



REFRIGERATOR

BASIC MODEL : RL50RQ*

MODEL NAME : RL50RQ*/E*/W*

RL48RH*/E*W*

RL46RH*/E*

SERVICE Manual

REFRIGERATOR



RL50 RQ
RL48 RH
RL46 RE



RL48 RW

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WARNING

IMPORTANT SAFETY NOTICE

The service guide is for service men with adequate backgrounds of electrical, electronic, and mechanical experience. Any attempt to repair a major appliance may result in personal injury and property damage. The manufacturer or dealer cannot be responsible for the interpretation of this information.

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1. PRECAUTIONS (SAFETY WARNINGS)

- Upon electronic Control system repair/change, make sure the set unplugged.
Be ware of electric shock.
- Use rated electronic Control equipment.
Make sure to check out Model name, Rated voltage, Rated current, Operation Temp, etc.
- Upon repair, make sure that harnesses are not to be water-penetrated and are bundled tight.
Should not be detached by a certain amount of external force.
- Upon repair, completely remove dust or other foreign substances from housing, harness, connector, etc.
To prevent fire by tracking, short, etc.
- Check out whether water has penetrated into the electronic Control system.
If there is any kind of trace, take necessary measures such as related component change, insulation tapping, etc.
- After repair, check out the assembled state of parts.
It should be the same as the previous state.
- Check out the surrounding conditions.
Change the location, if the fridge is located at humid, wet places or the installed state is unstable.
- If needed, ground the fridge.
Especially, if there is a possibility of electric leakage, ground is indispensable.
- Do not allow consumers to overload a certain outlet.
- Check out whether the power cord or the outlet is broken, squeezed, chopped off or heat-deformed.
Repair or replace the defective power cord/outlet immediately.
Make sure the power cord is not punctuated or stomped down.
- Do not allow consumers to keep food unstable or place bottles in the Freezer Room.
- Do not allow consumers to repair the fridge for themselves.
- Do not allow consumers to keep things except for food.
Pharmaceutical, Chemical substances : These are not possible to be fine-Controlled with a consumer fridge.
Flammable material (alcohol, benzene, ether, LPG, etc) : possibility of explosion.

1. PRECAUTIONS (SAFETY WARNINGS)

Read all instructions before repairing the product and keep to the instructions in order to prevent danger or property damage.

CAUTION/WARNING SYMBOLS DISPLAYED

	Warning	Indicates that a danger of death or serious injury exists.
	Caution	Indicates that a risk of personal injury or material damage exists.

SYMBOLS

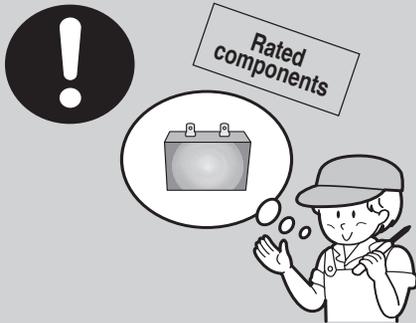
	means Prohibition".
	means Do not disassemble".
	means No contact".
	means The things to be followed".
	means Power cord should be unplugged from the consent".
	means Earth to prevent Electric shock".



Warning & Caution

Use the rated components on the replacement.

- Check the correct model, rated voltage, rated current, operating temperature and so on.



On repair, make sure that the wires such as harness are bundled tightly.

- Bundle tightly wires in order not to be detached by the external force and then not to be wetted.



On repair, remove completely dust or other things of housing parts, harness parts, and check parts.

- Cleaning may prevent the possible fire by tracking or short.



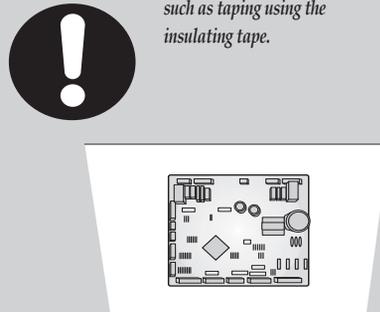
After repair, check the assembled state of components.

- It must be in the same assembled state when compared with the state before disassembly.



Check if there is any trace indicating the permeation of water.

- If there is that kind of trace, change the related components or do the necessary treatment such as taping using the insulating tape.



1. PRECAUTIONS (SAFETY WARNINGS)

* Please let users know following warnings & cautions in detail.



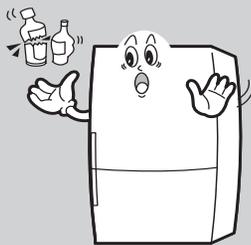
Warning & Caution

Do not allow users to put bottles or kinds of glass in the freezer.

- Freezing of the contents may inflict a wound.



Prohibition



Do not allow users to store narrow and lengthy bottles or foods in a small multi-purpose room.

- It may hurt you when refrigerator door is opened and closed resulting in falling stuff down.



Prohibition



Do not allow users to store pharmaceutical products, scientific materials, etc., in the refrigerator.

- The products which temperature control should not be stored in the refrigerator.



Prohibition

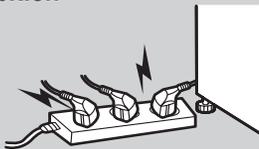


Do not allow users to insert the power plugs for many products at the same time.

- May cause abnormal generation of heat or fire.



Prohibition

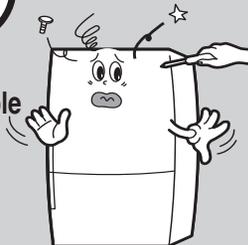


Do not allow users to disassemble, repair or alter.

- It may cause fire or abnormal operation which leads to injury.



Do not disassemble



Do not allow users to bend the power cord with excessive force or do not have the power cord pressed by heavy article.

- May cause fire.

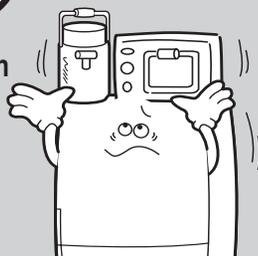


Do not allow users to store articles on the product.

- Opening or closing the door may cause things to fall down, with may inflict a wound.

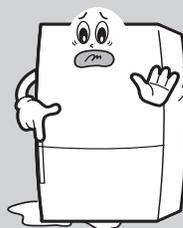


Prohibition



Do not allow users to install the refrigerator in the wet place or the place which water splashes.

- Deterioration of insulation of electric parts may cause electric shock or fire.

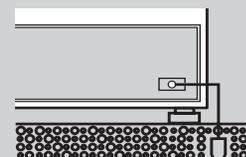


Make sure of the earth.

- If earthing is not done, it will cause breakdown and electric shock.



Earth



2. PRODUCT SPECIFICATIONS

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2. PRODUCT SPECIFICATIONS

2-1) Introduction of main function

● **SAMSUNG refrigerator has the following characteristics.**

Characteristics	Specification
Environment-friendly fridge/freezer using R600a	<ul style="list-style-type: none"> This products protects the environment by using the R600a refrigerant and the cyclopentane blowing agent Properties :ODP(Ozone Depletion Potential):0GWP : Lowest * GWP(Global Warming Potential)
High -energy efficiency	<ul style="list-style-type: none"> Optimized power consumption when using R600a and cyclopentne.
High -energy efficiency	<ul style="list-style-type: none"> Drawer for dry or wrapped food Drawer for fresh salades,vegetables and fruits 
Fridge at the top, drawer-type freezer at the bottom	<ul style="list-style-type: none"> The highly ergonomic vegetables compartment is placed at waist height as it is frequently used. The drawer -type freezer minimize temperature variations and stores food cleanly and conveniently. The operation switch is handy to switch the appliance on and off without pulling out the main plug.
Digital temperature control display	<ul style="list-style-type: none"> The display shows all functions of the appliance, so that you can easily control them.
Supply of cool water without door opening	<ul style="list-style-type: none"> With the water dispenser,you can obtain chilled water easily without opening the door. In addition, you can save electricty by more than 30%reducing the number of times the door is open.
SUPER fast freezing function	<ul style="list-style-type: none"> Food can be stored in fresh conditions by cooling it quickly via the "Super Freeze"freezing function.
Vacation	<ul style="list-style-type: none"> Save on energy consumption by switching off the fridge and maintaining only the freezer running when you take a long vacation or are away for any reason
LED LAMP	<ul style="list-style-type: none"> High Energy Efficiency, Long Life 

2. PRODUCT SPECIFICATIONS

2-2) Model Specification

Item		Specification					
Models	RL50RQ*	RL50RE*	RL48RH*	RL48RE*	RL48RW*	RL46RH*	RL46RE*
Net Capacity	Total	326L	345L	325L	318L	301L	
	Refrigerator	232L	245L	231L	224L	207L	
Freezer	94L						94L
W (mm)	595						
Net dimension	D (mm)	643					
	H (mm)	1920					
Rated Voltage and Frequency	220 ~ 240V/50Hz						220 ~ 240V/50Hz
							115~127V/ 60Hz
Motor Rated Consumption Power	90 ~ 95W						
Electric Heater Rated Consumption Power	240W ~ 288W						
Kind of Refrigerator	INDIRECT COOLING METHOD REFRIGERATOR						
Refrigerant/ Refrigerant Amount	R600a / 60g	R600a/56g	R600a /60g	R600a /56g	R600a /60g	R600a/56g	R600a/56g
					R134a/145g	R134a/145g	R134a/145g
Freezer Performance	 4-STAR						
Product Weight	79Kg		74Kg		73kg		

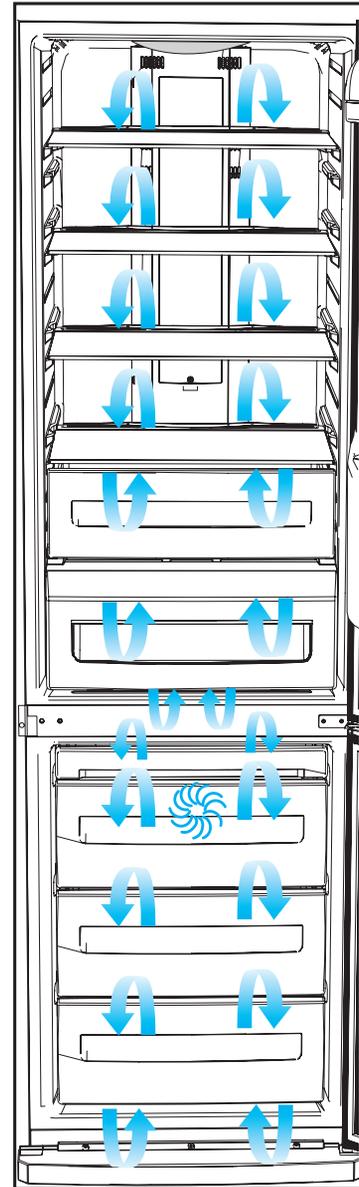
2. PRODUCT SPECIFICATIONS



NOTE

This operation instruction covers various models.

The characteristics of your appliance may differ slightly from those described in this manual.



2. PRODUCT SPECIFICATIONS

2-3) Electric Parts Specification

Item	Specification
Models	RL44*/RL41*/RL38*
Refrigerant	* ** * 4-STAR
Freezing Capacity	R600a R134a
Model	MSS4A2QR1U/E02 MSA4A1QL1B/E01 MK172Q-L2U/E18 MK172H-L2U/E18 MK162D-L1U/E08
Starting type	R.S.C.R R.S.C.R
Oil Charge	Mineral Oil(10 cst) FREOL α-10(ESTER)
Evaporator	Freezer
Condenser	Split Fin Type
Dryer	Natural Convection Type
Capillary Tube	Molecular Sieve XH-9 ID0.75 x L3500, 5.95 kg/cm ²
Defrost Heater	Conducting at F Defros 240W
Thermal-Fuse for preventing overheating of Refrigerator Defrost-Heater	AC 250V 10A 77°C(+0°C/-5°C)
Condenser for Compressor (Package)	Running 400VAC/5uF 250VAC/12uF Starting -
Starting-Relay	Operation PTH330MD3 J531Q35E330M385-2 J531Q34E220M350-2 J531Q33E100M200-2 Model 33Ω± 40% 33Ω± 20% 22Ω± 20% 10Ω± 20% Model 4TM189PHBYY-53 4TM232SHBYY-53 4TM265RFBYY-53 4TM412SFBYY-53 Temp. ON 125 ± 9°C 135 ± 9°C 130 ± 9°C 135 ± 9°C Temp. OFF 69± 5°C 69± 5°C 61 ± 5°C 61 ± 5°C
Over-load Relay	Temp. ON 125 ± 9°C 135 ± 9°C 130 ± 9°C 135 ± 9°C Temp. OFF 69± 5°C 69± 5°C 61 ± 5°C 61 ± 5°C
Rated Voltage	220 ~ 240V/50HZ 220 ~ 240V/50HZ 115~127V/60HZ
Motor	BLDC DREP5020LB - - AC IS-27210SNC5B IS-27210SNP6A
Lamp	LED Type TOWER TOP DC 12V,3.0W(12EA) DC 12V 2.3W (8EA) AC 115~127V/40W(1EA)
Door Switch	REED SWITCH

Components for Freezer

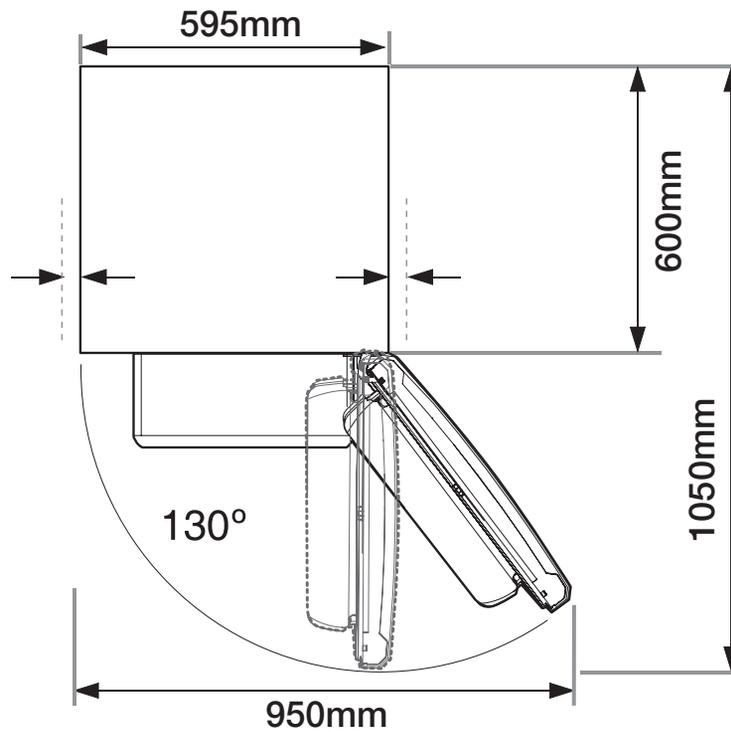
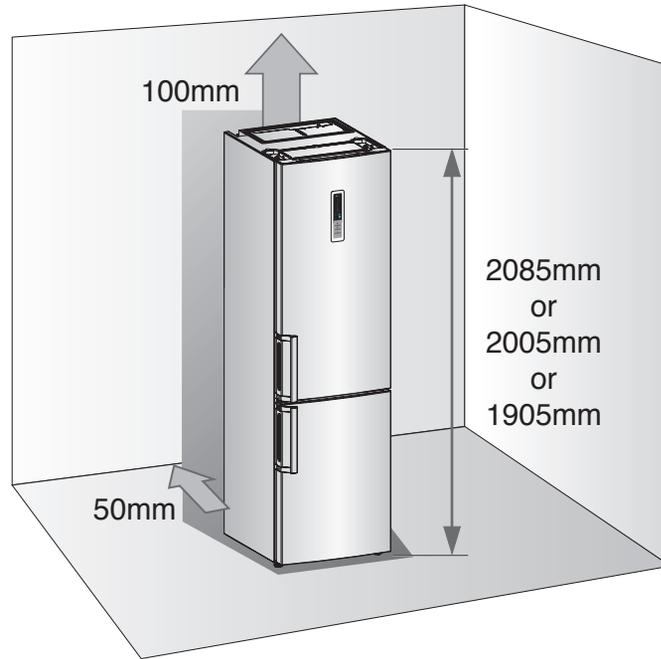
Electric Components

2. PRODUCT SPECIFICATIONS

Items				Specification		
Model				RL50/RL48/RL46		
Room Temperature Sensor Components	Freezer	Model	Temperature Selection	ON(°C)	OFF(°C)	
		THERMISTOR (Freezer sensor) 502AT	-23°C	-22.0	-24.0	
			-20°C	-19.0	-21.0	
		-14°C	-13.0	-15.0		
	Refrigerator	Model	Temperature Selection	ON(°C)	OFF(°C)	
		THERMISTOR (Fridge sensor) 502AT	1°C	2.0	0	
3°C			4.0	2.0		
	7°C	8.0	6.0			
Defrost Related Components	Defrost Cycle	First Defrost Cycle (Concurrent defrost of F and F)		6hr ±10min		
		Defrost Cycle(FRE)		6 ~ 19hr (vary according to the conditions used)		
		Pause time		8 ±1 min		
	Defrost Sensor	Model	Thermister(502AT)			
		SPEC	5.0KΩ at 25 °C			
	Thermal-Fuse	Rated	AC 250V 10A			
Operating temperature		77 °C (+0 °C/-5 °C)				

2. PRODUCT SPECIFICATIONS

2-4) Dimensions (mm)



3. DISASSEMBLY & REASSEMBLY

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3. DISASSEMBLY & REASSEMBLY

3-1) PRECAUTION

- Unplug the refrigerator before cleaning and making repairs.
- Do not disassemble or repair the refrigerator by yourself.
 - You run risk of causing a fire, malfunction and/or personal injury.
- Remove any foreign matter or dust from the power plug pins.
 - Otherwise there is a risk of fire.
- Do not use a cord that shows cracks or abrasion damage along its length or at either end.
- Do not plug several appliances into the same multiple power board. The refrigerator should always be plugged into its own individual electrical which has a voltage rating that matched the rating plate.
 - This provides the best performance and also prevents overloading house wiring circuits, which could cause a fire hazard from overheated wires.
- Do not install the refrigerator in a damp place or place where it may come in contact with water.
 - Deteriorated insulation of electrical parts may cause an electric shock or fire.
- The refrigerator must be grounded.
 - You must ground the refrigerator to prevent any power leakages or electric shocks caused by current leakage from the refrigerator.
- Do not put bottles or glass containers in the freezer.
 - When the contents freeze, the glass may break and cause personal injury.
- Do not store volatile or flammable substances in the refrigerator.
 - The storage of benzene, thinner, alcohol, ether, LP gas and other such products may cause explosions.

- NEED TOOL

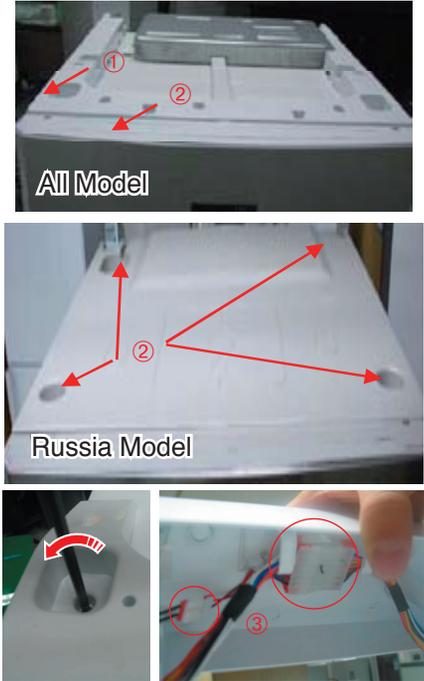
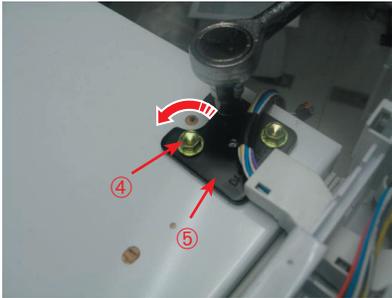
IMAGE	ITEM	USE
	Phillips Head Driver	Use for assembling and disassembling of screw
	Flat Head Driver	Use for assembling and disassembling of HomeBar, Dispenser, Deli Cartessen Box, Main PBA etc...
	Hex Wrench Ø2mm	Use for assembling and disassembling of Handle
	Socket Wrench Ø10mm	Use for assembling and disassembling of Door Hinge

3. DISASSEMBLY & REASSEMBLY

3-2) Assy Door



Removing the Refrigerator Door

PART NAME	FIGURE	DESCRIPTION
<p>Removig the Refrigerator Door</p>	 <p>All Model</p> <p>Russia Model</p>	<p>1) With the door closed, remove the Cover Wire Door (①) and Cap Cabi (②) using a flat-head screwdriver and philips-head screwdriver, and then disconnect the wires (③).</p> <p> Be careful of injury.</p>
		<p>2. Remove hinge screws (④) by turning to counter-clockwise, and take off the upper hinge (⑤) along the arrow.</p> <p> Take care when removing the door to ensure that it does not fall on you.</p>
		<p>3. Remove the door from the middle hinge by carefully lifting the door (⑥).</p> <p> Be careful not to scratch.</p>

3. DISASSEMBLY & REASSEMBLY

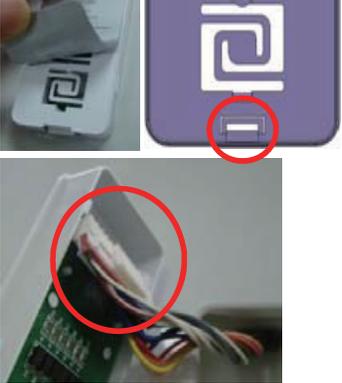


Removing the Freezer Door

PART NAME	FIGURE	DESCRIPTION
<p>Removing the Freezer Door</p>		<p>1) Open the Freezer door, and then take off the Front Leg Cover assembly (①) by removing the 3 screws (②) to counter-clockwise.</p> <p> Be careful not to scratch.</p>
		<p>2) Remove hinge screws (③) by turning to counter-clockwise, and take off the lower hinge (④) by pulling out.</p> <p> Take care when removing the door to ensure that it does not fall on you.</p> <p>- If you want to assemble, follow the reverse order.</p>

3. DISASSEMBLY & REASSEMBLY

3-3) Door Sub parts

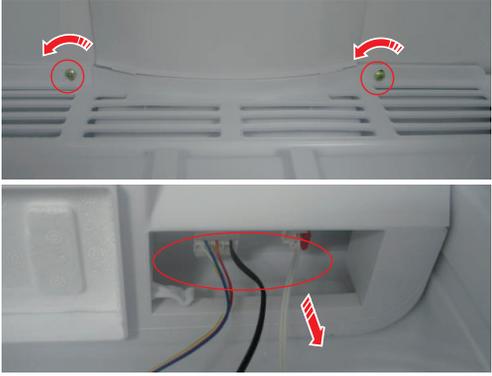
PART NAME	FIGURE	DESCRIPTION
<p>Control Panel</p>		<p>- TACT/BAR TYPE</p> <ol style="list-style-type: none"> 1. Remove inlay film as shown. 2. Insert a flat-head screwdriver on the slot as shown, and unlock the tabs. 3. Disconnect the wire connector. <p> When disassembling, make sure the unit turned off.</p>
<p>Door Handle</p>		<ol style="list-style-type: none"> 1. Insert a flat-head screwdriver on the slot as shown, and unlock the caps. 2. Remove screws by turning to counter-clockwise, and take off the Handle Assy by pulling out.
<p>Door Gasket</p>		<p>The door gasket is a molded gasket set into a channel located in the door liner.</p> <ol style="list-style-type: none"> 1. Open the door. 2. Grasp the gasket and pull in an outward motion until the molded gasket separates from the door liner. <p> Be careful of injury.</p>

3. DISASSEMBLY & REASSEMBLY

PART NAME	FIGURE	DESCRIPTION
Refrigerator Door Magnet S/W		<p>The refrigerator has a door magnet switch located in the upper center for the refrigerator.</p> <ol style="list-style-type: none">1. Use a small flat-blade screwdriver to unlock the locking tab and pull the switch out.

3. DISASSEMBLY & REASSEMBLY

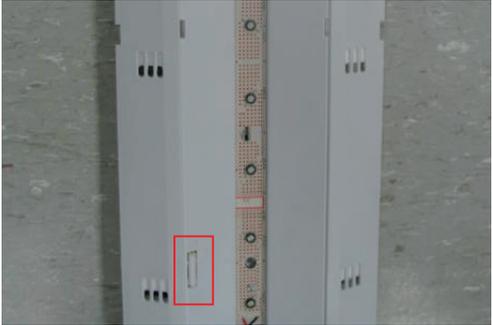
3-4) Refrigerator Compartments

PART NAME	FIGURE	DESCRIPTION
<p>Glass Shelf</p>		<p>These shelves allow the storage of larger items and pull out for easy access.</p> <ol style="list-style-type: none"> 1. Lift it up and pull the shelf out to the front.
<p>Plastic Drawers In Refrigerator</p>		<p>Drawers are designed for storage of fruits, vegetables, and deli items. The drawers are located in the lower portion of the refrigerator.</p> <ol style="list-style-type: none"> 1. Pull out the drawer as far as it goes. 2. Tilt the drawer up and pull it out until it is removed.
<p>Cool Select Zone™</p>		<ol style="list-style-type: none"> 1. Remove 2 screws and pull the CoolSelect Zone drawer out and then disconnect the 2 wire connectors. <p> When disassembling, make sure the unit turned off.</p>
<p>Chilled Room</p>		<ol style="list-style-type: none"> 1. Remove 2 screws and pull the Chilled Room drawer out.

3. DISASSEMBLY & REASSEMBLY

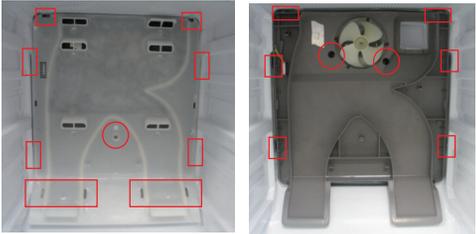
PART NAME	FIGURE	DESCRIPTION
<p>Refrigerator Light (LED Type)</p>		<p>The refrigerator lights are located in the Refrigerator.</p> <ol style="list-style-type: none"> 1. Remove all shelves, plastic drawer and CoolSelect Zone drawer. 2. Pull out cover lamp after removing 1 screw as shown. 3. Remove 3 screws as shown and disconnect the upper and lower wire connectors. <p> When disassembling, make sure the unit turned off.</p> <ol style="list-style-type: none"> 4. Remove tape for cover of wire at the back side and remove 3 screws at the front side.

3. DISASSEMBLY & REASSEMBLY

PART NAME	FIGURE	DESCRIPTION
Refrigerator Thermistor		<p>- LED TYPE</p> <p>The refrigerator thermistor is located inside of the light cover of the refrigerator.</p>
Refrigerator Light (LED type)		<ol style="list-style-type: none"> 1. Disassemble Refrigerator Compartment COVER-LAMP while pressing down the threshold. 2. Take off LED-LAMP while pressing down CASE-LAMP threshold. 3. Separate LED and the cable.

3. DISASSEMBLY & REASSEMBLY

3-5) Freezer Compartments

PART NAME	FIGURE	DESCRIPTION
<p>Plastic Drawer In Freezer</p>	 <p>Upper Drawer</p>  <p>Mid Drawer</p>  <p>Lower Drawer</p>	<p>Drawers are designed for storage of meat and dry foods. The drawers are located in the lower portion of the refrigerator.</p> <ol style="list-style-type: none"> 1. Pull out the drawer as far as it goes. 2. Tilt the drawer up and pull it out until it is removed.
<p>Evaporator Cover In Freezer</p>	 	<ol style="list-style-type: none"> 1. Pull out all drawers 2. Pull out the cover evap front after removing 1 screw and unlocking hooks using flat-head screwdriver. 3. Pull out the cover evap rear after removing 2 screws and unlocking hooks using flat-head screwdriver. <p> When disassembling, make sure the unit turned off.</p>

3. DISASSEMBLY & REASSEMBLY

PART NAME	FIGURE	DESCRIPTION
<p>Evaporator In Freezer</p>		<p>Evaporator is located in the bottom of freezer to produce cold air driven across the evaporator Coils.</p> <ol style="list-style-type: none"> 1. Take off the ductwork in Freezer. 2. Disconnect the wire connector (Heater, Bimetal, and Thermistor). 3. Cut the pipes, desoldering is dangerous with R600a charged appliances. 4. Remove the evaporator. 5. Take the same steps to seal the system as mentioned earlier.
<p>Freezer Thermistor</p>		<p>The freezer thermistor is located at the lower left of freezer vent. It sends temperature signals to the micro-processor.</p>

3-6) Machine Compartments

PART NAME	FIGURE	DESCRIPTION
		<p>The electric box is located in the top of the refrigerator.</p> <ol style="list-style-type: none"> 1. Remove 1 screw at right side. <p> When disassembling, make sure the unit turned off.</p> <p>Only, Russia Model has it like the picture. Cover pcb is in the Top tabel. You should remove Four screw of the Top table to open the cover pcb.</p> <p>- If you want to aseemble, follow the reverse order.</p>

3. DISASSEMBLY & REASSEMBLY

3-7) Reversing the Door swing

Read these instructions completely and carefully



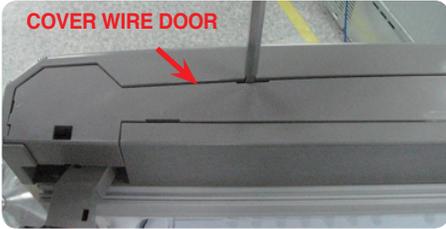
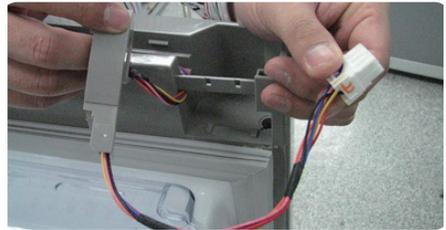
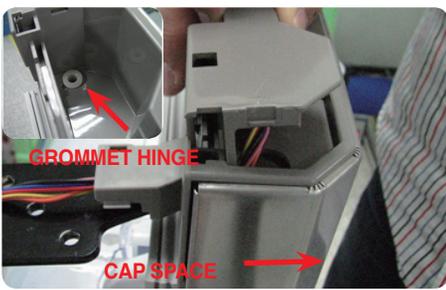
• Before reversing the door, first of all, main power should be switched off. you should take out contents and accessories like door guard from the doors. Be careful not to drop the doors during disassembling or assembling.

1. Handle parts carefully to avoid scratching paint.
2. Set screws down by their related parts to avoid using them in the wrong places.
3. Provide a non-scratching work surface for the doors. (ex: blanket)
4. During door reversing, refrigerator should not be stained with oil.

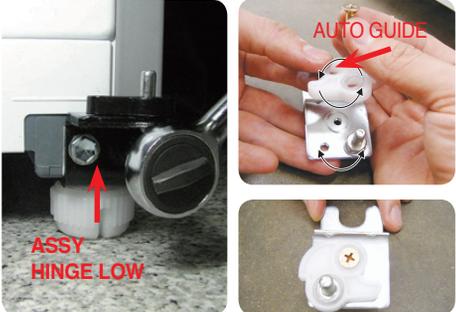
NOT PROVIDED					ADDITIONAL PART
Phillips Head Driver (+)	Flat Head Driver (-)	10mm Socket Wrench (for bolts)	11mm Wrench (for hinge shaft)	3/16" Allen Wrench (for middle hinge)	Top Left Hinge Cover (Underneath the Top Cover)

PART NAME	FIGURE	DESCRIPTION
Disassembly of the fridge door		1. After removing screws, disassemble the CAP CABI.
		2. Disconnect electric wires inside of the CAP CABI. When disassembling, make sure the unit turned off.
		3. With a 10mm socket wrench wrench, remove bolts on the top of the refrigerator.
		4. Disassemble the Fridge door by lifting it upward. Be careful not to drop and scratch the face of the Fridge door. Be careful not to scratch.

