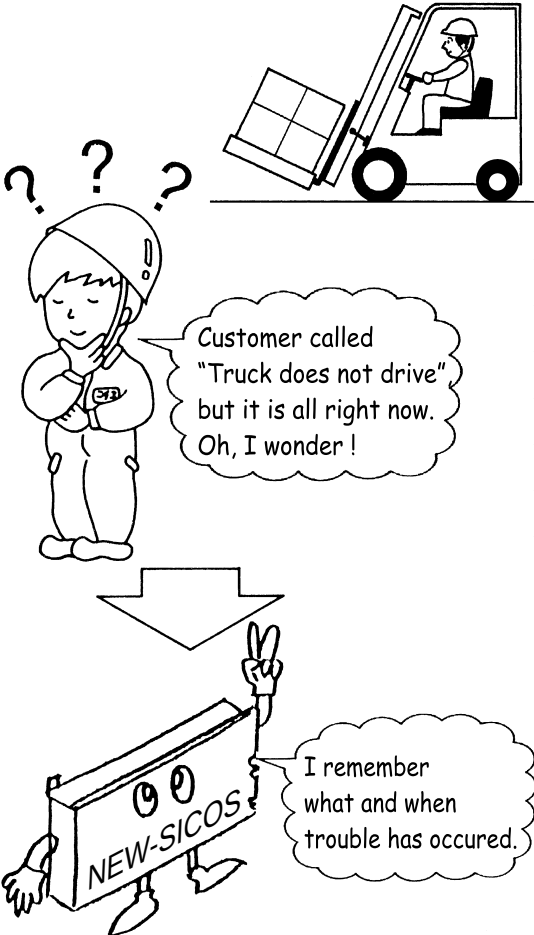
5. Self diagnosis history memory and I/O check.

5-1 Self diagnosis history memory

The total 34 error histories which have occurred at least once can be memorized. There are two (2) kind of information for this function.

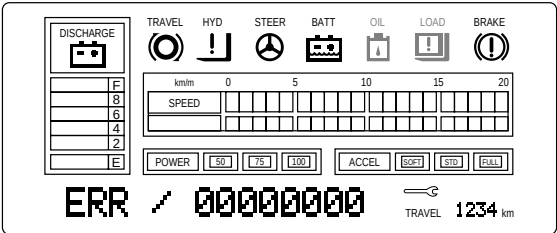
The one is to memorized the operated condition when the trouble has occurred (called "Format 1"), the other one is to memorize the each mal-function (called "Format 2").

◇The basic system of "Format 2" is same as the one adopted on SICOS 50/60 and A-SICOS for FBR-60 series.



<Format 1>

Memory and display for the operated condition when the trouble has occurred.

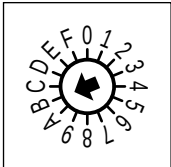


<Format 2>

Memory and display for the each malfunction.
*same as SICOS 50/60 and A-SICOS or FBR-60 series.

<How to check the error history memories>

- 1) Set the rotary switch RS1 to “B”, and turn the key switch on.
- 2) Press the mode select button (M) to call the each mode.



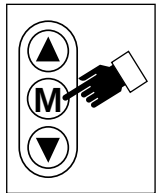
Set RS 1 to “B”



Do not turn the key switch on/off when the rotary switch RS0 is set to “F” as the history memory is cleared.



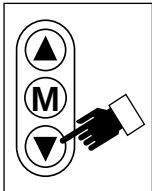
The truck can be moved even though the history memory is called.



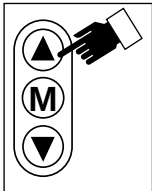
Mode select button

Ⓐ: Format 1 of history memory

- 3) Press Up (▲) or Down (▼) button to change the each history No..

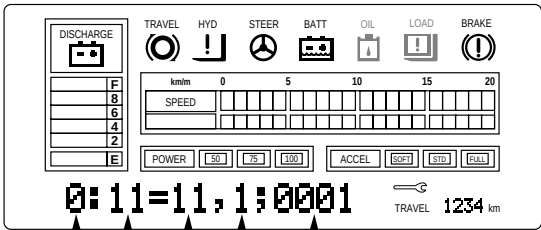


DOWN button



UP button

History memory No. can be changed (called) by pressing Up/Down button.



[1] : History No. (0-9)

Each error is displayed in order.
0 : Latest error
9 : Oldest error

* It is naturally cleared for the errors over 11th. The history No. can be changed by pressing UP/Down button.

[5] : Traveling mileage

Traveling mileage will be displayed when some trouble happen.

[4] : Hydraulic motion mode No.

Hydraulic motion (condition) is displayed when the trouble has occurred. (see the page24 “[2] Hydraulic motion (condition) mode No.” in details)

[3] : Traveling motion mode No.

Traveling motion (condition) is displayed when the trouble has occurred. (see the page24 “[1] Traveling motion (condition) mode No.” in details)

[2] : Error No. (If “00” is displayed, there is no error memory)

Error No. of error message is displayed (see the page35 table)

[1] Traveling motion mode No.

Mode No.	Content
00	Neutral
01	Forward mode: Regenerative contactor OFF
02	Forward mode: Traveling contactor ON
03	Forward mode: Regenerative contactor ON
04	Forward mode: Traveling speed control
05	Forward mode: Bypass contactor ON
06	Forward mode: Bypass contactor OFF
07	Forward mode: Bypass control
08	Forward mode: Over driving contactor ON
09	Forward mode: Over driving contactor OFF
0A	Forward mode: Over driving control
0B	Forward mode: Pre-energizing
0C	Forward mode: Regenerative control
11	Reverse mode: Regenerative contactor OFF
12	Reverse mode: Traveling contactor ON
13	Reverse mode: Regenerative contactor ON
14	Reverse mode: Traveling speed control
15	Reverse mode: Bypass contactor ON
16	Reverse mode: Bypass contactor OFF
17	Reverse mode: Bypass control
18	Reverse mode: Over driving contactor ON
19	Reverse mode: Over driving contactor OFF
1A	Reverse mode: Over driving control
1B	Reverse mode: Pre-energizing
1C	Reverse mode: Regenerative control

[2] Hydraulic motion mode No.

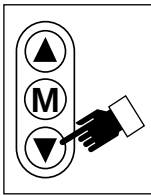
Mode No.	Content
0	Hydraulic neutral
1	Hydraulic control
2	Hydraulic bypass contactor ON
3	Hydraulic bypass contactor OFF
4	Hydraulic bypass control

Ⓑ: **Format 2 of history memory**

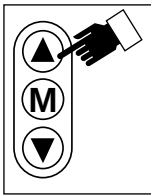
3) Press Up ▲ or Down ▼ button to change (call) the each Error memory No..

If there has been a problem at least once, the bit shows “1”. If not, it shows “0” on the monitor.

- “0” . . .No trouble
- “1” . . .Troubled (at least once)



DOWN button



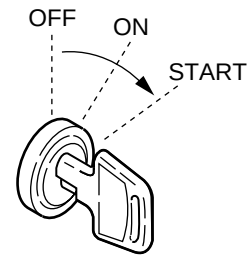
UP button

History memory No. can be changed (called) by pressing Up/Down button.

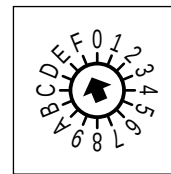
DISCHARGE F 8 6 4 2 E TRAVEL HYD STEER BATT OIL LOAD BRAKE SPEED LIMIT 0 30 40 60 80 % POWER 50 75 100 ACCEL 50% 50% FULL ERR1 / 00000000								
Error memory No.	7th bit	6th bit	5th bit	4th bit	3rd bit	2nd bit	1st bit	0 bit
ERR0	A5 : CONTACTOR-FORWARD	A6 : FET9-REVERSE	A4 : FET10-FORWARD	A3 : CONTACTOR-REGEN	A2 : FET6-REGEN	A1 : FUSE-TRAVEL	*FAIL HYD*	*FAIL TRAVEL*
ERR1	A14 : SENSOR-CURRENT (ARMATURE)	A13 : ACCEL-ACCELERATOR	A12 : TR-REGEN MAIN	A11 : TR-TRAVEL MAIN	A10 : FET7-OVER DRIVE	A9 : CONTACTOR BYPASS	A8 : FET8-BYPASS	A7 : CONTACTOR-REVERSE
ERR2	B22 : SWITCH-LIFT	B21 : TR-HYD MAIN	B20 : FET4-HYD. BYPASS	B19 : CONTACTOR-HYD	B18 : FET5-HYD	B17 : FUSE HYD	A16 : SENSOR-SPEED	A15 : SENSOR-CURRENT (FIELD)
ERR3	*REDUCE THE LOAD*	*REFILL HYDRAULIC OIL*	Not used	Not used	C31 : FUSE EPS	C30 : TR-EPS MAIN	C29 : SENSOR-EPS TORQUE	Not used
ERR4	Not used	Not used	Not used	Not used	Not used	Not used	*REPLENISH REFINED WATER FOR BATTERY*	*REFILL BRAKE OIL*

<How to clear the error history memories>

1) Turn the key switch OFF.

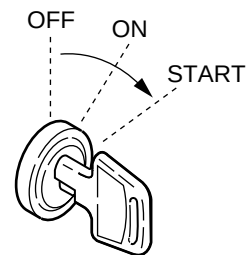


2) Set the rotary switch RS0 to "F".

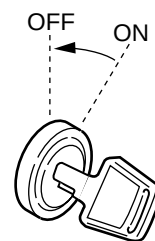


Set the rotary switch
RS0 to "F"

3) Turn the key switch ON. (To START)



4) Turn the key switch OFF.



5) Set the rotary switch RS0 at the original position.

6) Make sure to be clear it.

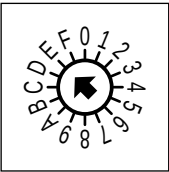
5-2 I/O check

I/O (Input/Output) check is the function that the input and output signal for the microcomputer can be displayed on the LCD by the binary code of [1] or [0] to check if each part is normal. Approx. 90 points of input/output signals can be checked.

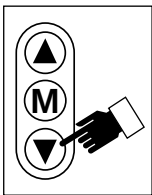
<Procedure of display>

- 1) Set the rotary switch RS1 to “E”, and turn the key switch on.
- 2) Select the port by pressing Up ▲ or Down ▼ button.
Refer to the I/O table for the detail of each port.

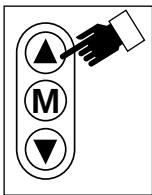
Set RS 1 to “E”



Select the port No.



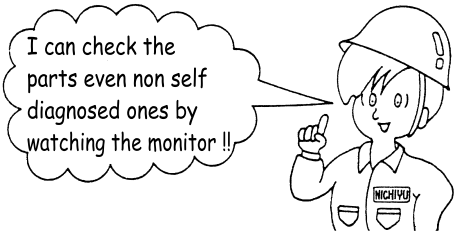
DOWN button



UP button

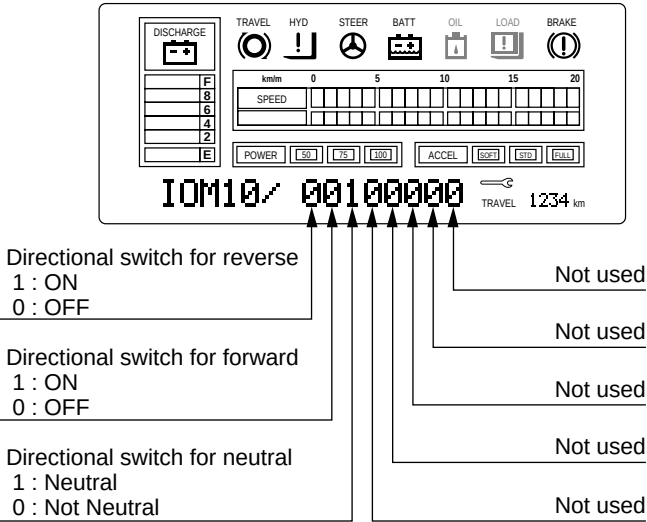


After confirming the I/O check, be sure to turn the key switch off and return the rotary switch RS1 to “0”.



<Example of I/O check>

For example, in case of the port No.10 (=IOM10), the following screen is displayed.



I/O TABLE (1)

PORT NO.	BIT	IN/OUT	CONTENTS	REMARKS
RS1-E NO.OD	0	IN	Button [UP]	0: Up [brake closed]
	1	IN	Button [Mode select]	0 : select
	2	IN	Button [Down]	0 : Down
	3	IN	Button [Slow speed]	1 : Slow speed
	4	IN	Hydraulic oil level	0 : Detection
	5	IN	Brake oil level	0 : Detection
	6	IN	Overload	0 : Detection
	7	IN	Not used	

RS1-E NO.OE	0	IN	Switch [Brake]	0 : ON [brake closed]
	1	IN	Switch [Lift 1]	1 : ON
	2	IN	Switch [Lift 2]	1 : ON
	3	IN	Switch [Tilt]	1 : ON
	4	IN	Switch [Attachment 1]	1 : ON
	5	IN	Switch [Attachment 2]	1 : ON
	6	IN	Switch [Attachment 3]	1 : ON
	7	IN	Switch [Parking brake]	1 : ON

RS1-E NO.OF	0	IN	Contact [Regenerative]	1 : ON
	1	IN	Contact [Hydraulic]	1 : ON
	2	IN	Contact [Forward]	0 : ON
	3	IN	Contact [Reverse]	0 : ON
	4		Not used	
	5	IN	Fuse [Travel]	0 : Fault
	6	IN	Fuse [Hydraulic]	0 : Fault
	7	IN	Fuse [EPS]	0 : Fault

RS1-E NO.OC	0	IN	Rotary switch RS-0	EX) 0000 : "0"
	1	IN	Rotary switch RS-0	0000 : "1"
	2	IN	Rotary switch RS-0	0000 : "3"
	3	IN	Rotary switch RS-0	0000 : "8"
	4	IN	Rotary switch RS-1	EX) 0000 : "0"
	5	IN	Rotary switch RS-1	0001 : "1"
	6	IN	Rotary switch RS-1	0011 : "3"
	7	IN	Rotary switch RS-1	1000 : "8"

I/O TABLE (2)

PORT NO.	BIT	IN/OUT	CONTENTS	REMARKS
RS1-E NO.10	1	IN	Not used	
	2	IN	Not used	
	3	IN	Not used	
	4	IN	Not used	
	5	IN	Directional [Neutral]	1 : Neutral
	6	IN	Directional [Forward]	1 : Forward
	7	IN	Directional [Reverse]	1 : Reverse
RS1-E NO.11	0		Not used	
	1		Not used	
	2		Not used	
	3		Not used	
	4	IN	Hour mete clear	1 : Clear
	5	IN	Hour meter count stop	1 : Stop
	6	IN	Hour meter option [Hydraulic]	1 : Counting
	7	OUT	Not used	
RS1-E NO.00 NO.01	Current [Armature] Use 10 bits by binary system. "1 and 0 bits of NO.01 and 7 to 0 bits of NO.00" ○○ ○○○○○○○○ bit 1 0 7 6 5 4 3 2 1 0 NO.01 NO.00 Analog / Digital conversion 0 - 500A → 1.2 - 4.0V			
RS1-E NO.02 NO.03	Current [Field] Use 10 bits by binary system. "1 and 0 bits of NO.03 and 7 to 0 bits of NO.020" ○○ ○○○○○○○○ bit 1 0 7 6 5 4 3 2 1 0 NO.03 NO.02 Analog / Digital conversion 0 - 500A → 1.2 - 4.0V			
RS1-E NO.04 NO.05	Voltage [Battery] Use 10 bits by binary system. "1 and 0 bits of NO.05 and 7 to 0 bits of NO.04" ○○ ○○○○○○○○ bit 1 0 7 6 5 4 3 2 1 0 NO.05 NO.04 Analog / Digital conversion 0 - 55V → 0 - 5V			
RS1-E NO.06 NO.07	Voltage [Battery capacity] Use 10 bits by binary system. "1 and 0 bits of NO.07 and 7 to 0 bits of NO.06" ○○ ○○○○○○○○ bit 1 0 7 6 5 4 3 2 1 0 NO.07 NO.06 Analog / Digital conversion 44.6 - 55V → 1.2 - 4.0V			

I/O TABLE (3)

RS1-E NO.08 NO.09	Accelerator voltage 1 Use 10 bits by binary system. "1 and 0 bits of NO.09 and 7 to 0 bits of NO.08" ○○○○○○○○○○ bit 1 0 7 6 5 4 3 2 1 0 NO.09 NO.08 Analog / Digital conversion 0 - 0.5V
-------------------------	---

RS1-E NO.0A NO.0B	Accelerator voltage 2 Use 10 bits by binary system. "1 and 0 bits of NO.0B and 7 to 0 bits of NO.0A" ○○○○○○○○○○ bit 1 0 7 6 5 4 3 2 1 0 NO.0B NO.0A Analog / Digital conversion 0 - 0.5V
-------------------------	---

PORT NO.	BIT	IN/OUT	CONTENTS	REMARKS
RS1-E NO.18	0	OUT	Contactor select [Forward]	1 : ON
	1	OUT	Contactor select [Reverse]	1 : ON
	2	OUT	Contactor select [By-pass]	1 : ON
	3	OUT	Contactor select [Overdrive]	1 : ON
	4	OUT	Contactor select [Regenerative]	1 : ON
	5	OUT	Contactor select [Hydraulic]	1 : ON
	6	OUT	Contactor select [Hydraulic by-pass]	1 : ON
	7		Not used	

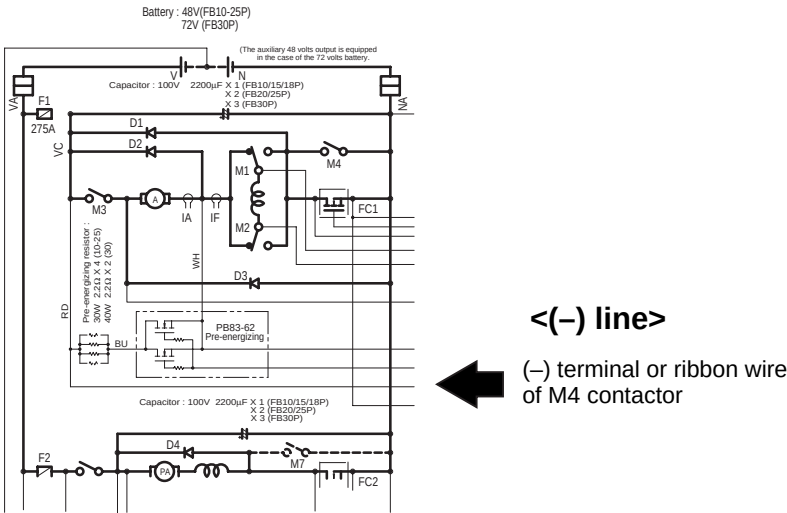
6. Practical trouble shooting (How to find the cause of problem)

6-1 Before starting

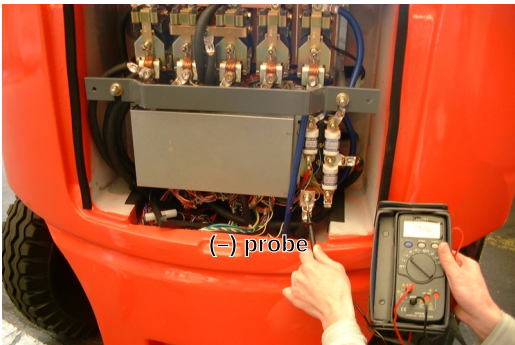
Basically the same procedure can be used as the previous SICOS-50 for the troubleshooting. However, the display unit, MPU board, accelerator etc. are changed in design and some new functions are added. I/O checking also has the different procedure to recall on the display unit. The details of the procedure are explained in the following sections. In this section, the following matters should be understood.

①Location of negative circuit

Fit the negative(-) probe of circuit tester to; Minus (-) terminal in the control unit or the ribbon wire of M4 contactor when checking the voltage.



<SYSTEM WIRING>



Battery (-) terminal

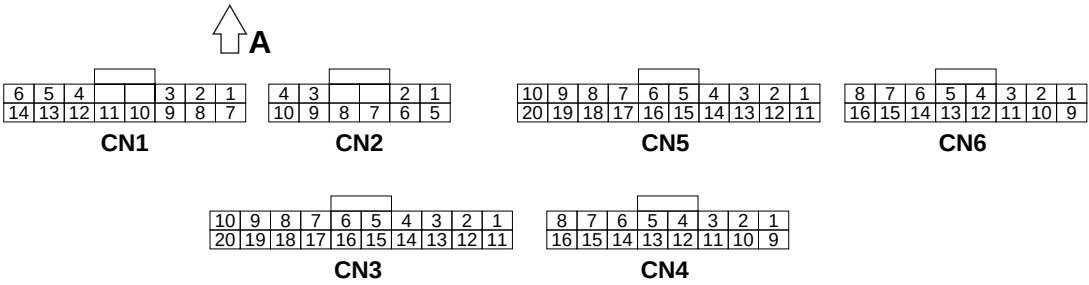
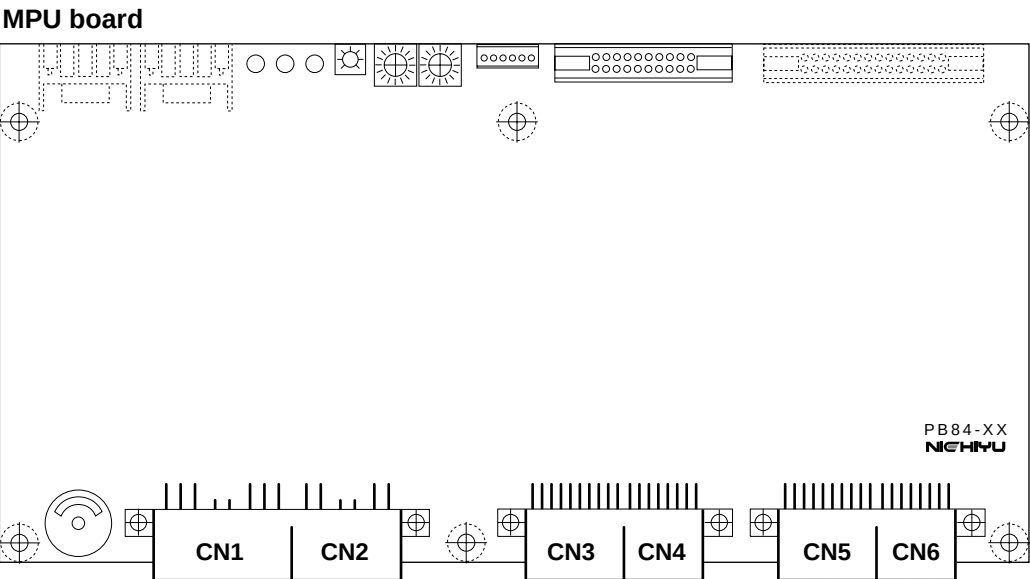


M4 contactor ribbon
Wire
(Bypass contactor)

<CONTROL UNIT>

②Layout of the connectors on MPU board
and others

1) MIC connector



View from A (receptacle/harness side)

Each No. in the connector indicates pin No.
For example, C N 3 - 6
↑ ↑
Pin No. (see picture in above)
Connector No. (CN1-CN6)



Pin location for connectors are shown from insertion side of pins.

2) Waterproof type connector
Each No. in the connector indicates pin No. .

	12 pin type	10 pin type	8 pin type	6 pin type	3 pin type	2 pin type
Rece side						
Tab side						

3) Other connector
Each No. in the connector indicates pin No. .

	6 pin type	4 pin type (1)	4 pin type (2)	2 pin type
Rece side				
Tab side				

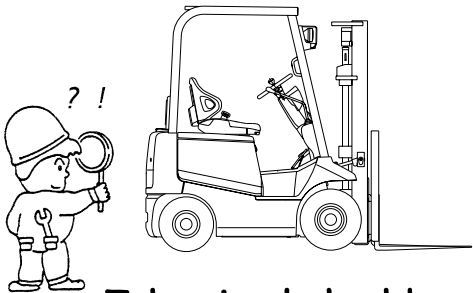
6-2 Attention for the troubleshooting



Initially correctly understand content and phenomena of problems.
After understanding customer's operator sayings and actual forklift truck status as correctly as possible (including problems that often occur).

- ①Visual checking
- The visual checking may help to find the main cause, check the each parts carefully.

- Example)
- Is there any parts or wire which is burned out ?
 - How about the looseness of connector ?



Take visual check!

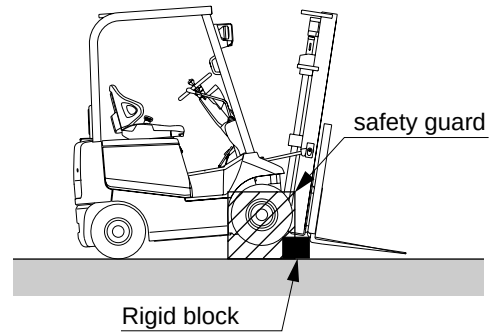
② Fault finding

When the cause is unknown even after visual check,

- 1) Place the rigid blocks under the outer mast to stable the truck.
- 2) Tilt the mast forward by pushing the tilt lever to rise the front wheels.



- Place the safety guards for safety !
- Do not rotate the drive wheels off the floor at high speed, because the drive motor and internal parts of the gear box could be damaged.
- Measurement of voltage should be done in a short time.
- Be sure to disconnect the battery plug when connecting the volt-ohm meter, repairing and replacing parts.



③ Error message and Possible defective part

Error No. and error message is displayed.

Symbol (Flash for defect)	Error No.	Message	Possible defective part	Remarks
TRAVEL 	3	* FAIL TRAVEL. *	FET, D2, MPU board ... etc.	
	4	* FAIL HYD. *	FET, MPU board ... etc.	
		* TURN OFF KEY SWITCH *	linked with other message	
	5	A1 : FUSE-TRAVEL.	Travel fuse	
	6	A2 : FET6-REGEN.	Regen. contactor coil, MPU board	Half speed
	7	A3 : CONTACTOR-REGEN.	Regen. contactor, MPU board	
	8	A4 : FET10-FORWARD	Forward contactor coil(Left), MPU board	Half speed
	9	A5 : CONTACTOR-FORWARD	Forward contactor	
	10	A6 : FET9-REVERSE	Reverse contactor coil (Left), MPU board	Half speed
	11	A7 : CONTACTOR-REVERSE	Reverse contactor	
	12	A8 : FET8-BYPASS	Bypass contactor coil, MPU board	Half speed
	13	A9 : CONTACTOR-BYPASS	Bypass contactor, MPU board	
	14	A10 : FET7-OVER DRIVE		
	15	A11 : TR-TRAVEL. MAIN	FET, Bypass contactor, MPU board	
	16	A12 : TR-REGEN. MAIN	Pre-energizing board, Resistor	
	17	A13 : ACCEL-ACCELERATOR	Accel., Directional sw.	
	18	A14 : SENSOR-CURRENT (ARMATURE)	Current sensor (Ia)	
	19	A15 : SENSOR-CURRENT (FIELD)	Current sensor (If)	
	20	A16 : SENSOR-SPEED	Speed sensor	
HYD 	21	B17 : FUSE-HYD.	Hydraulic fuse	
	22	B18 : FET5-HYD.	Hydraulic contactor coil, MPU board	Half speed
	23	B19 : CONTACTOR-HYD.	Hydraulic contactor, MPU board	
	24	B20 : FET4-HYD. BYPASS		
	25	B21 : TR-HYD. MAIN	Hydraulic FET, MPU board	
	26	B22 : SWITCH-LIFT	Lift micro switch (1), (2)	
	27	B23 : SENSOR-CURRENT (HYD.)		
		D24 : PC. BOARD-AOS		
		* FAIL AOS *		
		D25 : TR-AOS		
		D26 : RELAY-AOS		
		D27 : POTENTIO-HYD. LEVER		
STEER 	34	C29 : SENSOR-EPS TORQUE		
	35	C30 : TR-EPS MAIN		
	36	C31 : FUSE-EPS		
	37	C32 : FET3-EPS		
	38	C33 : CONTACTOR-EPS		

* The following parts cannot be diagnosed and displayed.

- | | | |
|-----------------------------------|----------------------------|--|
| 1) Diodes : D1, D2, D3 and D4 | 5) Motors | 9) Connectors |
| 2) Capacitors for surge absorbing | 6) A part of MPU board | 10) Back contacts of forward / reverse contactor |
| 3) A part of current sensor | 7) A part of microswitches | 11) LCD display |
| 4) A part of pre-energizing board | 8) Wire harness | |

* The error messages for the current sensor and the pre-energizing board are depend on the defect conditions to display.

Symbol (Flash for defect)	Error No.	Message	Possible defective part	Remarks
     	39	* REFILL HYDRAULIC OIL *	Shortage of hydraulic oil	
	40	* REDUCE THE LOAD *	Overloaded	Opt.
	41	* REFILL BRAKE OIL *	Shortage of brake oil	Opt.
	42	* REPLENISH REFINED WATER FOR BATTERY *	Shortage of battery electrolyte	GS batt.
		* CHARGE THE BATTERY *	Need to charge battery	
		* RELEASE ACCEL. TO NEUTRAL *	Accelerator is operated before power on	
		* OFF HYD. LEVER TO NEUTRAL *	Hyd. lever is operated before power on	

6-3 Troubleshooting Procedure

Correct understanding of the content and phenomena of the problems is a great prerequisite. However, after understanding them, the indications on the display (safety monitor, error message, I/O checking) become effective means.

- An indication is not made on the LCD display.
 - No indications or abnormal.
- Indication of the LCD display is normal.
 - No error message appears.
- Indication of the LCD display is normal.
 - Error messages appears.

These cases are assumed. Considering them and referring to the error messages and circuit diagram (system wiring), trace the malfunctions. Approximate guess is required. Thoughtless tracing greatly wastes time. The basic considerations are the same as the SICOS50/60. However, glance over this manual and roughly take note of the key matters.

6-4 Analysis of malfunction causes

It was previously stated that initial understanding of the content and phenomena of the problems is an important point in finding the malfunctions. With prerequisite that a malfunction results in any error, the following checkings lead to a start for the procedure.

- **Check for truck status**
- **LCD display status**

- 1) Check to ensure that the display is normal.
(Ordinary display or non-display)
- 2) Check to ensure that the display indicates error messages.

Next, the malfunctions can be classified mainly into following three:

- No indications are made on the LCD display.
- Indication of the LCD display is normal, but the truck abnormally travels.
- On the LCD display, error messages appear.

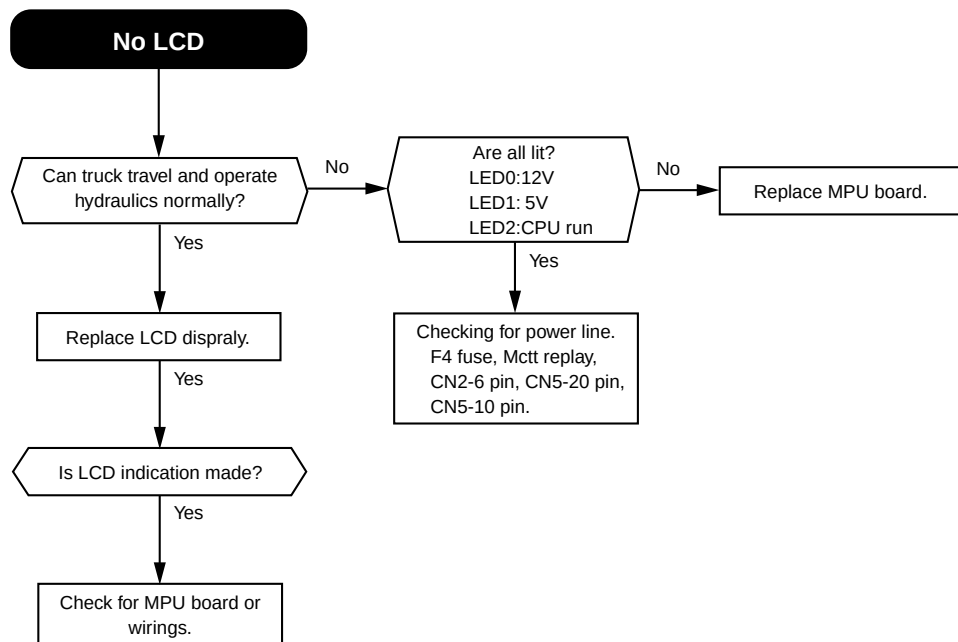
The following are the counter measures.

① **No indications are made on the LCD display.**

In this case, only the display does not make an indication. Whether the forklift truck normally travels or not is a judgement diverge.

- 1) If only indication problems exist;
 - LCD display
 - MPU board that is controlling LCD.
 - Cables including connector between MPU and LCD shall be checked.
- 2) Without LCD indications, the forklift truck abnormally travels. (In many cases, the truck does not travel quite). The power circuits seem to have problems.
 - At the LCD lighting on the MPU board, the MPU board, wirings or fuses are judged to have problems.

PROCEDURE:Example,



②Indication of the LCD display is normal, but the truck abnormally travels.

In this case, especially checking for malfunctions of the truck must be done.

They are largely classified into two(2):
Traveling and Hydraulic malfunctions.

1) Truck traveling status

- The truck does not travel.
- The truck rushes out.
- The electric braking (plugging) force is weak.

If the LCD display indication is normal and the traveling system has an error, the following checkings must be initially done.

- Check to ensure that all adjustments have been done.
(See 1-3 Adjustment of starting current and current limitation)
- Check to ensure that **the option setting** is correct.
- Check to ensure that the hour meter display is normal. Check for the parts which are not self-diagnosed regarding travel,
(See 6-2 ③Error message and Possible defective part)

2) Hydraulic malfunctions

- A hydraulic motion is not made.
- The hydraulic speed control is impossible.

If the hydraulic systems have errors, perform checking in the same way as the traveling systems.

- Check to ensure that all adjustments have been done.
(See 1-3 Adjustment of starting current and current limitation)
- Check for malfunctions of the option and hour meter display.

③On the LCD display, error messages appear.

In this case, with reference to Section 6 Practical trouble shooting.

Please try checking.

The detailed procedure will be notified to you soon later. Main signal lines for error message will be attached to the system wiring base. Please refer to it.

6-5 Flowchart for troubleshooting

① Check point

- 1) Is model select correct?
- 2) Check the specification.
 - With option.
 - Special truck?

After checking the above, start to troubleshoot.



When replacing MPU board and/or Current sensor, and/or FET comp. be sure to check the following.

1. MPU board
 - (1) Check the setting of Rotary switch (RS0, RS1-7). (See Adjustment Specification Table.)
 - (2) Adjust Start current and Current limitation. Repeat the plugging operation a few times and re-check the setting.
 - (3) Check the plugging brake distance. (See Adjustment Specification Table.)
2. Current sensor
 - (1) Adjust Start current and Current limitation.
Repeat the plugging operation a few times and re-check the setting.
3. FET Comp.
 - (1) Adjust Start current and Current limitation.
Repeat the plugging operation a few times and re-check the setting.

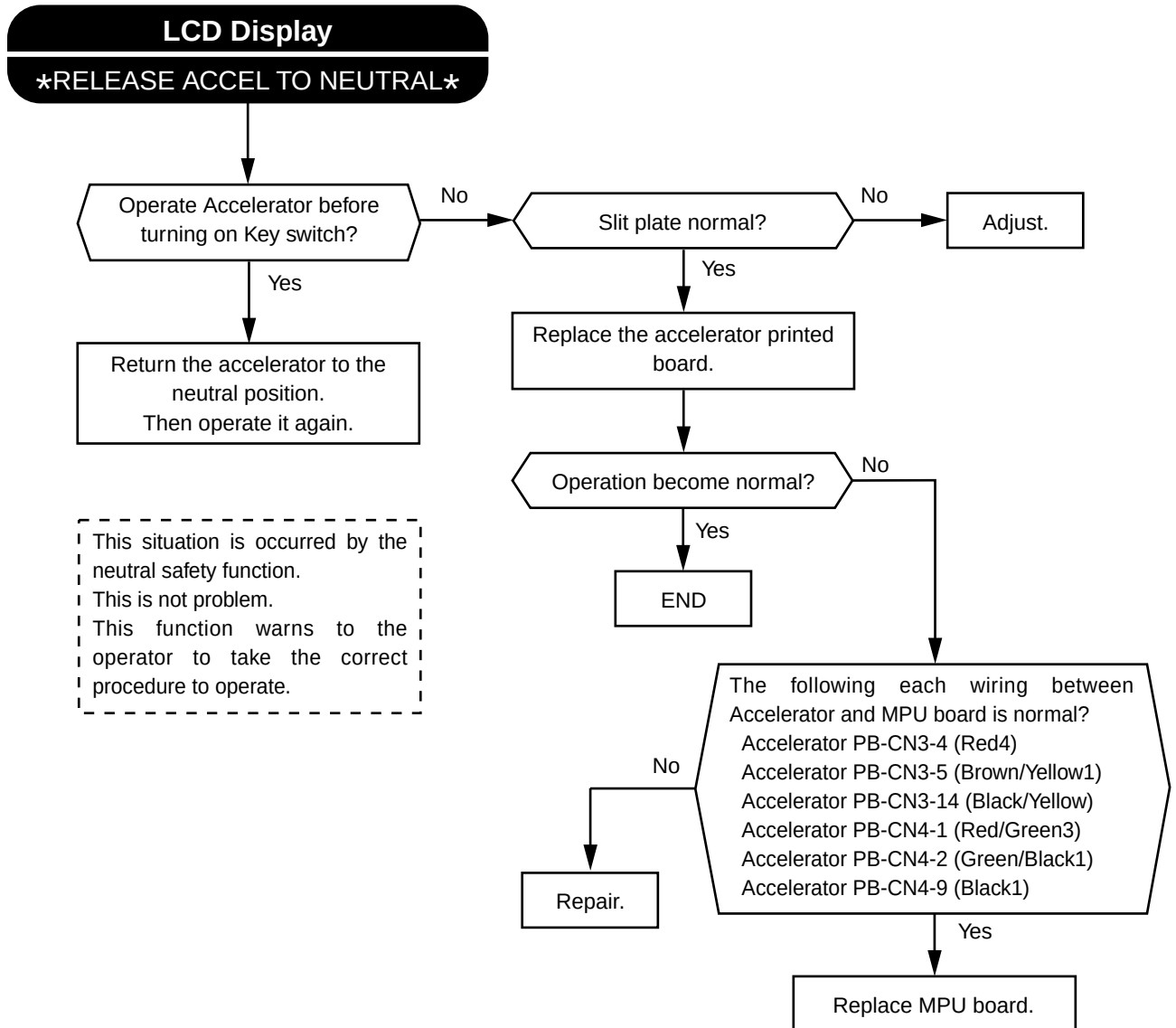


1. Be sure to turn off the key switch when setting Rotary switches.
2. Be sure to disconnect the battery plug when replacing the inner parts of Control unit.

② Contents of flowchart

ERROR NO.1	*RELEASE ACCEL TO NEUTRAL*	
ERROR NO.2	*OFF HYD. LEVER TO NEUTRAL*	
ERROR NO.3	*FAIL TRAVEL* *TURN OFF KEY SWITCH*	
ERROR NO.4	*FAIL HYD.* *TURN OFF KEY SWITCH*	
ERROR NO.5	A1:FUSE-TRAVEL	ERROR NO.6 A2:FET6-REGEN.
ERROR NO.7	A3:CONTACTOR-REGEN.	ERROR NO.8 A4:FET10-FORWARD
ERROR NO.9	A5:CONTACTOR-FORWARD	ERROR NO.10 A6:FET9-REVERSE
ERROR NO.11	A7:CONTACTOR-REVERSE	ERROR NO.12 A8:FET8-BYPASS
ERROR NO.13	A9:CONTACTOR-BYPASS	ERROR NO.15 A11:TR-TRAVEL MAIN
ERROR NO.16	A12:TR-REGEN. MAIN	ERROR NO.17 A13:ACCEL-ACCELERATOR
ERROR NO.18	A14:SENSOR-CURRENT(ARMATURE)	ERROR NO.19 A15:SENSOR-CURRENT(FIELD)
ERROR NO.20	A16:SENSOR-SPEED	ERROR NO.21 A17:FUSE-HYD.
ERROR NO.22	A18:FET5-HYD.	ERROR NO.23 B19:CONTACTOR-HYD.
ERROR NO.24	B20:FET4-HYD. BYPASS	ERROR NO.25 B21:TR-HYD. MAIN
ERROR NO.26	B22:SWITCH-LIFT	ERROR NO.34 C29:SENSOR-EPS TORQUE
ERROR NO.35	C30:TR-EPS MAIN	ERROR NO.36 C31:FUSE-EPS

Error No.1 * RELEASE ACCEL TO NEUTRAL *



When replacing MPU board and/or Current sensor, and/or FET comp. be sure to check the following.

1. MPU board

- (1) Check the setting of Rotary switch (RS0, RS1-7). (See Adjustment Specification Table.)
- (2) Adjust Start current and Current limitation. Repeat the plugging operation a few times and re-check the setting.
- (3) Check the plugging brake distance. (See Adjustment Specification Table.)

2. Current sensor

- (1) Adjust Start current and Current limitation.
Repeat the plugging operation a few times and re-check the setting.

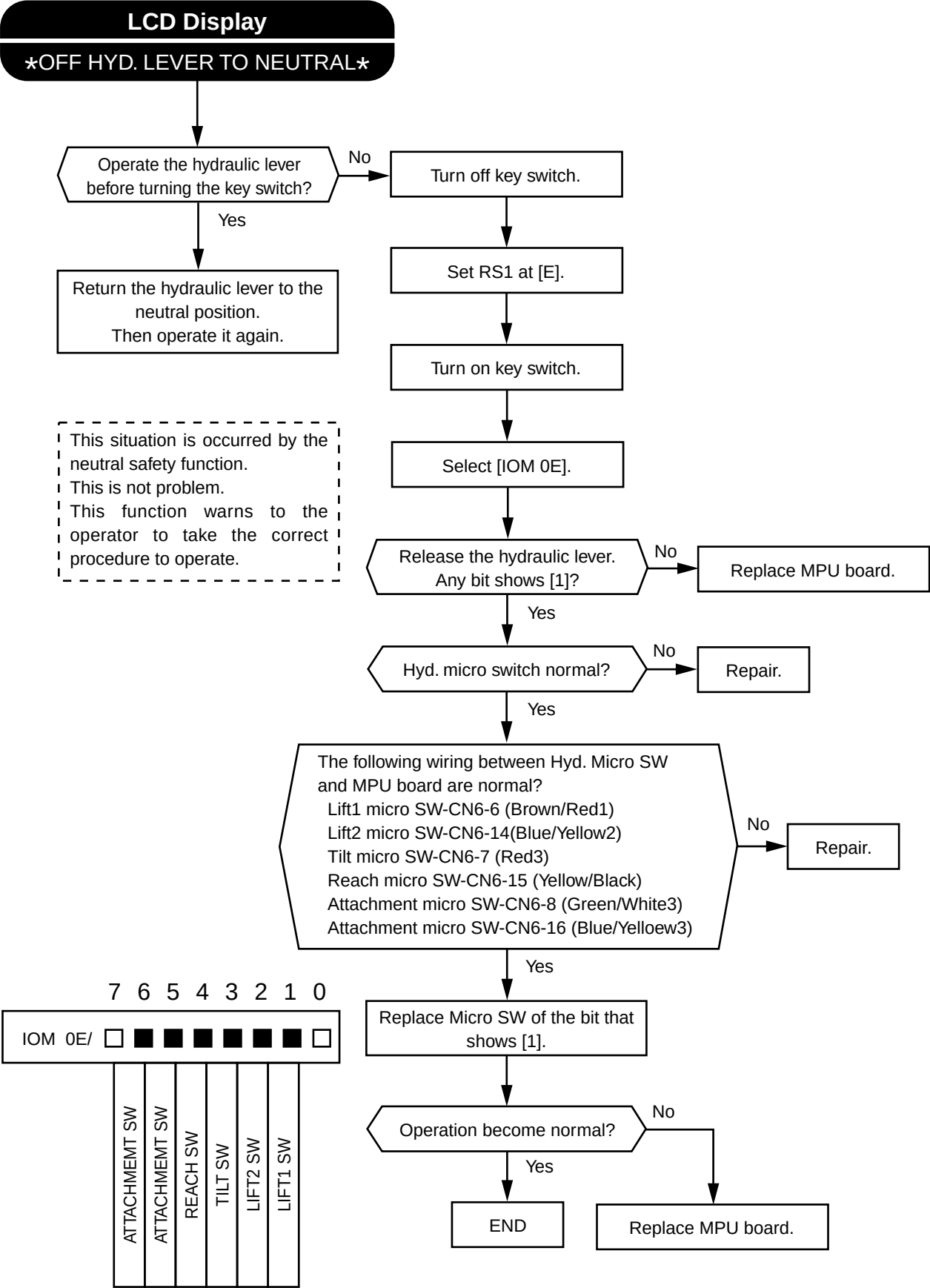
3. FET Comp.

- (1) Adjust Start current and Current limitation.
Repeat the plugging operation a few times and re-check the setting.