3. DISASSEMBLY & REASSEMBLY

PART NAME	FIGURE	DESCRIPTION
Disassembly of the fridge door	 <p>COVER WIRE DOOR</p>	<p>5. Disassemble the COVER WIRE DOOR on the top of the fridge door with a flathead screw driver by putting it into the indicated position(△).</p> <p> Be careful not to scratch.</p>
	 <p>COVER WIRE HINGE R</p> <p>ASSY HINGE UPP</p>	<p>6. Disjoin the COVER WIRE HINGE R from the ASSY HINGE UPP as shown. Take out the electric wire from the COVER WIRE HINGE R.</p>
		<p>7. Switch the direction of the electric wire as below. Take out the COVER WIRE HINGE L from the underneath the CAP CABI and rejoin it with the electric wire.</p> <p> Make sure the length of the electric wire should be more than 150mm.</p>
	 <p>SHAFT</p>	<p>8. With 11mm wrench, separate the HINGE SHAFT and then flip the HINGE and reattach the HINGE SHAFT.</p>
	 <p>GROMMET HINGE</p> <p>CAP SPACE</p>	<p>9. After rejoining the COVER WIRE HINGE L and the ASSY HINGE UPP and switching the position of the GROMMET HINGE and the CAP SPACE DOOR, reposition the ASSY HINGE UPP and assemble the COVER WIRE DOOR as shown. (The electric wire should be inside of the COVER WIRE DOOR.)</p>
	 <p>STOPPER</p> <p>GROMMET HINGE</p>	<p>10. Switch the position of the STOPPER DOOR and the GROMMET HINGE as shown.</p>

3. DISASSEMBLY & REASSEMBLY

PART NAME	FIGURE	DESCRIPTION
Disassembly of the freezer door		<p>11. After unscrewing and removing two bolts, disassemble the ASSY HINGE MID.</p>
		<p>12. Disassemble the Freezer Door by lifting it upward.</p> <p> Be careful not to drop and scratch the Freezer Door.</p>
		<p>13. Remove the COVER LEG FRONT COVER by removing the screws.</p> <p> Be careful not to scratch.</p>
		<p>14. Disassemble the ASSY HINGE LOW as shown and put the AUTO GUIDE upside down, switch the position of the SHAFT.</p>
Reversing the handle bar (fridge/ freezer)		<p>15. Detach the CAP SCREW HANDLE with flat screwdriver and disassemble the HANDLE BAR with unscrewing.</p>
		<p>16. Switch the position of the CAP HOLE DOORS, pulling out and pushing them in.</p> <p> Be careful not to scratch.</p>

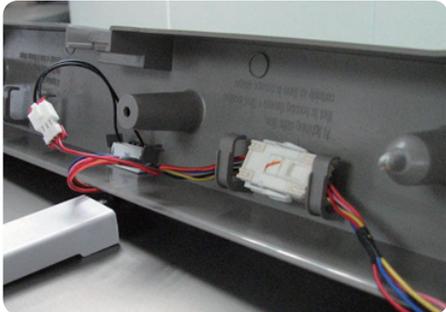
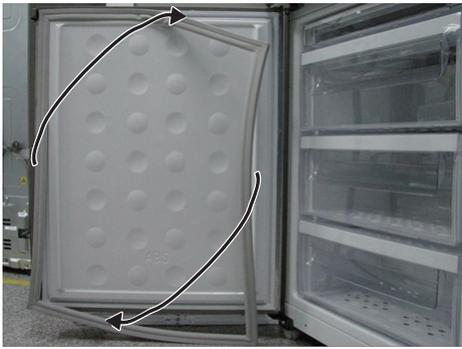
3. DISASSEMBLY & REASSEMBLY

PART NAME	FIGURE	DESCRIPTION
<p>Reversing the handle bar (fridge/ freezer)</p>		<p>17. Reattach the HANDLE BARs on the other side of doors in reverse order.</p>
<p>Assembly of the freezer door</p>		<p>18. Exchange the positions of a bolt and the assy HINGE LOW after making a hole with phillips head driver on the left bottom side of the unit.</p>
		<p>19. After switching the position of the CAP HOLE HINGE LOW, reassemble the COVER LEG FRONT.</p> <p> Be careful not to scratch.</p>
		<p>20. Switch the position of the CAP HOLE HINGE MID and a screw.</p>
		<p>21. Switch the position of the STOPPER DOOR and the GROMMET HINGE as shown.</p>

3. DISASSEMBLY & REASSEMBLY

PART NAME	FIGURE	DESCRIPTION
Disassembly of the freezer door		22. Switch the position of the GROMMET HINGE and the CAP HINGE HOLE.
		23. Carefully put the Freezer door back on and assemble HINGE MID with 2 bolts.  A screw will be remained after reversing freezer door. And it does not affect performance of the refrigerator.
Assembly of the refrigerator door		24. Carefully put the Fridge door back on.  Be careful of injury.
		25. Secure the ASSY HINGE UPP with 3 bolts as shown. Make sure the Fridge Door is firmly closed.
		26. Switch the position of the CAP HOLE HINGE UPP.

3. DISASSEMBLY & REASSEMBLY

PART NAME	FIGURE	DESCRIPTION
Assembly of the refrigerator door		<p>27. Reconnect the electric wires and reposition the wires inside of the CAP CABI as shown below.</p>
		<p>28. Reassemble the CAP CABI after assuring the position of Wires.</p>
		<p>29. Detach the Fridge and Freezer gaskets and attach them after rotating 180°. (Make sure the door gaskets are properly arranged. If not, there can be a noise or dew can be formed which affects performance of the unit.)</p>
		<p>30. Make sure the doors are working properly.</p>

4. TROUBLESHOOTING

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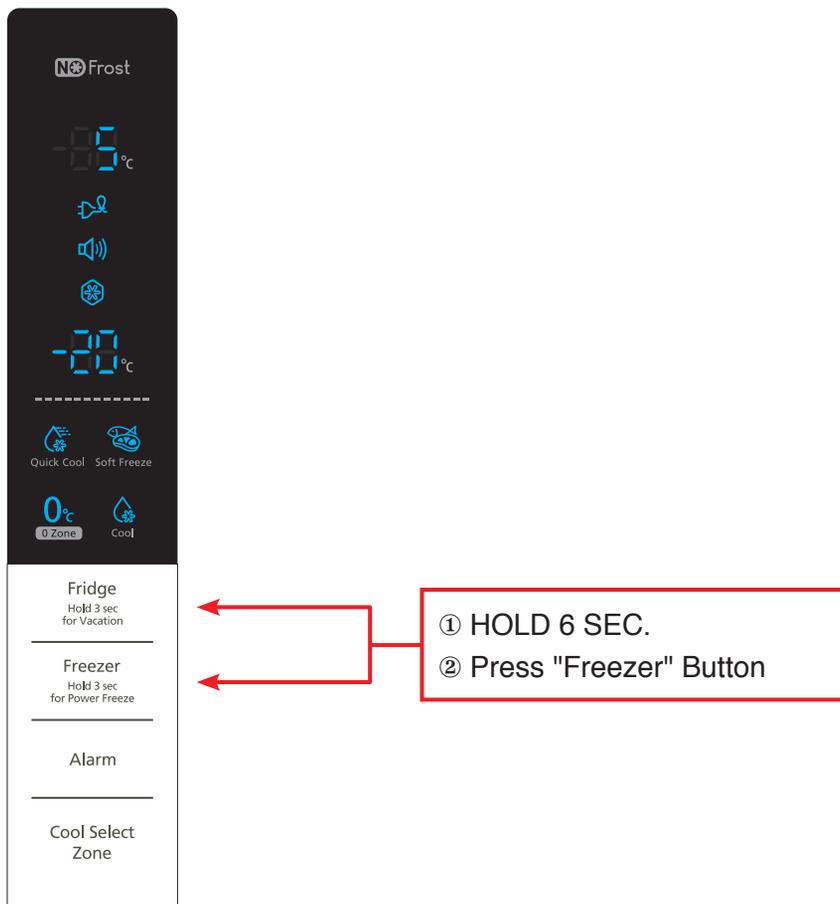
4. TROUBLESHOOTING

4-1) Check-List before Trouble-Shooting

4-1-1) Test Function (Forced Operation / Forced Defrost)

1. When the Freezer and the Fridge buttons on the display panel are held down for more than 6 seconds, the Panel Display will blink at an interval of 0.5 second for 4 seconds.
At this time, release both of the Freezer and the Fridge buttons and press the Freezer button to enter the Test Mode.
2. When entering the Test Mode, it works as the Test button whatever button on the display panel is pressed.
3. Each time the Test button is pressed, it will change in the following order.
Forced Operation → Forced F-Defrost → Cancellation (Normal Operation) → Forced Operation.
4. It is recommended that the unit be re-plugged in to terminate the operation of the Test function.

1) Test Mode Entering Process

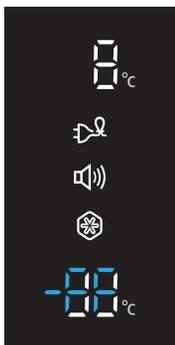


- ① Press for 6 seconds at the same time.
- ② When pressing the Freezer button, it will go into the Test Mode.

4. TROUBLESHOOTING

2) Test Mode Description

1. Forced Operation Function



1-1) Any button is pressed during the Test Mode, "FF" lights up on the display panel indicating that it is in the Forced Operation.

At this time, it starts alarming with "Beep" sounds.

1-2) When the Forced Operation is selected, the compressor starts without a 7-minute delay in any operation mode.

At this time, when it is in a Defrost mode, it stops defrosting and the Forced Operation begins.

(If the Forced Operation begins as soon as the compressor stops, it may cause the overload. So, take care when entering into the Forced Operation.)

1-3) When the Forced operation is selected, the compressor and the F-Fan operate for 24 hours without stopping and the Fridge compartment will operate according to the set temperature.

1-4) When the unit is shifted to the Forced Operation, the Freezer and the Fridge temperatures will be set to -25°C and 1°C.

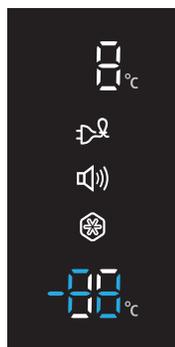
1-5) When the Forced Operation is selected, the Power Freeze function won't work.

And, when the Power Freeze function is selected, the Power Freeze LED will go off in 10 seconds.

1-6) When the Forced Operation or the Test function is cancelled within one minute after the Forced Operation being selected, the set temperature will automatically change to the previously set temperature.

1-7) The alarm sound during the Forced Operation (0.25 sec On and 0.75 sec Off) keeps on until the Forced Operation completes and there is no cancellation function.

2. Forced Defrost Function



2-1) When any button is pressed once at the Forced Operation (FF), "Fd" lights up on the Display Panel and the Forced Operation will be cancelled and the Freezer compartment starts defrosting.

2-2) At this time, it sends out "Beeping" sound for 3 seconds.

This alarm sound repeats 0.5 sec On and 0.5 sec Off which keeps on until the Forced F-Defrost finishes.

3. Test Cancellation Mode

3-1) When turning the display panel into the Test mode and pressing the TEST button once more during the Forced F-Defrost, the Forced F-Defrost will be cancelled and it will go back to the normal operation.

Also, when the unit is plugged out and in again, the Test mode is to be deactivated.

4. TROUBLESHOOTING

4-1-2) Self-Diagnosis Function

1) Self-Diagnosis Function upon Initial Power-On

- 1-1) When the unit is plugged into the power, MICOM diagnoses the status of the temperature sensors in a few minutes.
- 1-2) If defective sensor is found after Self-Diagnosis, relevant Display LEDs will blink at an interval of 0.5 sec. and there will be no beeping sound.
(Refer to the Self-Diagnosis Check List)
- 1-3) When there is a defective sensor found and its relevant LED blinks, it will only recognize the Self-Diagnosis button combination and it doesn't do the normal display.
But, the temperature will be controlled with the Emergency Operation.
- 1-4) To cancel the error code, fix the failure of the defective sensor or cancel the Initial Self-Diagnosis Function by pressing the Freezer and the Fridge button for 10 seconds.

2) Self-Diagnosis Function during Normal Operation



2-1) During the Normal Operation, press the Freezer + Fridge buttons for 6 seconds.

Then, the entire Display Panel blinks at intervals of 0.5 seconds for 4 seconds.

When pressing the Freezer + Fridge buttons for 10 seconds including the 4-second blinking time, it sends out "Ding Dong" sound and it goes into the Self-Diagnosis function.

2-2) When it goes into the Self-Diagnosis, the entire display panel goes off and when there is an error occurred, it will last for 60 seconds continuously and go to the normal operation whether or not the error is fixed.

(It sends out "Ding-Dong" sound)

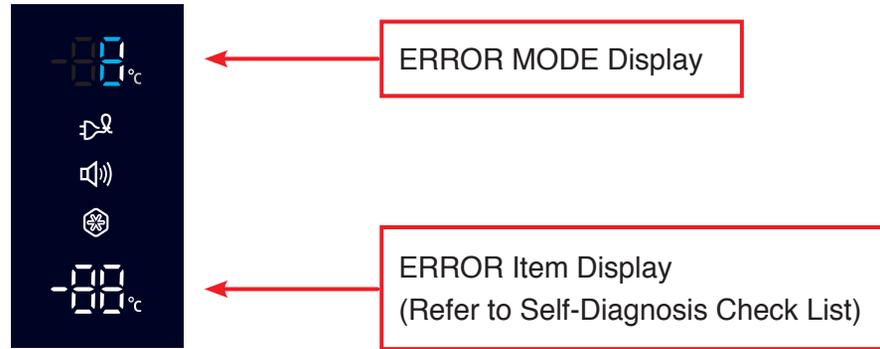
(Refer to the Self-Diagnosis Check List below)

2-3) Buttons won't work during Self-Diagnosis.

① HOLD 6 SEC.

② HOLD 10 (Including the 4-second LED)

4. TROUBLESHOOTING



* Self-Diagnosis Check List

NO	Category	Defect Description	ERROR CODE (FREEZER LED)	
1	F - SENSOR	Defects in Parts related to F-SENSOR		1
2	R - SENSOR	Defects in Parts related to R-SENSOR		2
3	F - DEF - SENSOR	Defects in Parts related to F-DEF-SENSOR		4
4	EXT - SENSOR	Defects in Parts related to EXT-SENSOR		6
5	CSZ-SENSOR	Defects in Parts related to CSZ-SENSOR		7
6	F-FAN ERROR	Defects in Parts related to F-FAN MOTOR		21
7	F-DEF ERROR	Defects in Parts related to F-DEF HEATER		24
8	CSZ Damper Heater ERROR	CSZ Damper Heater open / Wire Defects		27

4. TROUBLESHOOTING

* Self-Diagnosis Error Description

NO	Error Code	Item	Description	Trouble Shooting
1		F - SENSOR	Connector Slipped-Out or Open-Contact, Wire Cut or Short-Circuited, Abnormal Sensing Temp (higher than +65°C or lower than -50°C)	The voltage should be within the range of 4.5V~0.5V between MAIN PCB CN31 #5(PNK) and #6(Gray).
2		R - SENSOR	Same as the above	The voltage should be within the range of 4.5V~0.5V between MAIN PCB CN31 #3(Red) and #6(Gray).
3		F - DEF - SENSOR	Same as the above	The voltage should be within the range of 4.5V~0.5V between MAIN PCB CN31 #4(Org) and #6(Gray).
4		EXT - SENSOR	Same as the above	The voltage should be within the range of 4.5V~0.5V between MAIN PCB CN30 #1(Yel) and #3(Yel).
5		CSZ-SENSOR	Same as the above	The voltage should be within the range of 4.5V~0.5V between MAIN PCB CN31 #2(W/Blu) and #6(Gray).
6		F-FAN ERROR	When the related Fan Motor operates, it occurs if the contact of the Feed Back Signal Wire is defective, the Motor Wire is slipped out or the Motor is defective.	The voltage between MAIN PCB CN72- "4(S/BLU)↔5(GRY)" should be within 7V~12V
7		F-DEF ERROR	When the F-DEF HEATER is related to the followings ; Connector Slipped-Out or Open-Contact, Wire Cut or Short-Circuited, Defective Thermistor When the Fridge does not complete defrosting even after it does defrosting for more than 70 minutes.	After plugging out MAIN PCB CN71 from PCB, check the resistance between White and Red. 0 Ohm → Heater Short ∞ Ohm → Wire Cut or check the Thermal Fuse, Bimetal Open
8		CSZ Damper Heater ERROR	It occurs when the Damper Heater is detected as open due to the slipped-out connector, the open contact or the open wire of the Damper Heater.	After plugging out MAIN PCB CN75 from PCB, check the resistance between #1(BLACK) and #2 (BROWN) → it should read 140 ~160 Ohm. 0 Ohm → Heater Short ∞ Ohm → Wire Cut or Connector Slipped-Out

4. TROUBLESHOOTING

4-1-3) Load Status Display Function

- 1) At the normal operation, press the Freezer + Fridge buttons for 6 seconds.
Then, the Freezer and Freezer Temperature Display will blink in an interval of 0.5 second for 4 seconds.
- 2) At this time, release the Freezer + Fridge buttons and press the Alarm button (it sends out "Ding Dong" sound.) Then, it shifts to the Load Display mode.
- 3) The Load Display function shows what MICOM signals come out from MAIN PCB.
But, it just indicates that there are MICOM signals coming out.
It does not necessarily mean that the related parts (Loads) are operating.
In other word, even though it shows a certain load working, the related part may not operate due to such as a defective PCB relay or the defective part itself (it needs a confirmation).
- 4) The Load Display function lasts for 30 seconds and then it goes back to the normal operation.
- 5) The following image shows load locations.



- ① Press the Freezer and Fridge buttons for 6 seconds at the same time.
Then, the Display LEDs will blink for 4 seconds.
At this time, release the buttons
- ② and press the Alarm button once.

4. TROUBLESHOOTING

* Load Mode Check List

NO	Category	Defect Description	ERROR CODE (FREEZER LED)
1	Overload	Fridge Digit "e" 	LED On when the ambient temperature is over 34°C
2	Low Temperature	Fridge Digit "f" 	LED On when the ambient temperature is lower than 21°C
3	Normal Operation	Fridge Digit "e", "f" LED all Off 	When the ambient temperature is between 22°C~33°C
4	Demo Mode	Fridge Digit "g" 	LED On when the unit is on Demo Mode
5	COMP	Freezer 2nd Digit "a" 	LED On when Comp is running
6	F FAN HIGH	Freezer 2nd Digit "b" 	LED On when the F-Fan runs High
7	F FAN LOW	Freezer 2nd Digit "c" 	LED On when the F-Fan runs Low
8	F-DEF HEATER	Freezer 2nd Digit "d" 	LED On when the Freezer Defrost Heater is on
9	CSZ Room Damper Open	Freezer 1st Digit "f" 	CSZ Room Damper Open (OPTION)

4. TROUBLESHOOTING

4-1-4) Restoration of Previous Settings upon Instant Power Outage

- 1) If the Display Panel is initialized by the instant power outage, it will cause customer inquiries.
To prevent this, when the power is restored, the previous settings will be restored or reset based on the inside temperature of the unit.
- 2) Upon the initial power on, it checks its Freezer temperature. When it is lower than +5°C, it is to be considered as an instant power failure and it brings back all its previous operation functions (Power Freeze, Vacation, Fridge, Freezer, Alarm On, etc) related to the panel display.
- 3) When it is higher than +5°C, it is to be considered as a long-period power failure and it will initialize the panel display. (Freezer: -20°C, Fridge: 3°C)

4-1-5) Demo Mode Function for Store Display



- 1) At the normal operation, press the Freezer + Alarm buttons for 8 seconds.
Then, the Freezer and Fridge Temperature Display will blink in an interval of 0.5 second for 4 sec.
- 2) At this time, release the Freezer + Alarm buttons and press the Fridge button (it sends out "Ding Dong" sound.) Then, it shifts to the Demo Display mode.
Compression just does not work.
- 3) When the unit is in Demo Mode, all the functions including the Display Panel works normal.
But, the Compressor does not operate.
- 4) To cancel the Demo Mode, Do the entering Demo mode again or turn off the power.
- 5) Aso, when the Freezer or Fridge room temperature goes over 65°C during the Demo Mode, the Demo Mode will be cancelled and the unit will shift to the normal operation mode.
- 6) The initial real temperature display function will end.

- ① Press the Freezer and Alarm buttons for 8 seconds at the same time.
Then, the Display LEDs will blink for 4 seconds.
At this time, release the buttons
- ② and press the Fridge button once.

4. TROUBLESHOOTING

4-1-6) Option Setting Function

- 1) At the normal operation, press the Freezer + Fridge buttons for 6 seconds.
Then, the Freezer and Freezer Temperature Display will blink in an interval of 0.5 second for 4 sec.
 - 2) At this time, release the Freezer + Fridge buttons and press the Fridge button (it sends out "Ding Dong" sound.) Then, it shifts to the Option Setting Mode.
- When there is no button press for 20 seconds at the Option Setting Mode, it will go back to the normal display mode.

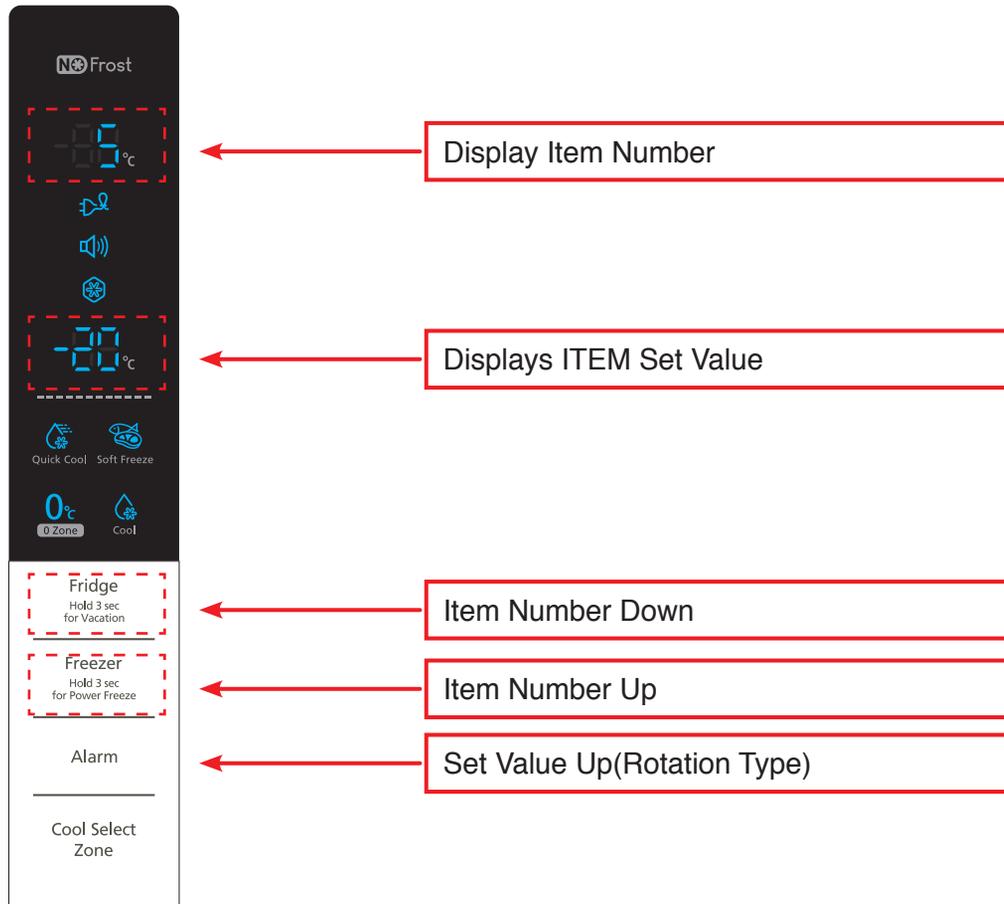
How to Shift to Option Setting Mode



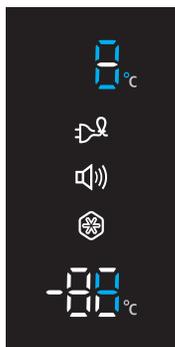
- ① Press the Freezer and Fridge buttons for 6 seconds at the same time. Then, the Display LEDs will blink for 4 seconds. At this time, release the buttons
- ② and press the Fridge button once.

4. TROUBLESHOOTING

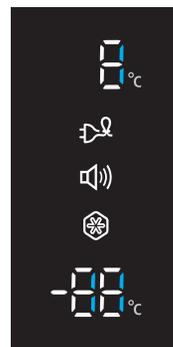
Option Mode & Button Description



- When the Display Panel converts to the Option Setting mode, the entire Display except the Fridge as shown below Temp LED goes off.



Freezer Temp Setting



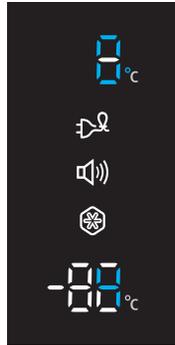
Fridge Temp Setting

- 1) For example, if you want to shift the standard temp of the Freezer compartment by -2°C , follow the steps below. This function is to change the default temperature and when the default temperature of the Freezer compartment is -20°C and the default setting is lowered by -2°C with the Option function, the default temperature will be controlled at -22°C . That is, when changing temperature options, the Freezer compartment will operate at -22°C internally even if it shows -20°C on the display panel. Therefore, the temperature will be controlled by -2°C lower than the set temperature on the display panel.

4. TROUBLESHOOTING

Note Basically, when units being shipped out, all the data in the Option function are cleared. That is, the Default settings are "0". However, for the purpose of quality improvement during mass production, the Default values may change. Therefore, be sure to check quality information, such as SVC bulletins.

- 2) After changing into the Option mode, "0"s on both of the Fridge and Freezer compartments lights up on the display panel. (when units being shipped out, the unit will be shipped out with "0"s set on both of the Fridge and Freezer compartments. However, for the purpose of quality improvement during mass production, the Default values may change.)



- When only "0" lights up on the Fridge compartment, the Freezer temperature option can be set and the current set Freezer temperature will show on the display panel.
- 3) If the Freezer temp code is set to "4" as the following table after setting the Fridge section to "0", the Freezer base temperature is to be lowered by -2°C (Refer to the Freezer temperature setting image.)
:In 15 seconds after completing the adjustment, MICOM is to store the setting value in EEPROM and it goes back to the normal display mode, deactivating the Option Setting mode.
 - 4) The Fridge temperature can be adjusted with the same method.
 - 5) Make sure not to change the factory-set default values otherwise exception cases.
Also, the Option Setting is to be completed when it goes back to the normal display mode in 15 seconds.
So, do not turn off the unit before it goes back to the normal display mode.

4. TROUBLESHOOTING

4-1-7) Option Table

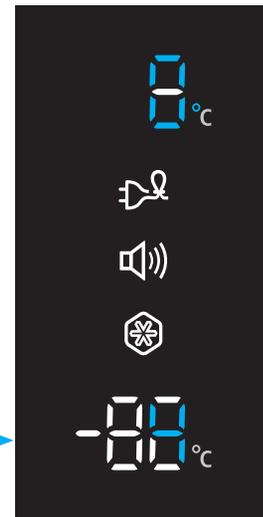
Note There are other option setting functions. But, it's got to do with the performance of the unit, not for repair purposes. So, they are not handled in this manual.
(Except those described in this manual, do not change other values.)

1) Freezer Temp Shift Table

Setting Item	Freezer Temp Shift
Option Item	Location : Fridge Temp LED
	0

Setting Value	Option Value
Freezer Temp	
0	0
1	-0.5°C
2	-1.0°C
3	-1.5°C
4	-2.0°C
5	-2.5°C
6	-3.0°C
7	-3.5°C
8	+0.5°C
9	+1.0°C
10	+1.5°C
11	+2.0°C
12	+2.5°C
13	+3.0°C
14	+3.5°C
15	+4.0°C

Ex) When shifting the Freezer default temp by -2.0°C



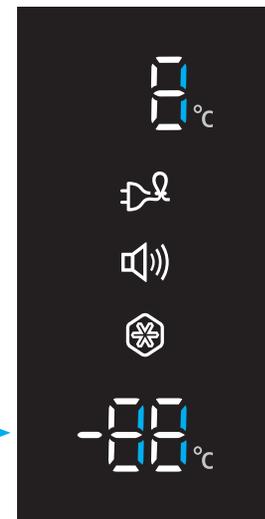
4. TROUBLESHOOTING

2) Fridge Temp Shift Table

Setting Item	Fridge Temp Shift
Option Item	Location : Fridge Temp LED
	1

Setting Value	Option Value
R Temp	
0	0
1	-0.5°C
2	-1.0°C
3	-1.5°C
4	-2.0°C
5	-2.5°C
6	-3.0°C
7	-3.5°C
8	+0.5°C
9	+1.0°C
10	+1.5°C
11	+2.0°C
12	+2.5°C
13	+3.0°C
14	+3.5°C
15	+4.0°C

Ex) When shifting the Fridge default temp by +2.0°C



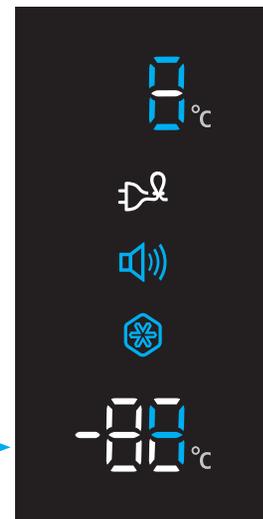
4. TROUBLESHOOTING

3) Cool Select Zone Temp Shift Table

Setting Item	Cool Select Zone Temp Shift
Option Item	20

Setting Value	Option Value
Freezer Temp	
0	0
1	-0.5°C
2	-1.0°C
3	-1.5°C
4	-2.0°C
5	-2.5°C
6	-3.0°C
7	-3.5°C

Ex) When shifting the Cool Select Zone default temp by +0.5°C



4. TROUBLESHOOTING

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4. TROUBLESHOOTING

4-2) Troubleshooting Flow-Chart by Symptoms

DATA1.Temp Table

Conversion Table - Temperature/MICOM PORT Voltage/Resistance

SENSOR CHIP : PX41C

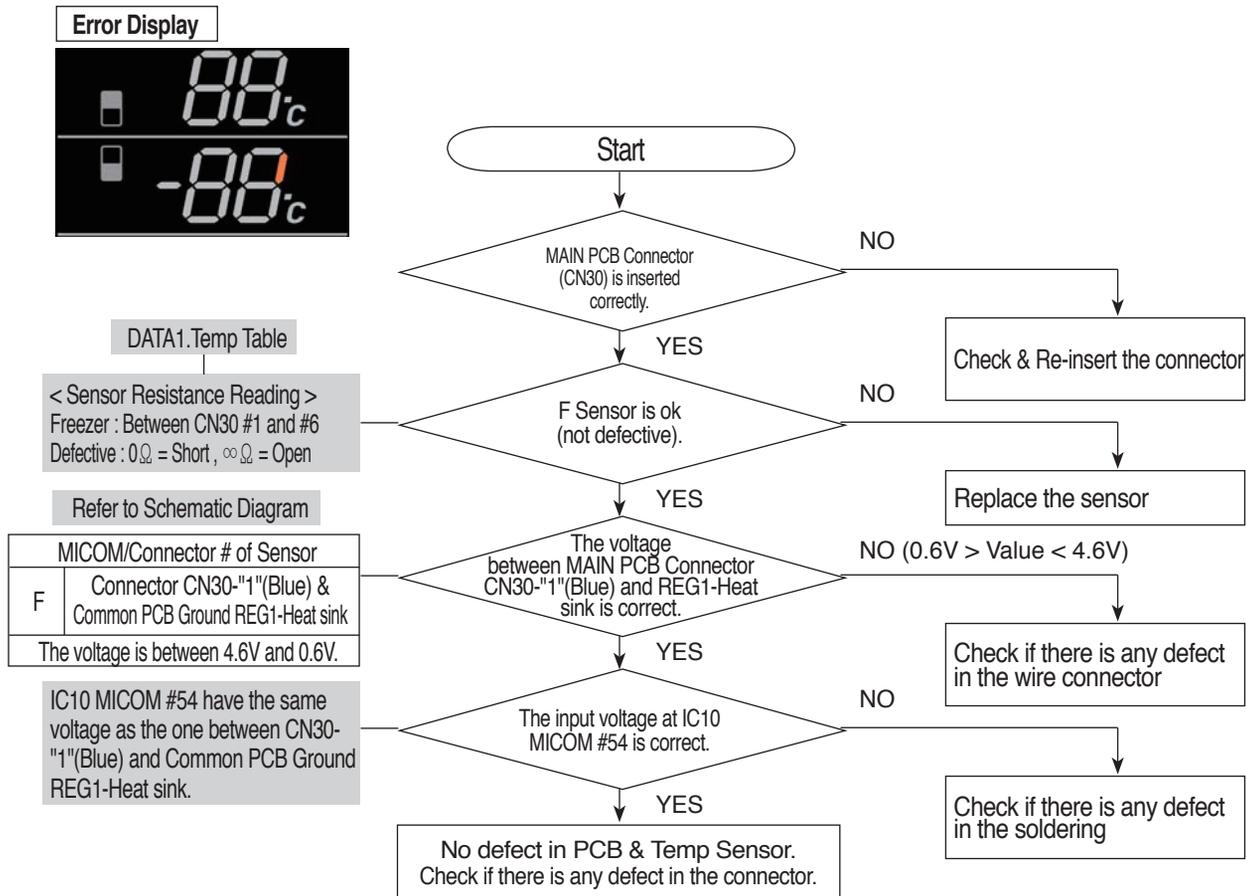
°C	°F	Voltage	Ω	°C	°F	Voltage	Ω	°C	°F	Voltage	Ω
-50	-58	4.694	153319	-5	23	3.107	16419	40	104	1.153	2997
-49	-56.2	4.677	144794	-4	24.8	3.057	15731	41	105.8	1.124	2899
-48	-54.4	4.659	136798	-3	26.6	3.006	15076	42	107.6	1.095	2805
-47	-52.6	4.641	129294	-2	28.4	2.955	14452	43	109.4	1.068	2714
-46	-50.8	4.622	122248	-1	30.2	2.904	13857	44	111.2	1.040	2627
-45	-49	4.602	115631	0	32	2.853	13290	45	113	1.014	2543
-44	-47.2	4.581	109413	1	33.8	2.802	12749	46	114.8	0.988	2462
-43	-45.4	4.560	103569	2	35.6	2.751	12233	47	116.6	0.963	2384
-42	-43.6	4.537	98073	3	37.4	2.700	11741	48	118.4	0.938	2309
-41	-41.8	4.514	92903	4	39.2	2.649	11271	49	120.2	0.914	2237
-40	-40	4.490	88037	5	41	2.599	10823	50	122	0.891	2167
-39	-38.2	4.465	83456	6	42.8	2.548	10395	51	123.8	0.868	2100
-38	-36.4	4.439	79142	7	44.6	2.498	9986	52	125.6	0.846	2036
-37	-34.6	4.412	75077	8	46.4	2.449	9596	53	127.4	0.824	1973
-36	-32.8	4.385	71246	9	48.2	2.399	9223	54	129.2	0.803	1913
-35	-31	4.356	67634	10	50	2.350	8867	55	131	0.783	1855
-34	-29.2	4.326	64227	11	51.8	2.301	8526	56	132.8	0.762	1799
-33	-27.4	4.296	61012	12	53.6	2.253	8200	57	134.6	0.743	1745
-32	-25.6	4.264	57977	13	55.4	2.205	7888	58	136.4	0.724	1693
-31	-23.8	4.232	55112	14	57.2	2.158	7590	59	138.2	0.706	1642
-30	-22	4.199	52406	15	59	2.111	7305	60	140	0.688	1594
-29	-20.2	4.165	49848	16	60.8	2.064	7032	61	141.8	0.670	1547
-28	-18.4	4.129	47431	17	62.6	2.019	6771	62	143.6	0.653	1502
-27	-16.6	4.093	45146	18	64.4	1.974	6521	63	145.4	0.636	1458
-26	-14.8	4.056	42984	19	66.2	1.929	6281	64	147.2	0.620	1416
-25	-13	4.018	40938	20	68	1.885	6052	65	149	0.604	1375
-24	-11.2	3.980	39002	21	69.8	1.842	5832	66	150.8	0.589	1335
-23	-9.4	3.940	37169	22	71.6	1.799	5621	67	152.6	0.574	1297
-22	-7.6	3.899	35433	23	73.4	1.757	5419	68	154.4	0.560	1260
-21	-5.8	3.858	33788	24	75.2	1.716	5225	69	156.2	0.546	1225
-20	-4	3.816	32230	25	77	1.675	5039	70	158	0.532	1190
-19	-2.2	3.773	30752	26	78.8	1.636	4861	71	159.8	0.519	1157
-18	-0.4	3.729	29350	27	80.6	1.596	4690	72	161.6	0.506	1125
-17	1.4	3.685	28021	28	82.4	1.558	4526	73	163.4	0.493	1093
-16	3.2	3.640	26760	29	84.2	1.520	4369	74	165.2	0.481	1063
-15	5	3.594	25562	30	86	1.483	4218	75	167	0.469	1034
-14	6.8	3.548	24425	31	87.8	1.447	4072	76	168.8	0.457	1006
-13	8.6	3.501	23345	32	89.6	1.412	3933	77	170.6	0.446	978
-12	10.4	3.453	22320	33	91.4	1.377	3799	78	172.4	0.435	952
-11	12.2	3.405	21345	34	93.2	1.343	3670	79	174.2	0.424	926
-10	14	3.356	20418	35	95	1.309	3547	80	176	0.414	902
-9	15.8	3.307	19537	36	96.8	1.277	3428	81	177.8	0.404	877
-8	17.6	3.258	18698	37	98.6	1.253	3344	82	179.6	0.394	854
-7	19.4	3.208	17901	38	100.4	1.213	3204	83	181.4	0.384	832
-6	21.2	3.158	17142	39	102.2	1.183	3098	84	183.2	0.375	810

4. TROUBLESHOOTING

4-2-1) Troubleshooting for Self-Diagnosis Errors

- When there is a sensor error, it will light up on the display panel. And, when there is a sensor error upon the initial power on, the unit does not operate blinking the relevant section in the 7-SEG.
- The refrigerator does not stop when there are sensor errors during the operation, but it goes into the emergency operation mode, which is not able to do the normal operation. So, do the double check with the Self Diagnosis in this manual.