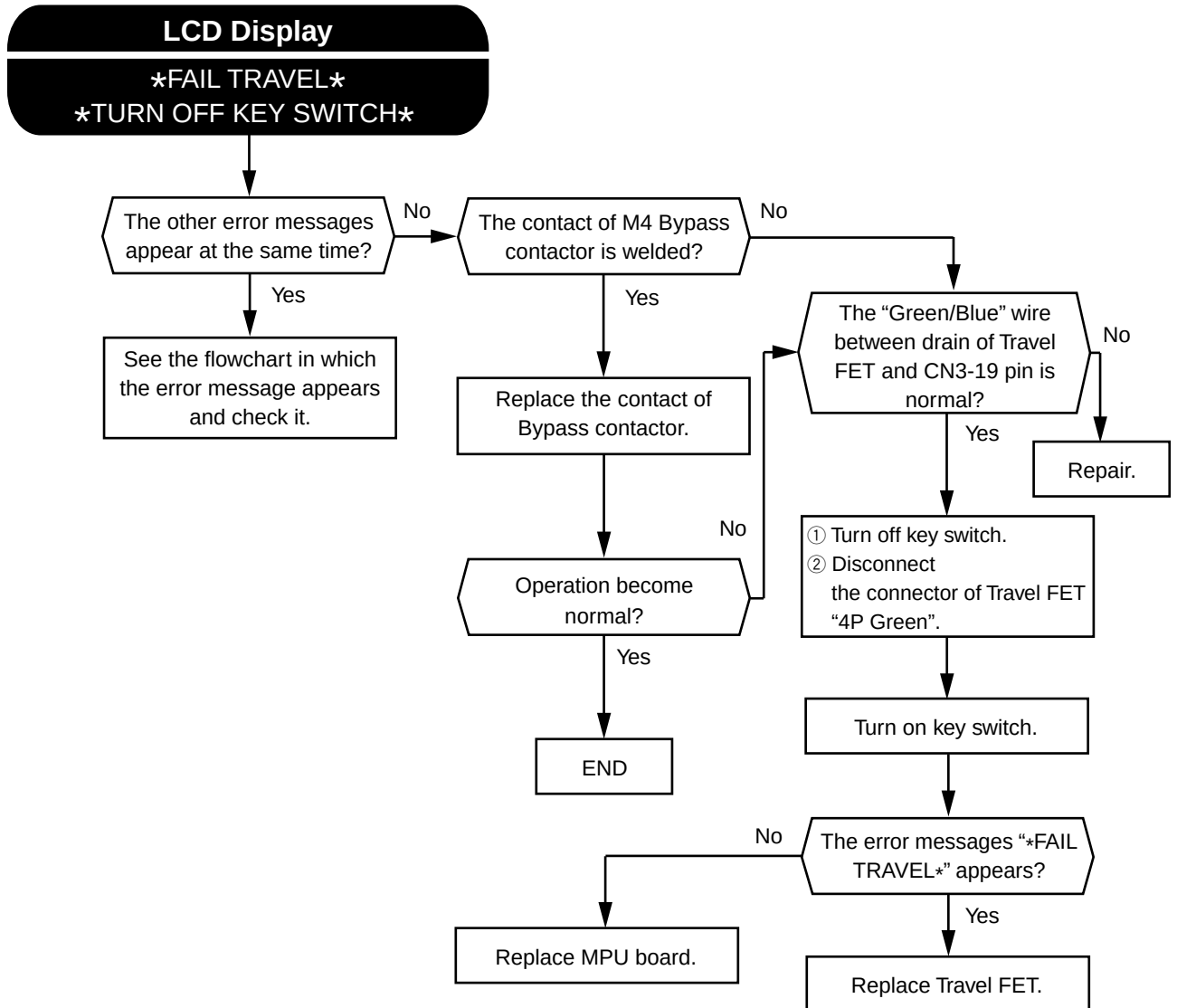


1. Be sure to turn off the key switch when setting Rotary switches.
2. Be sure to disconnect the battery plug when replacing the inner parts of Control unit.

Error No.2 * OFF HYD. LEVER TO NEUTRAL *



Error No.3 * FAIL TRAVEL* *TURN OFF KEY SWITCH*



When replacing MPU board and/or Current sensor, and/or FET comp. be sure to check the following.

1. MPU board

- (1) Check the setting of Rotary switch (RS0, RS1-7). (See Adjustment Specification Table.)
- (2) Adjust Start current and Current limitation. Repeat the plugging operation a few times and re-check the setting.
- (3) Check the plugging brake distance. (See Adjustment Specification Table.)

2. Current sensor

- (1) Adjust Start current and Current limitation.
Repeat the plugging operation a few times and re-check the setting.

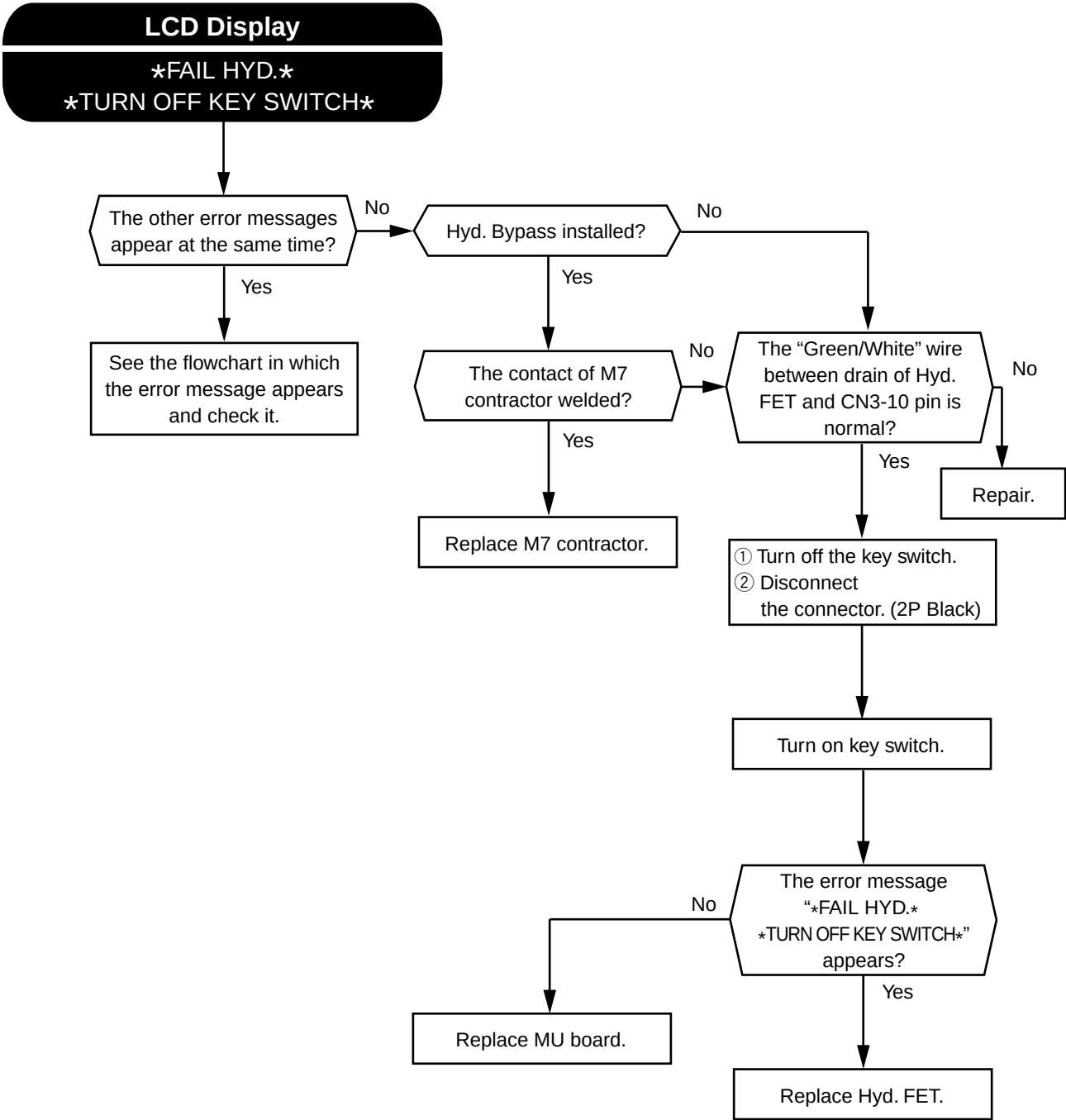
3. FET Comp.

- (1) Adjust Start current and Current limitation.
Repeat the plugging operation a few times and re-check the setting.

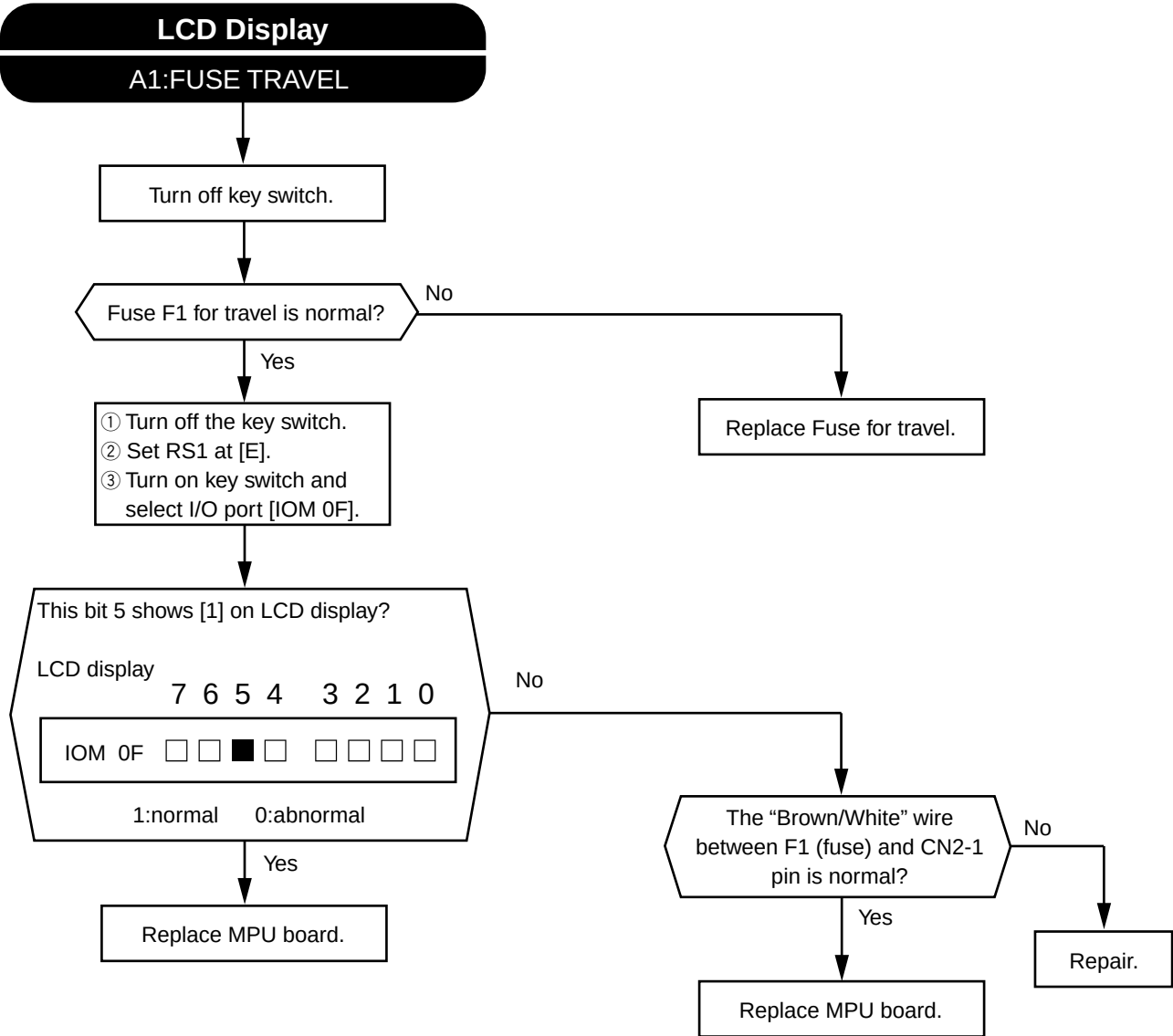


1. Be sure to turn off the key switch when setting Rotary switches.
2. Be sure to disconnect the battery plug when replacing the inner parts of Control unit.

Error No.4 * FAIL HYD.* *TURN OFF KEY SWITCH*



Error No.5 A1:FUSE TRAVEL



When replacing MPU board and/or Current sensor, and/or FET comp. be sure to check the following.

1. MPU board

- (1) Check the setting of Rotary switch (RS0, RS1-7). (See Adjustment Specification Table.)
- (2) Adjust Start current and Current limitation. Repeat the plugging operation a few times and re-check the setting.
- (3) Check the plugging brake distance. (See Adjustment Specification Table.)

2. Current sensor

- (1) Adjust Start current and Current limitation. Repeat the plugging operation a few times and re-check the setting.

3. FET Comp.

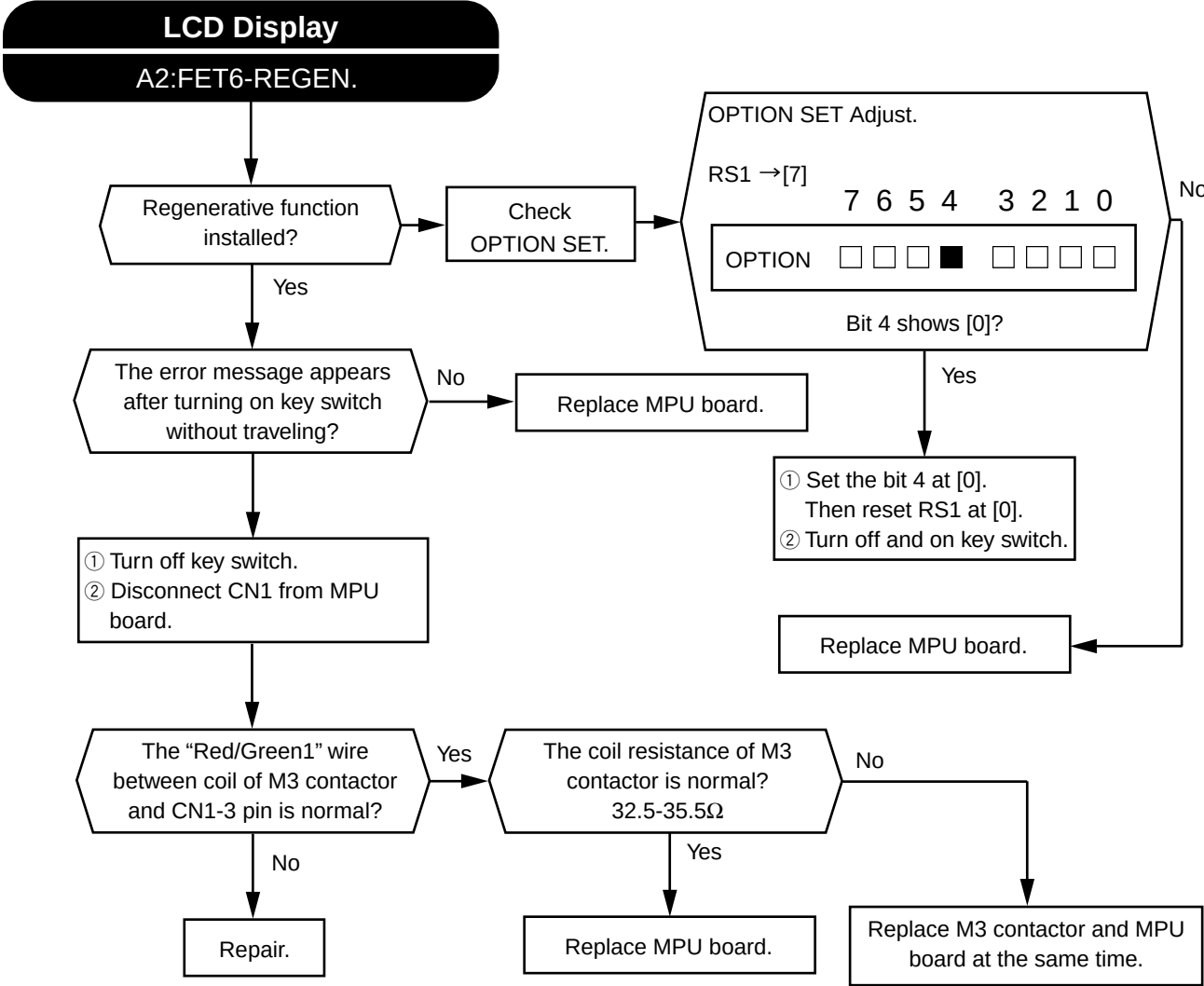
- (1) Adjust Start current and Current limitation. Repeat the plugging operation a few times and re-check the setting.



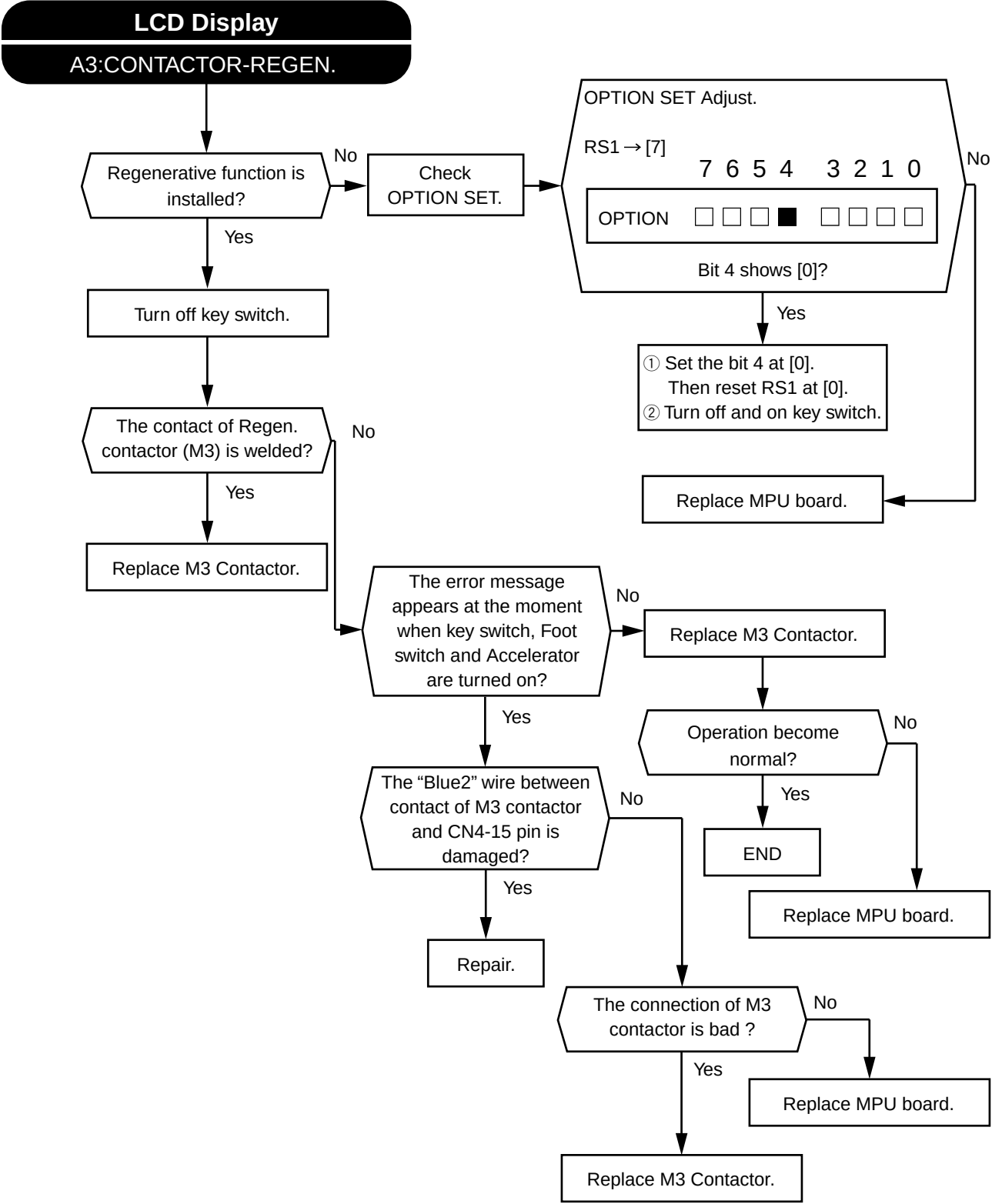
1. Be sure to turn off the key switch when setting Rotary switches.

2. Be sure to disconnect the battery plug when replacing the inner parts of Control unit.

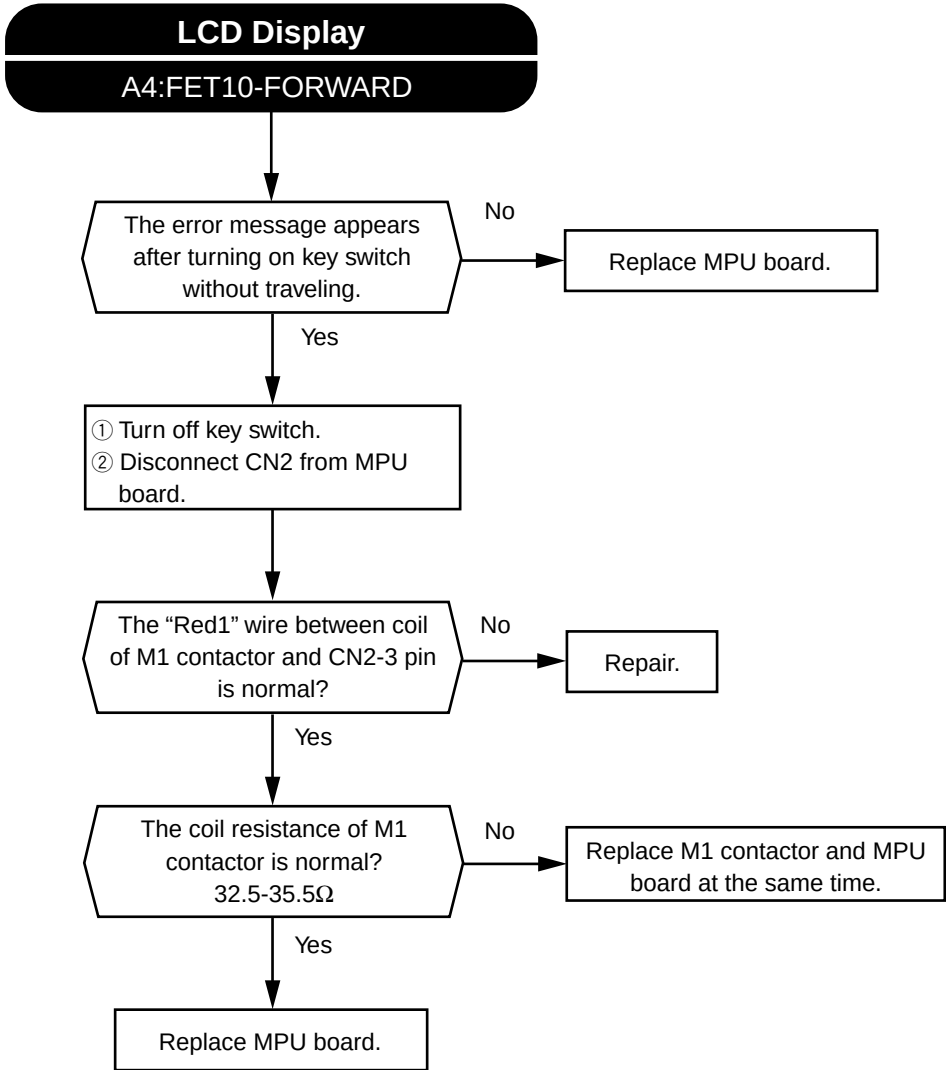
Error No.6 A2:FET6-REGEN.



Error No.7 A3:CONTACTOR-REGEN.