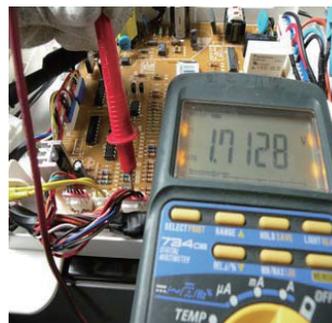
1) When the Freezer Sensor is defective



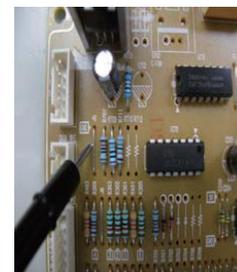
How to measure the Freezer Sensor Resistance
- Measure CN31-"3"(Red) ↔ "6"(Gray) and compare with the value at the temp table.



How to measure the Freezer Sensor Voltage
- Measure IC10 MICOM #52 or CN31-"3"(Red) ↔ REG1-Heat Sink and compare with the value at the temp table.
- Measure between CN31-"3"(Red) ↔ Common PCB Ground Voltage

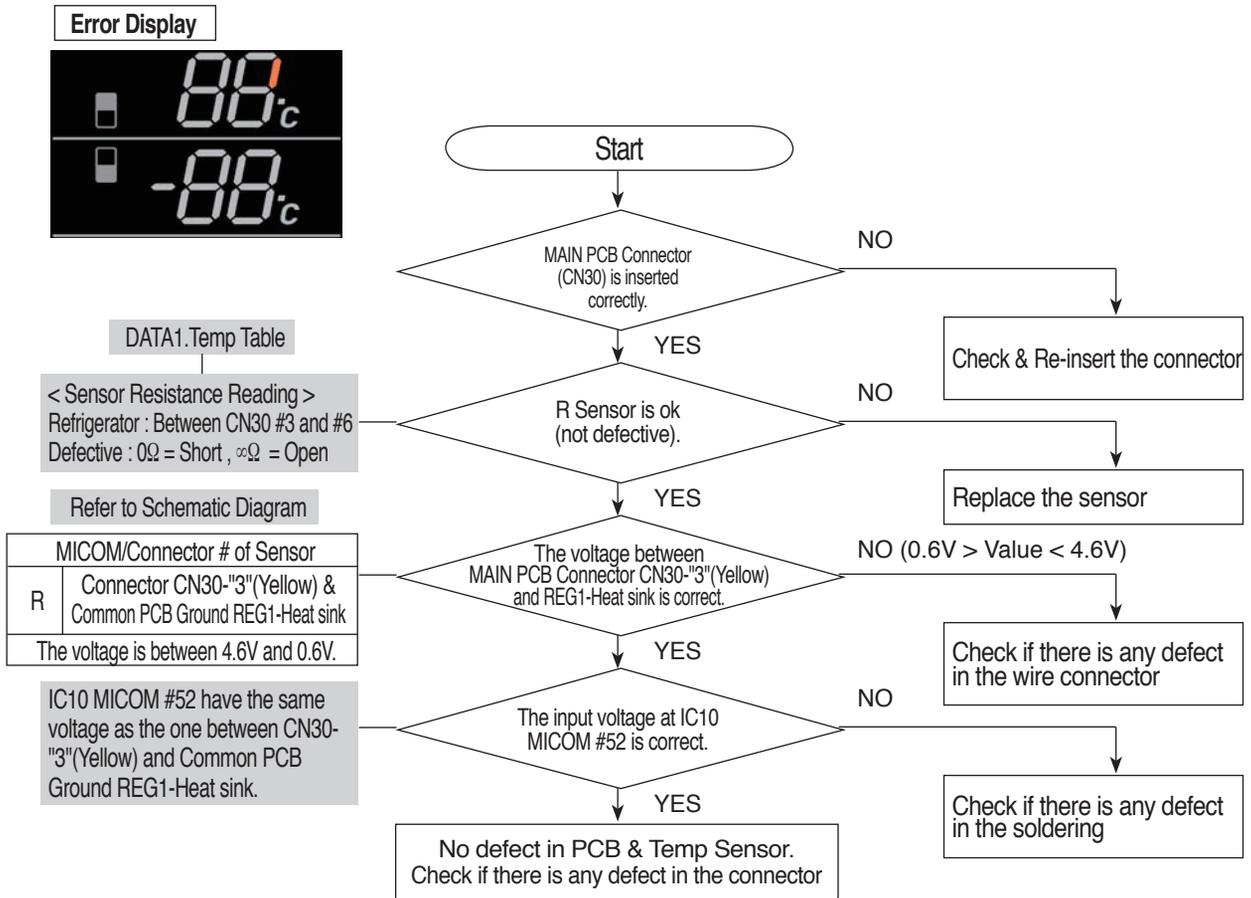


Common PCB Ground REG1-Heat sink



4. TROUBLESHOOTING

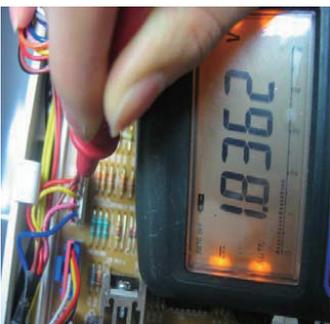
2) When the Refrigerator Sensor is defective



How to measure the R-Sensor Resistance
- Measure CN30-"3"(Yellow) ↔ "6"(Brown) and compare with the value at the temp table.



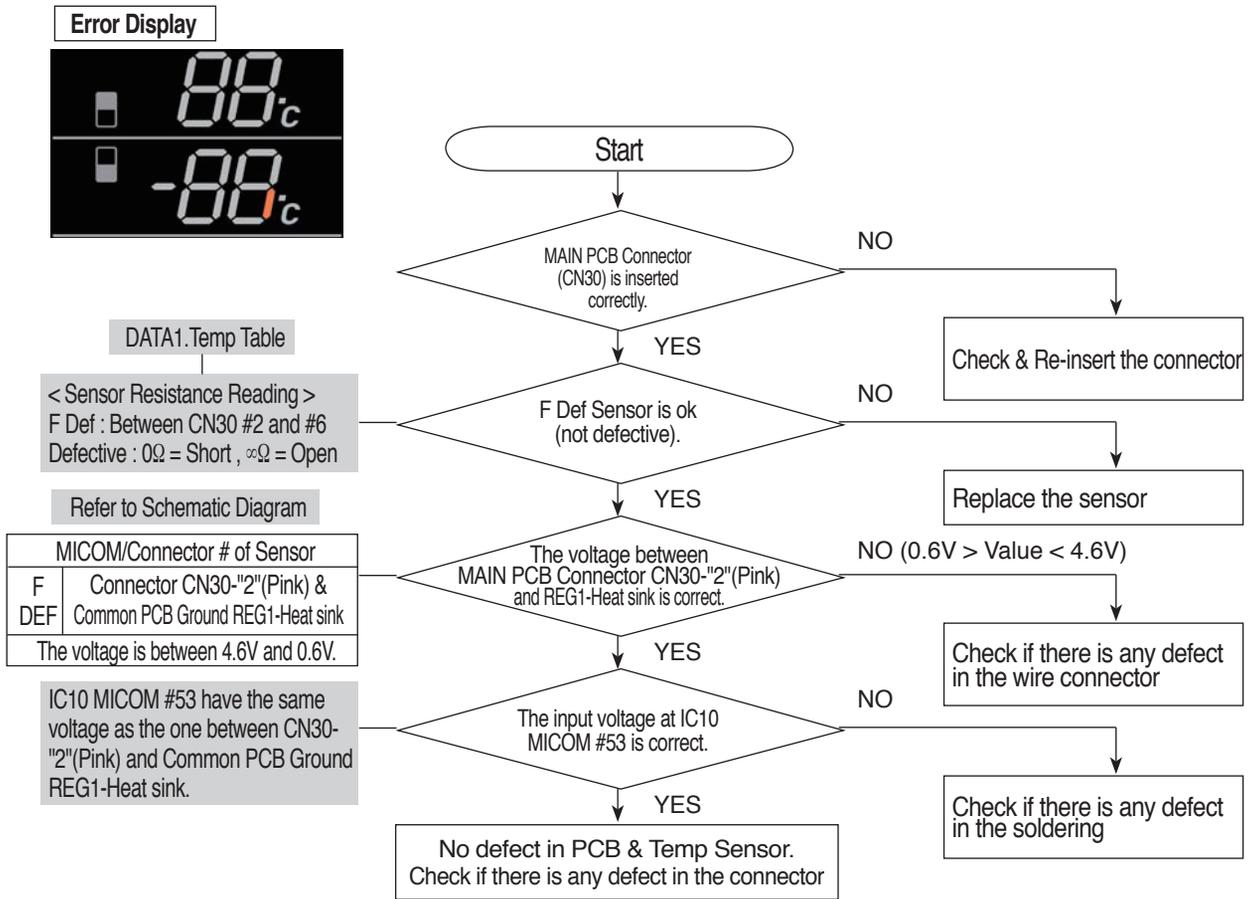
How to measure the R-Sensor Voltage
- Measure IC10 MICOM #52 or CN30-"3"(Yellow) ↔ REG1-Heat Sink and compare with the value at the temp table. Measure between CN30-"3"(Yellow) ↔ Common PCB Ground Voltage




Common PCB Ground REG1-Heat sink

4. TROUBLESHOOTING

3) When the Defrost Sensor is defective



How to measure the Def-Sensor Resistance
 - Measure CN30-"2"(Pink) ↔ "6"(Brown) and compare with the value at the temp table.



How to measure the Def-Sensor Voltage
 - Measure IC10 MICOM #53 or CN30-"2"(Pink) ↔ REG1-Heat Sink and compare with the value at the temp table. Measure between CN30-"2"(Pink) ↔ Common PCB Ground Voltage




4. TROUBLESHOOTING

4) When the Ambient Sensor is defective

Error Display



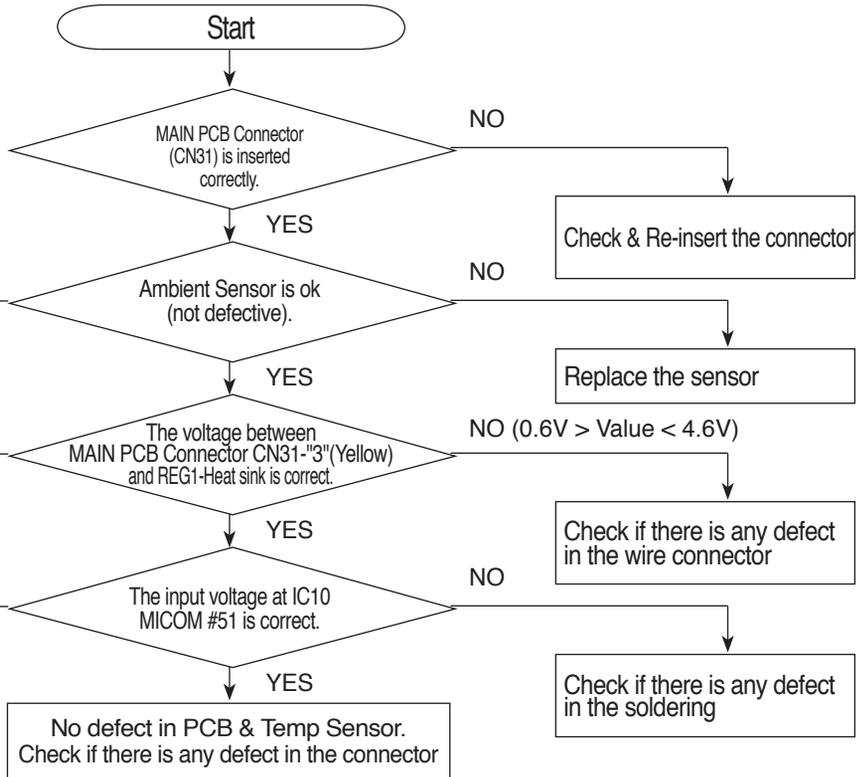
DATA1.Temp Table

< Sensor Resistance Reading >
Refrigerator : Between CN31 #1 and #3
* Located at the left upper door hinge.
Defective : 0Ω = Short , $\infty\Omega$ = Open

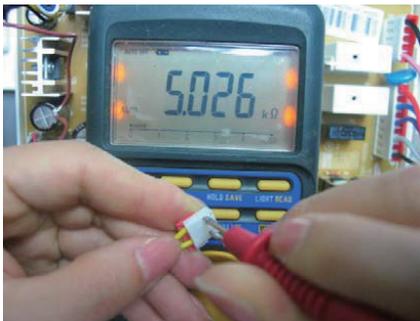
Refer to Schematic Diagram

MICOM/Connector # of Sensor	
F	Connector CN31-"3"(Yellow) & Common PCB Ground REG1-Heat sink
DEF	The voltage is between 4.6V and 0.6V.

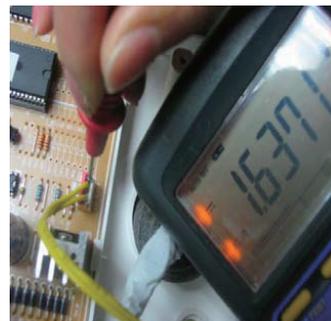
IC10 MICOM #51 have the same voltage as the one between CN31-"3"(Yellow) and Common PCB Ground REG1-Heat sink.



How to measure the Amb-Sensor Resistance
- Measure CN31-"1"(Yellow) ↔ "3"(Yellow) and compare with the value at the temp table.



How to measure the Amb-Sensor Voltage
- Measure IC10 MICOM #51 or CN31-"3"(Yellow) ↔ REG1-Heat Sink and compare with the value at the temp table. Measure between CN31-"3"(Yellow) ↔ Common PCB Ground Voltage



Common PCB Ground REG1-Heat sink



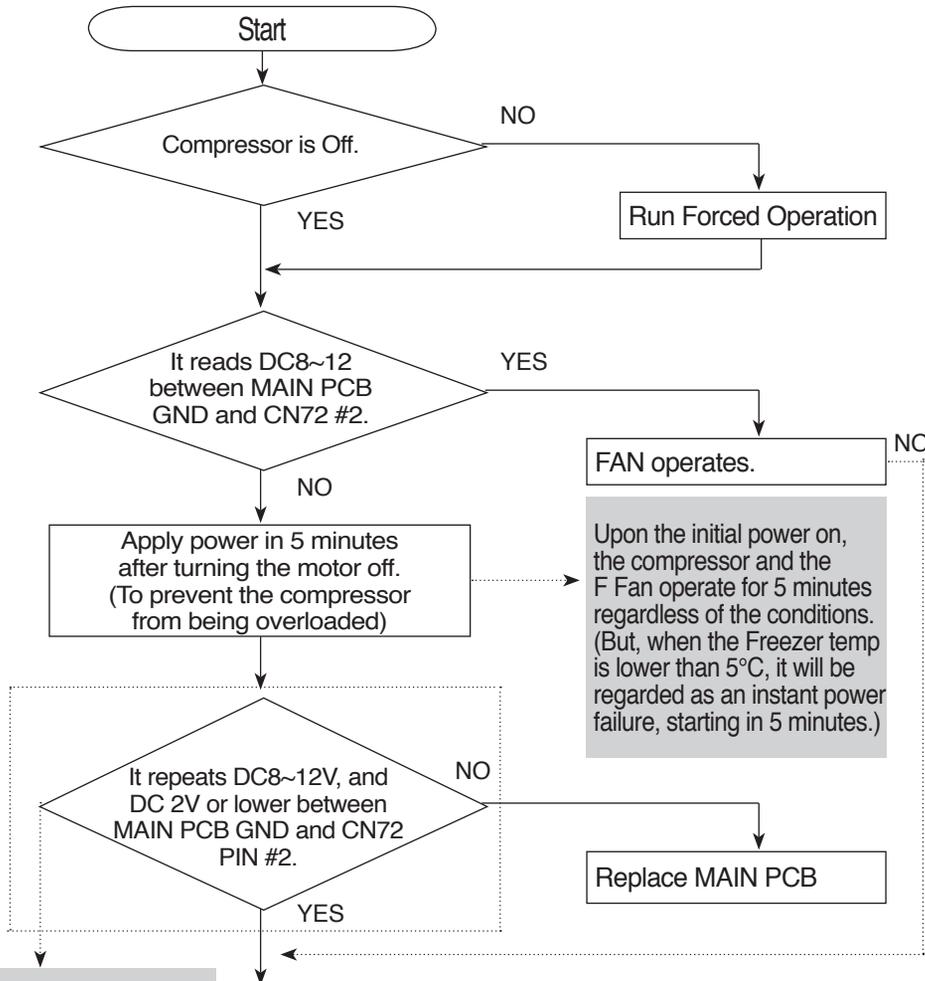
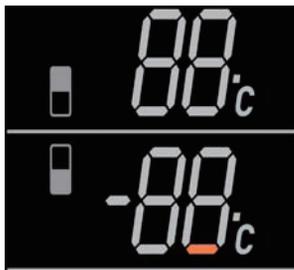
4. TROUBLESHOOTING

4-2-2) When the Freezer Fan does not operate

- A BLDC Fan Motor is applied to this refrigerator and it runs on DC 8~12V.
- The F-Fan motor runs together with the compressor.

Self-Diagnosis Error Display

F FAN ERROR



<Note>

Pulse signals being generated when the motor is rotating are to be input to CN72 #3 (F). These will be input to MICOM and when there are no input signals with the motor rotating, the fan will be turned off and then be turned on in 10 seconds. If there are still no input signals, it keeps trying the above 4 times. And, if it still fails, it runs the motor in 10 minutes. It is implemented to prevent the motor from being overloaded due to restrictions by foreign substances such as ice built up around the motor.



It is pulse signal. So, the voltage keeps changing. But, when it is measured with the Multi-Meter, it reads about 2~3V.

◆ Possible Causes

- ① Defective FAN-MOTOR
- ② Contact problem at the terminal (MAIN PCB CONNECTOR - TERMINAL (CN72, ①, ②, ④), Contact problem at Freezer Fan Motor Connector, Defective Motor Wire)
- ③ Check the motor rotating pulse input upon Fan Motor operation. (Refer to Fan-Motor Circuit in this manual)

How to measure voltage for the F-Fan Motor

- The voltage between the Common PCB Ground and the F Fan CN75-"3" (Orange) is DC7~12V.
- When the measurement is different, it needs additional checking.

1) F-Fan



Common PCB Ground
REG1-Heat sink



4. TROUBLESHOOTING

4-2-3) When it (F DEF Heater) does not Defrost

- When there is a Defrost error, check if there is a Defrost Heater error with the Self-Diagnosis before turning off the unit. And then, turn off the unit and do the trouble shooting. (Check with the Self-Diagnosis.)

Sensor Resistances by Temp	
30°C	4.22kΩ
20°C	6.05kΩ
10°C	8.87kΩ
0°C	13.29kΩ
-10°C	20.42kΩ
-20°C	32.23kΩ
-30°C	52.41kΩ

Refer to DATA1.
Temp Table for detail Temp

F-SEN: Read Resistance between CN30 #1 and #6
 R-SEN: Read Resistance between CN30 #3 and #6
 D-SEN: Read Resistance between CN30 #2 and #6
 AMBIENT-SEN : Read Resistance between CN31 #1 and #3

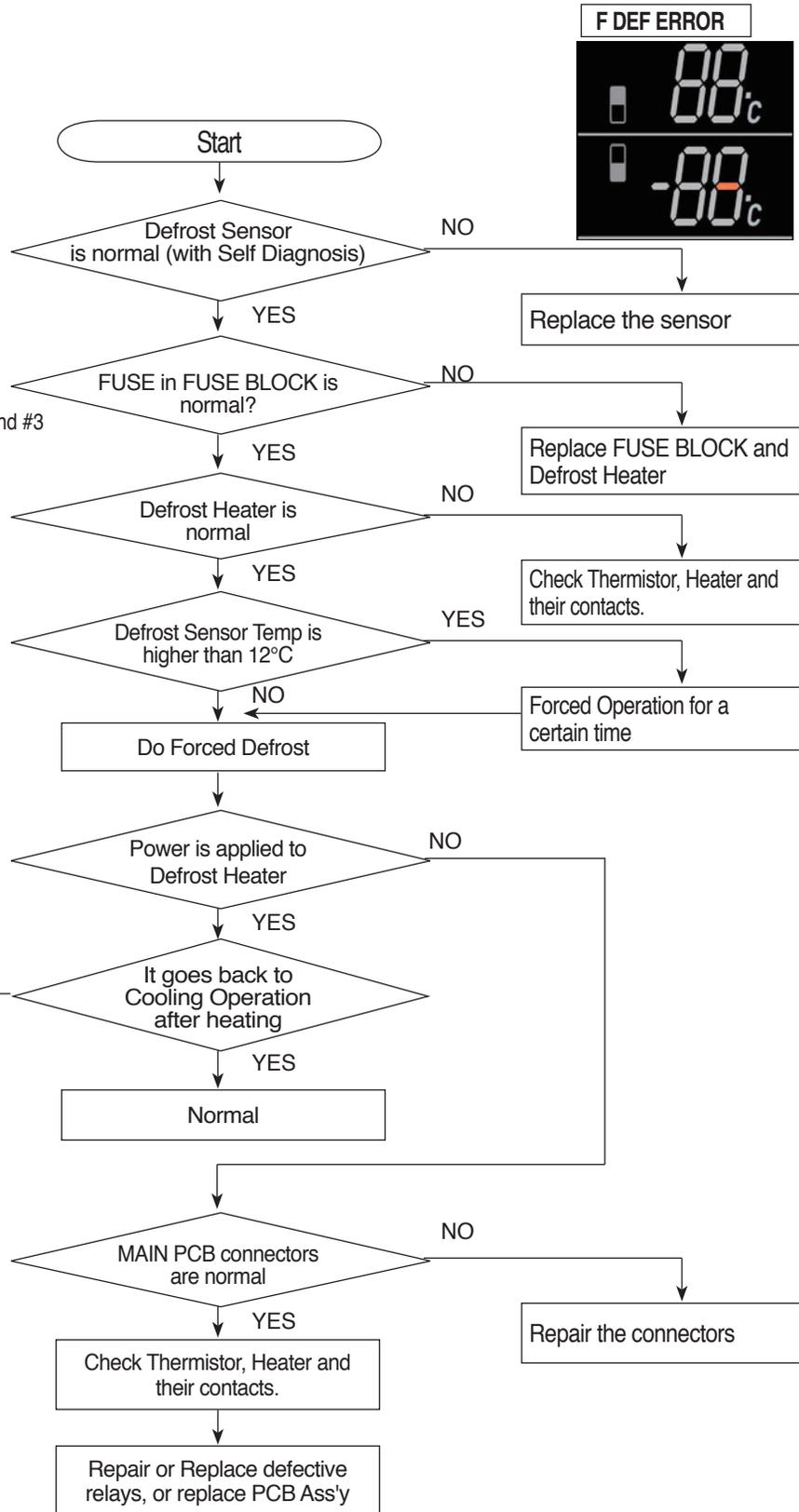
Defrost: Read Resistance between CN70 #7 and #5
 Based on 220V Input Voltage (203ohm ± 7%)

Defrost Sensor Voltage is lower than 2.25V

* LED Segment Type
 Press the OPERATION & MENU buttons at the same time for 6 sec and press the MENU button once

<Note>
 When Defrost Sensor is higher than +12 °C, (+10 °C, +15 °C, +17 °C) after heating, it will stop heating and go back to Cooling Operation.

How to measure resistance for the Defrost Heater.
 - Measure the resistance between CN70 #7 (White) ↔ #5 (Violet)
 - When the measurement is different, it needs additional checking.
 1) Defrost Heater



4. TROUBLESHOOTING

4-2-4 When the refrigerator does not turn on

How to measure

1) Measure the input voltage of the primary Trans



2) Measure the output voltage of the secondary Trans (A)



3) Measure the output voltage of the secondary Trans (B)



4) Measure the voltage at the 12V terminal (C103) and. And, by using the Common PCB Ground, measure the voltage at the 5V terminal (C106)



5) Measure the Motor input voltage (Q101-GND)

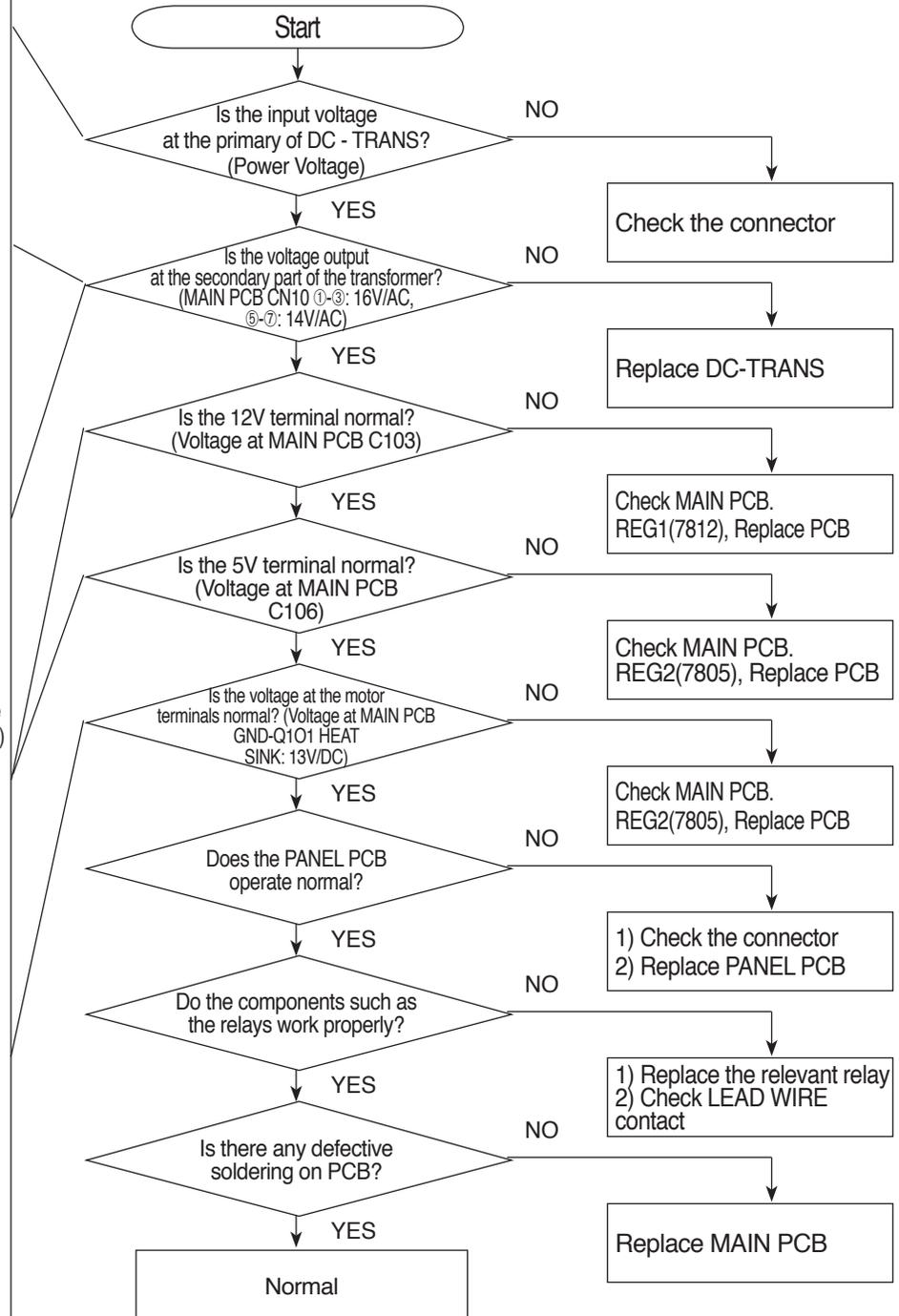


6) Common PCB Ground



<Note>

There is AC 200~240V flowing at the Main PCB. So, take care when doing a repair or a easurement with a tester.



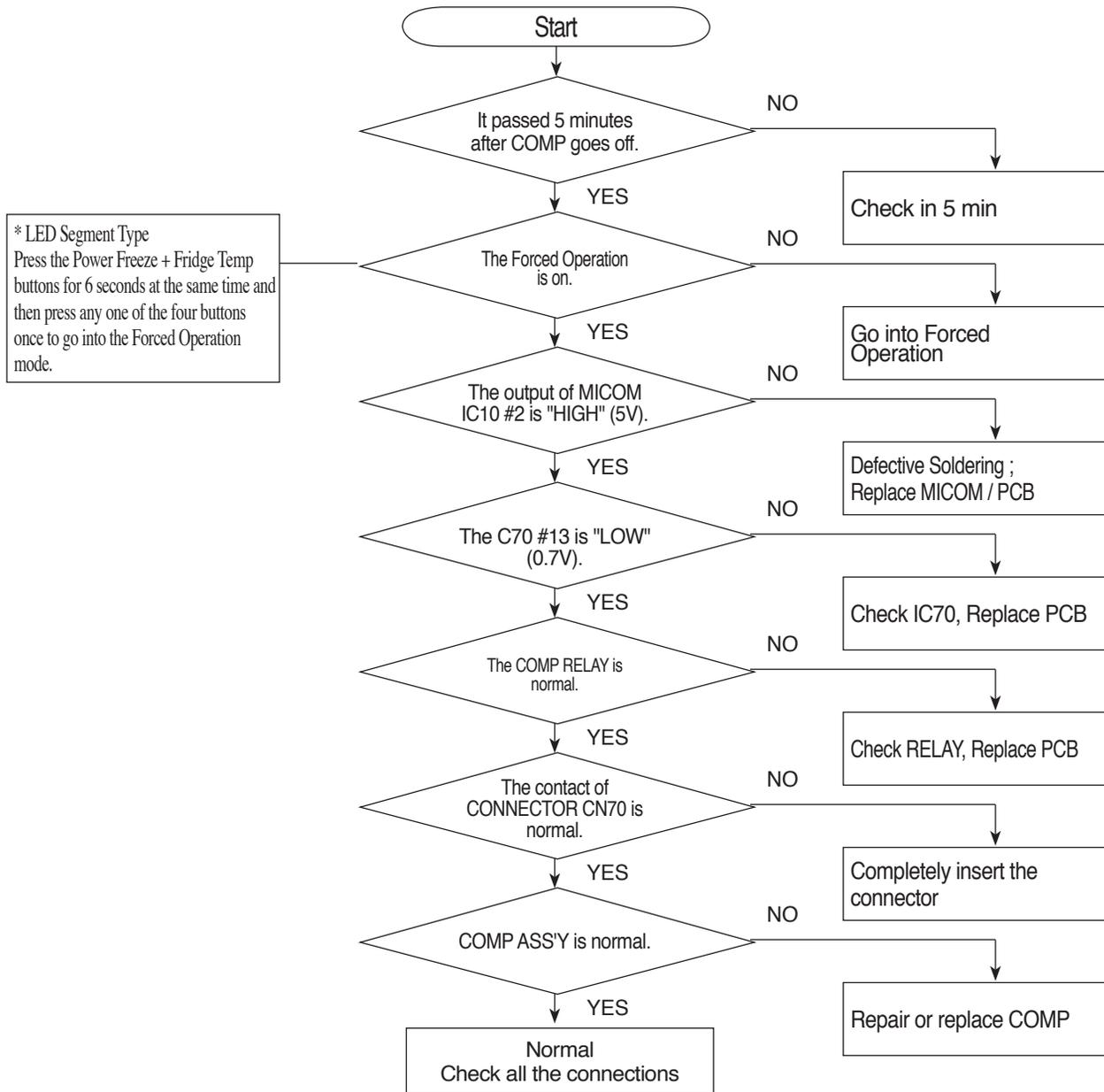
- Check MAIN PCB Connector
- Check the connection at the Upper Hinge Cabi-Door
- Check the Door Panel PCB connections

4. TROUBLESHOOTING

4-2-5) When the compressor does not operate

Check the compressor during the Forced Operation

1. It takes more than 5 minutes before the compressor starts operating since it becomes the set temperature.
2. The compressor does not work during the defrost.
3. It also takes more than 5 minutes to run the compressor again when an instant power failure is detected.



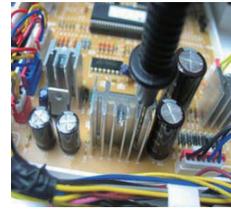
How to measure the voltage With the compressor on, it is High Voltage (5V ± 0.5V) between the Common_PCB Ground and IC10 MICOM #2



How to measure the voltage With the compressor on, it is Low Voltage 0.7V ± 0.5V) between the Common_PCB Ground and IC70 #13



Common PCB Ground REG1-Heat sink



4. TROUBLESHOOTING

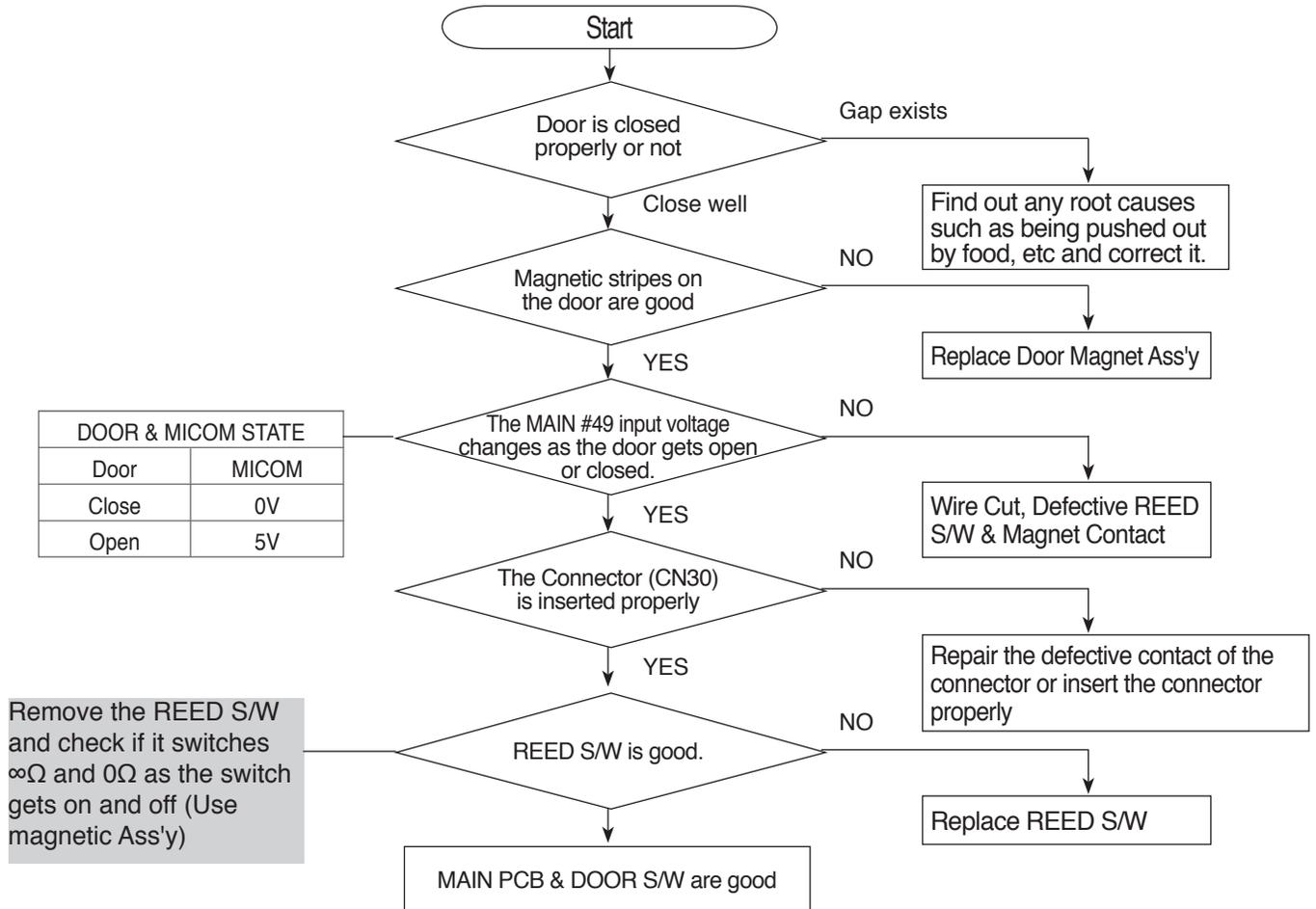
4-2-6) When it keeps alarming (Buzzer Sound)

* The DOOR REED SWITCH is a magnetic type.

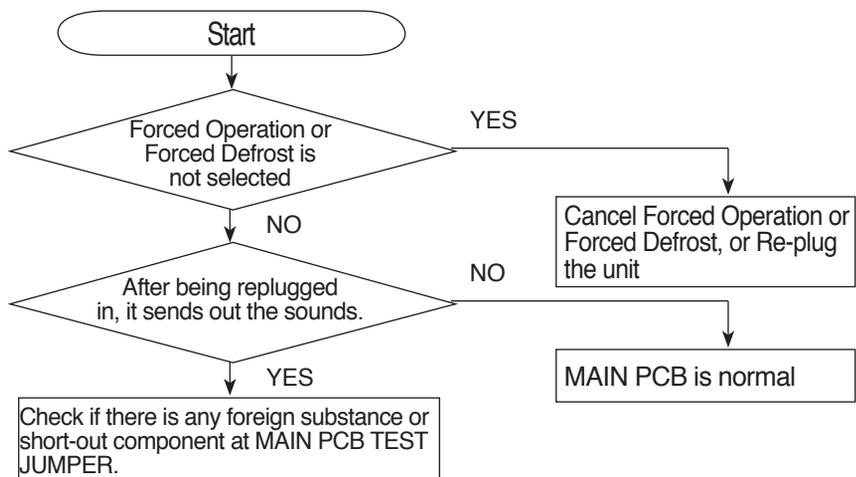
So, check its open & close with the magnet attached on the Fridge door.

* Because there is no buzzer with LED SEMI type, it does not send out alarm sounds (isolated to LED SEG model)

1) When "DingDong" sound continues



2) When it keeps beeping



4. TROUBLESHOOTING

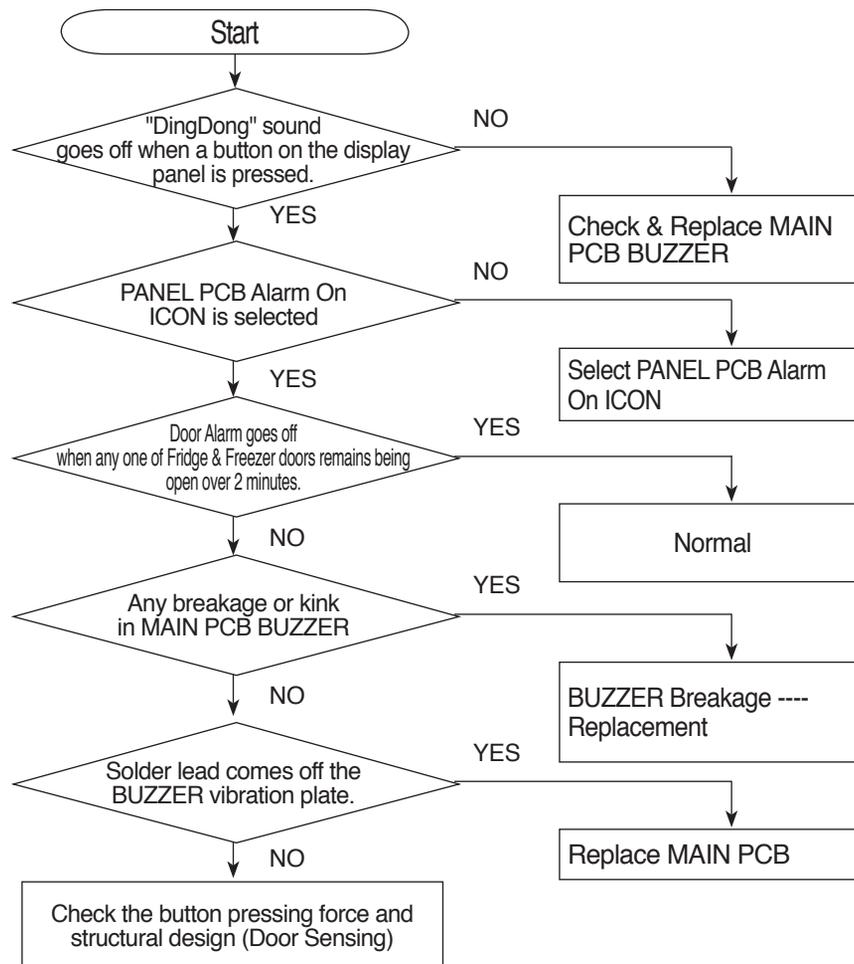
3) No Buzzer Sound

This model has a buzzer affixed on the MAIN PCB.(Except SEMI LED Model)

If there is no buzzer sound upon button press, Forced Operation or Door Open, disconnect MAIN PCB and check if the buzzer is damaged or there is any defective soldering.

(If it is not a soldering problem, it is recommended replacing MAIN PCB due to difficulties in repairing)

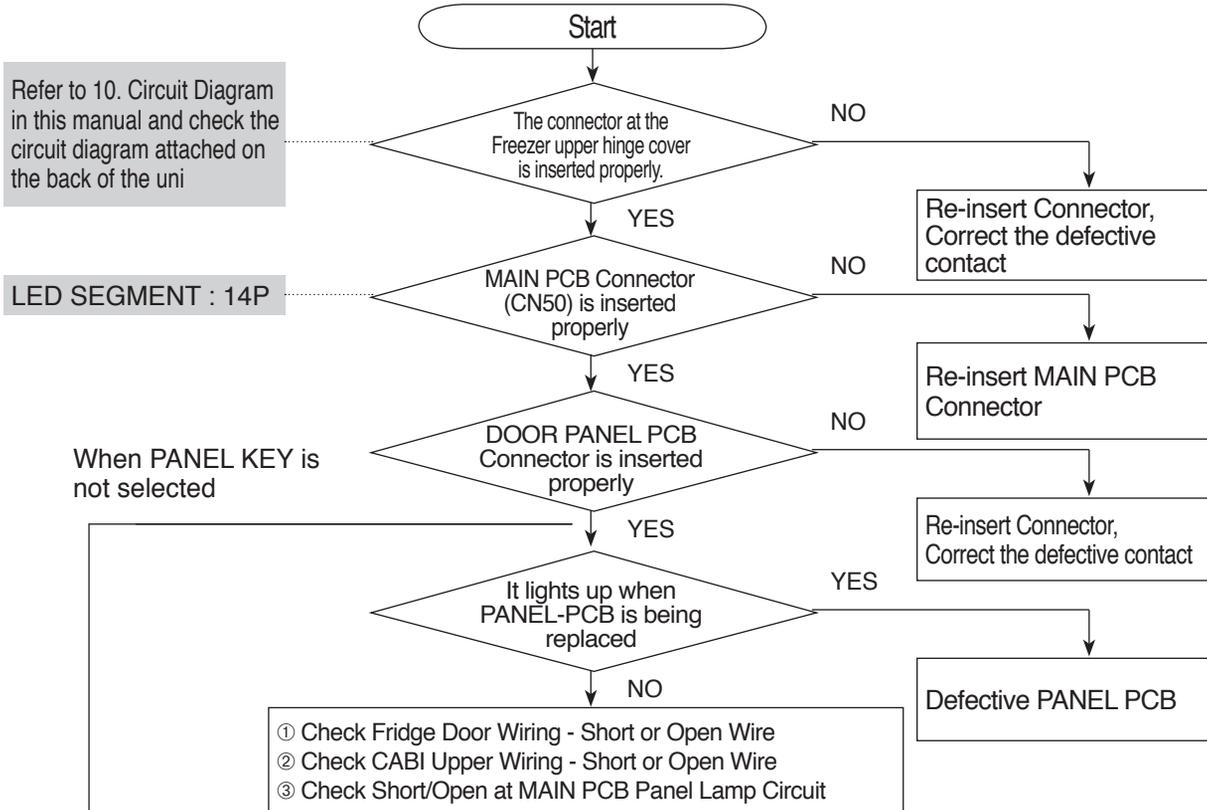
※ It may not be able to check when it is a closed built-in environment and there is lots of noise around.



4. TROUBLESHOOTING

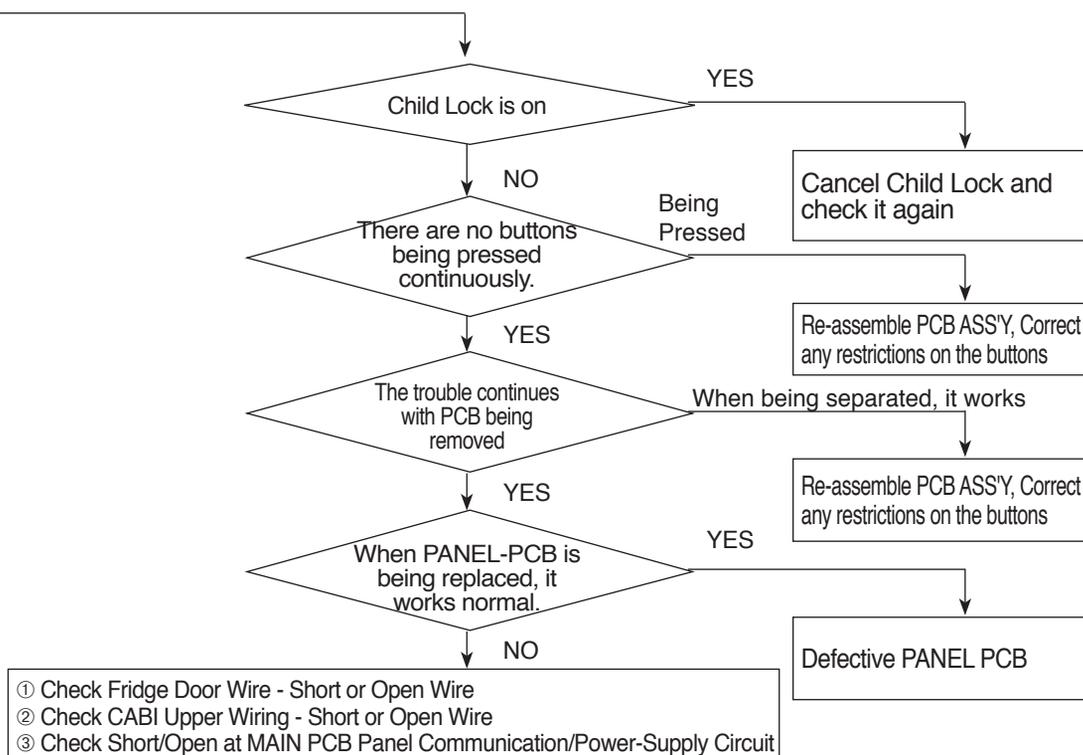
4-2-7) When the Panel PCB does not work properly

1) When PANEL PCB does not light up or partially does



2) When Panel PCB buttons are not working

※ When the trouble is being remained after the above,



4. TROUBLESHOOTING

4-2-8) When the fridge lamp does not turn on

Caution

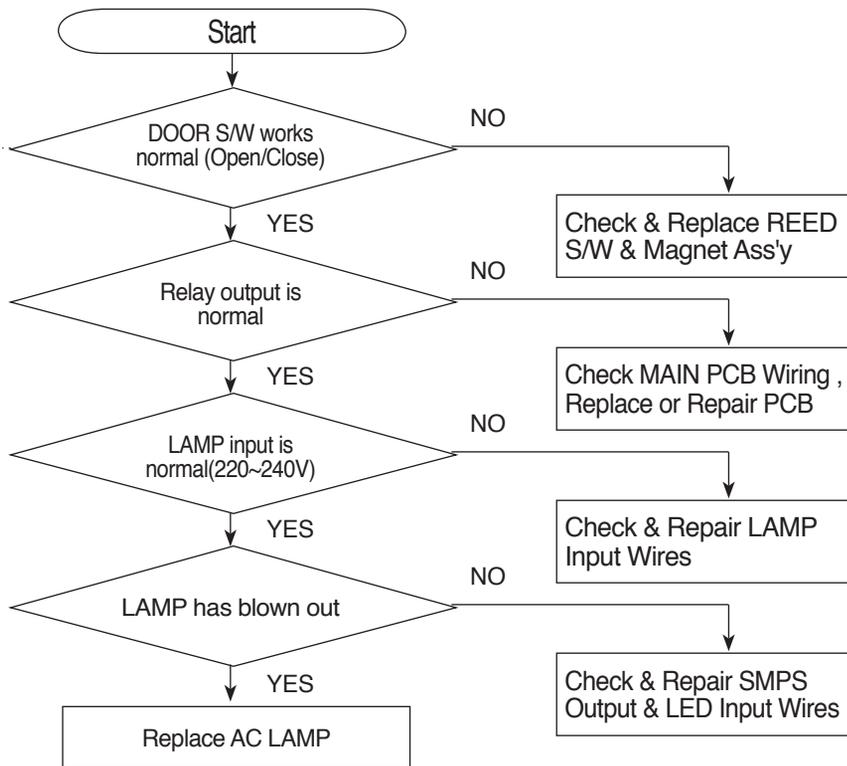
1. When replacing the Fridge Lamp (incandescent lamp), be sure to turn off the power to prevent electric shock.
2. Take care when replacing the incandescent lamp to prevent skin burn.

When the lamp is controlled with Relay + SMPS (LED lamp is used).

DOOR & MICOM STATE	
Door	MICOM(#48)
Close	0V
Open	5V

<Note>

The Room Lamp Relay switches on & off when the door gets opened and closed. When the lamp does not light up, check the relay operation with its switching sounds by opening & closing the door.



< Lamp Control Process >

DOOR S/W(REED S/W) → PBA MAIN MICOM Input → RELAY Output (LAMP Control) → AC LAMP

When measuring the lamp resistance, the reading varies depending on the lamp input voltage. (The reading in the photo below is an example.)



Fridge Lamp
CN71-"1"(Black) ↔ "1"(Pink) ; 89Ohm ± 7%
Lamp ; 40W

How to measure Door Switch Voltage

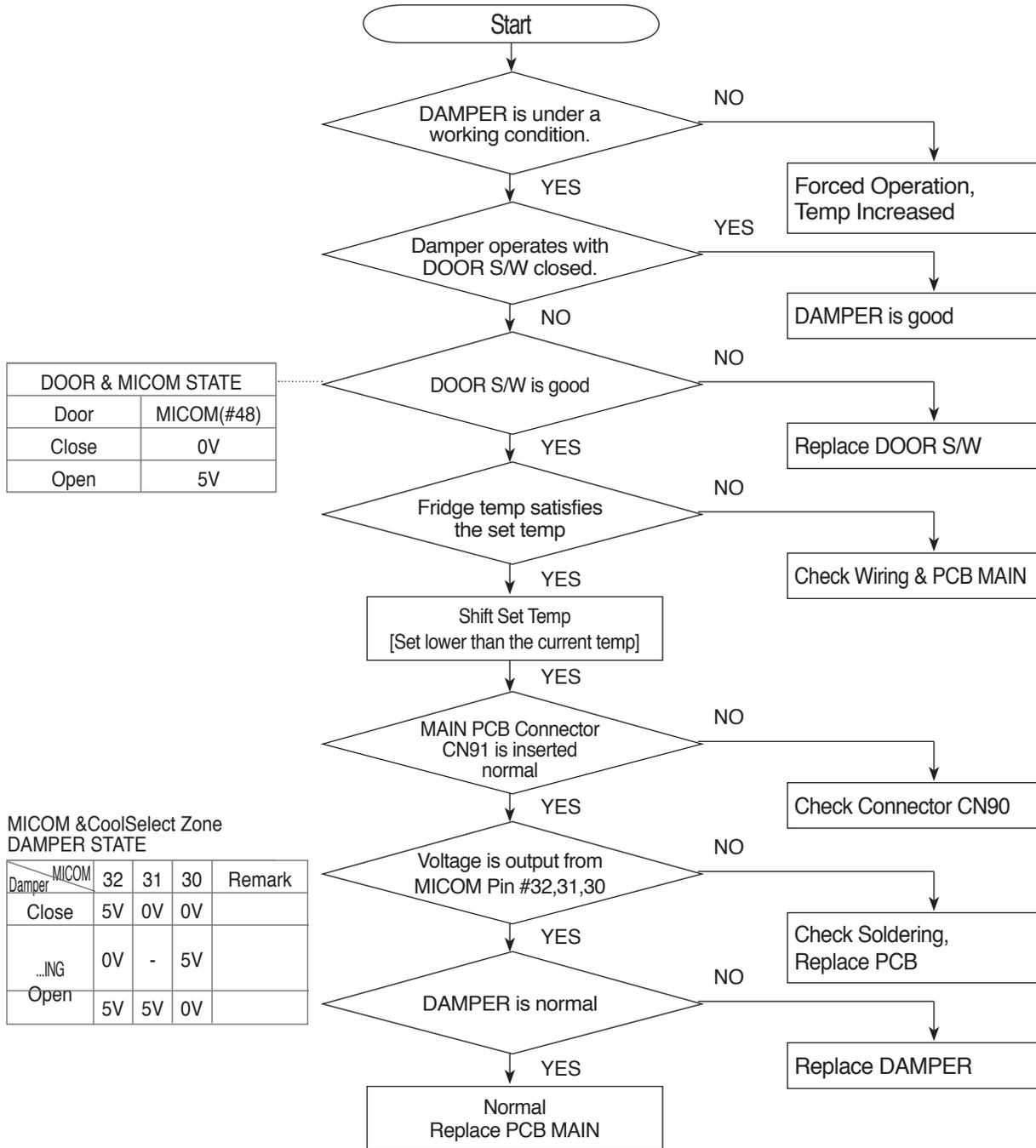
- Measure voltage between the Common PCB Ground and CN30-"5"(Red).
- Open : 5V ± 0.5V , Close : 0V

Common PCB Ground
CN10-"3"(Black)



4. TROUBLESHOOTING

4-2-9) When the Refrigerator Damper does not work



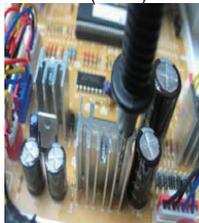
DOOR & MICOM STATE	
Door	MICOM(#48)
Close	0V
Open	5V

MICOM & CoolSelect Zone DAMPER STATE					
Damper	MICOM	32	31	30	Remark
Close		5V	0V	0V	
...ING		0V	-	5V	
Open		5V	5V	0V	

How to measure Door Switch Voltage
 - Measure voltage between the PCB Ground and the CN30-5"(Red) voltage.
 - Open : 5V ± 0.5V , Close : 0V



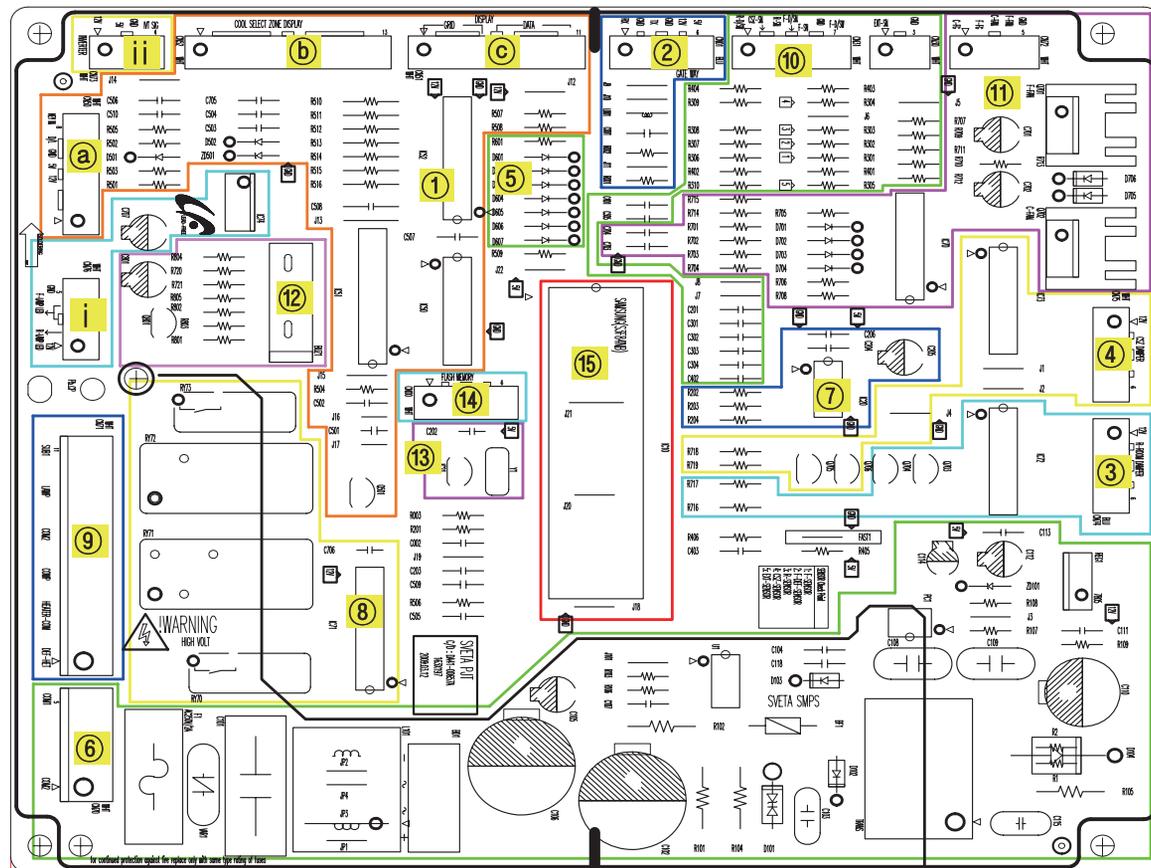
Common PCB Ground CN10-3"(Black)



5. PCB DIAGRAM

5-1) PART ARRANGEMENT (Main Board)

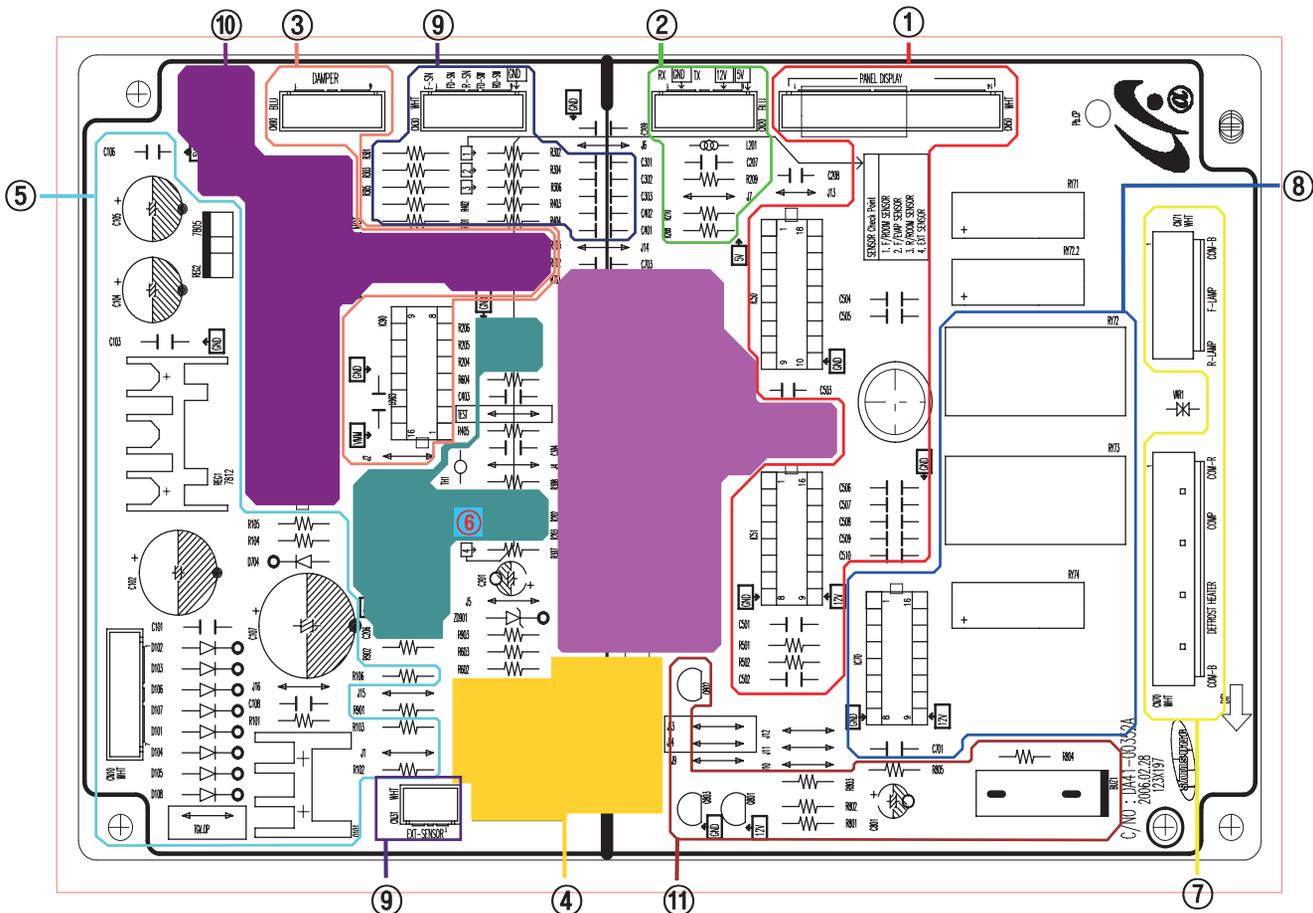
5-1-1) LCD MODEL



1. It controls communication signals between PANEL ↔ MAIN PCB (Button Input & Display Reaction)
 - ⓑ : LED Display Connector(Optional)
 - ⓒ : LED Display Connector(Optional)
2. Power Line Communication Circuit (PLC Input/Output)
 - PLC (Power Line communication)
 - * Option (Not available except for special applications)
3. It controls the Fridge Damper and the Damper Heater (Option).
4. It controls the Coolselect Zone Damper and the Damper Heater (Option).
5. It is the Diode Option setting area for option setting.
6. DC12V,5V and GND power are supplied from the SMPS PCB.
7. EEPROM : It stores various kinds of data.
8. It is a relay for AC load controlling and operates with the MICOM driving signals received from the Sink IC.
9. Connector for AC Load
10. By receiving various sensor signals, the MICOM eliminates noise and detects the door open/close.
11. Fan Motor Driver : It supplies 8V~12V to various motors (Option).
12. Buzzer Alarm Circuit (Button Input Sound & Door Open Alarm)
13. MICOM, Clock Generation & Software Reset Circuit
14. FLASH MEMORY Write Connector
15. Main Micom (CPU)
 - i . LED LAMP Control Circuit (F, R LAMP)/(Optional)
 - ii . INVERTER COMP. Signal (Option)