Error No.8 A4:FET10-FORWARD



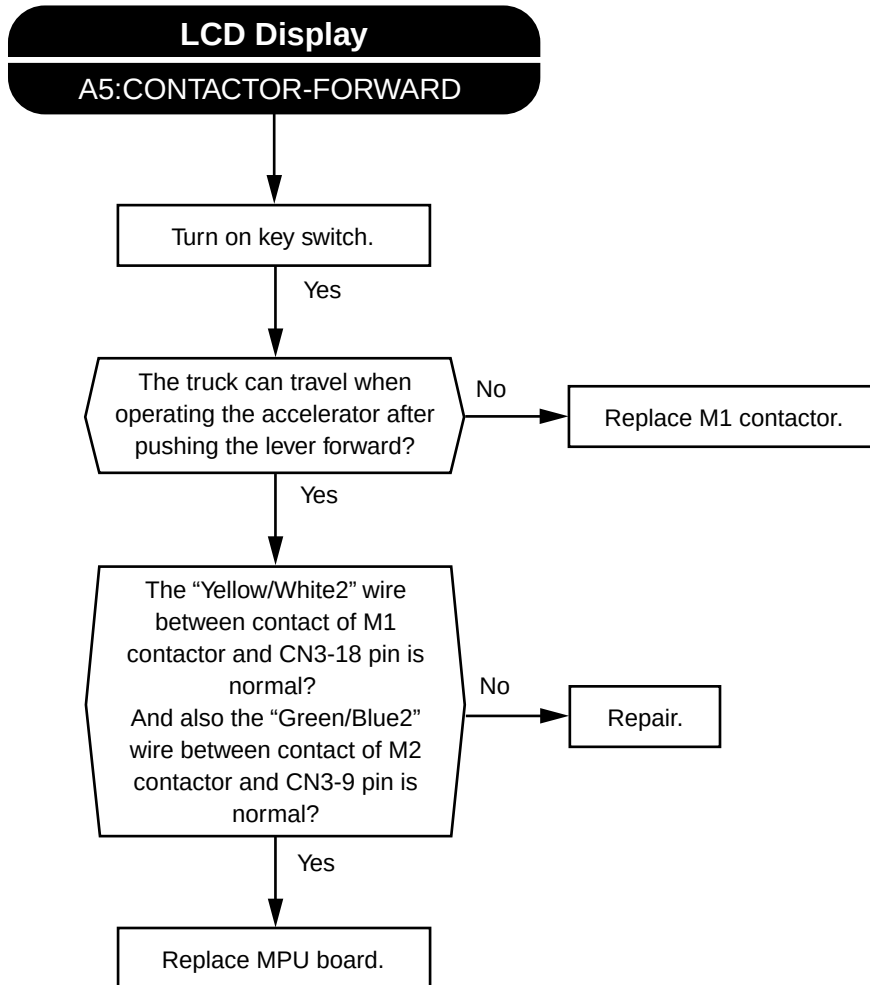
When replacing MPU board and/or Current sensor, and/or FET comp. be sure to check the following.

1. MPU board
 - (1) Check the setting of Rotary switch (RS0, RS1-7). (See Adjustment Specification Table.)
 - (2) Adjust Start current and Current limitation. Repeat the plugging operation a few times and re-check the setting.
 - (3) Check the plugging brake distance. (See Adjustment Specification Table.)
2. Current sensor
 - (1) Adjust Start current and Current limitation.
Repeat the plugging operation a few times and re-check the setting.
3. FET Comp.
 - (1) Adjust Start current and Current limitation.
Repeat the plugging operation a few times and re-check the setting.



1. Be sure to turn off the key switch when setting Rotary switches.
2. Be sure to disconnect the battery plug when replacing the inner parts of Control unit.

Error No.9 A5:CONTACTOR-FORWARD



When replacing MPU board and/or Current sensor, and/or FET comp. be sure to check the following.

1. MPU board

- (1) Check the setting of Rotary switch (RS0, RS1-7). (See Adjustment Specification Table.)
- (2) Adjust Start current and Current limitation. Repeat the plugging operation a few times and re-check the setting.
- (3) Check the plugging brake distance. (See Adjustment Specification Table.)

2. Current sensor

- (1) Adjust Start current and Current limitation.
Repeat the plugging operation a few times and re-check the setting.

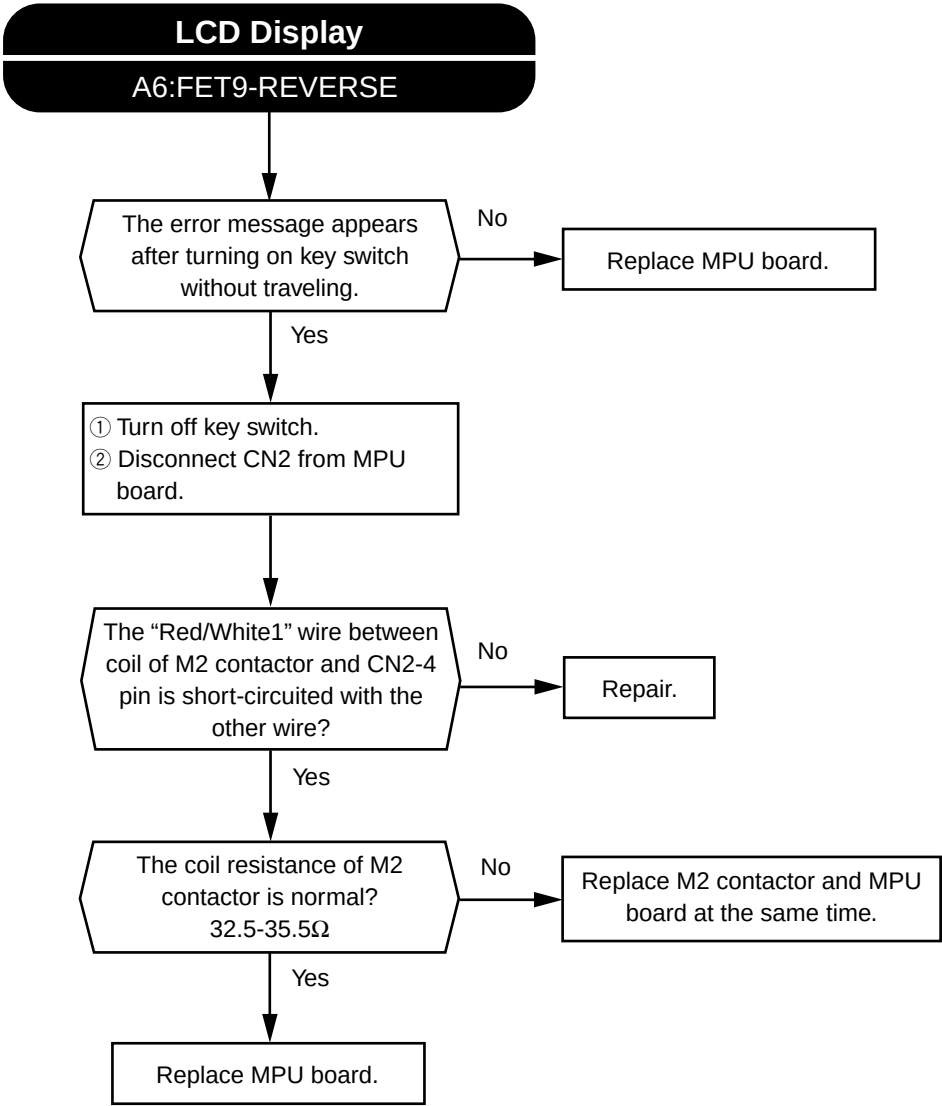
3. FET Comp.

- (1) Adjust Start current and Current limitation.
Repeat the plugging operation a few times and re-check the setting.

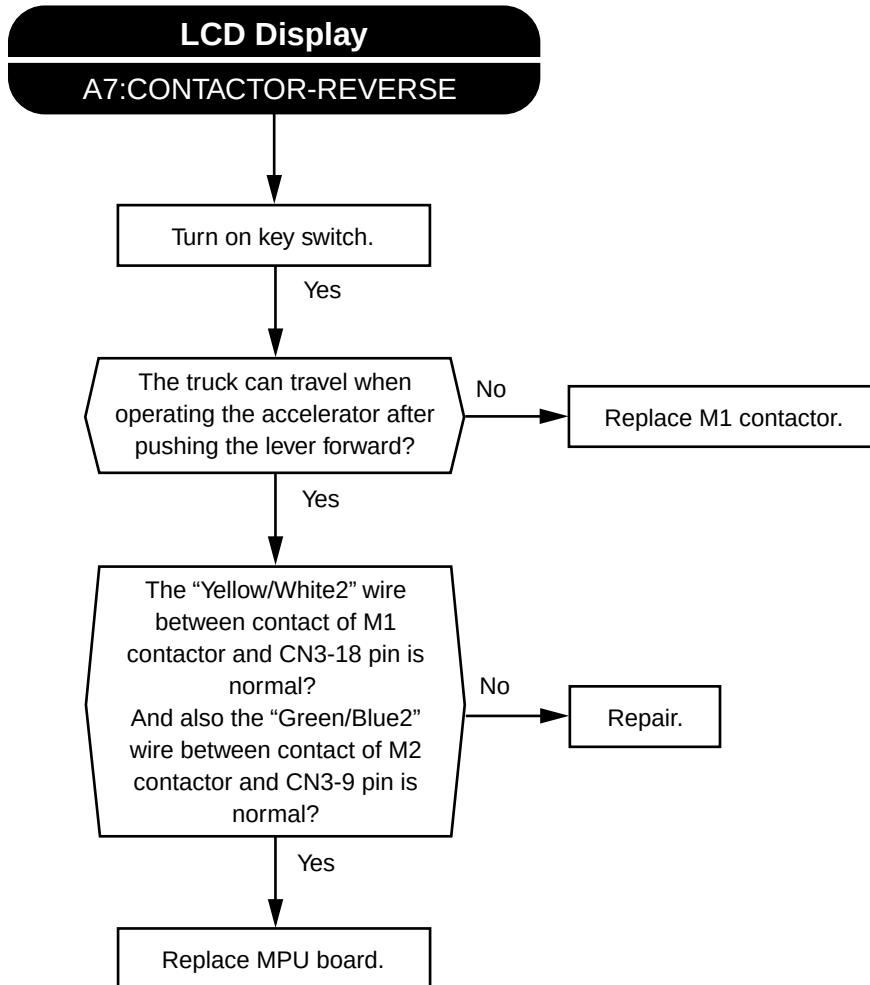


1. Be sure to turn off the key switch when setting Rotary switches.
2. Be sure to disconnect the battery plug when replacing the inner parts of Control unit.

Error No.10 A6:FET9-REVERSE



Error No.11 A7:CONTACTOR-REVERSE



When replacing MPU board and/or Current sensor, and/or FET comp. be sure to check the following.

1. MPU board

- (1) Check the setting of Rotary switch (RS0, RS1-7). (See Adjustment Specification Table.)
- (2) Adjust Start current and Current limitation. Repeat the plugging operation a few times and re-check the setting.
- (3) Check the plugging brake distance. (See Adjustment Specification Table.)

2. Current sensor

- (1) Adjust Start current and Current limitation.
Repeat the plugging operation a few times and re-check the setting.

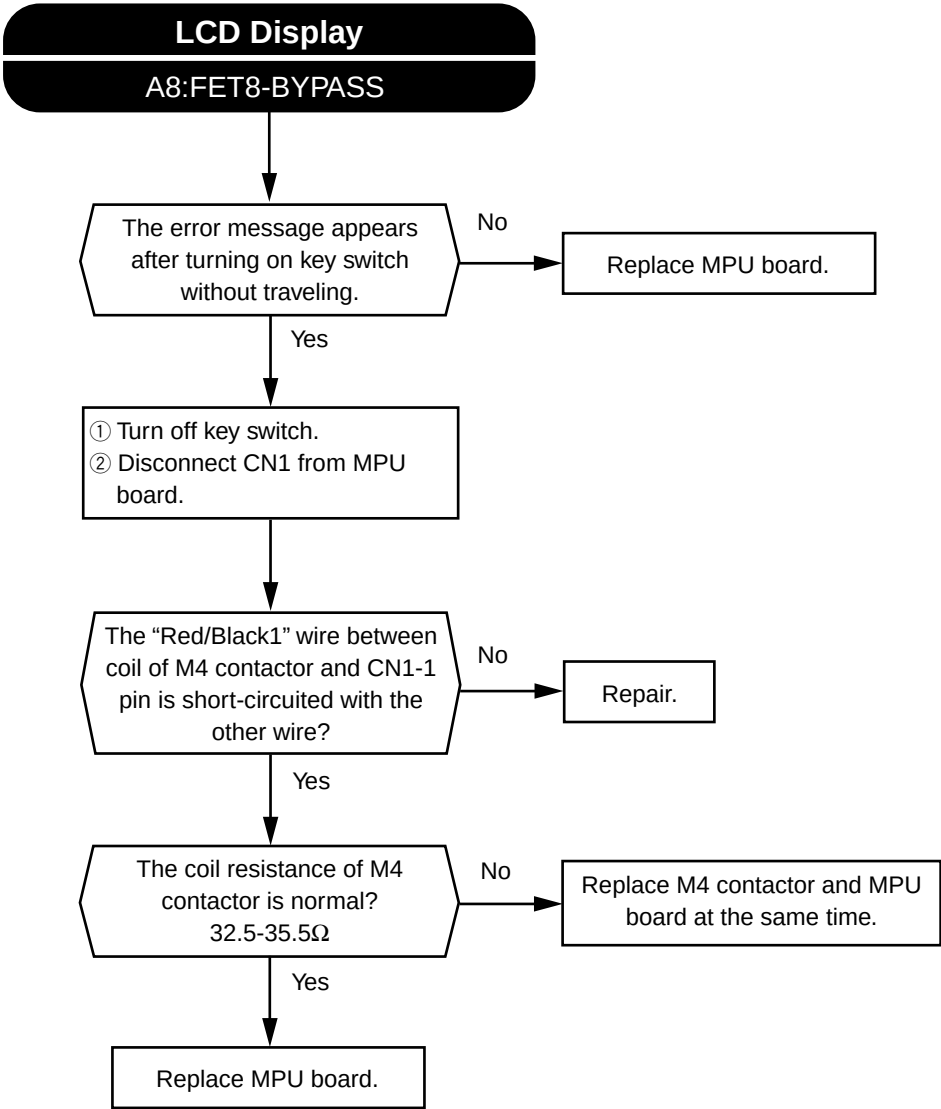
3. FET Comp.

- (1) Adjust Start current and Current limitation.
Repeat the plugging operation a few times and re-check the setting.

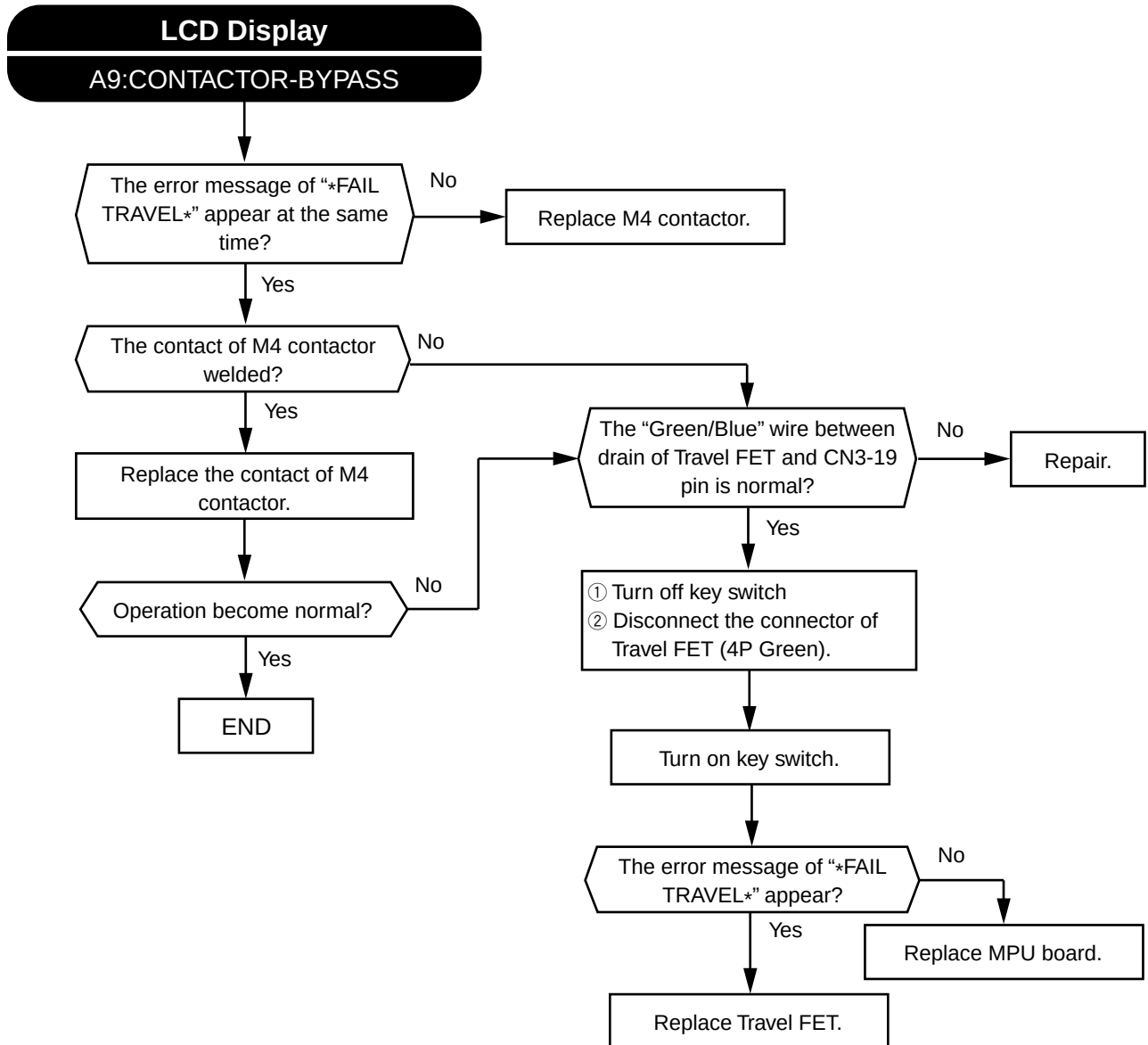


1. Be sure to turn off the key switch when setting Rotary switches.
2. Be sure to disconnect the battery plug when replacing the inner parts of Control unit.

Error No.12 A8:FET8-BYPASS



Error No.13 A9:CONTACTOR-BYPASS



When replacing MPU board and/or Current sensor, and/or FET comp. be sure to check the following.

1. MPU board

- (1) Check the setting of Rotary switch (RS0, RS1-7). (See Adjustment Specification Table.)
- (2) Adjust Start current and Current limitation. Repeat the plugging operation a few times and re-check the setting.
- (3) Check the plugging brake distance. (See Adjustment Specification Table.)

2. Current sensor

- (1) Adjust Start current and Current limitation.
Repeat the plugging operation a few times and re-check the setting.

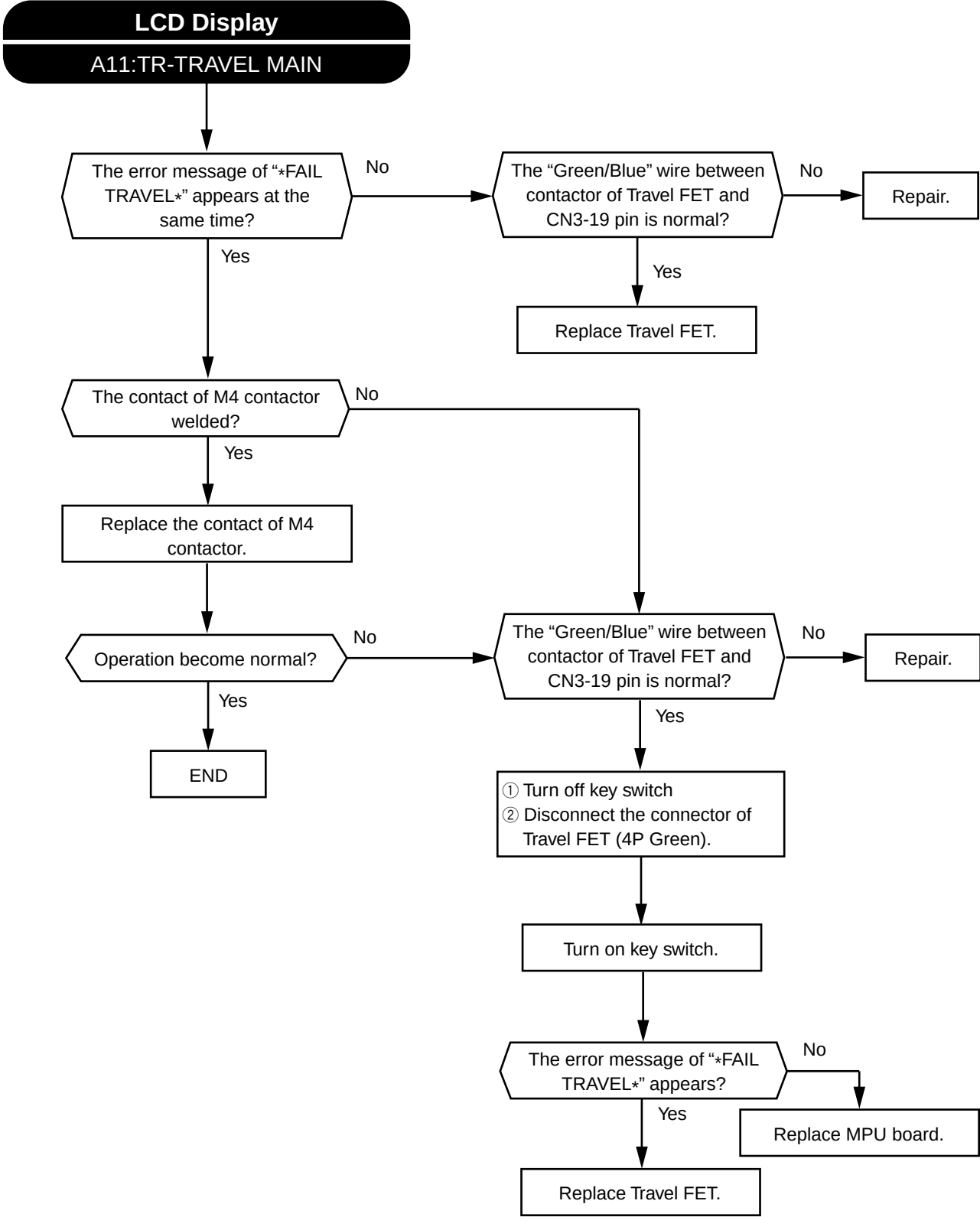
3. FET Comp.

- (1) Adjust Start current and Current limitation.
Repeat the plugging operation a few times and re-check the setting.