5. PCB DIAGRAM

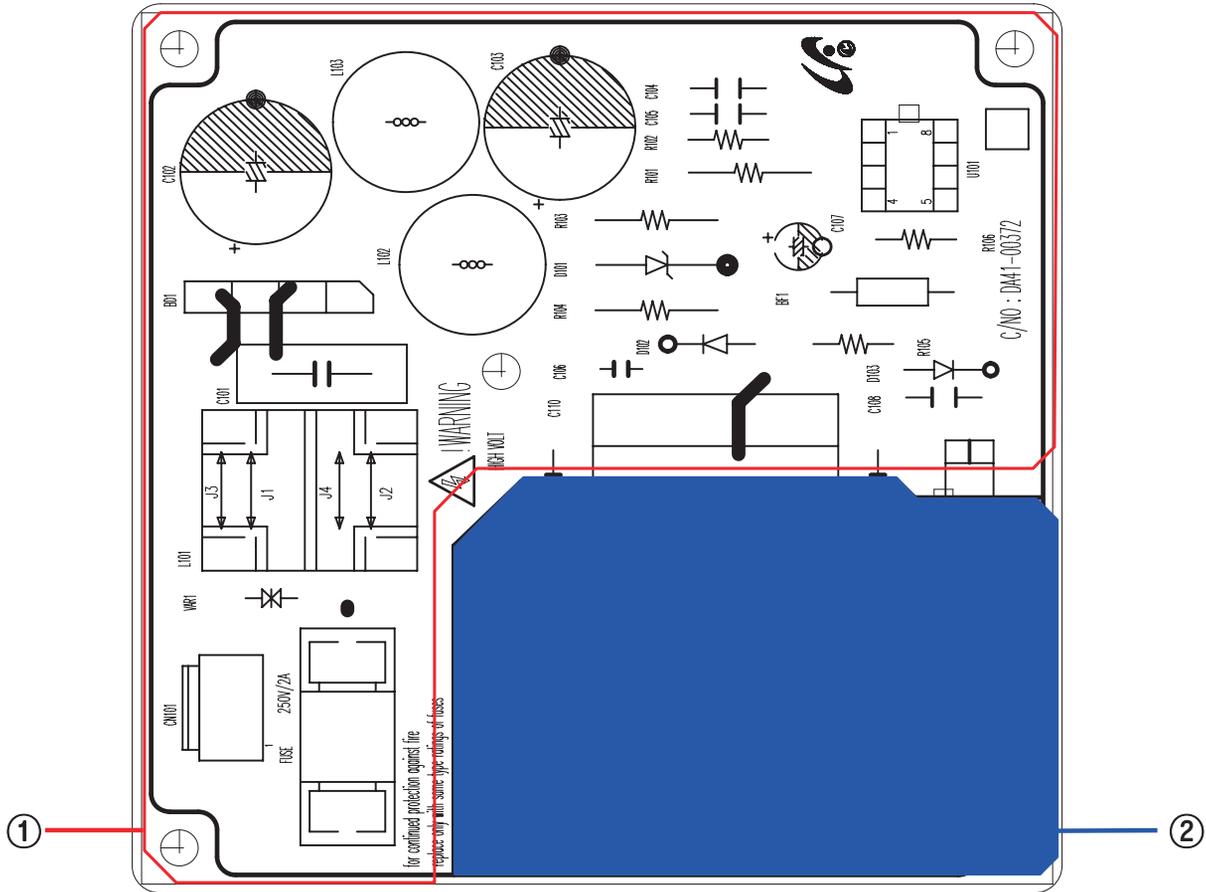
5-1-2) LED MODEL



1. Perform the role of managing interface in panel ↔ main pcb communication signal (key input and display indication)
2. Power line communication circuit (plc input/output part)
3. Operating role of cold room damper and damper heater
4. Diode option setting part for option setup
5. Pcb power terminal trans input and micom power and load power terminal supply (damper heater) supply power from cn10 connector
6. Eeprom: save/write every data
7. Connector part that connects ac load
8. Operate receiving driving signal of micom through sink ic by controlling ac load to replay part
9. Transfer noise to micom by removing as receiving inputs of every sensor signals and sense door open of cold room
10. Supply power to motor by types of motor till 10v-12v of fan motor driving part
11. Buzzer alarm part (key input & operate alarm in consistent interval when opening door)
12. Occurrence of micom and clock & software reset part

5. PCB DIAGRAM

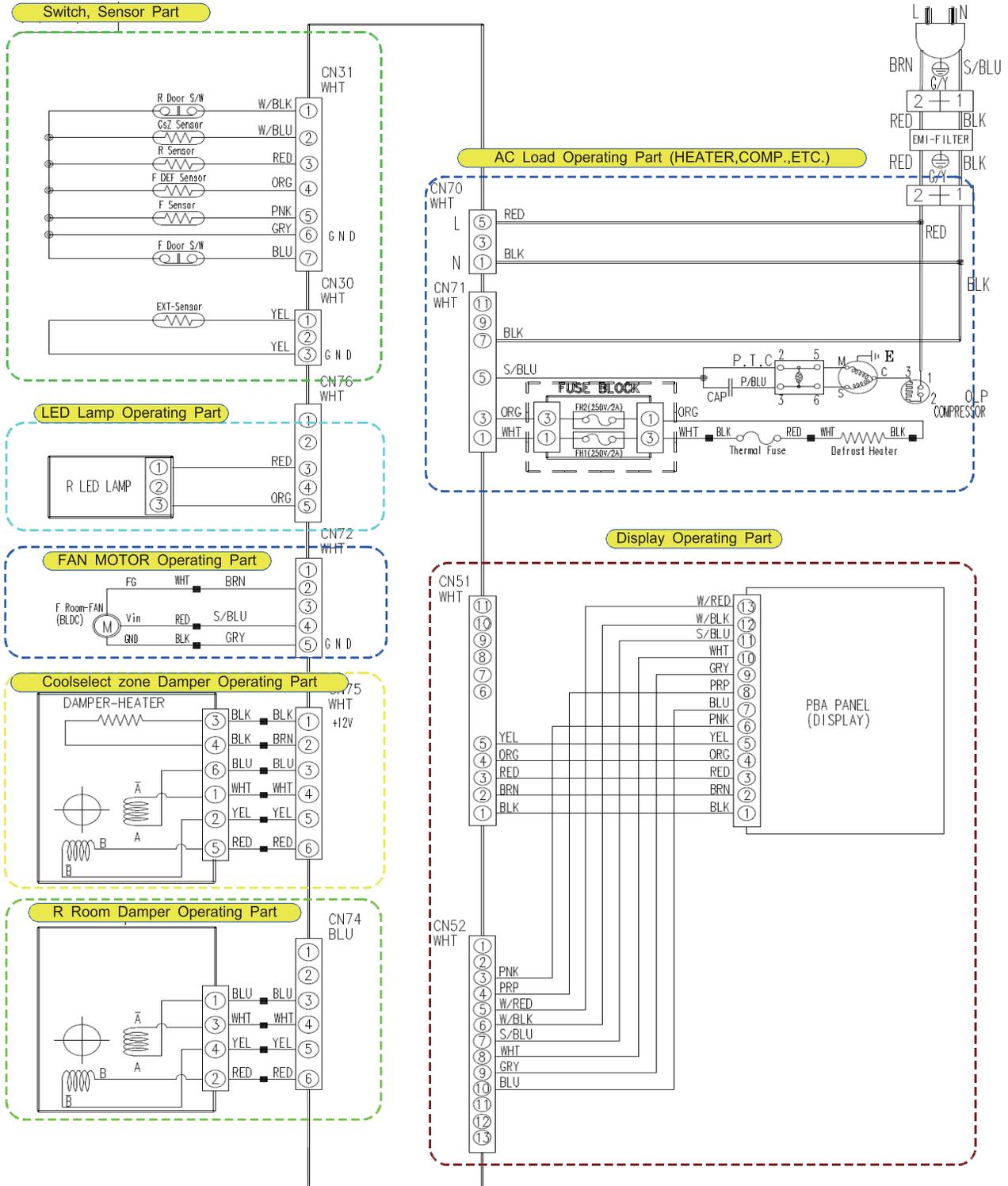
5-1-3 LCD MODEL (PBA SMPS-LED SUB) / OPTION



1. AC input (it's option setting and power input of led lamp controlling. It supplies input power by power supplied from pba main.
2. Dc output output for led lamp power supply

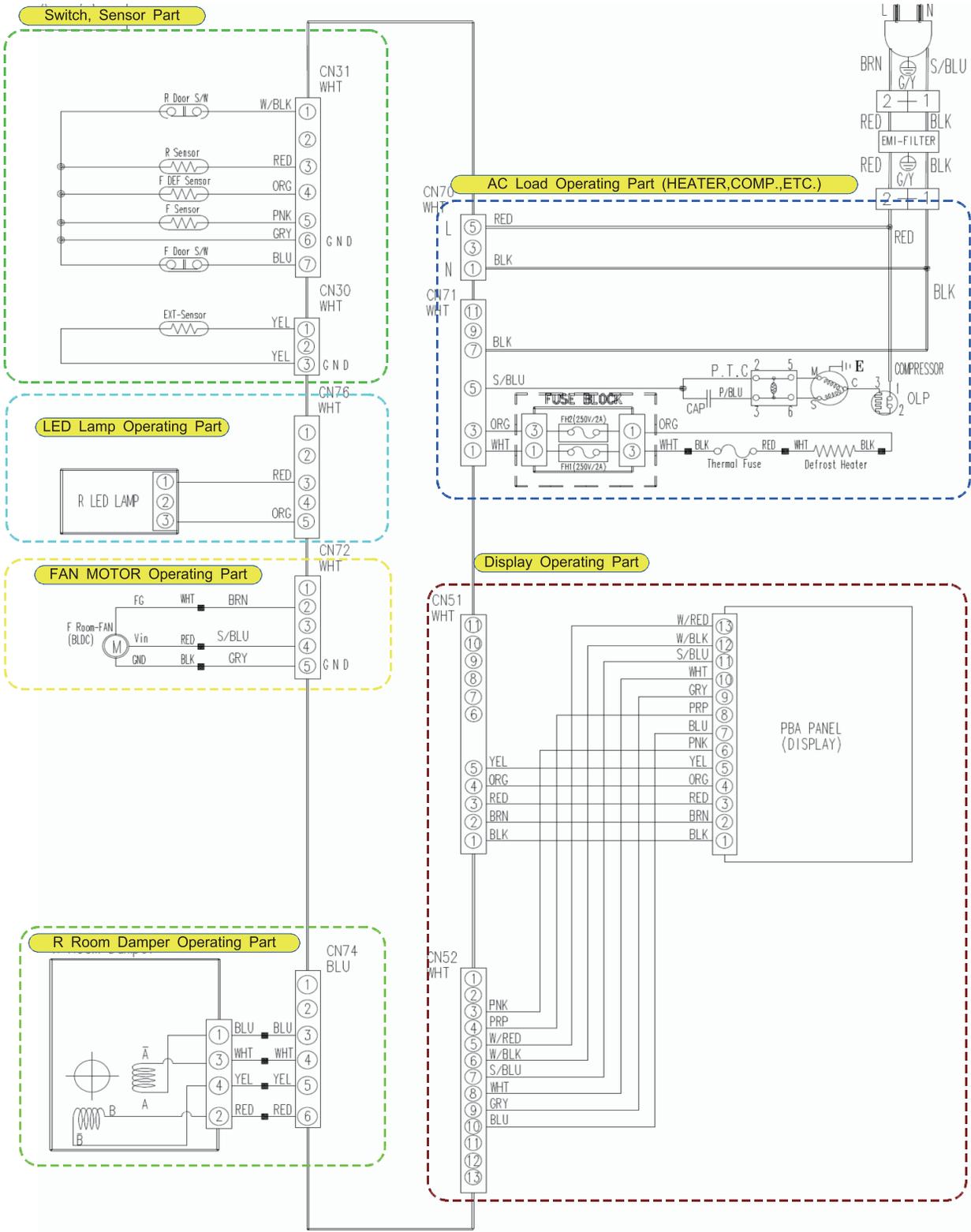
6. WIRING DIAGRAM

6-1) Model : (Q)



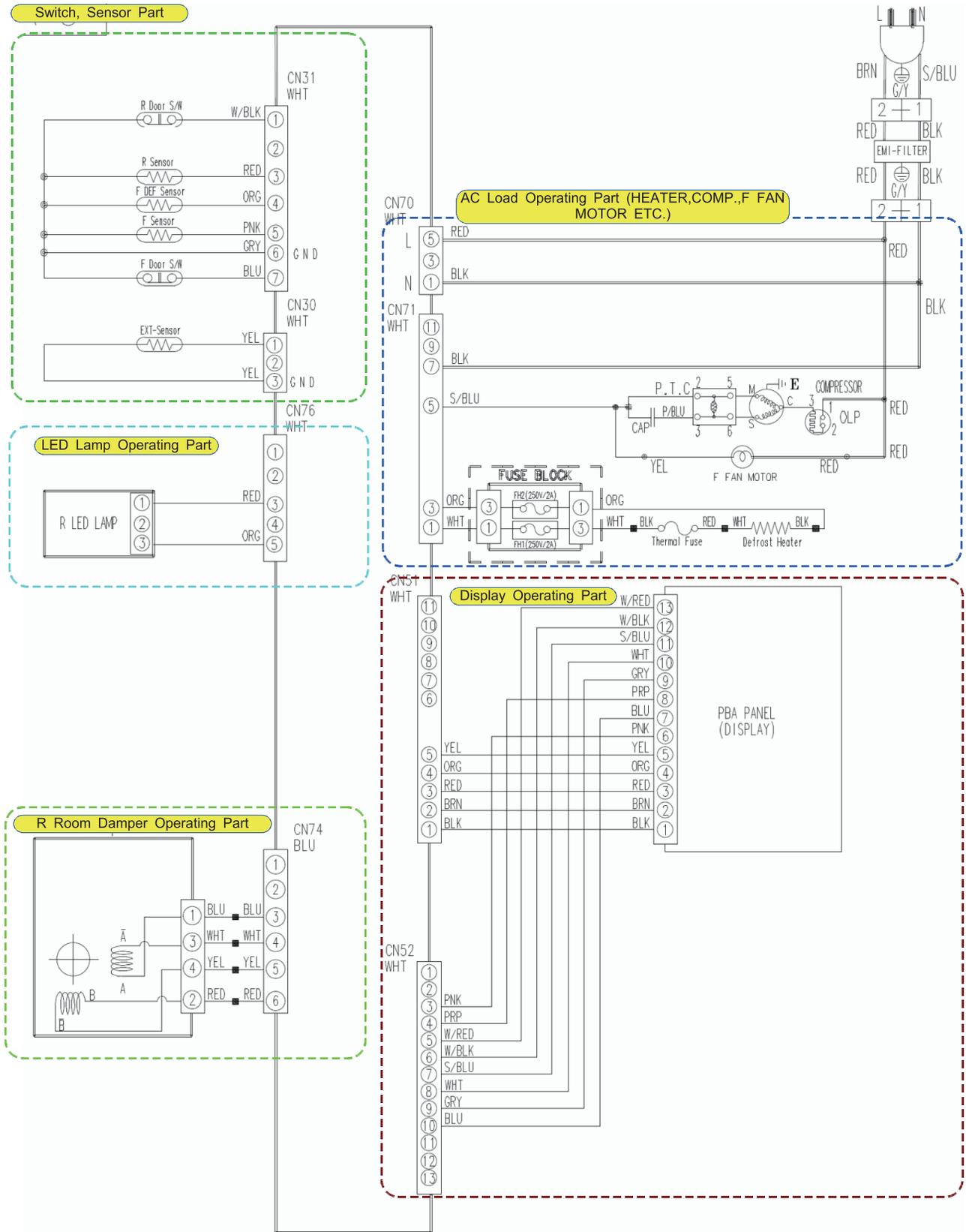
6. WIRING DIAGRAM

6-2 Model : (H)



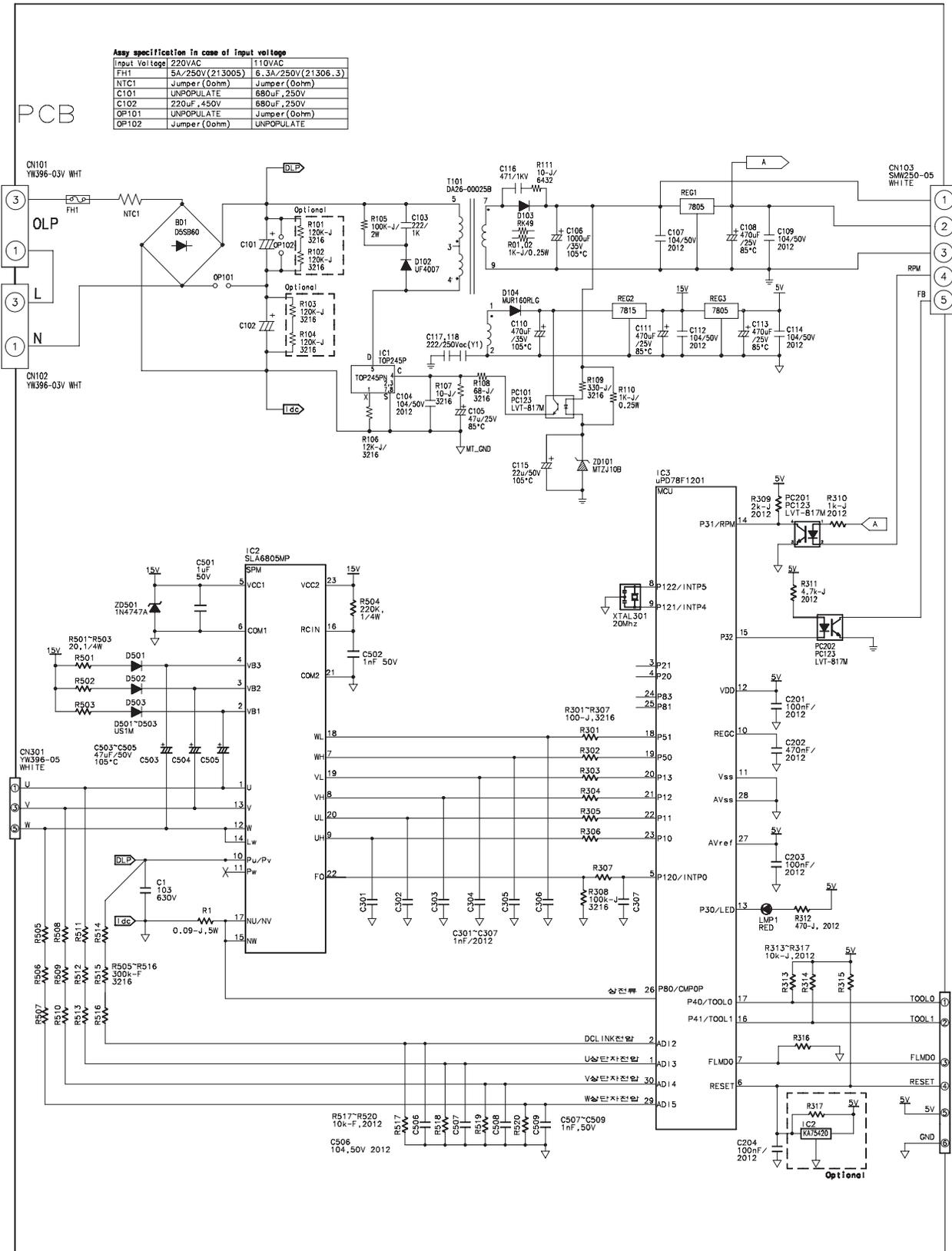
6. WIRING DIAGRAM

6-3 Model : (E,W)



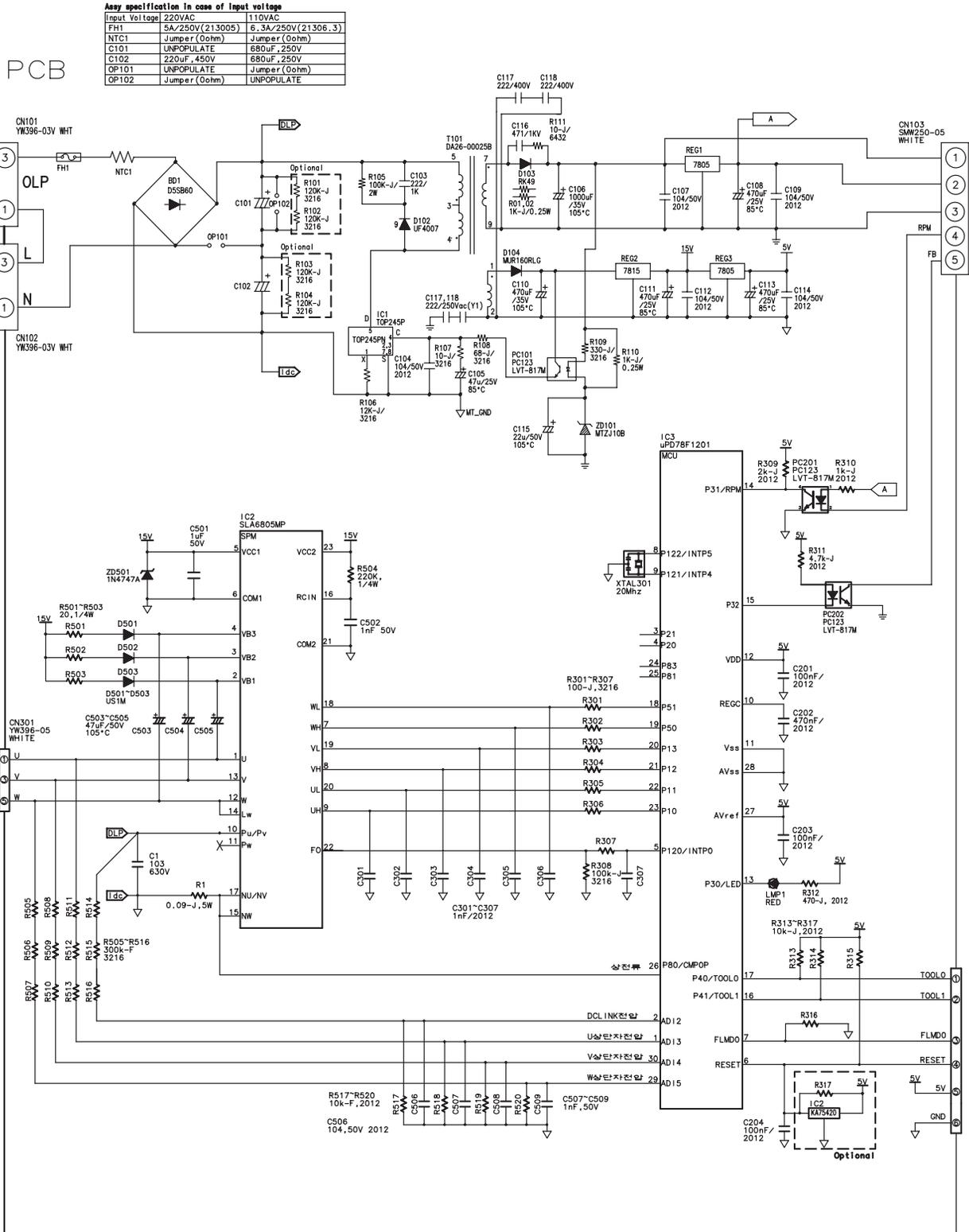
6. WIRING DIAGRAM

6-4) Block Diagram (PBA Main)



6. WIRING DIAGRAM

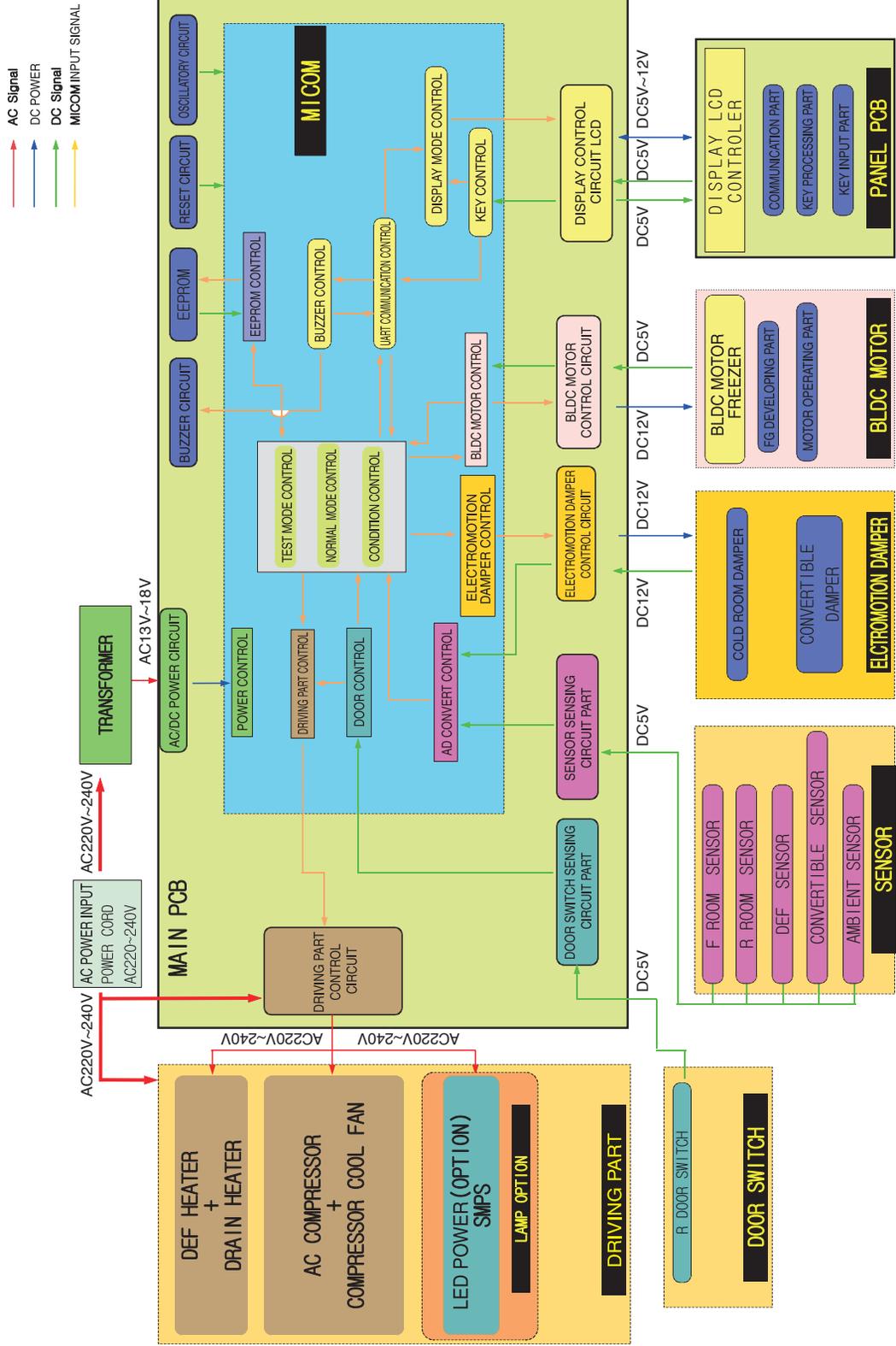
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7. CIRCUIT DIAGRAM

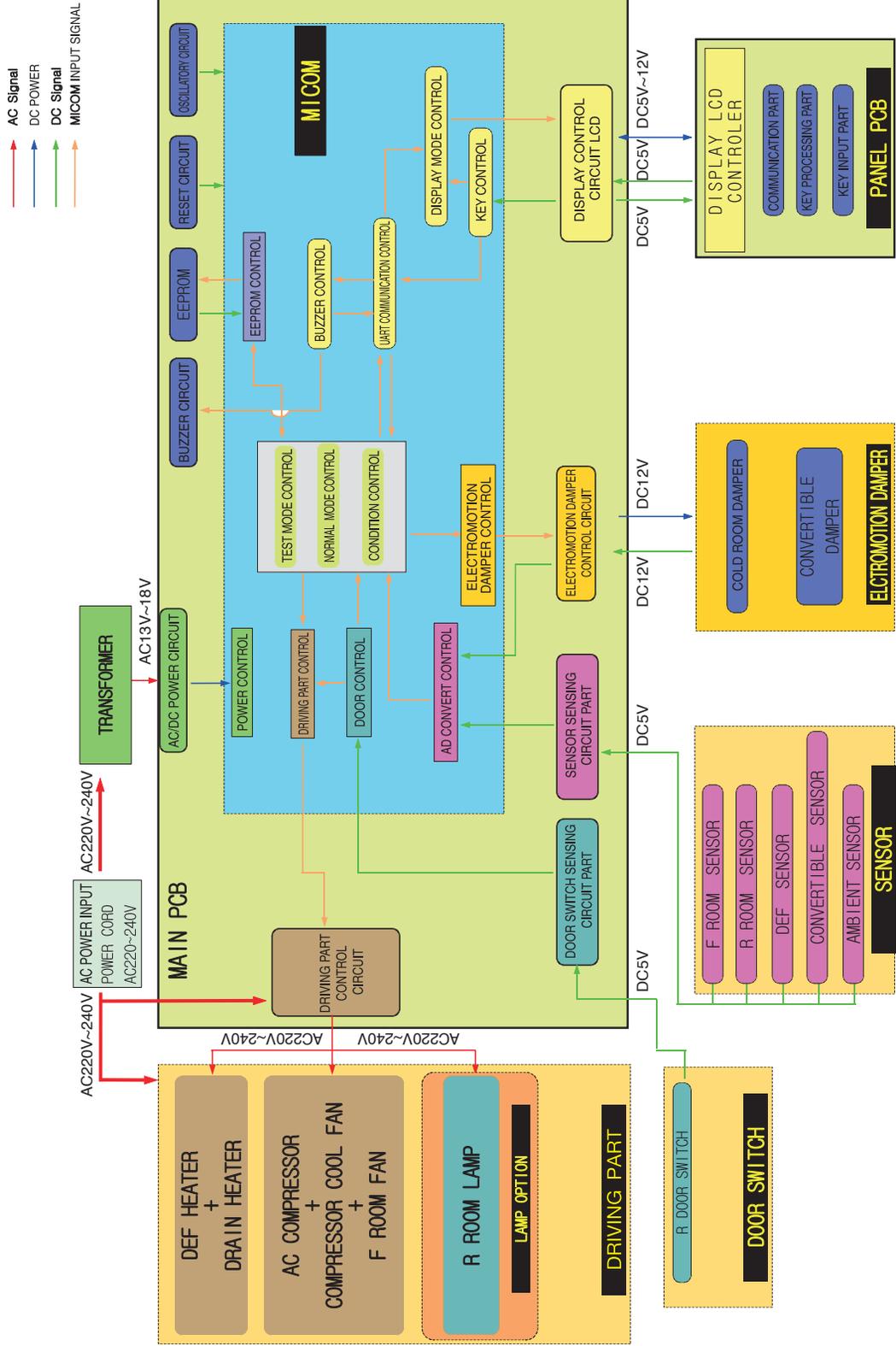
7-1) BLOCK DIAGRAM

7-1-1) RL50Q*** (LCD Display + BLDC Motor)-BULB TYPE



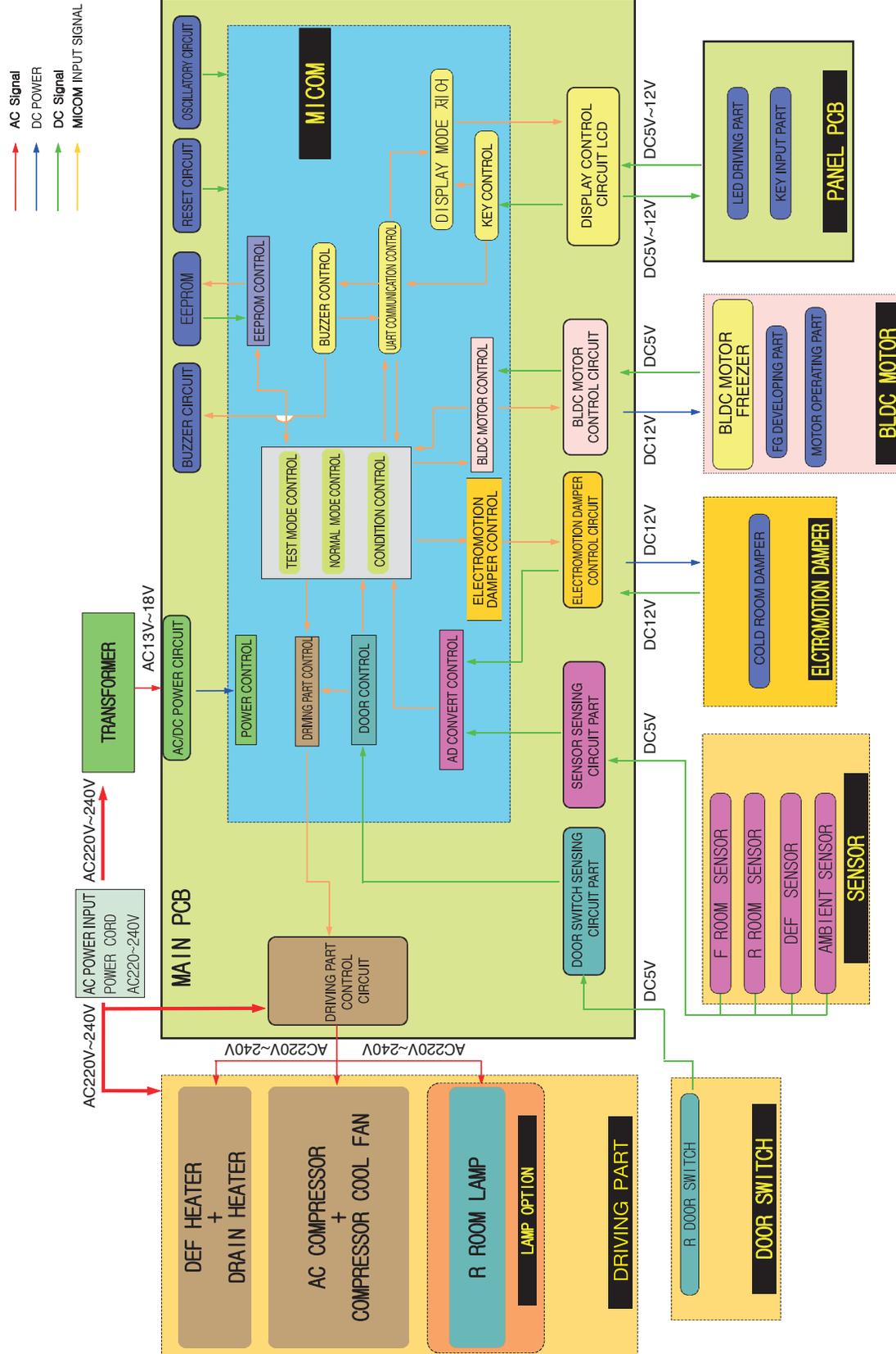
7. CIRCUIT DIAGRAM

7-1-2) RL50/48F**(LCD Display + AC Motor)-BULB TYPE



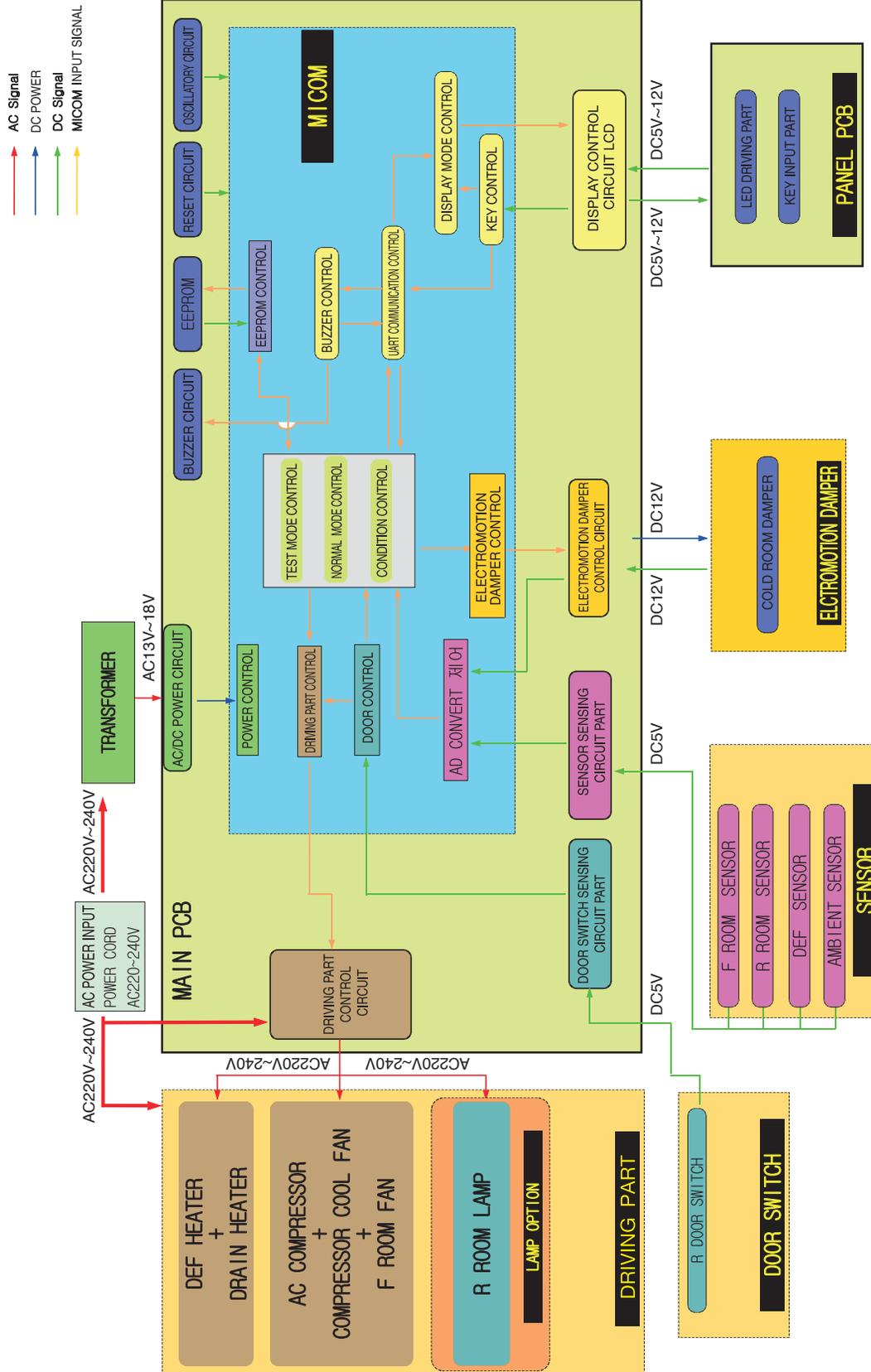
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7-1-3) RL48/46H,50/48P***(LED Display + BLDC Motor)-BULB TYPE



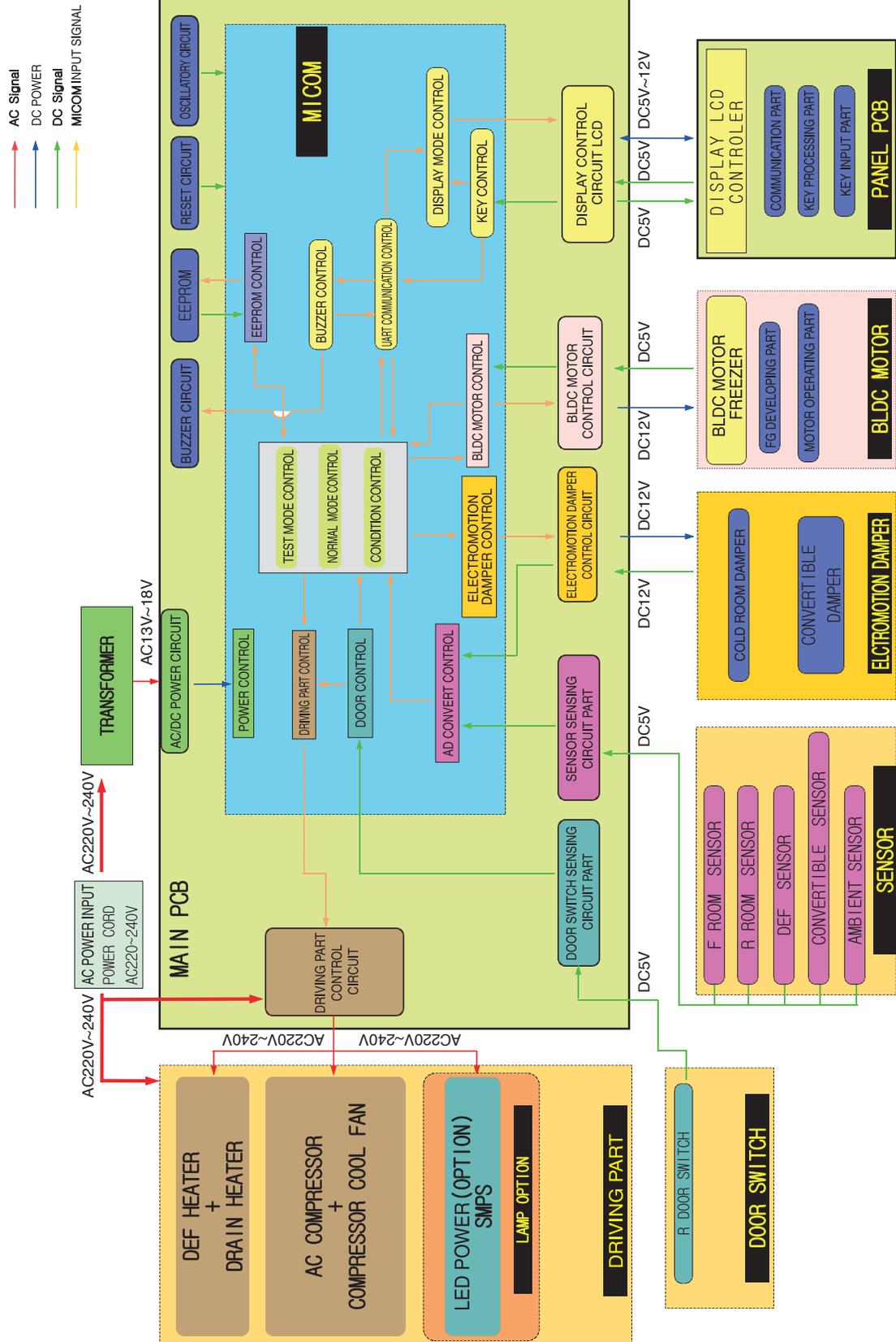
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7-1-4) RL50(48,46)E(W)*** (LED Display + AC Motor)-BULB TYPE



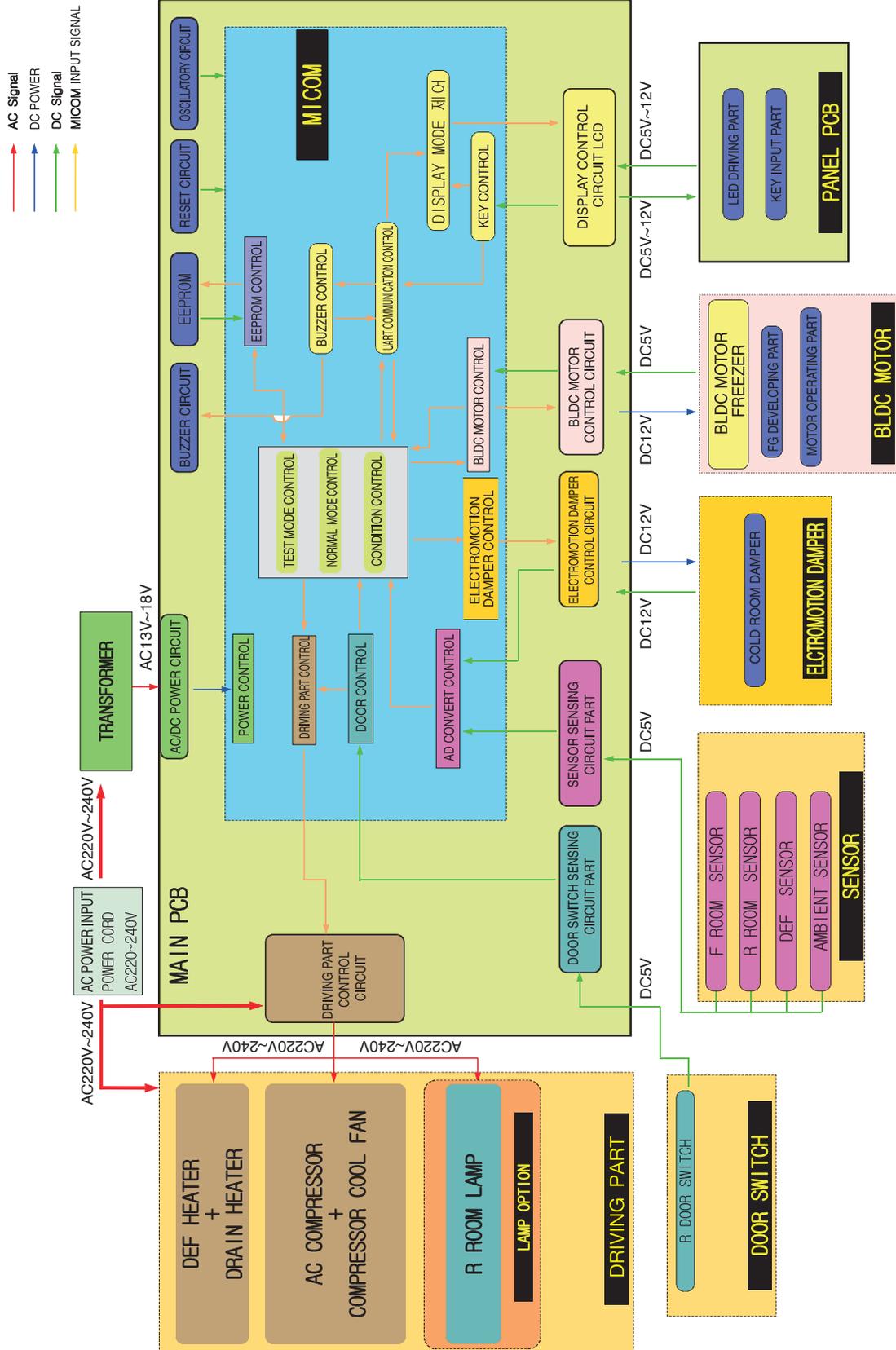
7. CIRCUIT DIAGRAM

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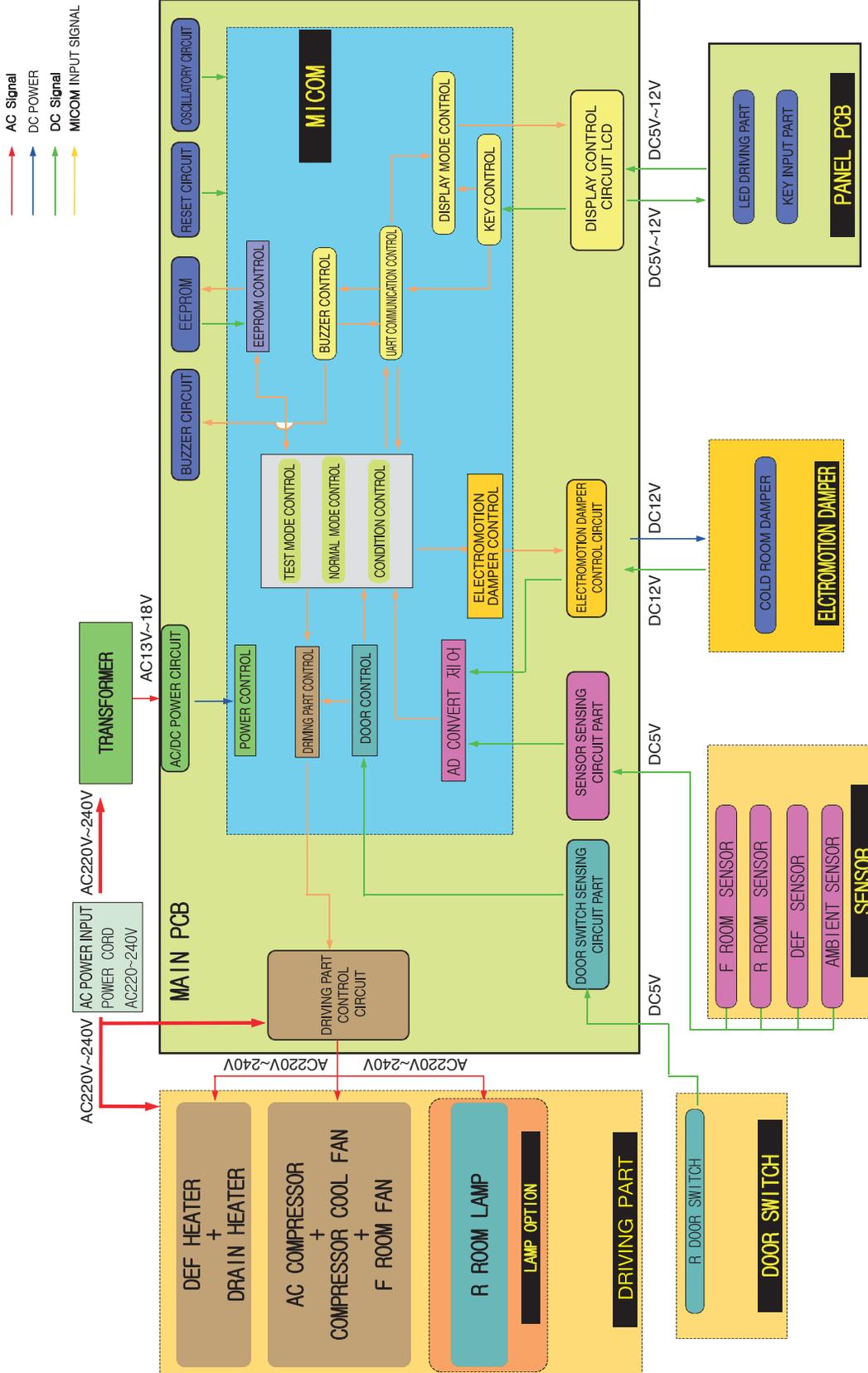
7. CIRCUIT DIAGRAM

7-1-6) RL48/46H,50/48P*** (LED Display + BLDC Motor)-LED TYPE



7. CIRCUIT DIAGRAM

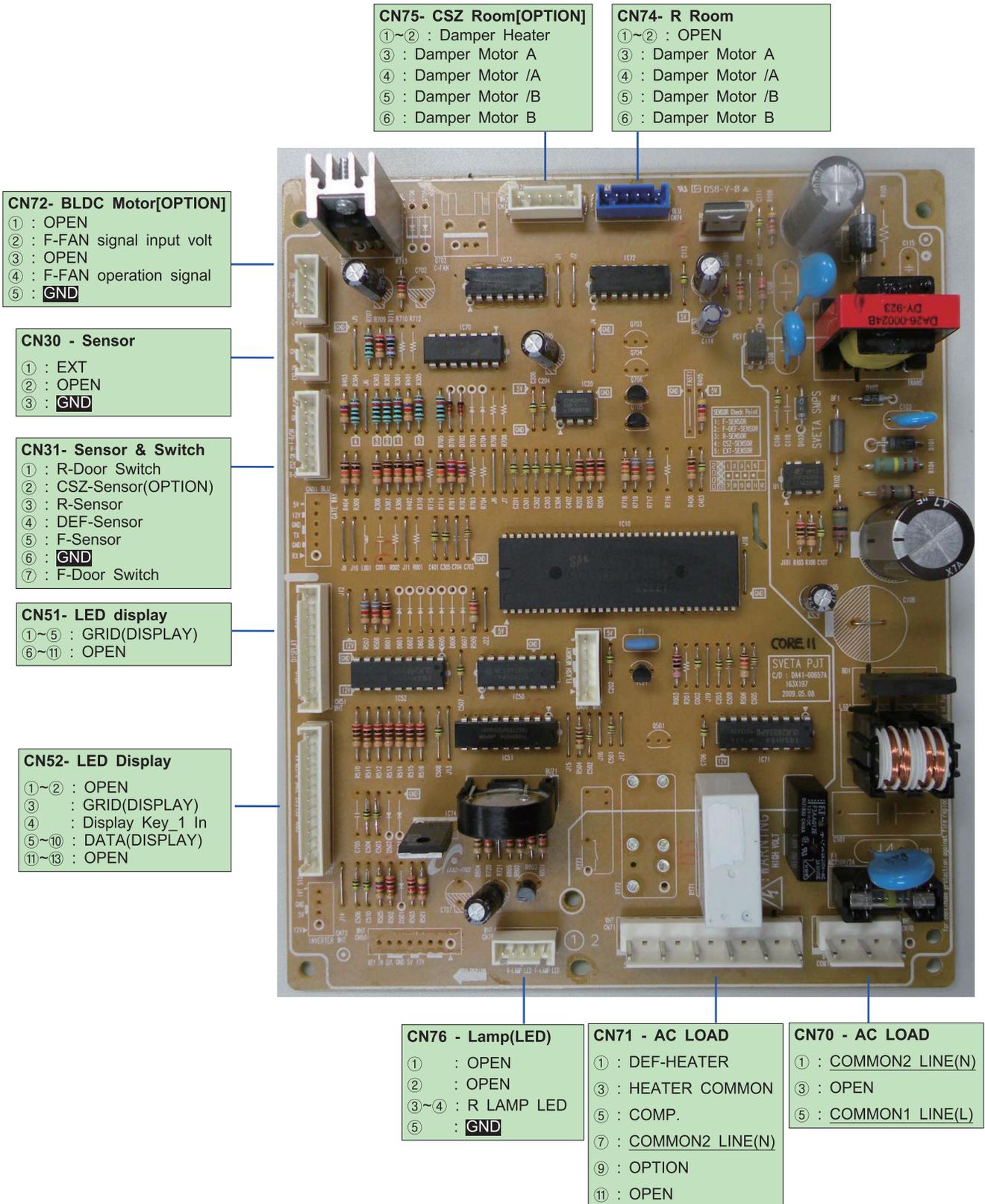
7-1-7) RL50(48, 46)E(W)*** (LED Display + AC Motor)-LED TYPE



7. CIRCUIT DIAGRAM

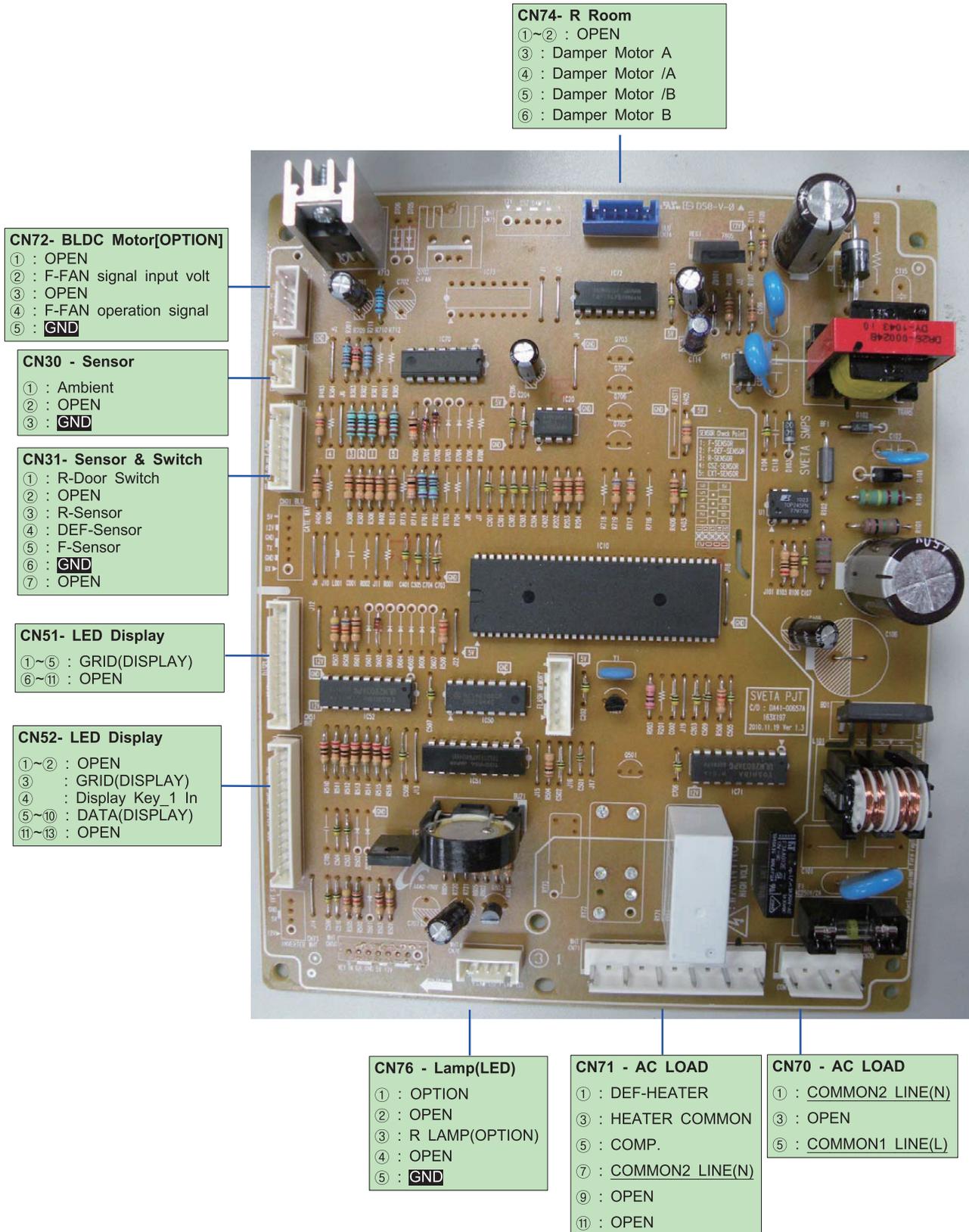
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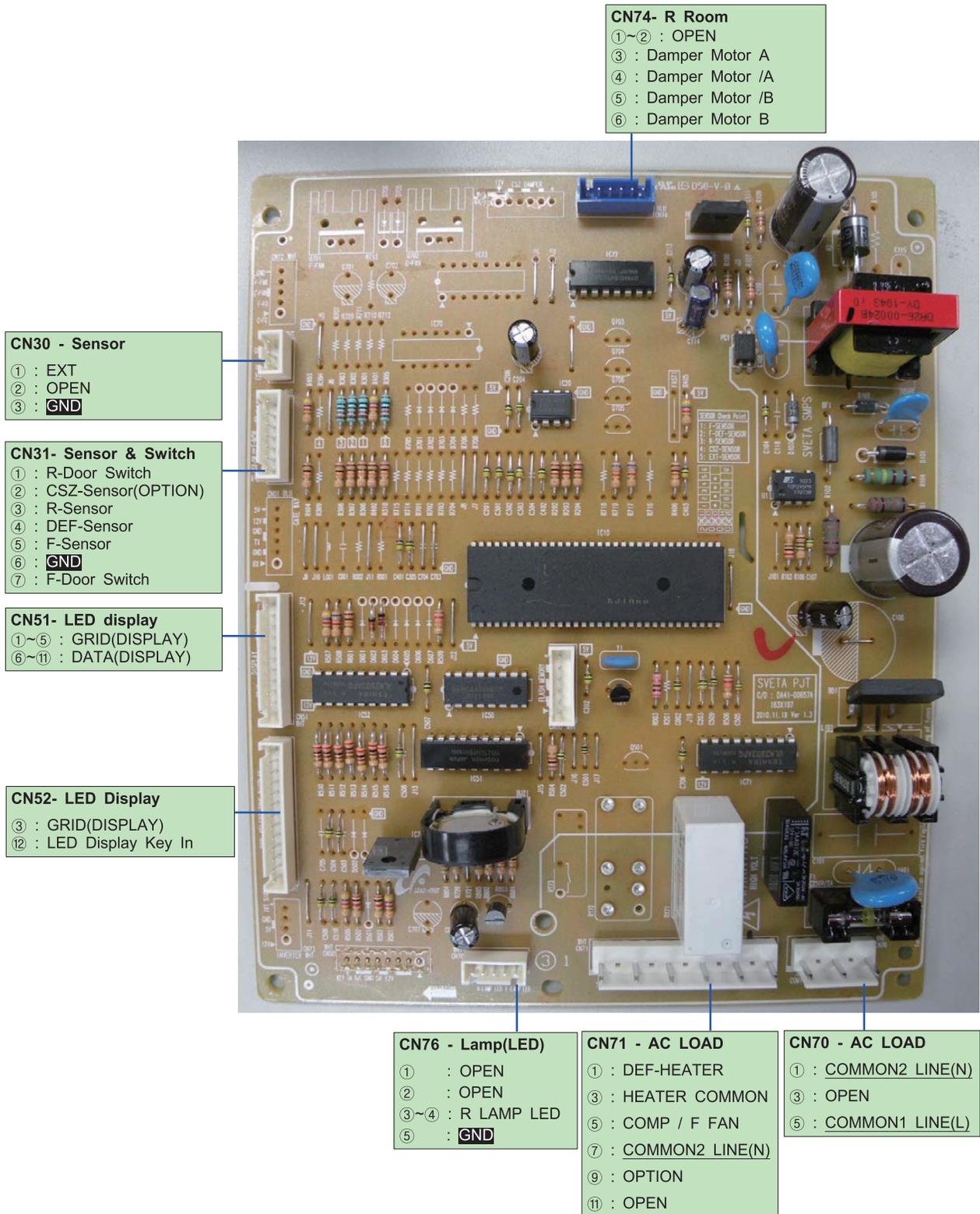
7. CIRCUIT DIAGRAM

7-2-2 Main (H, BLDC)



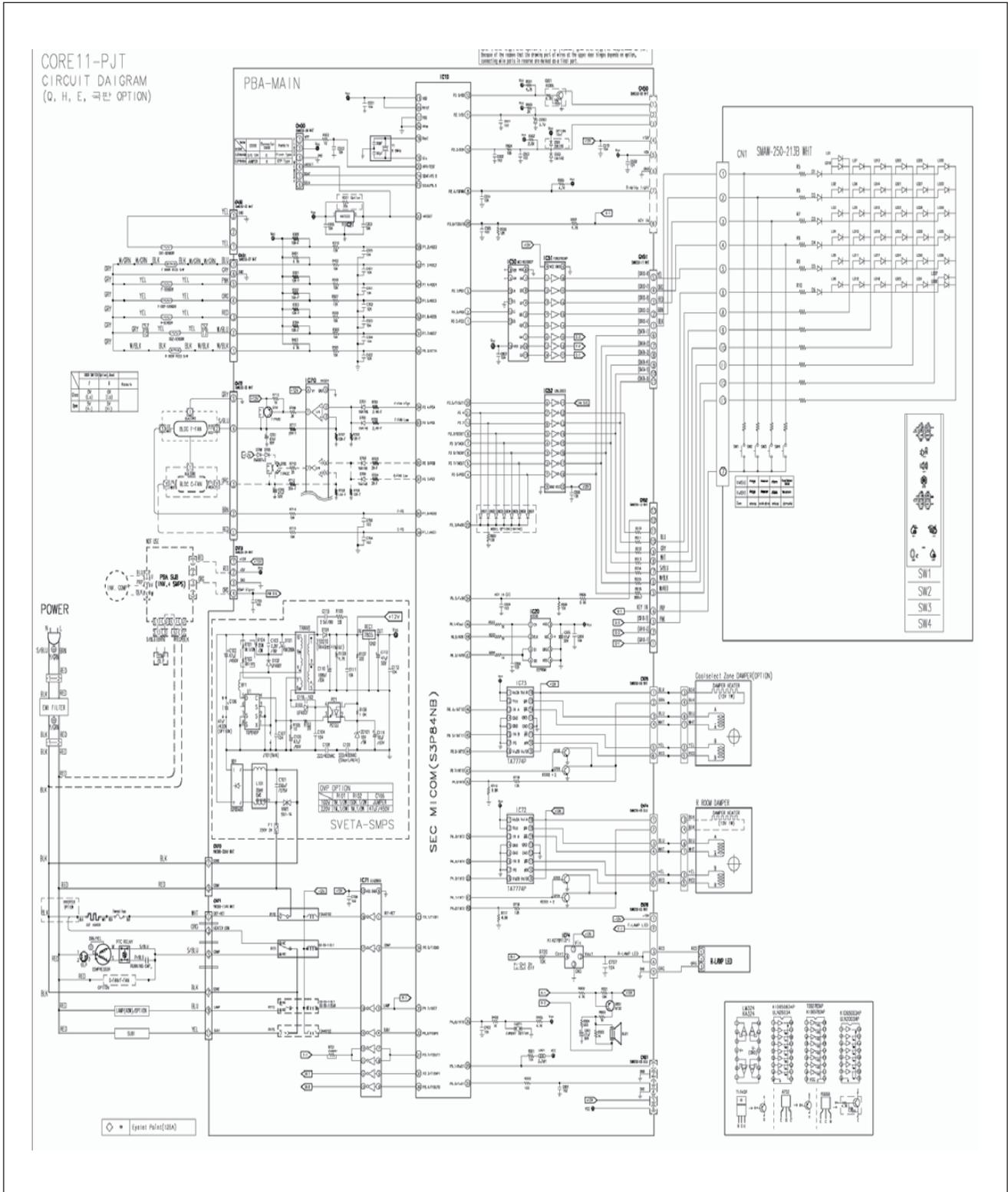
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7. CIRCUIT DIAGRAM

7-3) CIRCUIT DIAGRAM



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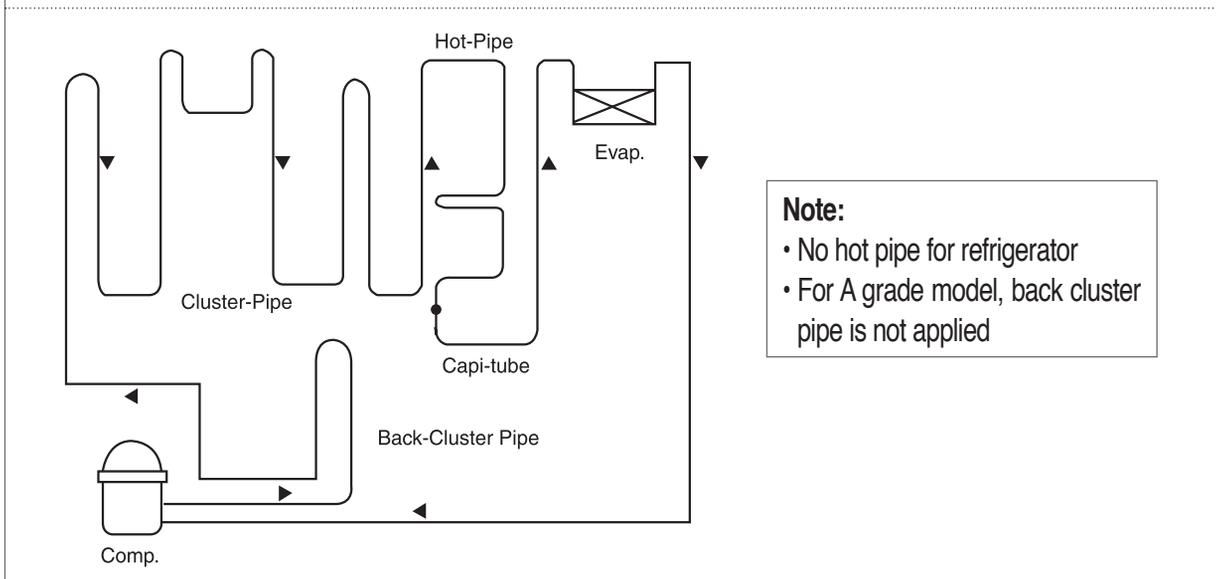
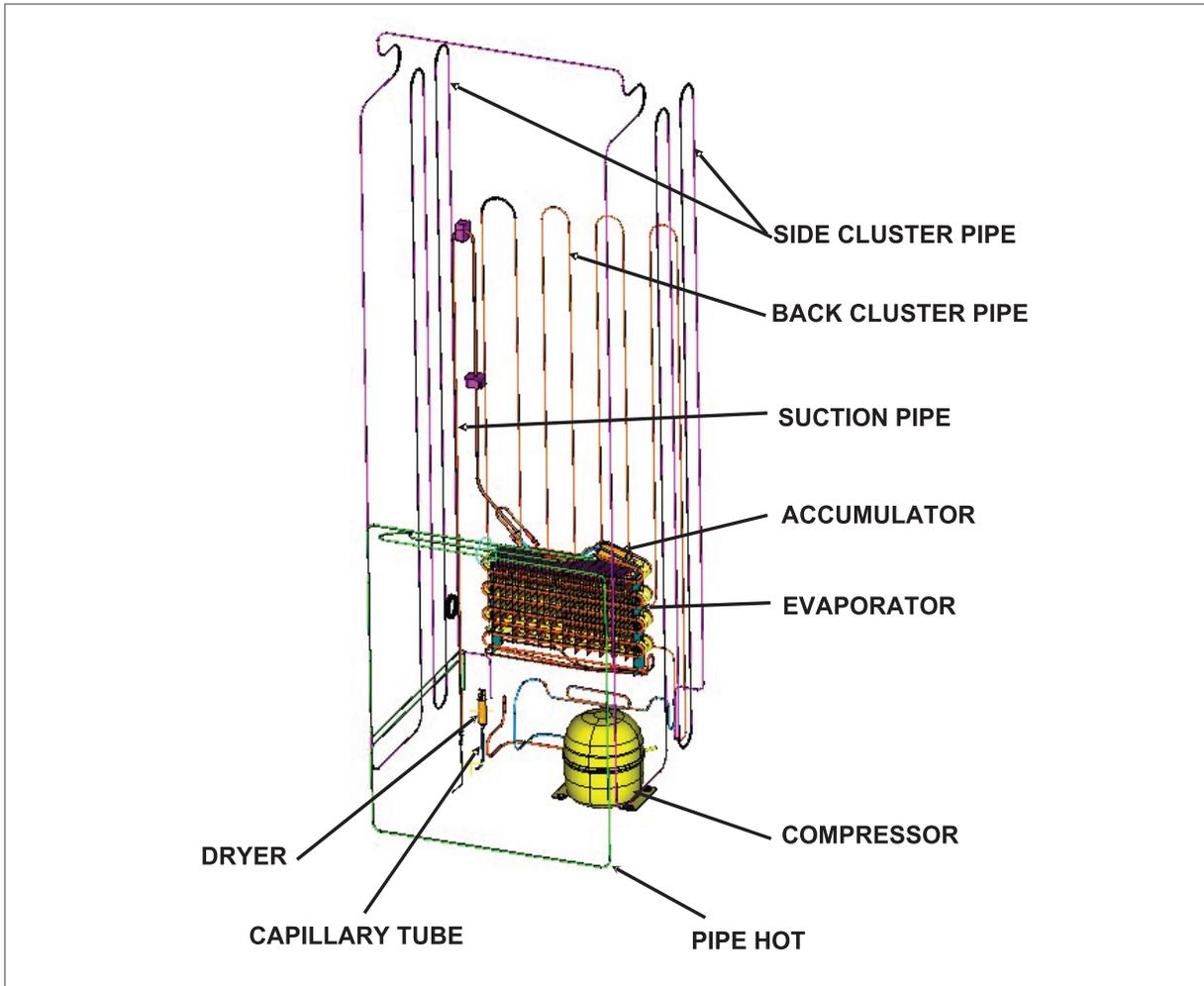
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8. REFERENCE INFORMATION

8-1. Refrigeration Cycle

[Refrigerant cycle]

Compressor → (Back cluster) → Side cluster → Freezer Hot pipe → Dryer → Capillary tube → Freezer Evaporator → Suction pipe → Compressor



8. REFERENCE INFORMATION

8-1-1) Temperature Control

1) Freezer Temperature Setting

1-1) When the unit is plugged into power, the Freezer and the Fridge compartments are to be set to $-20\text{ }^{\circ}\text{C}$ and $3\text{ }^{\circ}\text{C}$ respectively.