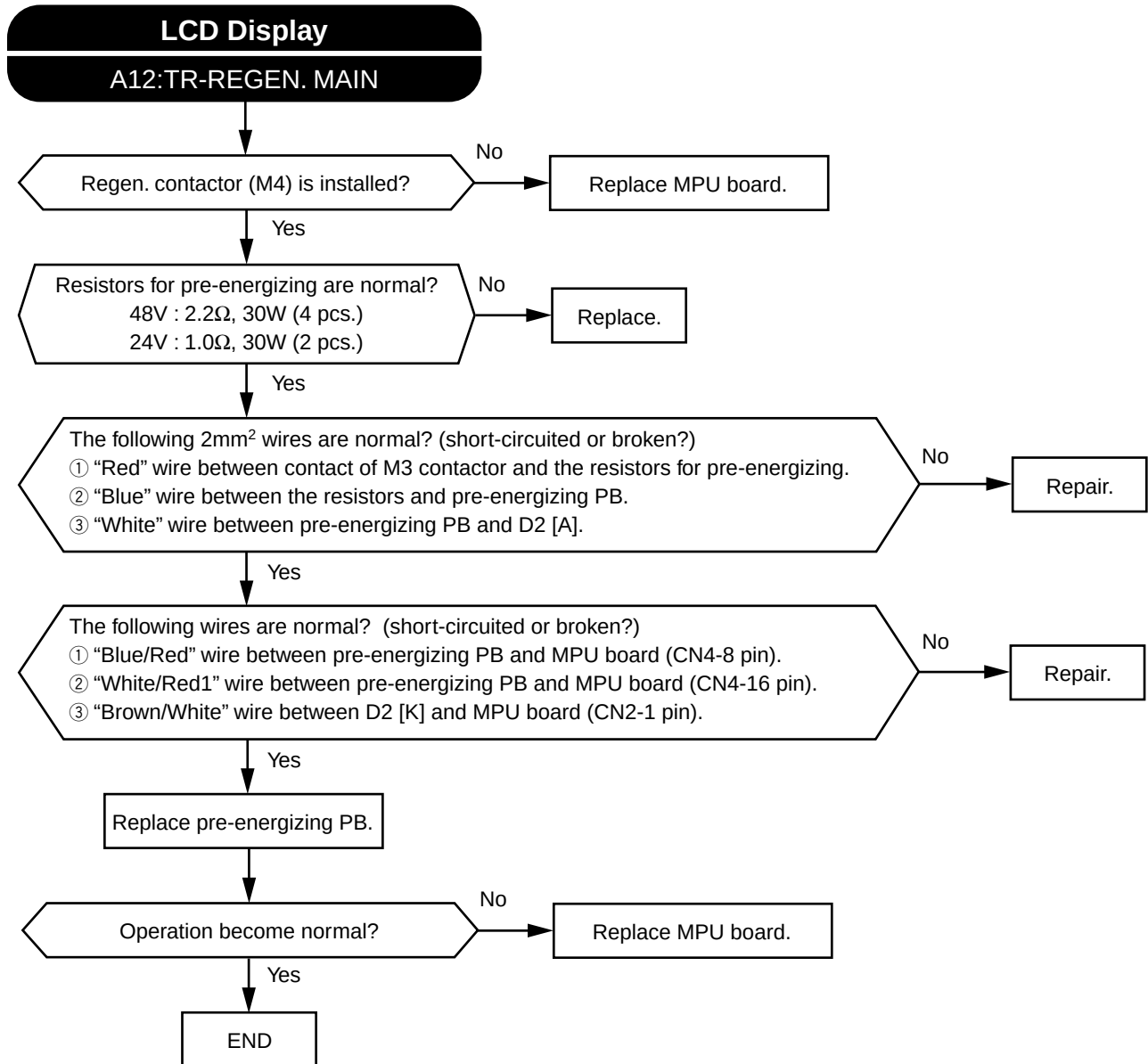


1. Be sure to turn off the key switch when setting Rotary switches.
2. Be sure to disconnect the battery plug when replacing the inner parts of Control unit.

Error No.15 A11:TR-TRAVEL MAIN



Error No.16 A12:TR-REGEN. MAIN



When replacing MPU board and/or Current sensor, and/or FET comp. be sure to check the following.

1. MPU board

- (1) Check the setting of Rotary switch (RS0, RS1-7). (See Adjustment Specification Table.)
- (2) Adjust Start current and Current limitation. Repeat the plugging operation a few times and re-check the setting.
- (3) Check the plugging brake distance. (See Adjustment Specification Table.)

2. Current sensor

- (1) Adjust Start current and Current limitation.
Repeat the plugging operation a few times and re-check the setting.

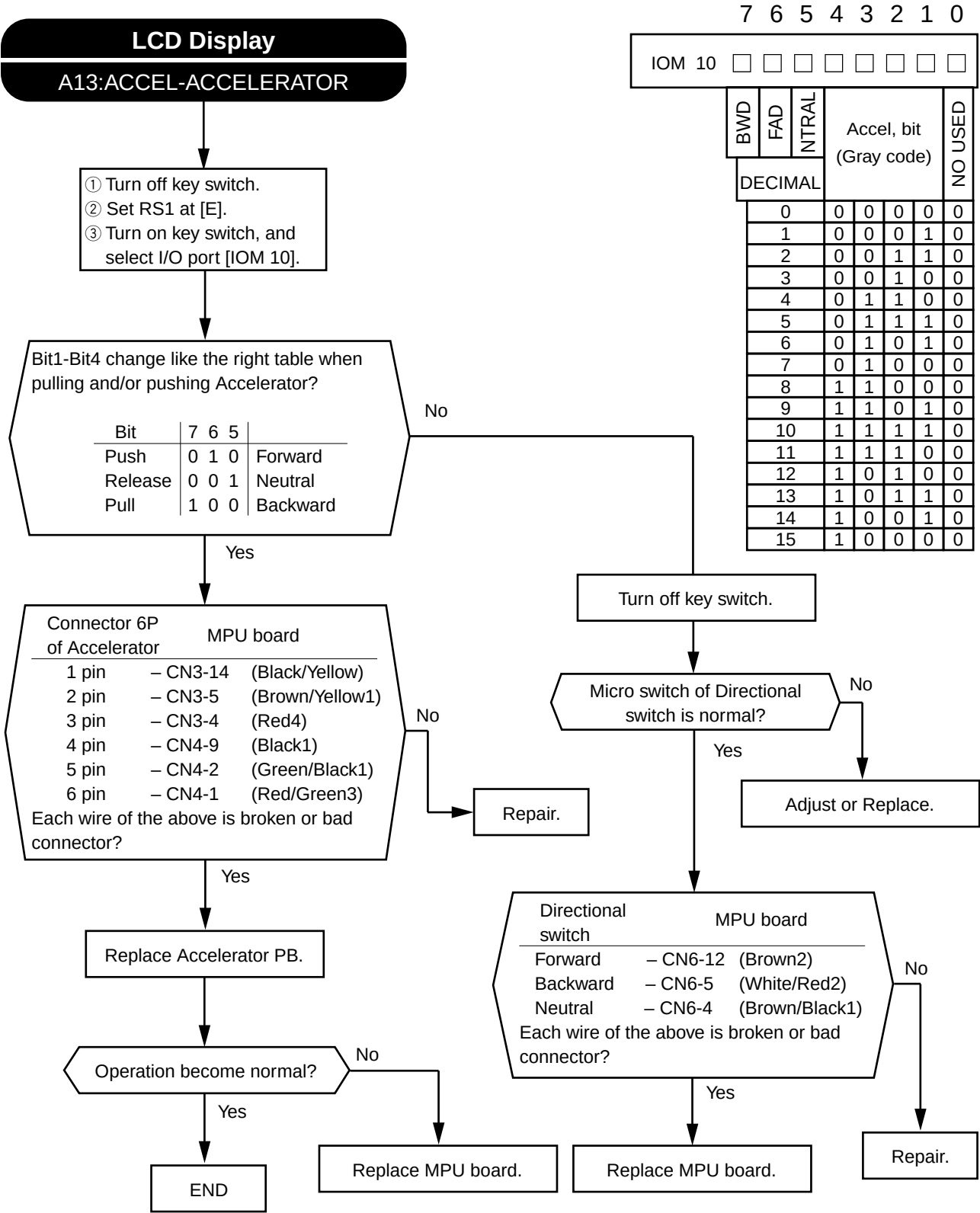
3. FET Comp.

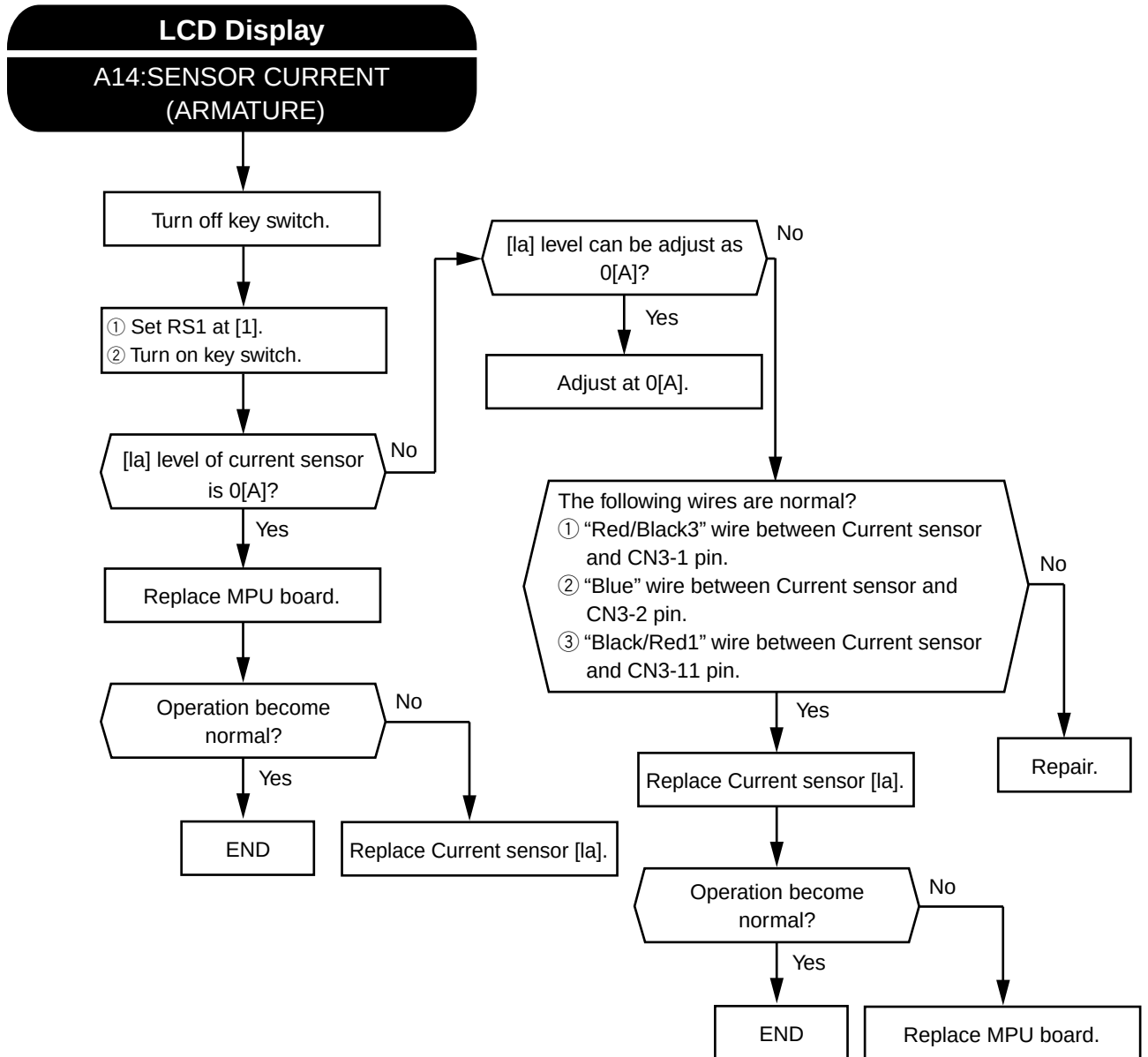
- (1) Adjust Start current and Current limitation.
Repeat the plugging operation a few times and re-check the setting.



1. Be sure to turn off the key switch when setting Rotary switches.
2. Be sure to disconnect the battery plug when replacing the inner parts of Control unit.

Error No.17 A13:ACCEL-ACCELERATOR



Error No.18 A14:SENSOR-CURRENT (ARMATURE)

When replacing MPU board and/or Current sensor, and/or FET comp. be sure to check the following.

1. MPU board

- (1) Check the setting of Rotary switch (RS0, RS1-7). (See Adjustment Specification Table.)
- (2) Adjust Start current and Current limitation. Repeat the plugging operation a few times and re-check the setting.
- (3) Check the plugging brake distance. (See Adjustment Specification Table.)

2. Current sensor

- (1) Adjust Start current and Current limitation.
Repeat the plugging operation a few times and re-check the setting.

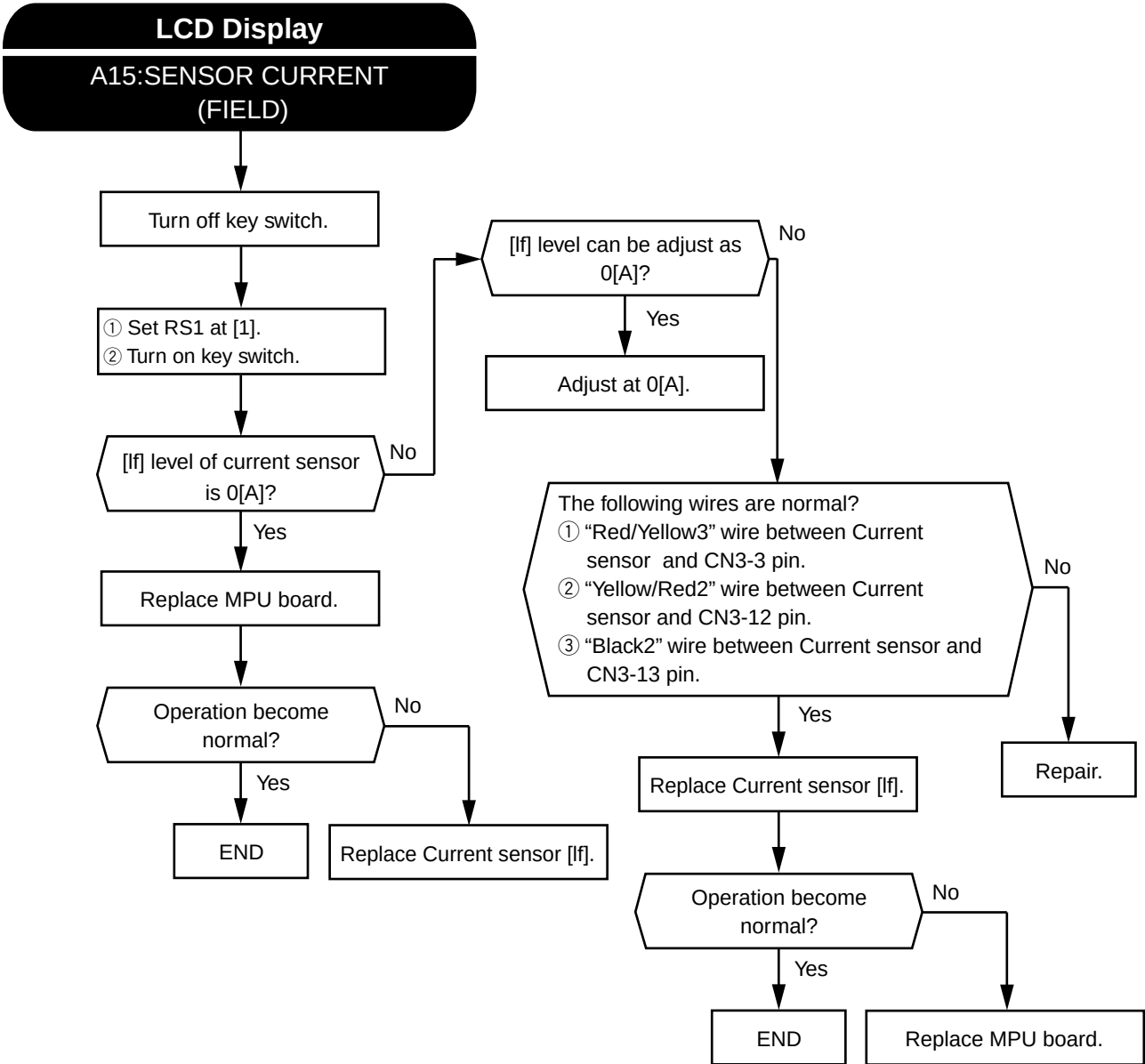
3. FET Comp.

- (1) Adjust Start current and Current limitation.
Repeat the plugging operation a few times and re-check the setting.

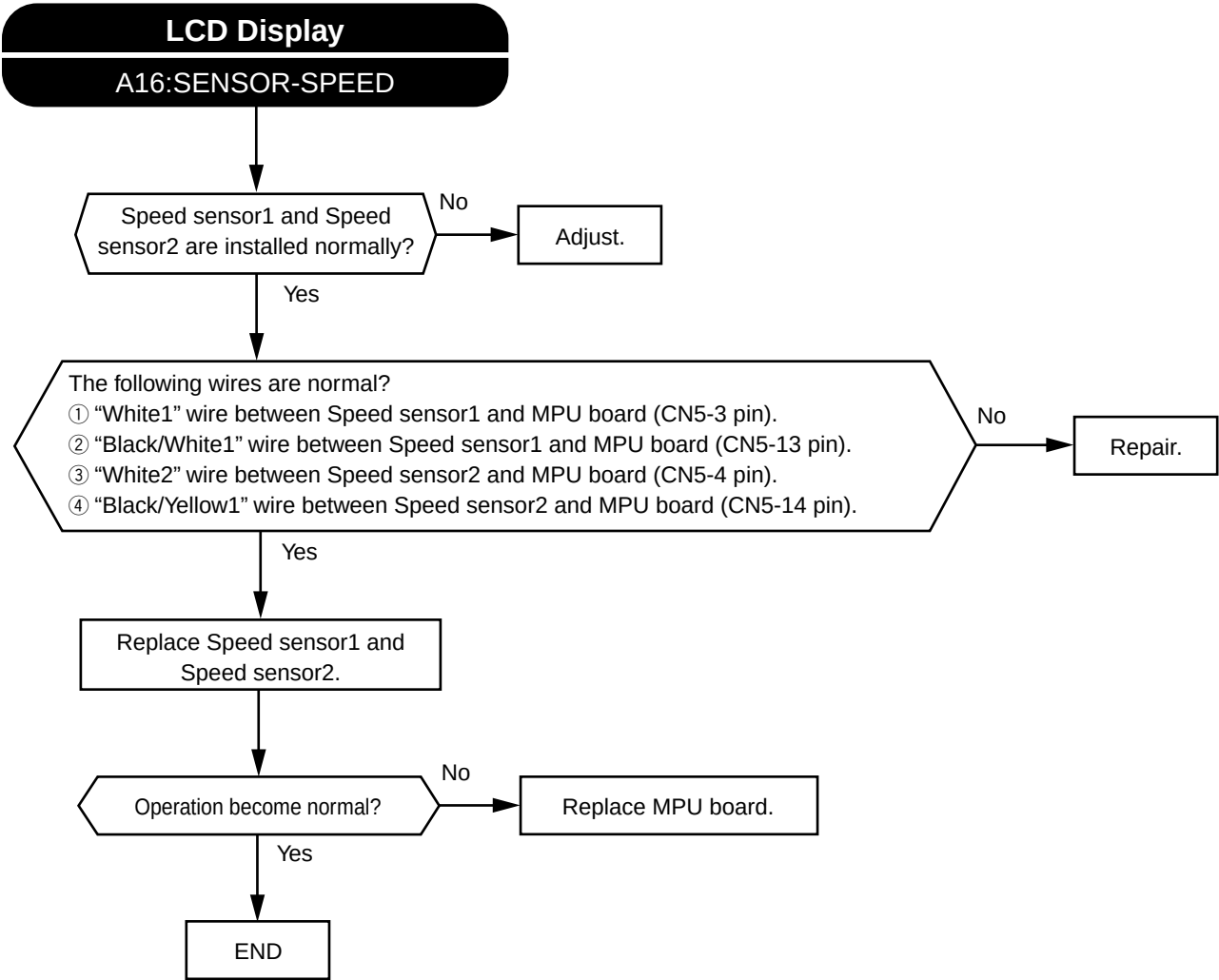


1. Be sure to turn off the key switch when setting Rotary switches.
2. Be sure to disconnect the battery plug when replacing the inner parts of Control unit.

Error No.19 A15:SENSOR-CURRENT (FIELD)



Error No.20 A16:SENSOR-SPEED



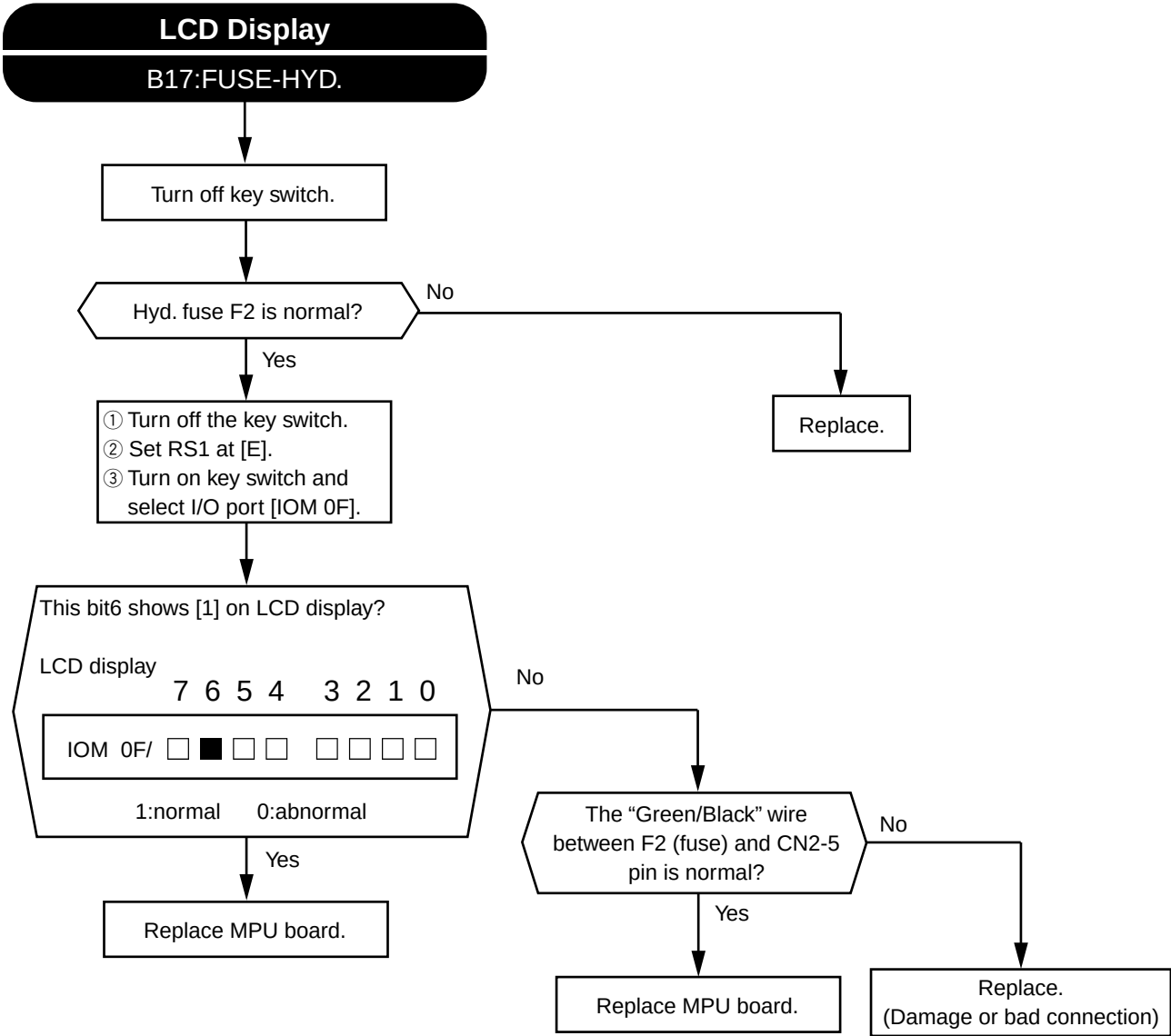
When replacing MPU board and/or Current sensor, and/or FET comp. be sure to check the following.

1. MPU board
 - (1) Check the setting of Rotary switch (RS0, RS1-7). (See Adjustment Specification Table.)
 - (2) Adjust Start current and Current limitation. Repeat the plugging operation a few times and re-check the setting.
 - (3) Check the plugging brake distance. (See Adjustment Specification Table.)
2. Current sensor
 - (1) Adjust Start current and Current limitation.
Repeat the plugging operation a few times and re-check the setting.
3. FET Comp.
 - (1) Adjust Start current and Current limitation.
Repeat the plugging operation a few times and re-check the setting.