At this time, the Fridge temperature showing on the display panel indicates its target temperature to reach. So, as its inside temperature goes down, the display temperature goes down until it gets down to its setting temperature. After this, it shows only the setting temperature.

(Temperature range to be set: Freezer Room ($30\text{ }^{\circ}\text{C}\sim 35\text{ }^{\circ}\text{C}$), Fridge Room ($9\text{ }^{\circ}\text{C}\sim 0\text{ }^{\circ}\text{C}$))

1-2) To set the Freezer temperature, press the Freezer Button.

Then, its temperature can be set to $-14\text{ }^{\circ}\text{C}\sim -25\text{ }^{\circ}\text{C}$ with the Freezer Button in the following order.

→ $-20\text{ }^{\circ}\text{C}\rightarrow -21\text{ }^{\circ}\text{C}\dots\dots\rightarrow -25\text{ }^{\circ}\text{C}\rightarrow -14\text{ }^{\circ}\text{C}\rightarrow -15\text{ }^{\circ}\text{C}\rightarrow -16\text{ }^{\circ}\text{C}\dots$

The temperature will circulate for selection.

2) Fridge Temperature Setting

2-1) To set the Fridge temperature, press the Fridge Button.

Then, its temperature can be set to $7\text{ }^{\circ}\text{C}\sim 1\text{ }^{\circ}\text{C}$ with the Fridge Button in the following order.

Example : → $3\text{ }^{\circ}\text{C}\rightarrow 2\text{ }^{\circ}\text{C}\rightarrow 1\text{ }^{\circ}\text{C}\rightarrow 7\text{ }^{\circ}\text{C}\rightarrow 6\text{ }^{\circ}\text{C}\rightarrow 5\text{ }^{\circ}\text{C}\rightarrow 4\text{ }^{\circ}\text{C}$

2-2) The Freezer / Fridge setting temperatures may show a little difference depending on the amount of food stocked inside and the ambient temperature. (When food is stored too close to the temperature sensors inside, it could cause inaccurate temperature sensing and result in insufficient or excessive cooling. So, make sure that the food is not placed too close the sensors.)

NOTE When there is a power failure, EEPROM stores its temperature setting. So, when the power comes back, it reads its Freezer temperature. And, when the Freezer temperature is lower than $5\text{ }^{\circ}\text{C}$, MICOM considers it as an instant power failure and displays the stored temperature settings.

8. REFERENCE INFORMATION

8-1-2) Power Freeze & Vacation Function

1) Power Freeze Function

- 1-1) To activate or deactivate, Press the Freeze button for 3 second Select button.
When 'Super Freeze' is selected, its Indicator lamp lights up immediately but it starts operating in 10 sec.
- 1-2) When Super Freeze is selected, Compressor & Freezer Fan operates continuously for 2 and a half hours.
- 1-3) During Super Freeze, the Fridge compartment continues its previous operation.
- 1-4) After the termination of Super Freeze, its indicator lamp goes off automatically and the Freezer compartment operates according to the set temp.
- 1-5) When it becomes conditions for Defrost during Super Freeze, Defrost gets delayed and it starts operating as it completes Super Freeze.
When Super Freeze is selected during Defrost, its indicator lamp lights up immediately.
But, Compressor and Freezer Fan start operating when Defrost is completed.

2) Vacation Function

- 2-1) Press the Vacation button to activate or deactivate the Vacation function(Cool Selectzone Yes).
Press the Fridge button for 3 second to activate or deactivate the Vacation function(Cool Selectzone No).
When the Vacation function is selected, both of the Fridge and the CoolSelect Zone indicator go off.
When it is set to the Fridge temperature shifting mode and there is a new setting during the operation of the vacation function, the Vacation function stops immediately.
When the vacation function is deactivated with the Vacation button, the Vacation indicator lamp goes off and the Vacation function stops operating immediately.
- 2-2) When the Vacation function is on, it is possible to shift the Freezer temperature.
- 2-3) Vacation feature is selected, the refrigerator is controlled by a +15°C.
- 2-4) When the vacation function is on, it is also not possible to control the Cool Select Zone and the Cool Select Zone Damper is kept being closed.

3) Dual Operation of Super Freeze & Vacation Functions

- 3-1) Each function operates independently. So, for the Super Freeze function, Compressor. and Freezer Fan (Freezer Fan)runs without stopping and for the Vacation function, Refrigerator is controlled by a +15 °C and the Zone dampers are kept Cool Select being closed.

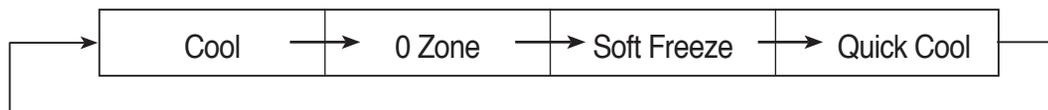
8. REFERENCE INFORMATION

8-1-3) Alarm ON Function

- When the Freezer temperature is higher than 5 °C at the initial power on, the Alarm On lamp lights up and it is automatically set to the Alarm On mode to be triggered by the Fridge door open.
- After it is set to the Alarm selection mode by pressing the Alarm Button, the Alarm function can be activated and deactivated with the Alarm Button.
- When the Alarm ON function is cancelled, the Alarm ON indicator lamp goes off.
 - With the Alarm ON function deactivated, the alarm does not go off even under alarm triggering conditions by the door open duration.

8-1-4) Cool Select Zone Function

- 1) At the initial power on, the default setting of Cool Select Zone is Cool.
- 2) With the Cool Select Zone setting button, it can be set in the following order.



- 3) After it is set to the Cool Select Zone setting mode, the above sub-settings are to be selected with the Select button.
- 4) The Cool Select Zone operates as follows.

Classification	Description	Remark
Cool	Cool Select Zone runs at 3 °C	
0 Zone	Cool Select Zone runs at 0 °C	
Soft Freeze	Cool Select Zone runs at -5 °C	
Quick Cool	- The Cool Select Zone damper is kept being open for an hour. - After the 1-hour operation, it is set to Cool automatically.	

8. REFERENCE INFORMATION

8-1-5) Alarm Function

1) Button Touch Tone (Refer to Sound Table)

1-1) When the control panel buttons are pressed, it sends out touch tones as follows.

Classification	Sound Group	Tone Pattern
When selecting Super Freeze, Vacation and Alarm On	SUB ON (Selection)	
When cancelling Super Freeze, Vacation and Alarm ON	SUB OFF (Cancellation)	
When selecting Cool Select Zone functions	MODE (Function selecting tone "Ding")	
When setting the Fridge & the Freezer temperatures	VERTICAL (Temp Setting)	
When a door keeps being open	ALERT (Warning)	

1-2) When more than 2 or an inaccurate combination of buttons are pressed, it does not send out the above operational tones.

2) Door-Open Alarm Sound

2-1) When the Fridge door is kept being open for 2 minutes, it sends out alarm sounds 10 times.

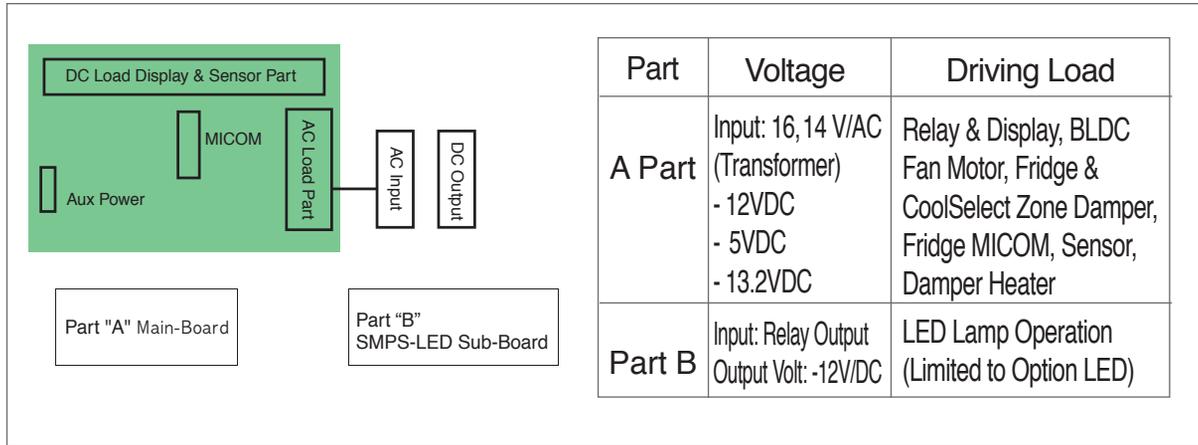
2-2) After the above, it sends out alarm sounds for 10 times with a one-minute cycle if the door is not being closed.

2-3) It stops alarming immediately when the Fridge door is closed.

8. REFERENCE INFORMATION

8-2. Circuit Description (LCD Model)

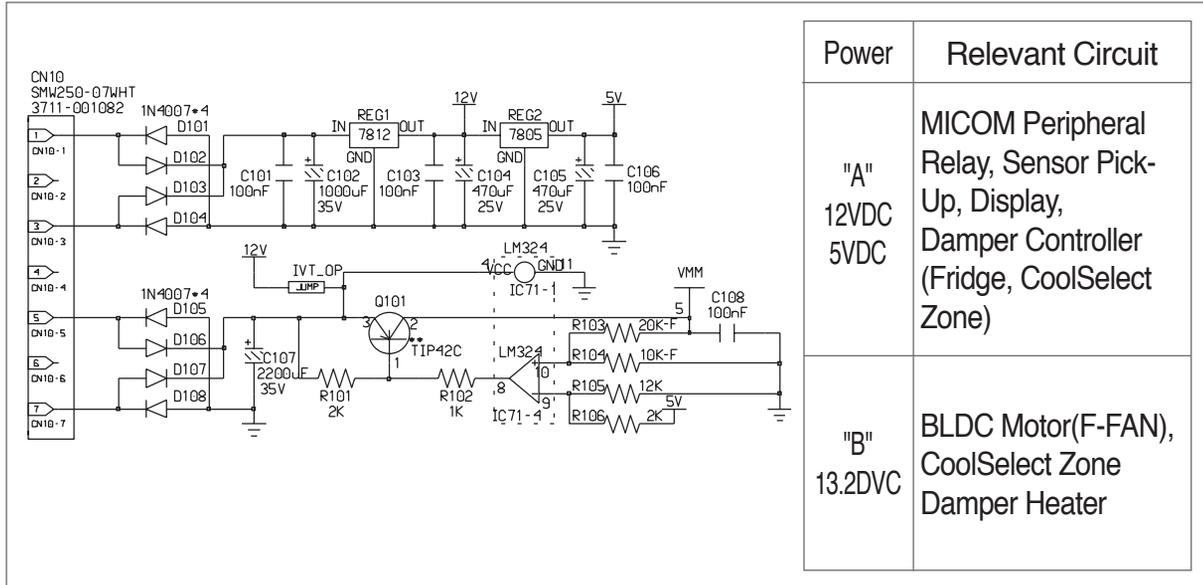
8-2-1) PCB ASS'Y (Control Board)



- 1) It has two PCB ASS'Ys being controlled by a single MICOM and "B" is only for a select model to control the LED lamp.
 - 2) Especially, "B" uses the SMPS power and when a door gets open, "A" supplies the input voltage and outputs DC +12V. (When the input is 200V/AC, rectified 300V/DC is to be used in PCB. So, it needs care to prevent electric shock.)
 - 3) "A" controls the overall operation of the fridge as the previous MICOM.
 - 4) "B" gets the lamp controlling signal (AC Power) and outputs +12V. (LED LAMP OPTION; Only to turn on and off the LED lamp.)
 - 5) The fridge control MICOM controls various loads (F-FAN, R-DAMPER, CoolSelect Zone DAMPER, D-HEATER, LAMP ON/OFF, etc) and when MICOM senses an instant power failure, the five-minute COMP delay will be initiated. (When the power gets back on and the Freezer temp is lower than +5°C, it will be considered as an instant power failure, restoring all the previous settings.)
 - 6) The default setting for the Freezer fan is the BLDC motor or the AC fan motor option. (The AC fan motor is assembled in connection with the compressor and the main MICOM does not control it separately)
- * Even though the unit is plugged out, the electrically charged condenser at "B" may cause electric shock. So, take care when handling "B". And, make sure to plug out the unit when replacing the PCB board.

8. REFERENCE INFORMATION

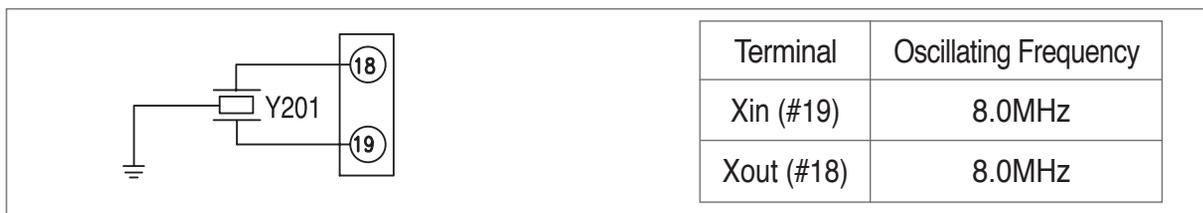
8-2-2) Power Supplier (AC TRANSFORMER Method)



- 1) On impression to power source "A", the voltage across ①-③ of the CN10 is around 16VAC supplied from a stepped-down voltage on the secondary side of the transformer and this is rectified to DC voltage through a rectification circuit, Diode D101~D104. And then, an output of 12VDC made by REG1(7812) Regulator is supplied to the Relay, the Panel PCB, and the Motor-operated Damper, and an output of 5VDC made by REG2(7805) is supplied to the Refrigerator control MICOM and the Panel PCB. With these power, the whole PCB parts are properly operated.
- 2) On impression to power source "B", the voltage across ⑤-⑦ of the CN10 is around 14VAC supplied from a stepped-down voltage on the secondary side of the transformer and this is rectified to DC voltage through a rectification circuit, Diode D105~D108. An output of around 13.2VDC is supplied to the Motor and the Damper.

※ The power of the power source "B" can vary according to the option specification.

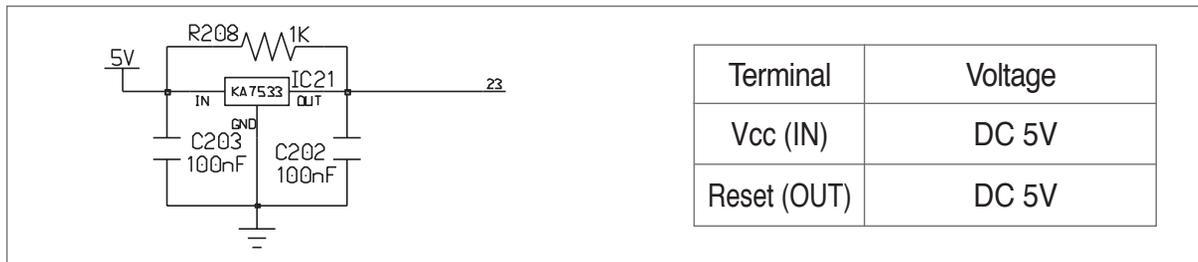
8-2-3) Oscillation Circuit



- 1) This is the oscillation circuit to generate time synchronizing clock and to calculate time for the sending and receiving of information of the components in the MICOM.

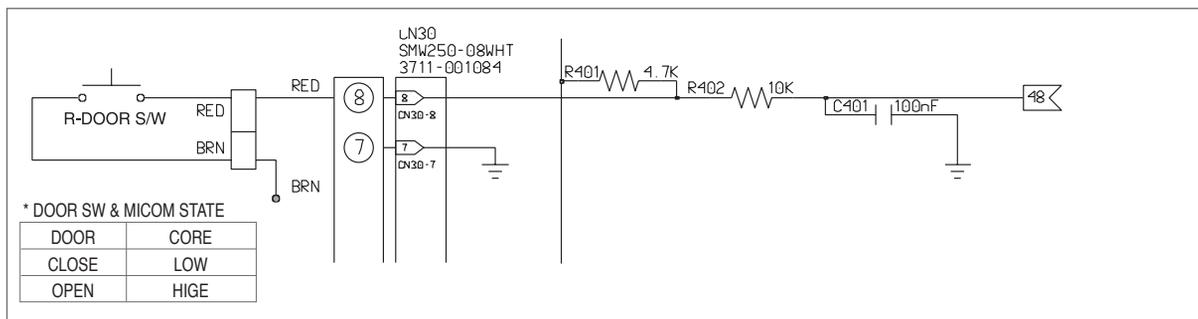
8. REFERENCE INFORMATION

8-2-4) Reset Circuit Part



- 1) When the MICOM is on or re-energized after momentary interruption, the reset circuit initialize several parts in MICOM such as RAM in order that the whole program can be operated from the initial stage. On impression, comparing the Vcc(5VDC) of MICOM, the voltage across the reset terminal becomes “LOW” for several tens seconds and in normal operation, the voltage maintains “HIGH” (Vcc voltage) state.

8-2-5) The circuit for sensing the door switch



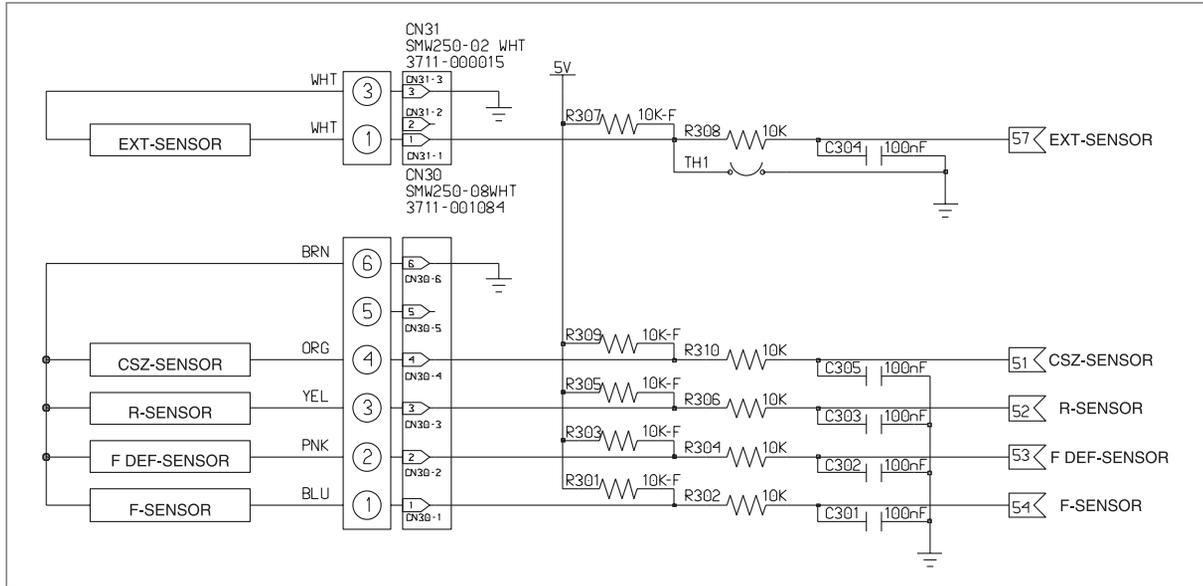
- 1) The door position of the refrigerator is detected by Vcc(5VDC) supplied to ⑤ of CN30 through R401 and the contact of the door switch is connected to Gnd. As the contact is connected to Gnd according to the position of the door, “HIGH”(5V) or “LOW”(0V) signal is sent to the MICOM. MICOM detects the open/close position of the refrigerator door with this voltage change.

Note) If the door switch has a fault, the damper in the refrigerator compartment can be incorrectly operated or the alarm function is initiated. The door switch should be checked on after-sales service. If the door opens, the damper in the refrigerator compartment is closed, but on fault, even though the door is closed, MICOM judges the door open and closes the damper.

Terminal	Voltage	MICOM	MICOM PIN Number
F compartment	Door Closed	0V(LOW)	Number 48 or ⑤ of CN30
	Door Open	5V(HIGH)	

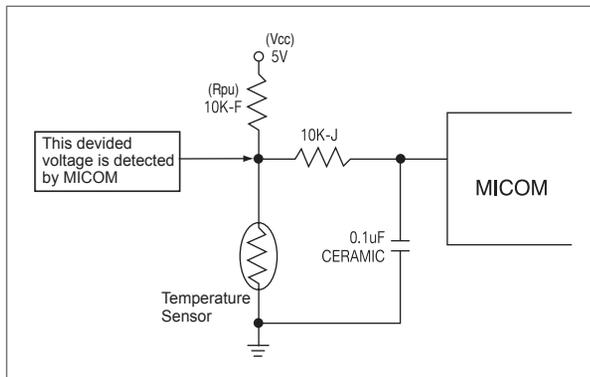
8. REFERENCE INFORMATION

8-2-6) Temperature Sensing Circuit Part



< Fig.1-1 Circuit Diagram for sensor part >

- 1) Temperature sensing (sensor part) is described with Fig. 1-1.
- 2) Using the Thermistor(Sensor) which has temperature coefficient of the negative resistance, the higher temperature the resistance is reduced and reversely the lower temperature the resistance is increased.
- 3) Regarding Freezer sensor, if the voltage input into MICOM is V_f , $V_f = (R_{th} \times V_{cc}) / (R_{pu}(R_{301}) + R_{th})$ R_{th} is the resistance value of the thermistor corresponding to temperature. Refer to the table in this manual showing the resistance of the sensor corresponding to the temperature and the value converted to the voltage. As it also has the terminal voltage of the MICOM, refer to this on after sales service. (R_{th} is the resistance value of the sensor. As this value is changed by the temperature of the sensor, refer to the resistance value of the sensor corresponding to the temperature)
- 4) As all temperature sensors applied to the refrigerator are running in the way above, you can check the Sensors for the chammart compartment, defrosting, refrigerating, and the ambient temperature in the same way.



< Fig-2 The equivalent circuit of the sensor's action >

The terminals on the MICOM	Voltage
#54(Freezer sensor)	The change of the terminal voltage on MICOM corresponding to the temperature
#53(F-DEF-Sensor)	
#52(FRIDGE SENSOR)	
#51(Chammart Compartment-Sensor)	
#57(Ambient Temperature-Sensor)	

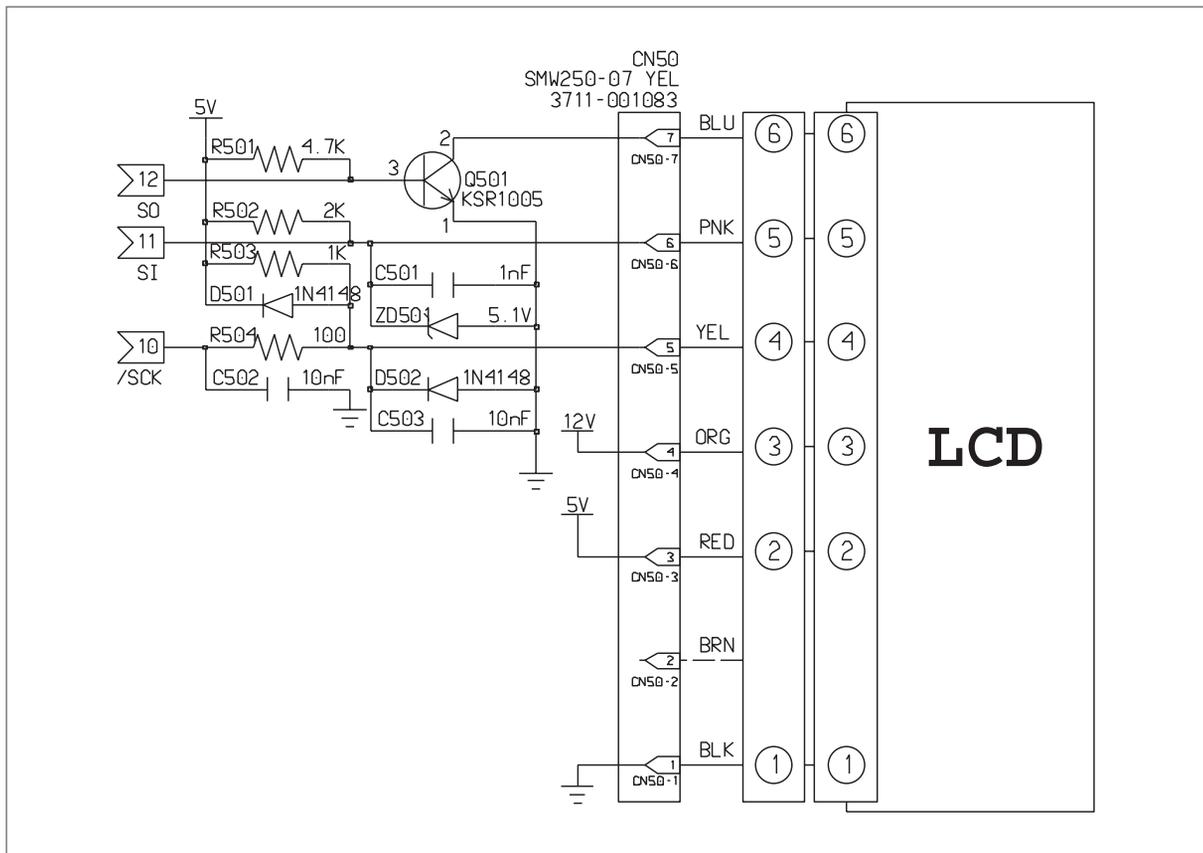
8. REFERENCE INFORMATION

- The Table for resistances & temperatures

Temp.(°F)	Temp.(°C)	Resistance(Ω)	Voltage(V)	Temp.(°F)	Temp.(°C)	Resistance(Ω)	Voltage(V)	Temp.(°F)	Temp.(°C)	Resistance(Ω)	Voltage(V)
-50	-58	4.694	153319	-5	23	3.107	16419	40	104	1.153	2997
-49	-56.2	4.677	144794	-4	24.8	3.057	15731	41	105.8	1.124	2899
-48	-54.4	4.659	136798	-3	26.6	3.006	15076	42	107.6	1.095	2805
-47	-52.6	4.641	129294	-2	28.4	2.955	14452	43	109.4	1.068	2714
-46	-50.8	4.622	122248	-1	30.2	2.904	13857	44	111.2	1.040	2627
-45	-49	4.602	115631	0	32	2.853	13290	45	113	1.014	2543
-44	-47.2	4.581	109413	1	33.8	2.802	12749	46	114.8	0.988	2462
-43	-45.4	4.560	103569	2	35.6	2.751	12233	47	116.6	0.963	2384
-42	-43.6	4.537	98073	3	37.4	2.700	11741	48	118.4	0.938	2309
-41	-41.8	4.514	92903	4	39.2	2.649	11271	49	120.2	0.914	2237
-40	-40	4.490	88037	5	41	2.599	10823	50	122	0.891	2167
-39	-38.2	4.465	83456	6	42.8	2.548	10395	51	123.8	0.868	2100
-38	-36.4	4.439	79142	7	44.6	2.498	9986	52	125.6	0.846	2036
-37	-34.6	4.412	75077	8	46.4	2.449	9596	53	127.4	0.824	1973
-36	-32.8	4.385	71246	9	48.2	2.399	9223	54	129.2	0.803	1913
-35	-31	4.356	67634	10	50	2.350	8867	55	131	0.783	1855
-34	-29.2	4.326	64227	11	51.8	2.301	8526	56	132.8	0.762	1799
-33	-27.4	4.296	61012	12	53.6	2.253	8200	57	134.6	0.743	1745
-32	-25.6	4.264	57977	13	55.4	2.205	7888	58	136.4	0.724	1693
-31	-23.8	4.232	55112	14	57.2	2.158	7590	59	138.2	0.706	1642
-30	-22	4.199	52406	15	59	2.111	7305	60	140	0.688	1594
-29	-20.2	4.165	49848	16	60.8	2.064	7032	61	141.8	0.670	1547
-28	-18.4	4.129	47431	17	62.6	2.019	6771	62	143.6	0.653	1502
-27	-16.6	4.093	45146	18	64.4	1.974	6521	63	145.4	0.636	1458
-26	-14.8	4.056	42984	19	66.2	1.929	6281	64	147.2	0.620	1416
-25	-13	4.018	40938	20	68	1.885	6052	65	149	0.604	1375
-24	-11.2	3.980	39002	21	69.8	1.842	5832	66	150.8	0.589	1335
-23	-9.4	3.940	37169	22	71.6	1.799	5621	67	152.6	0.574	1297
-22	-7.6	3.899	35433	23	73.4	1.757	5419	68	154.4	0.560	1260
-21	-5.8	3.858	33788	24	75.2	1.716	5225	69	156.2	0.546	1225
-20	-4	3.816	32230	25	77	1.675	5039	70	158	0.532	1190
-19	-2.2	3.773	30752	26	78.8	1.636	4861	71	159.8	0.519	1157
-18	-0.4	3.729	29350	27	80.6	1.596	4690	72	161.6	0.506	1125
-17	1.4	3.685	28021	28	82.4	1.558	4526	73	163.4	0.493	1093
-16	3.2	3.640	26760	29	84.2	1.520	4369	74	165.2	0.481	1063
-15	5	3.594	25562	30	86	1.483	4218	75	167	0.469	1034
-14	6.8	3.548	24425	31	87.8	1.447	4072	76	168.8	0.457	1006
-13	8.6	3.501	23345	32	89.6	1.412	3933	77	170.6	0.446	978
-12	10.4	3.453	22320	33	91.4	1.377	3799	78	172.4	0.435	952
-11	12.2	3.405	21345	34	93.2	1.343	3670	79	174.2	0.424	926
-10	14	3.356	20418	35	95	1.309	3547	80	176	0.414	902
-9	15.8	3.307	19537	36	96.8	1.277	3428	81	177.8	0.404	877
-8	17.6	3.258	18698	37	98.6	1.253	3344	82	179.6	0.394	854
-7	19.4	3.208	17901	38	100.4	1.213	3204	83	181.4	0.384	832
-6	21.2	3.158	17142	39	102.2	1.183	3098	84	183.2	0.375	810

8. REFERENCE INFORMATION

8-2-7) Display Circuit Part



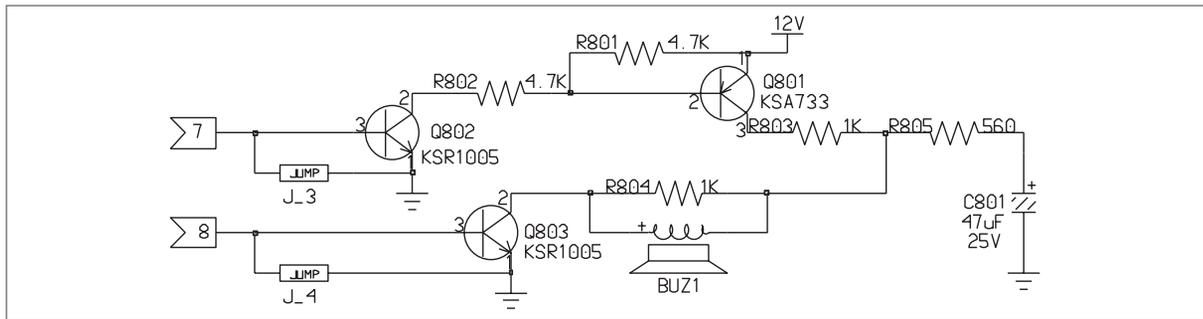
- 1) The panel pcb and the main pcb send and receive signals to each other.
- 2) The Model is distinguished by the display – LCD or LED. The panel of the LCD model communicates with Main PCB and MICOM. The communication ports are SI, SO, and /SCK, and if there is communication error on one of those, the error is indicated. If there is a communication failure between Panel and Main PCB, “Er - Pc” is flashing on the panel display until the communication error is clear.