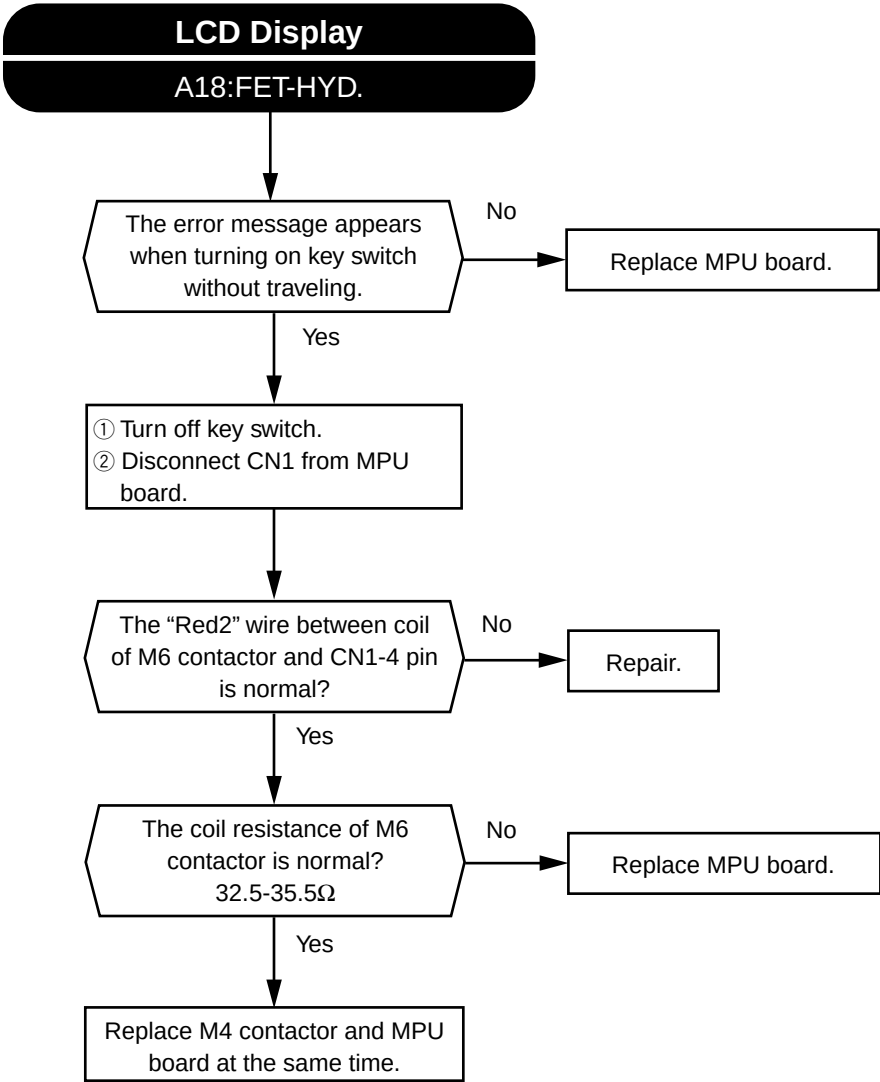


1. Be sure to turn off the key switch when setting Rotary switches.
2. Be sure to disconnect the battery plug when replacing the inner parts of Control unit.

Error No.21 B17:FUSE-HYD.



Error No.22 B18:FET5-HYD.



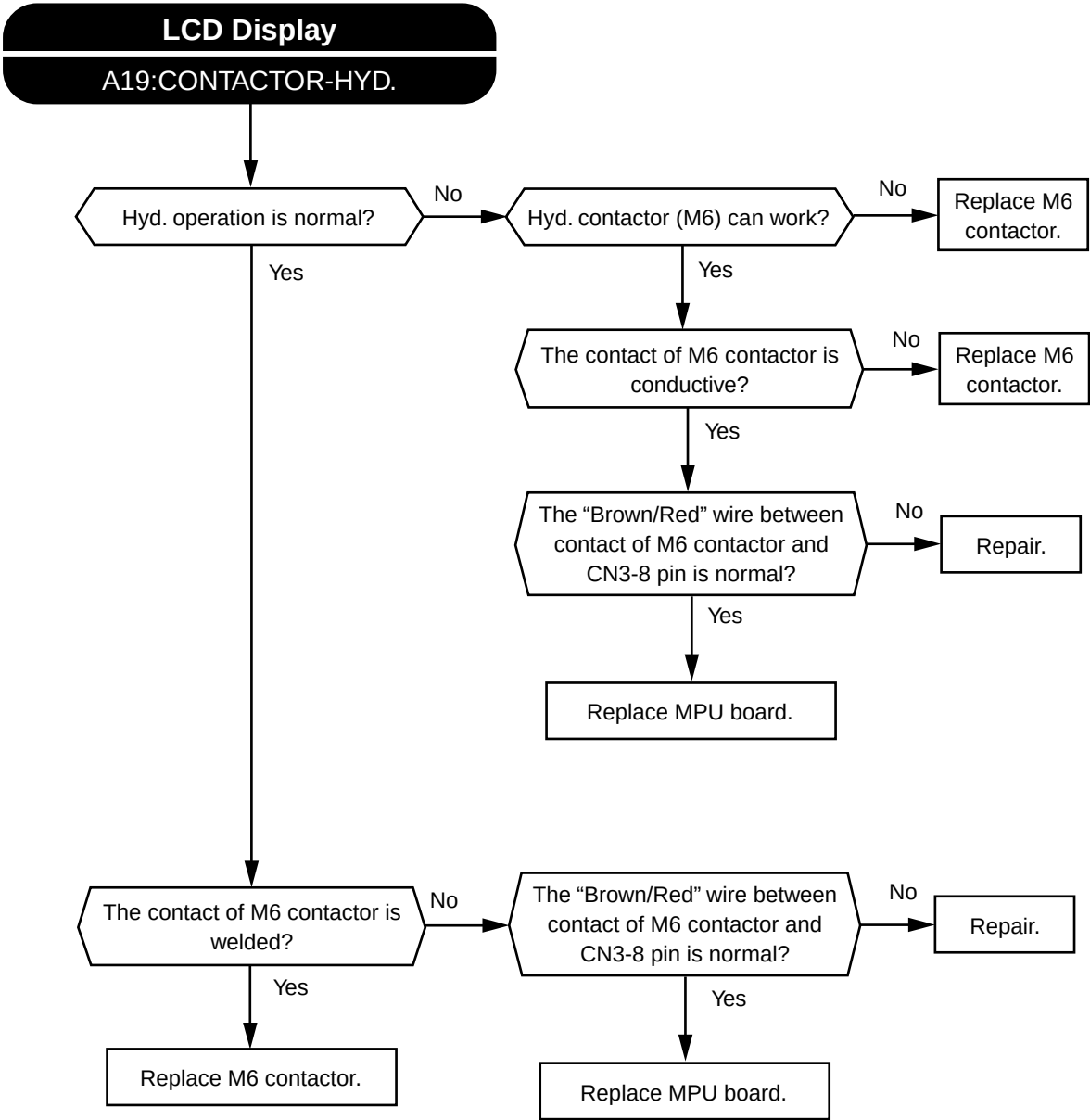
When replacing MPU board and/or Current sensor, and/or FET comp. be sure to check the following.

1. MPU board
 - (1) Check the setting of Rotary switch (RS0, RS1-7). (See Adjustment Specification Table.)
 - (2) Adjust Start current and Current limitation. Repeat the plugging operation a few times and re-check the setting.
 - (3) Check the plugging brake distance. (See Adjustment Specification Table.)
2. Current sensor
 - (1) Adjust Start current and Current limitation.
Repeat the plugging operation a few times and re-check the setting.
3. FET Comp.
 - (1) Adjust Start current and Current limitation.
Repeat the plugging operation a few times and re-check the setting.

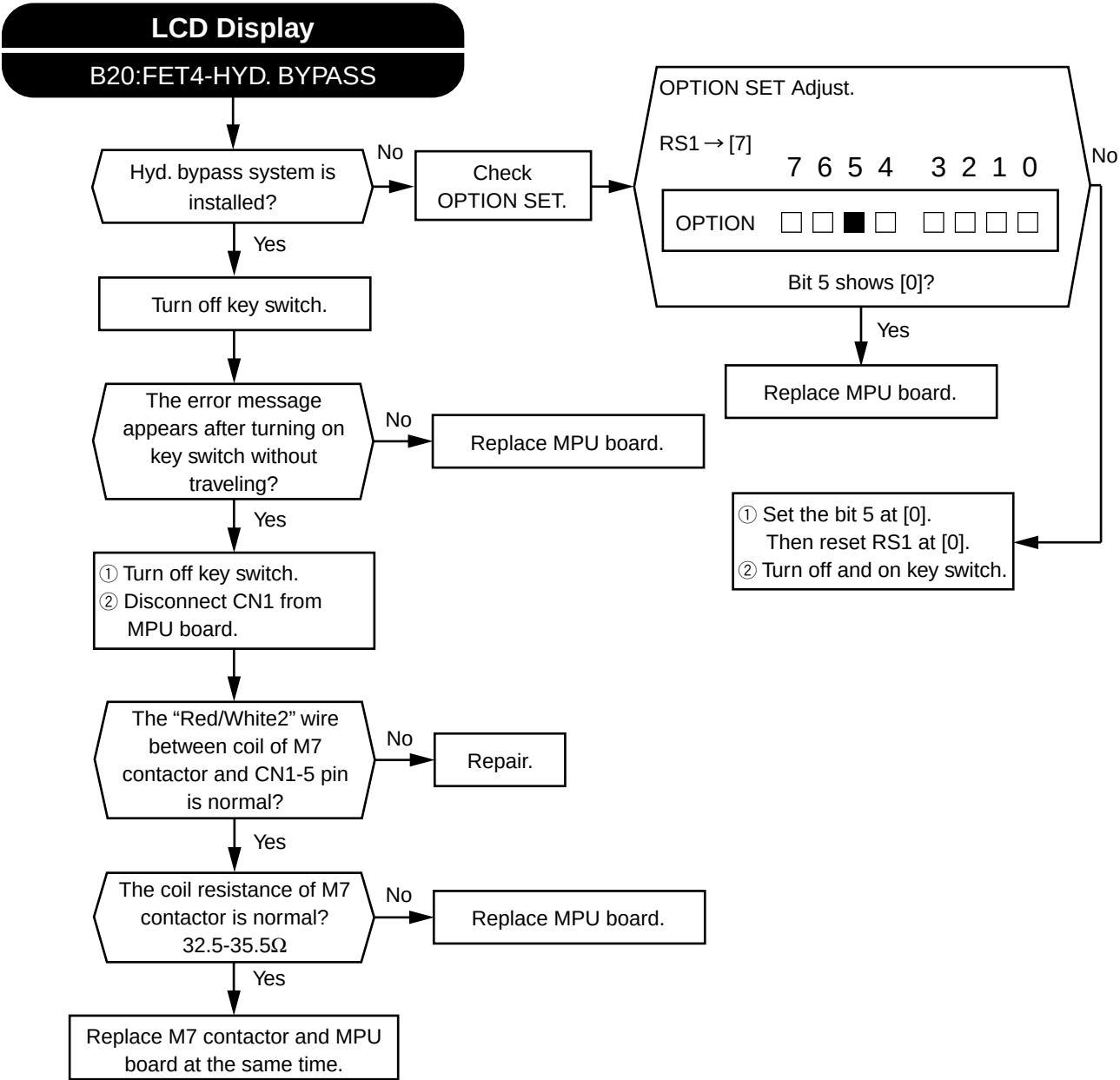


1. Be sure to turn off the key switch when setting Rotary switches.
2. Be sure to disconnect the battery plug when replacing the inner parts of Control unit.

Error No.23 B19:CONTACTOR-HYD.



Error No.24 B20:FET4-HYD. BYPASS



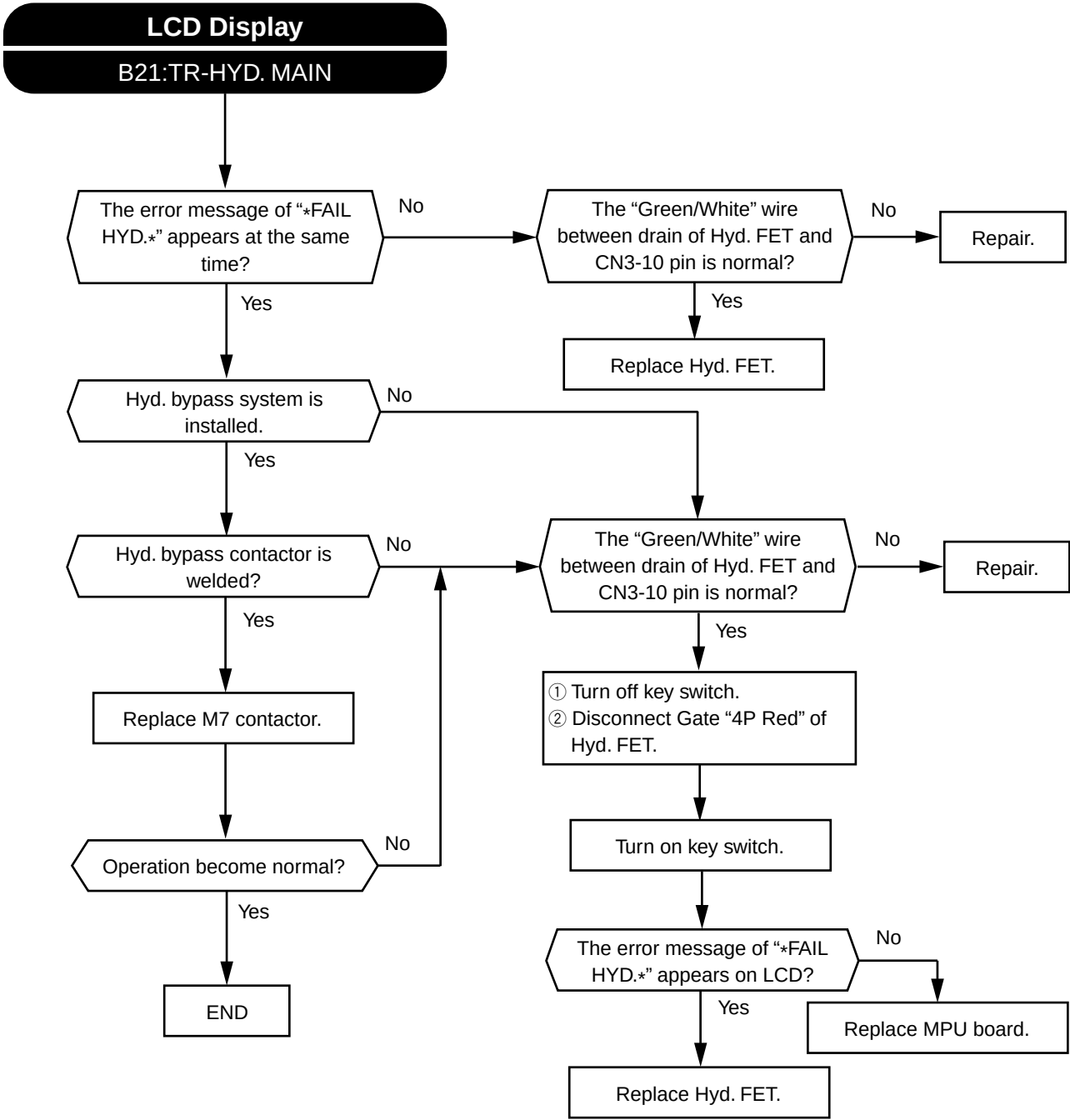
When replacing MPU board and/or Current sensor, and/or FET comp. be sure to check the following.

1. MPU board
 - (1) Check the setting of Rotary switch (RS0, RS1-7). (See Adjustment Specification Table.)
 - (2) Adjust Start current and Current limitation. Repeat the plugging operation a few times and re-check the setting.
 - (3) Check the plugging brake distance. (See Adjustment Specification Table.)
2. Current sensor
 - (1) Adjust Start current and Current limitation. Repeat the plugging operation a few times and re-check the setting.
3. FET Comp.
 - (1) Adjust Start current and Current limitation. Repeat the plugging operation a few times and re-check the setting.

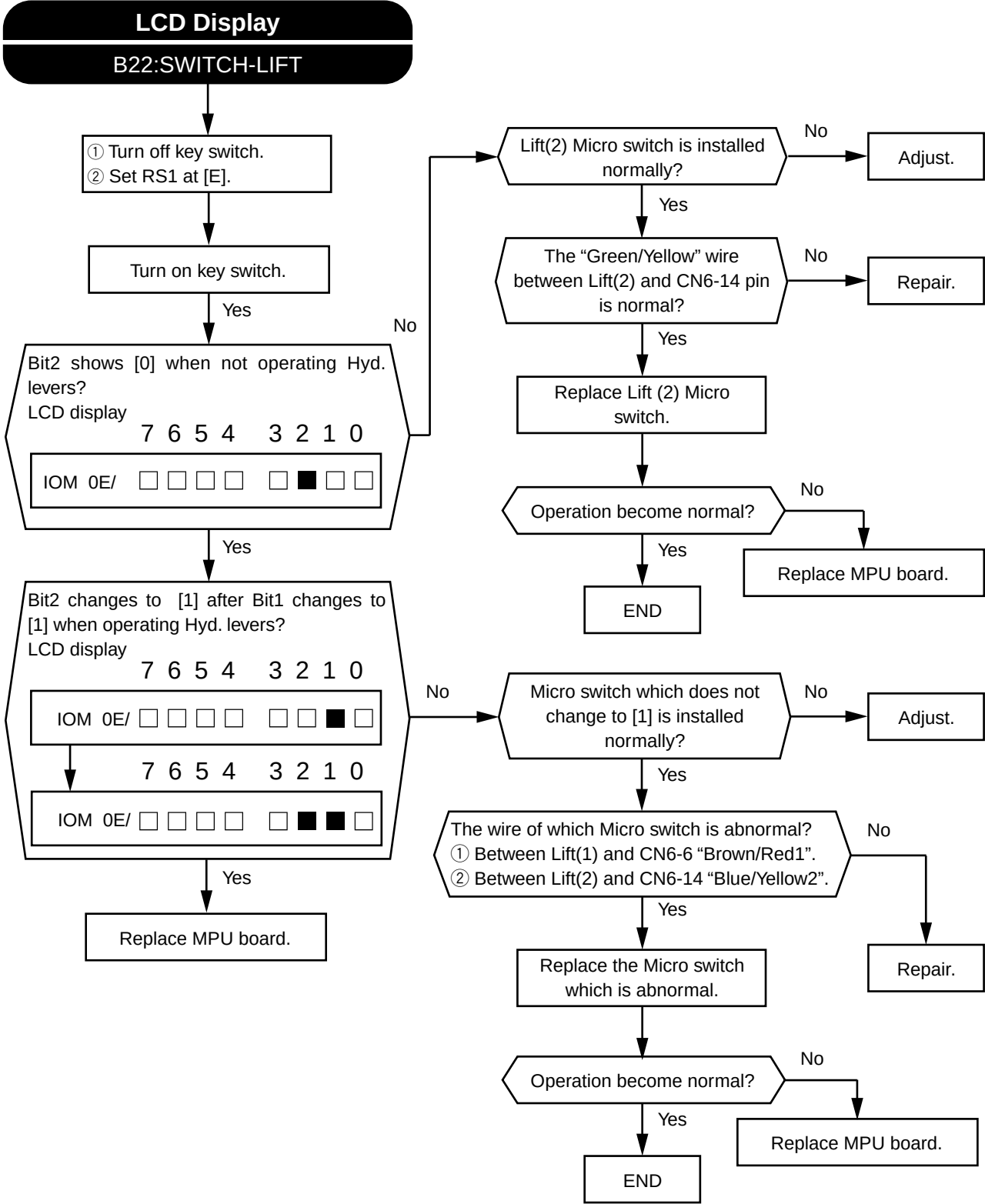


1. Be sure to turn off the key switch when setting Rotary switches.
2. Be sure to disconnect the battery plug when replacing the inner parts of Control unit.

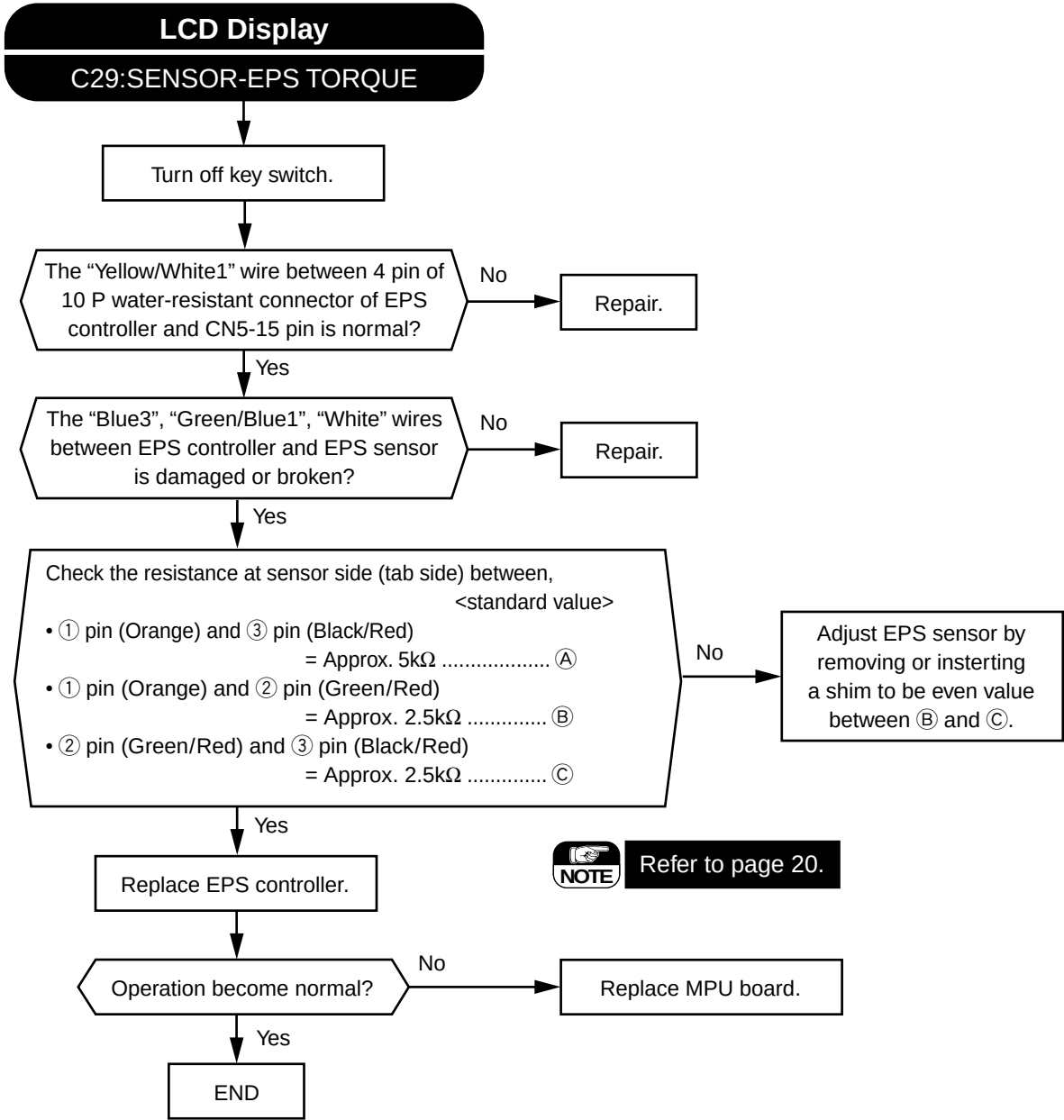
Error No.25 B21:TR-HYD. MAIN



Error No.26 B22:SWITCH-LIFT



Error No.34 C29:SENSOR-EPS TORQUE



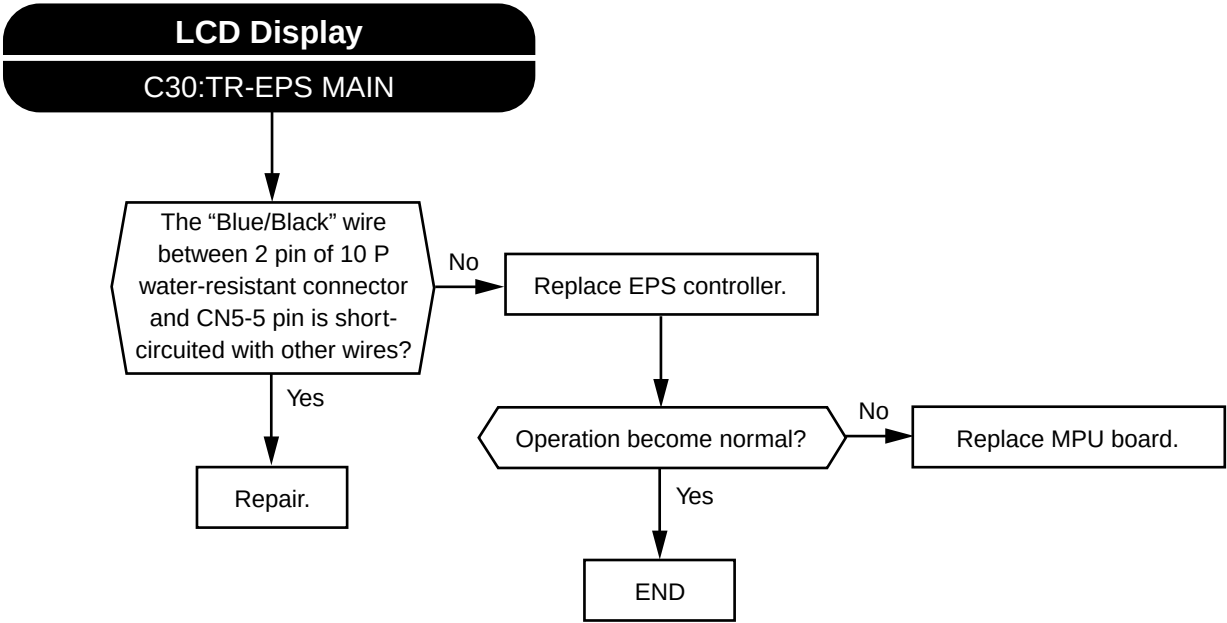
When replacing MPU board and/or Current sensor, and/or FET comp. be sure to check the following.

1. MPU board
 - (1) Check the setting of Rotary switch (RS0, RS1-7). (See Adjustment Specification Table.)
 - (2) Adjust Start current and Current limitation. Repeat the plugging operation a few times and re-check the setting.
 - (3) Check the plugging brake distance. (See Adjustment Specification Table.)
2. Current sensor
 - (1) Adjust Start current and Current limitation.
Repeat the plugging operation a few times and re-check the setting.
3. FET Comp.
 - (1) Adjust Start current and Current limitation.
Repeat the plugging operation a few times and re-check the setting.



1. Be sure to turn off the key switch when setting Rotary switches.
2. Be sure to disconnect the battery plug when replacing the inner parts of Control unit.

Error No.35 C30:TR-EPS MAIN



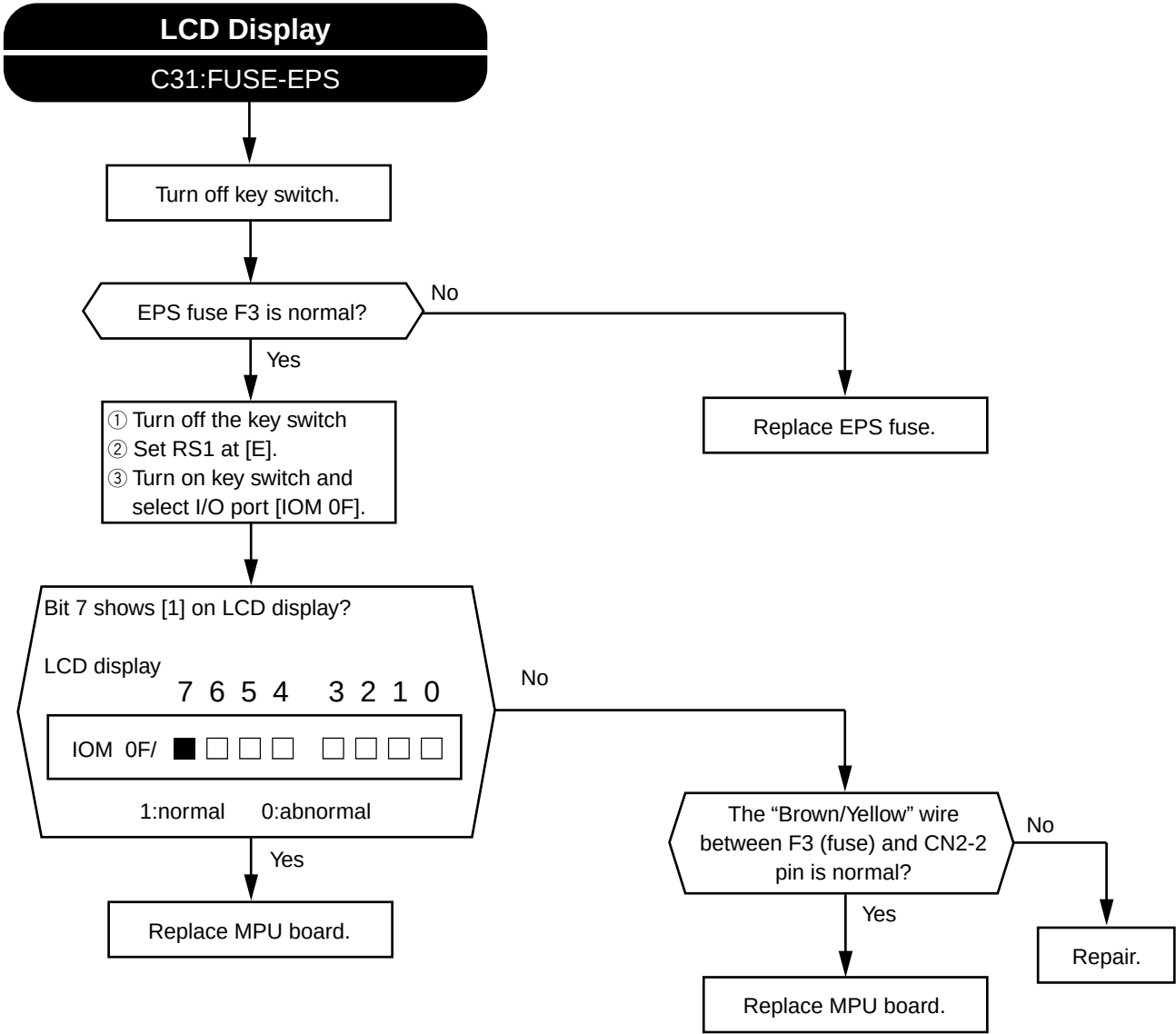
When replacing MPU board and/or Current sensor, and/or FET comp. be sure to check the following.

1. MPU board
 - (1) Check the setting of Rotary switch (RS0, RS1-7). (See Adjustment Specification Table.)
 - (2) Adjust Start current and Current limitation. Repeat the plugging operation a few times and re-check the setting.
 - (3) Check the plugging brake distance. (See Adjustment Specification Table.)
2. Current sensor
 - (1) Adjust Start current and Current limitation.
Repeat the plugging operation a few times and re-check the setting.
3. FET Comp.
 - (1) Adjust Start current and Current limitation.
Repeat the plugging operation a few times and re-check the setting.

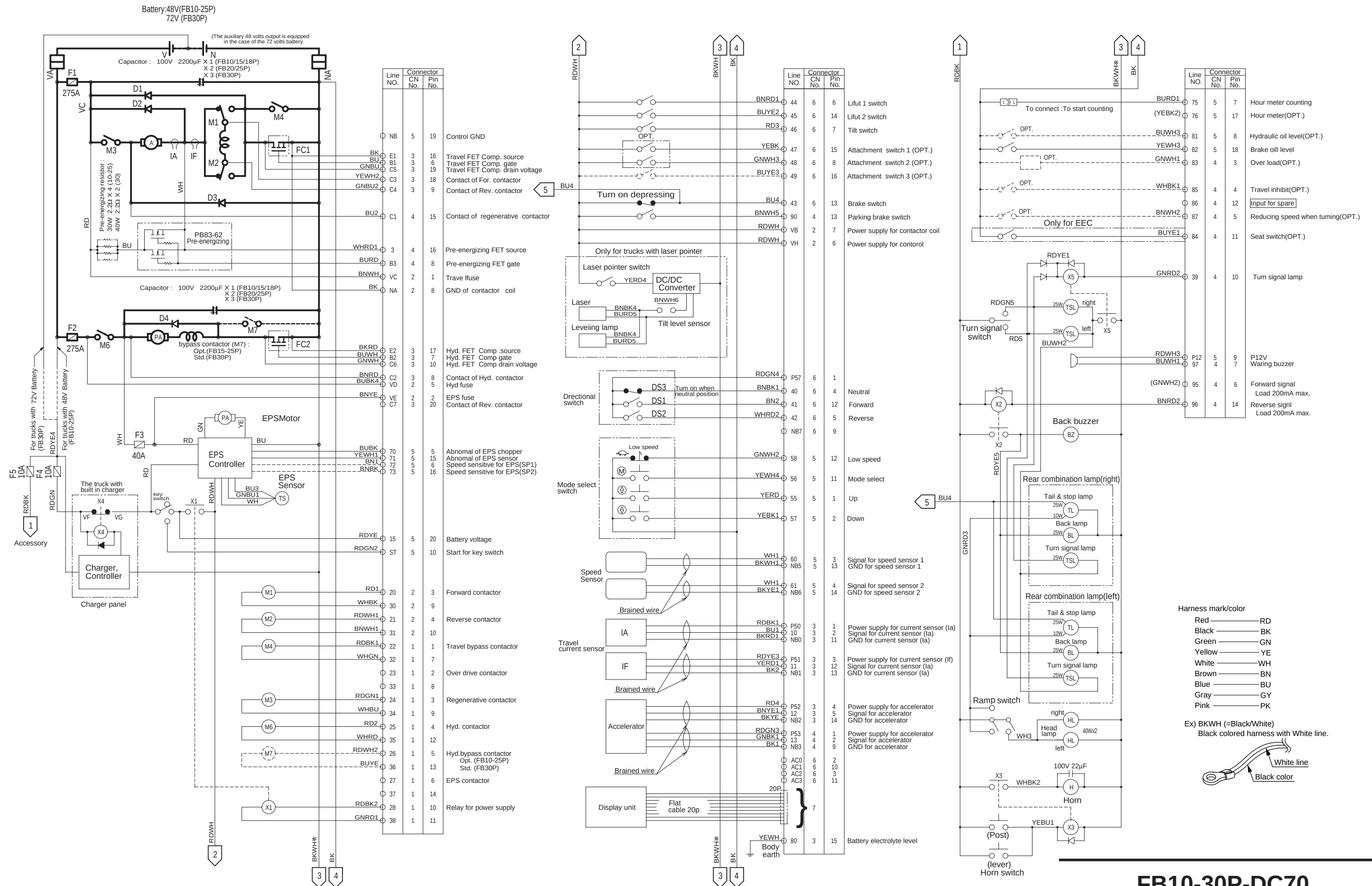


1. Be sure to turn off the key switch when setting Rotary switches.
2. Be sure to disconnect the battery plug when replacing the inner parts of Control unit.

Error No.36 C31:FUSE-EPS

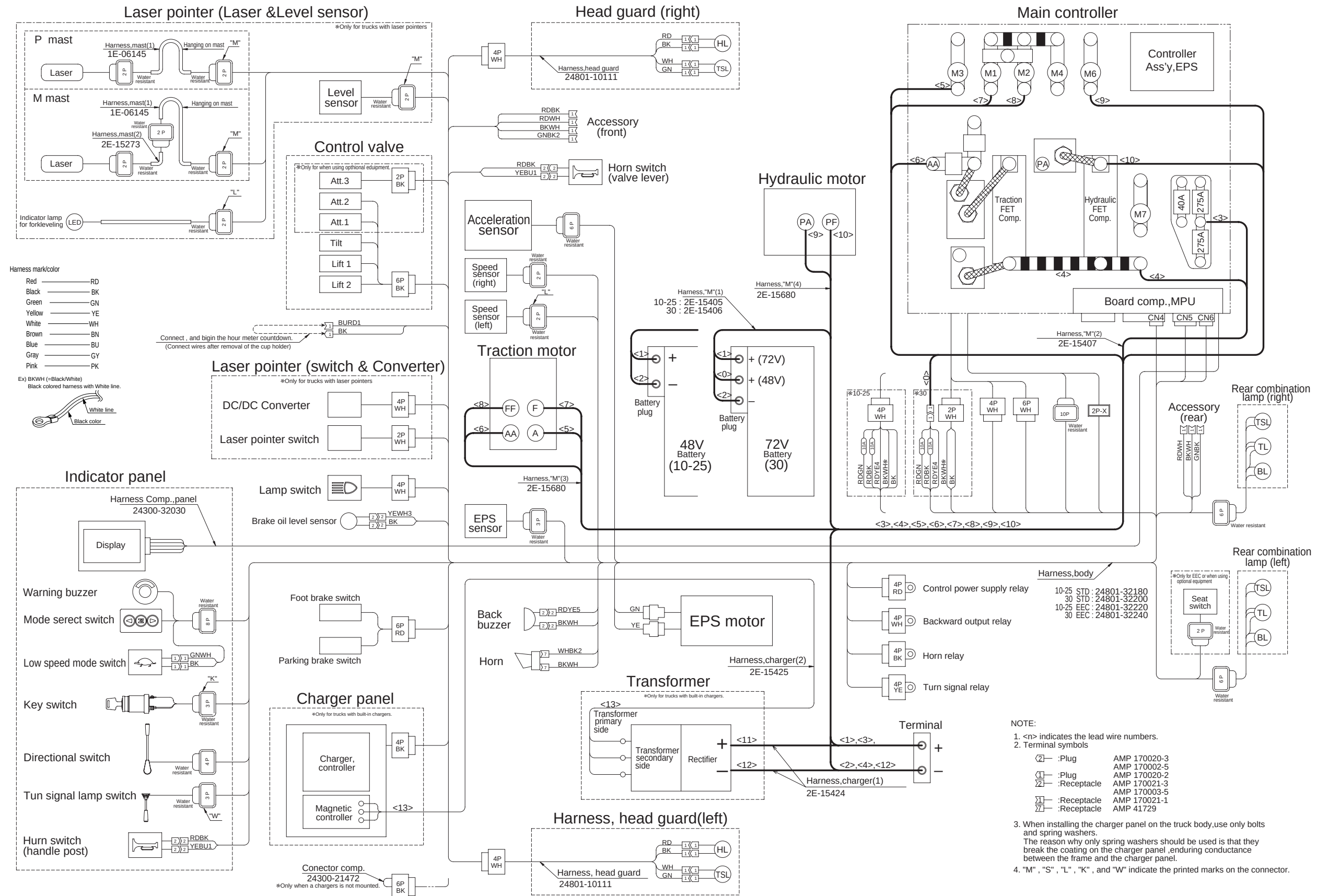


7. Wiring and layout of control unit



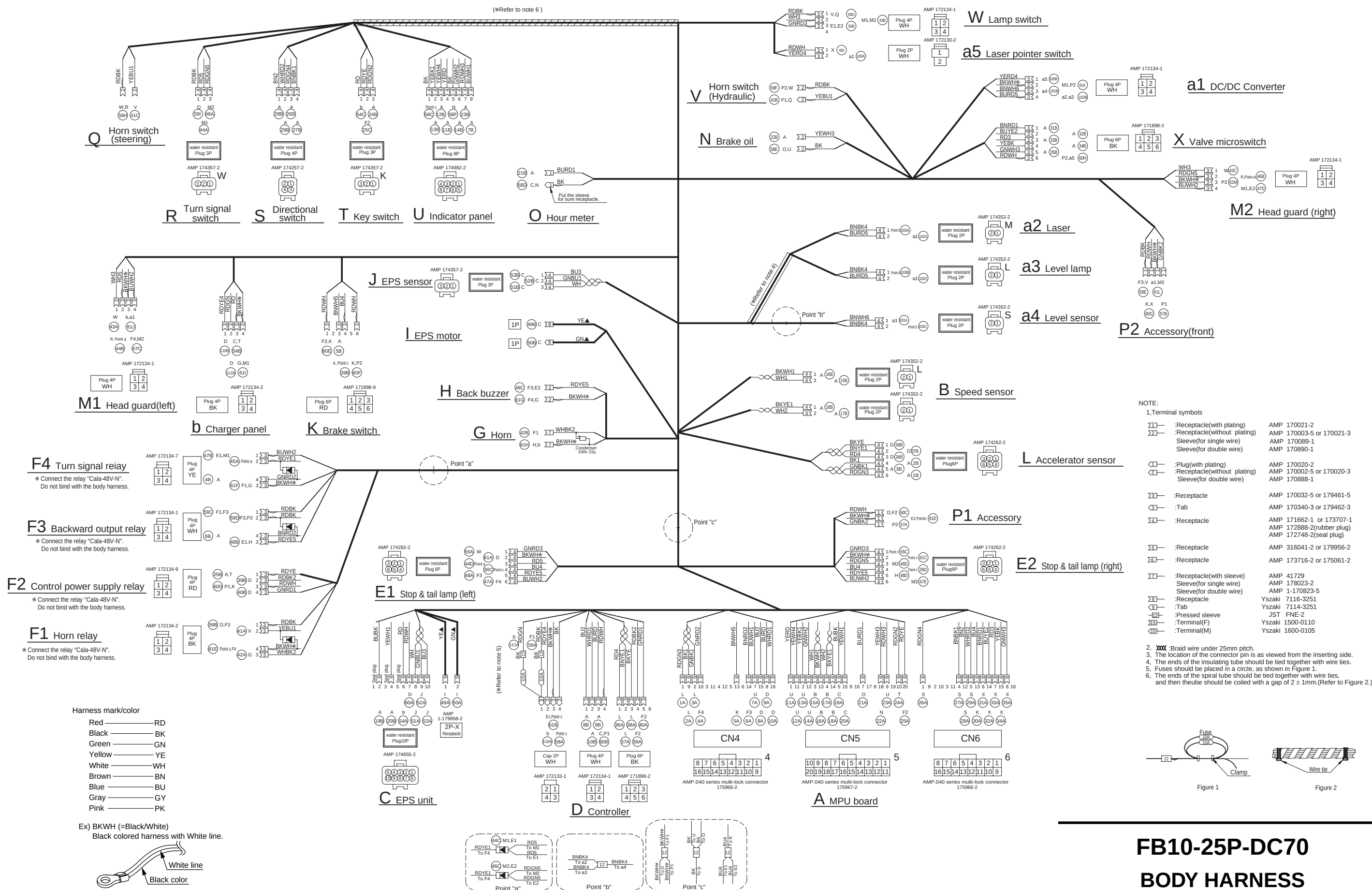
FB10-30P-DC70

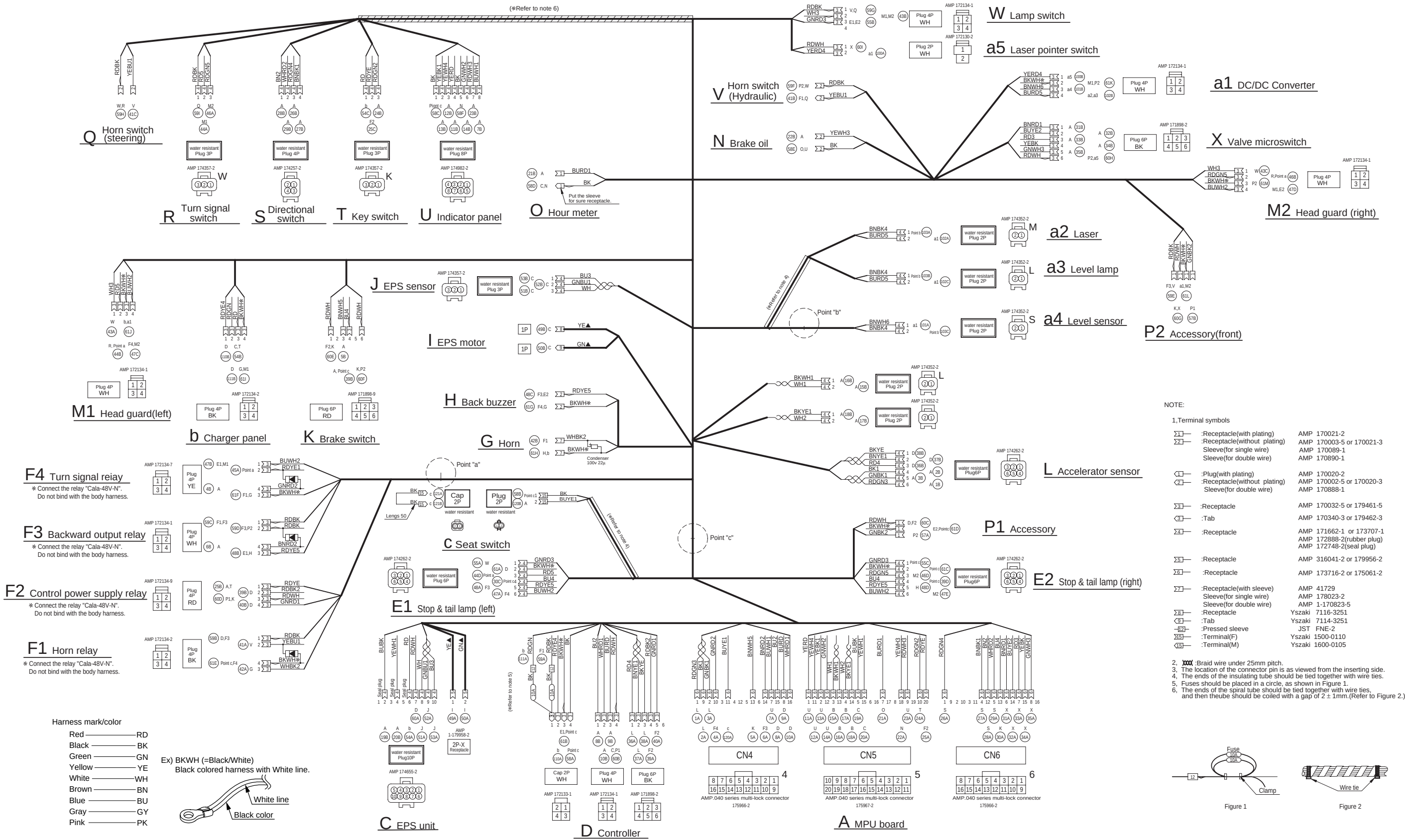
SYSTEM WIRING



FB10-30P-DC70

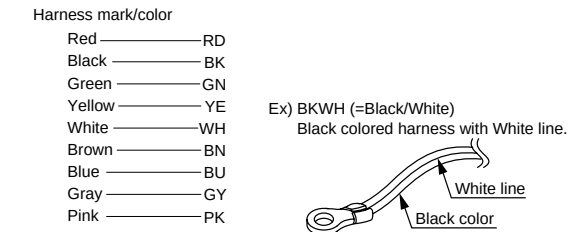
BODY WIRING



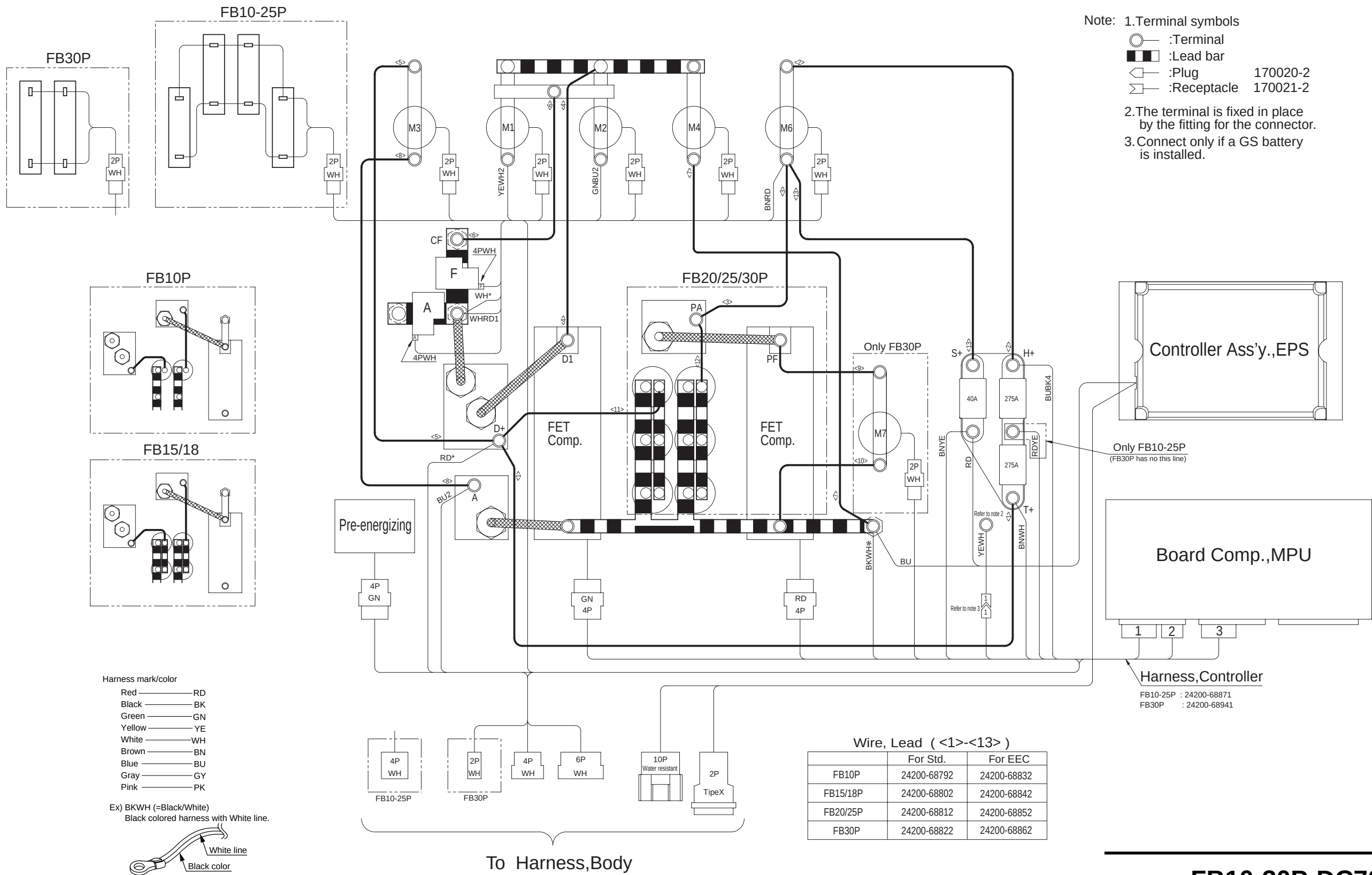


FB10-25P-DC70 BODY HARNESS (EEC)





FB30P-DC70
BODY HARNESS (EEC)



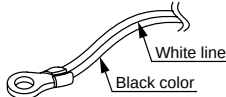
FB10-30P-DC70 CONTROL UNIT WIRING

Harness mark/color

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

Ex) BKWH (=Black/White)

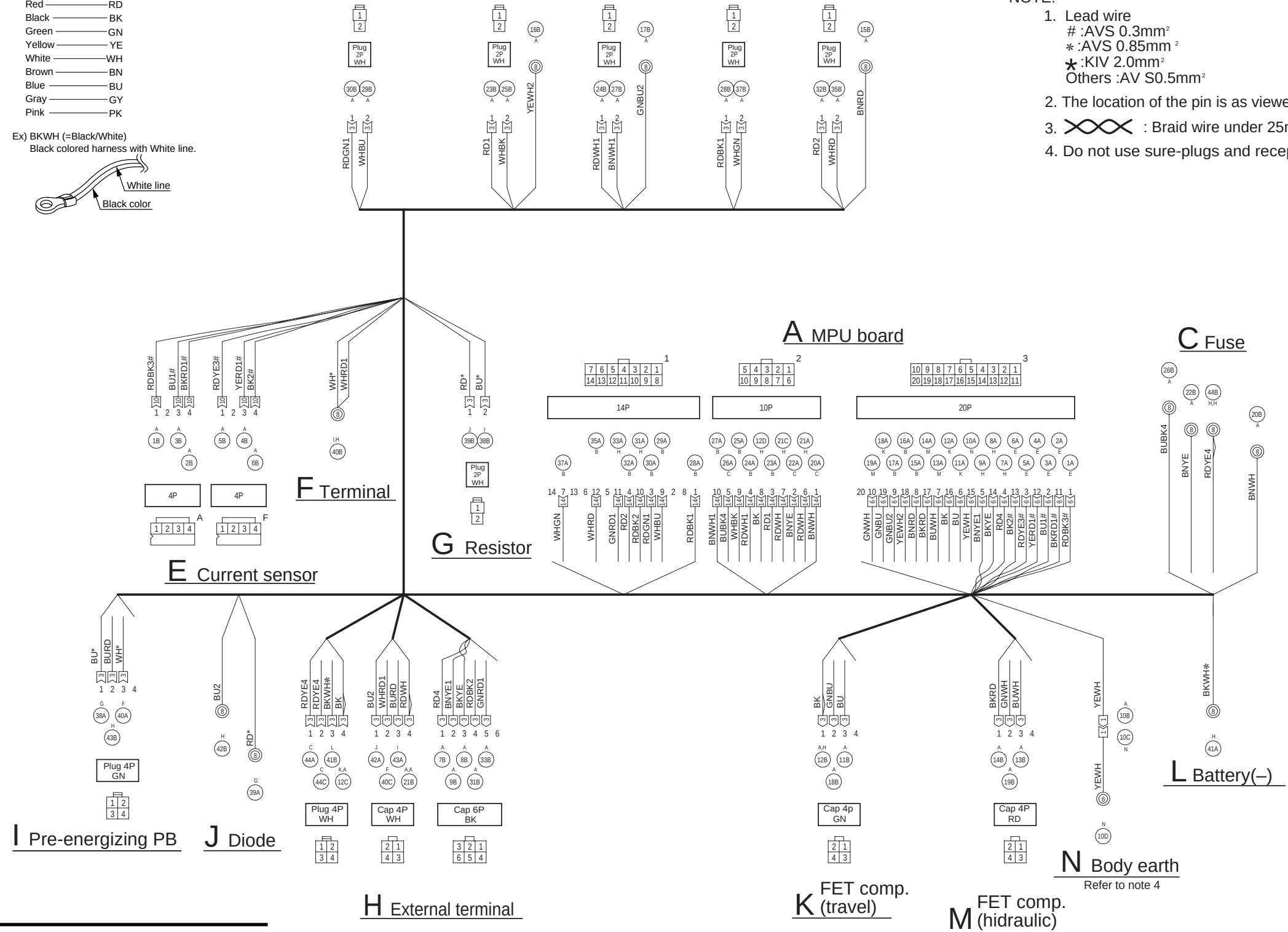
Black colored harness with White line.



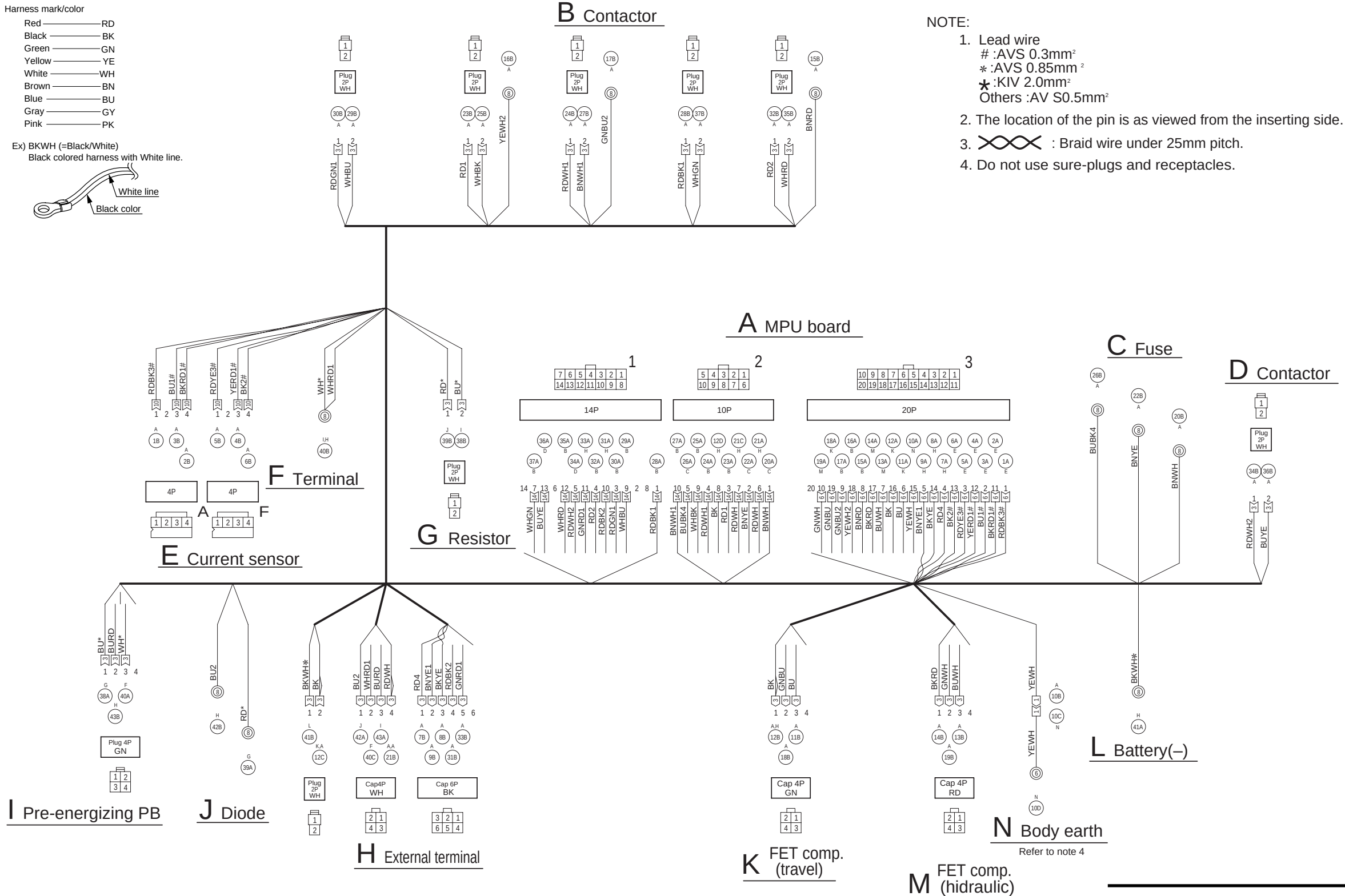
B Contactor

NOTE:

1. Lead wire
:AVS 0.3mm²
* :AVS 0.85mm²
★ :KIV 2.0mm²
Others :AV S0.5mm²
2. The location of the pin is as viewed from the inserting side.
3.  : Braid wire under 25mm pitch.
4. Do not use sure-plugs and receptacles.



FB10-25P-DC70 CONTROL UNIT HARNESS



FB30P-DC70

CONTROL UNIT HARNESS

Reference

Connector for MPU board

1. Pin layout of housing

6	5	4			3	2	1
14	13	12	11	10	9	8	7

CN1 (gray)
[P/No.37010-21040]

4	3			2	1
10	9	8	7	6	5

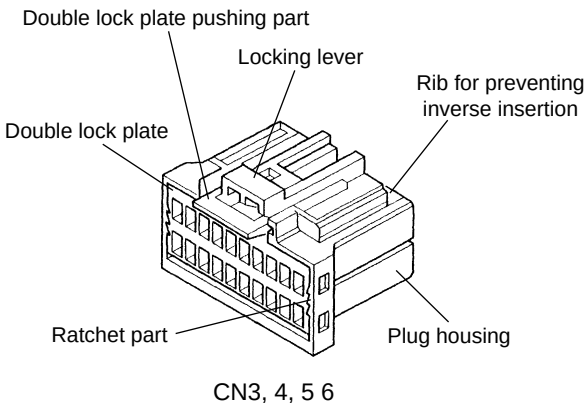
CN2 (gray)
[P/No.37010-21030]

10	9	8	7	6	5	4	3	2	1
20	19	18	17	16	15	14	13	12	11

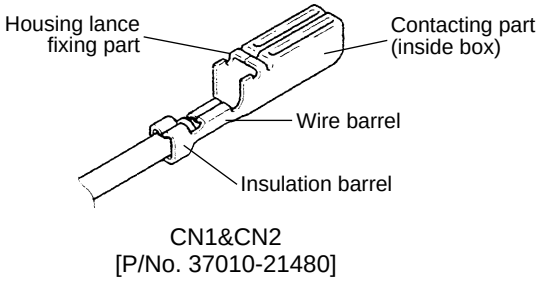
CN3 (black)
CN5 (black)
[P/No.37010-21020]

8	7	6	5	4	3	2	1
16	15	14	13	12	11	10	9

CN4 (black)
CN6 (black)
[P/No.37010-21010]

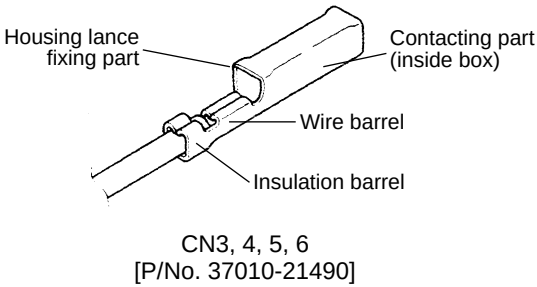
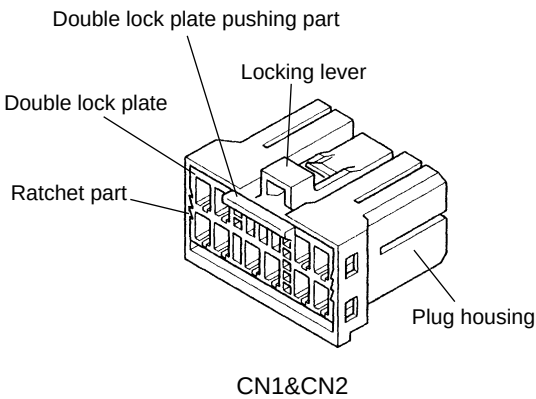


(2) Crimping terminals



2. Names of parts

(1) housing



3. Insertion terminal into housing

- (1) With the locking lever of housing upward and the crimping part of terminal upward, insert the housing into corresponding port. (Fig.1)



When it is impossible to insert the terminal easily, do not force to insert it.

At first, check the corresponding port. When inserting forcibly, the housing will be damaged at the housing. Pay attention to insertion of terminal.

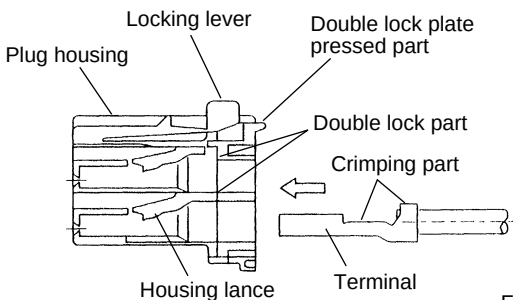
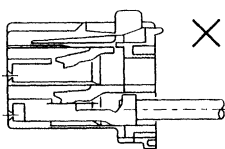


Fig.1

- (2) Verify the terminal is locked correctly into the housing. When inserting the terminal like as Fig.2, the terminal which the crimping part is placed in the middle of the retainer would come to lose, insert the terminal into the housing like as Fig.3. When the terminal is locked, it would sound snapping. And after inserting the terminal, pull the wire lightly to make sure the locking it.

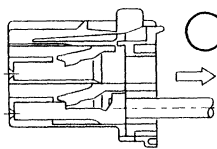


When remove the terminal for doing over again, use the specified pulling tool.



[Unlocked condition of terminal]

Fig.2



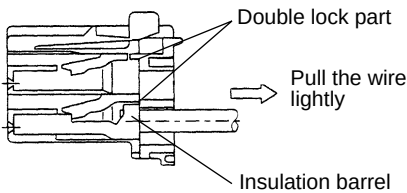
[Correct locked condition of terminal]

Fig.3

- (3) Press the crimping part of the double lock plate. The plate will go down and release from the ratchet part and will sound snapping. And after finishing the inserting the terminal, pull the wire lightly to make sure the locking. When the double lock plate would work correctly, the condition would be like as Fig.4.



When there are some unlocked terminals, the double lock plate would not work correctly, the plate would be one side locking and the ratchet would be raised at one side. Remove the terminal by using the ejection tool and do over again correctly.



[Completed double locking]

Fig.4

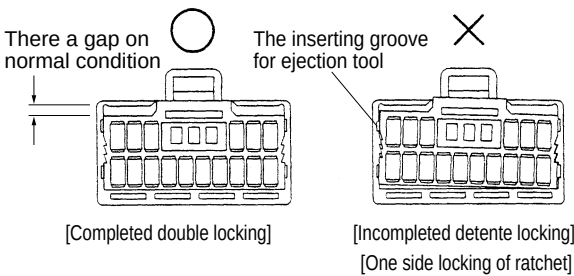


Fig.5

4. Pulling terminal

- (1) Release the double locking (Fig.6)
- ① Insert the jig into the groove .
 - ② Lay it to the direction of arrow and bend the wall of housing, and then rise the plate crimping part and remove the ratchet. Repeat the same way at the opposite side also.



Do not vent the wall of housing strongly, it will come to be damaged.

[In case of CN1, 2]

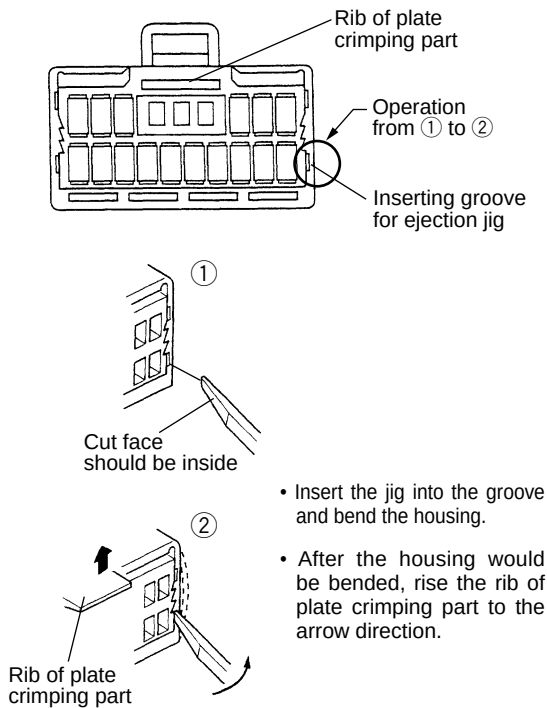
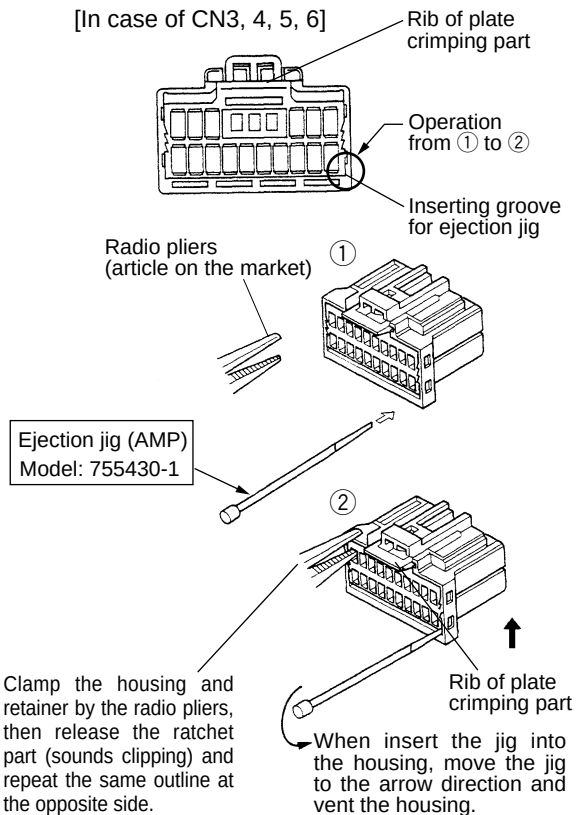


Fig.6

[In case of CN3, 4, 5, 6]



(2) Pulling out the crimping terminal

- ① Push the crimping terminal to the arrow direction.
- ② Insert the ejection jig tool to the groove.
- ③ Rise the lance.
- ④ Pull the crimping terminal.



Be careful not to insert the ejection tool into the housing side of crimping terminal.

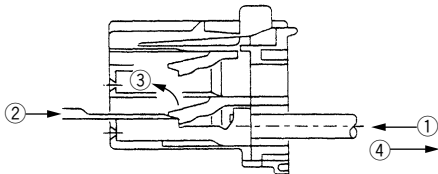
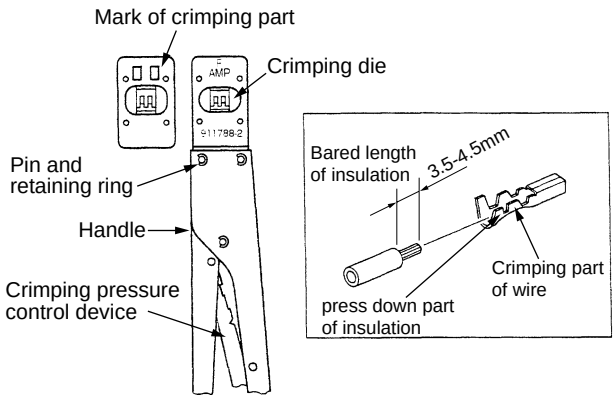


Fig.7

5. Crimping tool (AMP made)

- (1) Crimping terminal for CN1&2
(P/No.37010-21480) applicable hand tool
Model: 911788-2



- (2) Crimping terminal for CN3, 4, 5, 6
(P/No.37010-21490) applicable hand tool
Model: 911738-1