Type of fault	Communication failure between Panel and Main PCB
Panel display	“Er – Pc”

- 3) In this case, firstly check the cable housing and connection. Secondly, test the signals on the Display SI, SO, and /SCX. (An oscilloscope is need.)

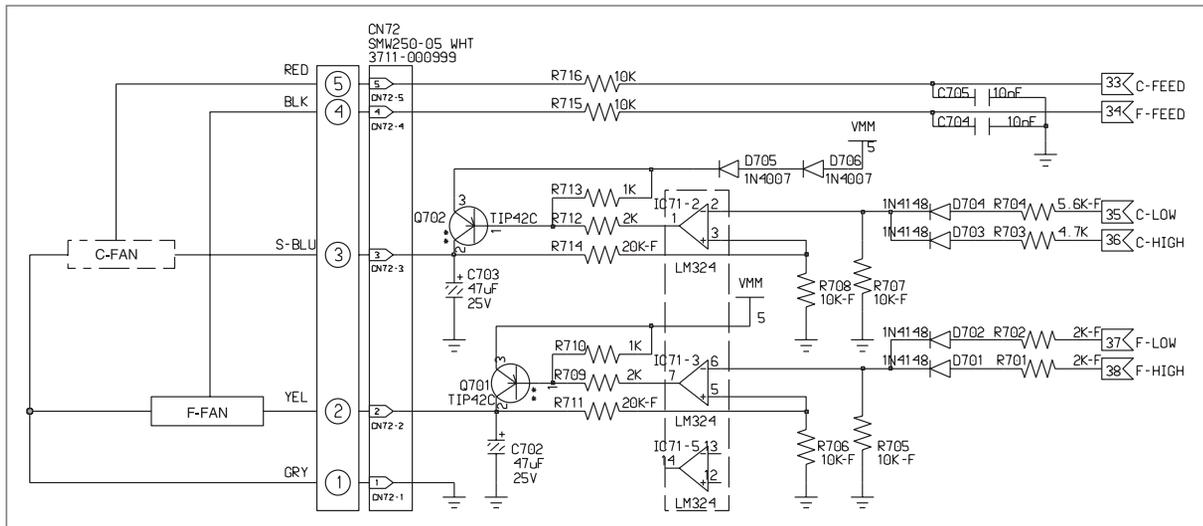
8. REFERENCE INFORMATION

8-2-8) Buzzer Circuit Part



- 1) The circuit is made up as above. Alarms are separately controlled in the MICOM and operated by sending different signals according to the setting value. (The several alarm levels can be made according to key control.) The power of 12V is steadily impressed to the circuit. When the MICOM sends an alarm signal to the transistor base, Q803, the transistor is turned on to apply a current of 12V to the Buzzer. The resistance of 1Kohm, R804, is used to get the better sound.

8-2-9) Fan Motor (BLDC) Driving Circuit Part



• Description of the motor driving circuit

- 1) To save power consumption, an BLDC Motor is used and this is only for the freezer compartment. (The motor driving circuit is commonly used for other models.) The circuit for the Condenser Fan is not applied but can be used in the future.
- ※ There is a LCD model which the BLDC Motor is not used but AC Motor is used. The LCD Model which AC MOTOR is used is described in the Load Driving Circuit Part.

8. REFERENCE INFORMATION

2) Operating principle

The above circuit shows that each motor has a similar circuit. Let me explain about this with the Freezer Fan motor. The Fan motor is operated in High speed or Low speed by condition. To run the Freezer Fan, the constant voltage should be impressed to the OP-AMP No. 6 as shown in the Fig. The constant voltage impressed to OP-AMP No.6 depends on the action of MICOM No.38 (HIGH RPM) and No.37 (LOW RPM). The voltage impressed to the motor is around 3 times of this voltage (the Gain at the present setting value) If the voltage across OP-AMP No. 6 is 3.4V, the voltage impressed to the motor is $3.4V \times 3 = 10.2V$

3) Comparison between High RPM and Low RPM

	The voltage impressed to the motor	Remark
	Freezer Fan	In normal operation of the motor, the constant frequency is input to the MICOM No. 34(F) and 33(C) (option), and with this signal MICOM checks whether the motor is in normal operation or not. (Frequency (Hz) X 15 = Motor rpm)
On HIGH PRM	10.86V	
On LOW RPM	10.86V	

* The voltage error is less than +/-0.2V

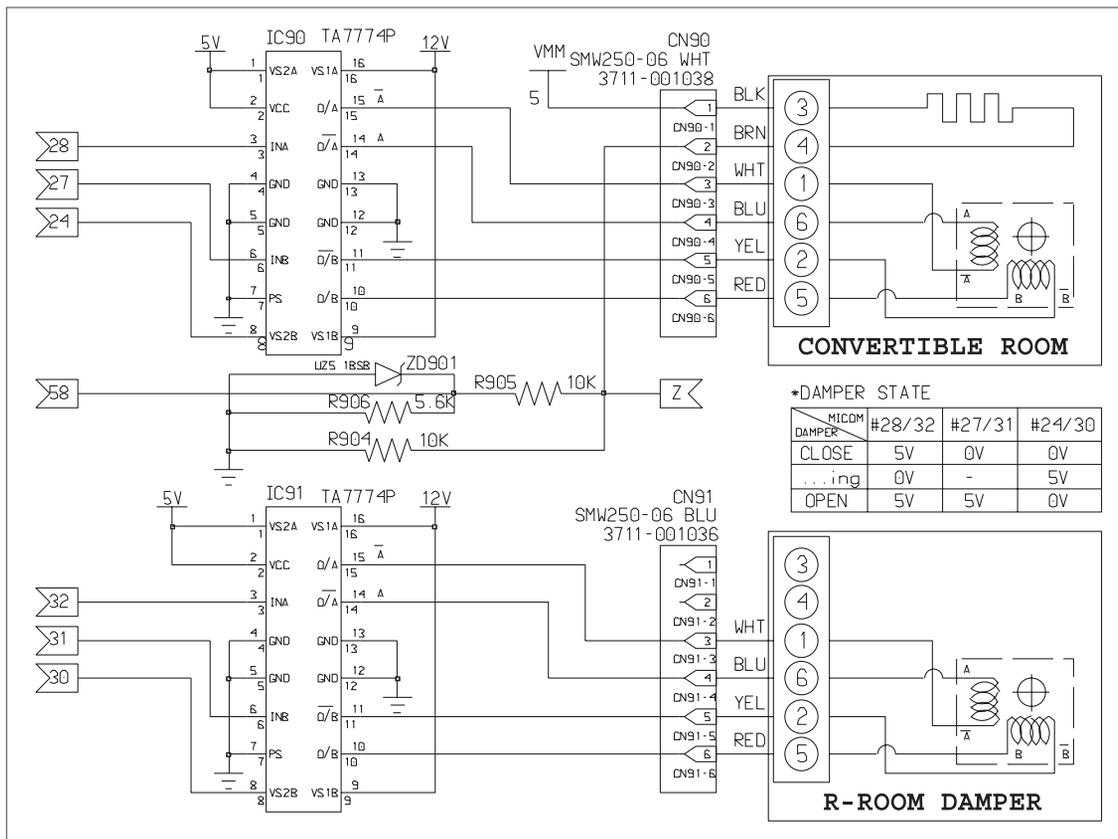
<Note> While the fan motors in the freezer and the refrigerator compartments are running at high RPM or low RPM depending on the condition, the present model is set with one RPM. (To improve performance, the RPM, voltage, frequency, etc. of the motor can be changed without notice in advance.)

4) When the fault is detected on the motor (In case that the speed is lower than 600-700rpm), the motor stops and restarts after 10 seconds. At this time, if the motor is running with normal speed, the motor state is judged as normal. But, if the normal state is not input to the MICOM, the motor restarts after 10 seconds again. In case that the motor can not run at the normal speed even after restarting 5 times, the motor stops for 10 minutes. After 10 minutes, the restarting procedure is tried again in the way of 5-time restarting every 10 seconds and a stop for 10 minutes. If you make self-supervision function started by the front panel of the freezer, the LED related to the faulty motor is lit to indicate that fault. If you turn off the power, the fault recording data is deleted. You have to check first before turning it off when visiting a customer for service.

<Note> During maintenance work, if it is expected that there is an error on the fan motor or the motor is tripped, execute the self-supervision function to check the state of the refrigerator.

8. REFERENCE INFORMATION

8-2-10) The driving circuit part for the dampers in the refrigerator and chammart compartment



- 1) The damper in the chammart compartment is controlled by MICOM. To check the damper heater on initial energizing, the voltage across MICOM 58 is checked. On initial energizing, as MICOM No. 1 is a LOW state and the heater is off, the voltage of around 12.6 V is impressed to R905 through the heater. So, the voltage divided by R905 and R906 (around 4.0 ~4.5V) is impressed to the MICOM No. 58. (Though the voltage can vary according to the input source due to AC Transformer, the voltage is detected in consideration of the voltage variation using MICOM port. (detecting only open position) After initial energizing, check whether the damper heater in the chammart compartment is disconnected or not.

Status of MICOM	On initial energizing	When the damper heater is off	When the damper heater is on
No.24	4.0 ~ 4.5V	4.0V ~ 4.5V	0V

- * So, in case that the MICOM No. 58 detects 0V during self-supervision after initial energizing, the fault of the damper heater is indicated on the panel display. (The status of the heater is monitored only for the damper in the chammart compartment, and for the one in the refrigerator compartment, the heater's running and status are not monitored.)

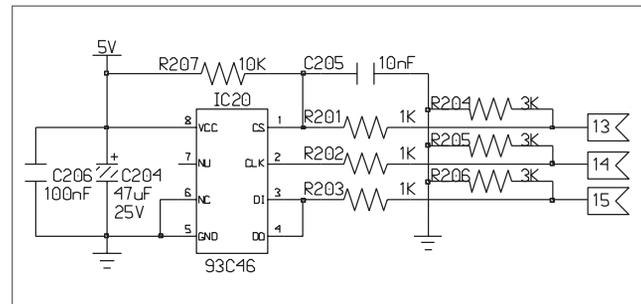
- 2) After the self-supervision process is finished, the dampers in the refrigerator and chammart compartment repeat opening and closing. (But, because the priority is given to the refrigerator compartment, the damper in the chammart compartment does not open until the temperature in the refrigerator compartment is adjusted in condition.) By IC90 and IC91, the electric power is supplied to the damper motor (stepping motor) through the 4 wires which are A, /A, B, and /B. The motor rotated forward and in reverse.

8. REFERENCE INFORMATION

- 3) To check whether the damper motor has a fault or not, disconnect the connectors of CN90 (the damper in the chammart compartment) and CN91 (the damper of the refrigerator compartment) and measure the resistance values between ③ ↔ ④ and between ⑤ ↔ ⑥. If the value is between 400~600 Ω, it is normal and if ∞Ω, it is that the wire is disconnected.
- 4) Regarding the damper heater, as HIGH(5V) signal comes out from MICOM No.1, the HIGH(5V) goes to IC70 and No. 10 is turned on by the characteristics of the IC, and the heater runs. The heater is on by the power impressed as 13.2V → CN90 ① → Damper Heater CN90 ② → IC70⑩ (GND).
- ※ The damper heater in the charmmart compartment is always on whenever the power is impressed. (under the condition that the temperature is between 23~27 °ΔC, and if the temperature in the freezer compartment is between T_{set on}+2 and T_{set off}-2 comparing the setting value of the temperature (based on MICOM), the heater is turned off)

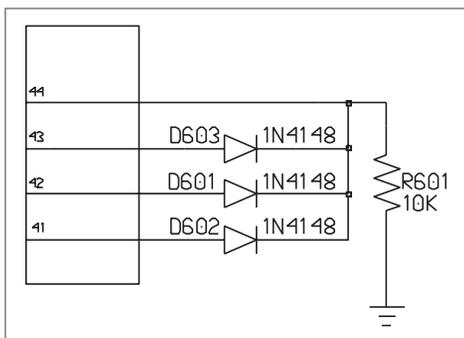
8-2-11) EEPROM Circuit Part

EEPROM is a semiconductor memory that data is not deleted even though the power is off. Using EEPROM, This model can save the data of the refrigerator which the customer has set even in the area that the electric power is not stable such as momentary interruption. This also has a function to conduct the input and output process for the data selected as options.



8-2-12) OPTION Circuit part

※ The specification for options can be changed.



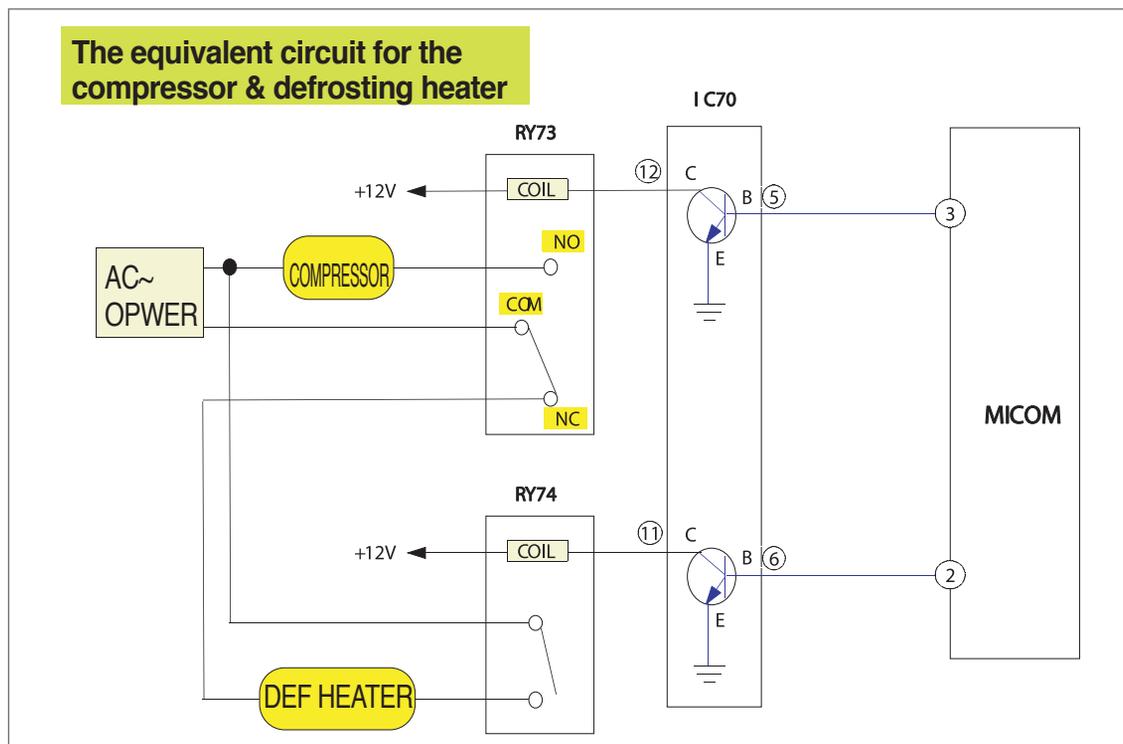
D601	-	REMARKS
X	-	
●	-	
D602	TEMP. OPTION	REMARKS
X	°C	
●	°F	
D603	FAN MOTOR	REMARKS
X	BLDC FAN	
●	AC FAN	
* ● Diode (1n4148) USE		

Using DIODE (1N4148), this circuit is checked on initial energizing. When the option circuit is modified, the power should be off. After work, turn it on again. The option is selected as shown in the table above. Except special situation, you are requested to operate as the specification when the product is shipped.

8. REFERENCE INFORMATION

8-2-13) Load Driving Circuit Part

- 1) Most loads of the electronic type refrigerator are controlled by the main PCB.
- 2) The compressor (F FAN(option)), the defrosting heater, and the lamps in the refrigerator are controlled by the relay.
- 3) Let me explain about the defrosting heater as an example. To run the defrosting heater, the HIGH(5V) signal comes out from the Pin no. 2 of the MICOM. This signal goes to No. 6 of IC70 as an input. The Pin no. 6 of the IC70 is operated as a base of the NPN TR and the output terminal, Pin no.11 is operated as a collector of the TR. So, if the Pin no. 6 of the IC70 gets 5V input, the No.11 of the IC70 is turned on and conducted to the GND. The end of the RY74 COIL connected to the No. 11 of the IC70 becomes LOW(0V) and the power, +12 V, on the other end of the RY74 COIL flows to the GND through No.11 of the IC70. As magnetic lines of force (electromagnet) are generated during flowing current through the coil, the contact of the secondary side (load side) in the RY74 is closed and then, the AC input (220~240VAC) across the defrosting heater turns on the heater. In case that the Pin no. 2 of the MICOM becomes LOW(0V), the Pin no. 11 of the IC70 opens (Switch off state) and the power is off. So, the current on the relay RY74 is off, the magnetic lines (electromagnet) are disappeared, the contact of the secondary side opens, and the defrosting heater is off.

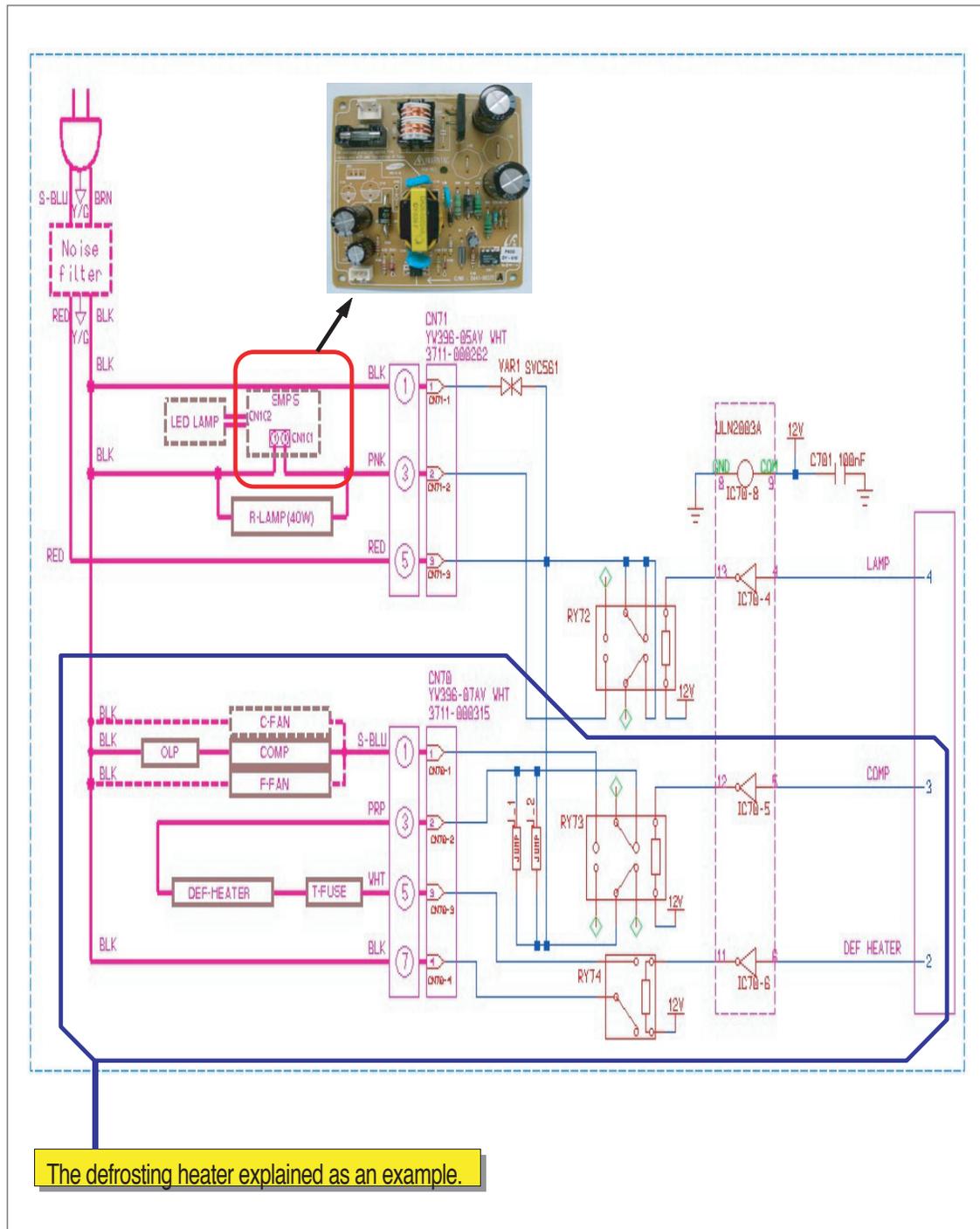


- 4) The other loads are operated in the same principle. (The compressor and the lamps in the refrigerator compartment)
- 5) AC Fan motor in the refrigerator compartment is an option. The model LCD display applied has two selections - BLDC motor or AC Fan motor. The AC Fan Motor is wired in link with the compressor. In case that the compressor is off, the fan is off. In case that the compressor is "on", the fan is "on"

8. REFERENCE INFORMATION

- 6) As the SMPS of the LED Lamp (option) control power source receives the power from the lamp control relay and simply supply 12VDC, check the input and the 12VDC output when the door opens. (Refer to the SMPS PBA picture in the driving circuit below)

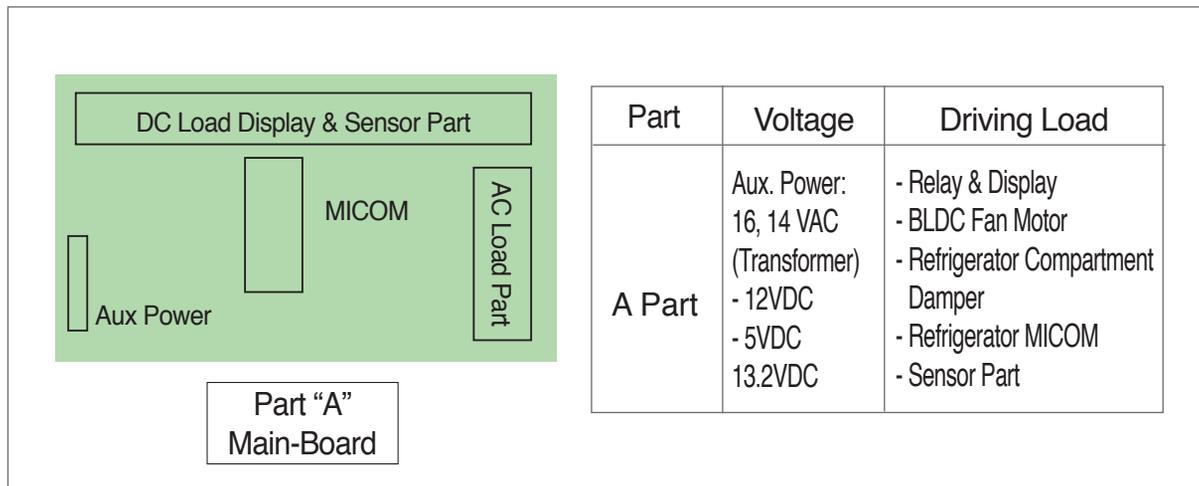
Load Driving Circuit Part (PCB Circuit)



8. REFERENCE INFORMATION

8-3. Circuit Description (LED Model & SEMI Model)

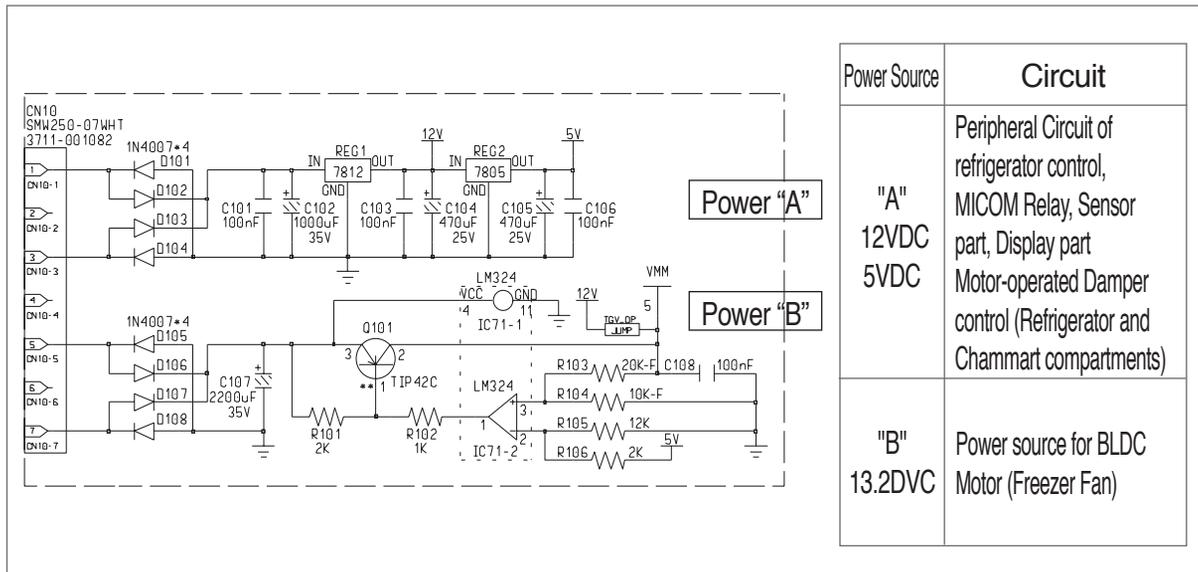
8-3-1) PCB Assembly Structure (Electronic Device Box)



- 1) There are one PCB Assembly operated by MICOM
 - 2) The refrigerator control part, the part "A", controls the whole parts of a refrigerator as the earlier MICOM.
 - 3) MICOM which is to control a refrigerator controls the loads (Freezer Fan, R-DAMPER, Chammart compartment, Defrosting damper, Lamp on/off, etc.) except the compressor, and the compressor is restarted after 5 minutes from tripping if it is momentary interruption. (The temperature in freezer compartment is measured when power is on, and if it is under +5°C, it is judged as a momentary interruption. In this case, all functions are restored to the operating status before momentary interruption.)
 - 4) BLDC Motor or AC Fan Motor is, as an option, specified for the fan in the freezer compartment and it is applied on setting and assembling (AC Fan Motor is wired in link with the compressor and not controlled by the main MICOM)
- ※ For your safety in case that the refrigerator is plugged, you should be careful.
Ensure the appliance is unplugged before replacing the PCB board.

8. REFERENCE INFORMATION

8-3-2) Power Supplier (AC TRANSFORMER Method)



- 1) On impression to power source "A", the voltage across ①-③ of the CN10 is around 16V/AC supplied from a stepped-down voltage on the secondary side of the transformer and this is rectified to DC voltage through a rectification circuit, Diode D101~D104. And then, an output of 12V/DC made by REG1(7812) Regulator is supplied to the Relay, the Panel PCB, and the Motor-operated Damper, and an output of 5VDC made by REG2(7805) is supplied to the Refrigerator control MICOM and the Panel PCB. With these power, the whole PCB parts are properly operated.
- 2) On impression to power source "B", the voltage across ⑤-⑦ of the CN10 is around 14V/AC supplied from a stepped-down voltage on the secondary side of the transformer and this is rectified to DC voltage through a rectification circuit, Diode D105~D108. An output of around 13.2VDC is supplied to the Motor and the Damper.

※ The power of the power source "B" can vary according to the option specification.

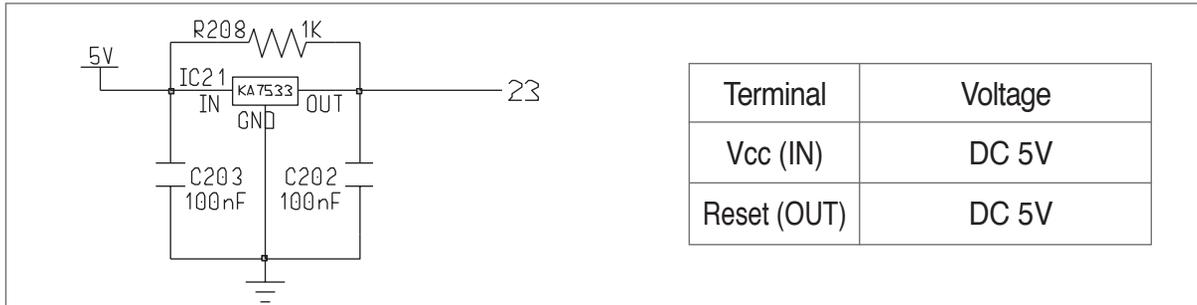
8-3-3) Oscillation Circuit



- 1) This is the oscillation circuit to generate time synchronizing clock and to calculate time for the sending and receiving of information of the components in the MICOM.

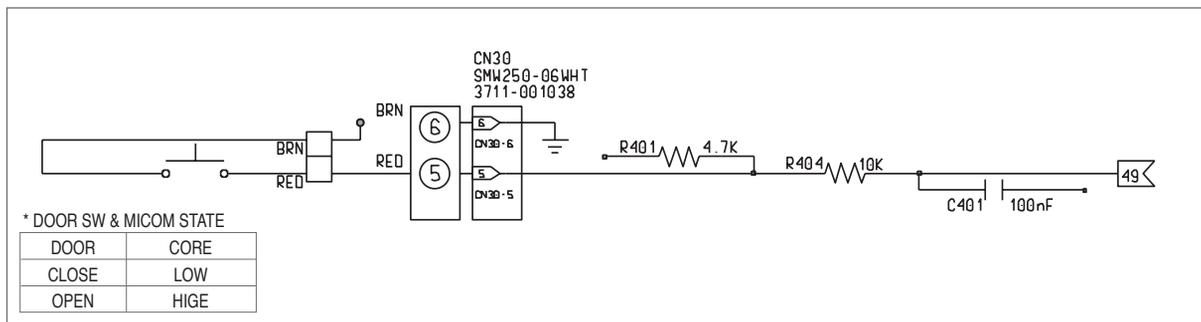
8. REFERENCE INFORMATION

8-3-4) Reset Circuit Part



- 1) When the MICOM is on or re-energized after momentary interruption, the reset circuit initialize several parts in MICOM such as RAM in order that the whole program can be operated from the initial stage. On impression, comparing the Vcc(5VDC) of MICOM, the voltage across the reset terminal becomes “LOW” for several tens seconds and in normal operation, the voltage maintains “HIGH” (Vcc voltage) state.

8-3-5) The circuit for sensing the door switch



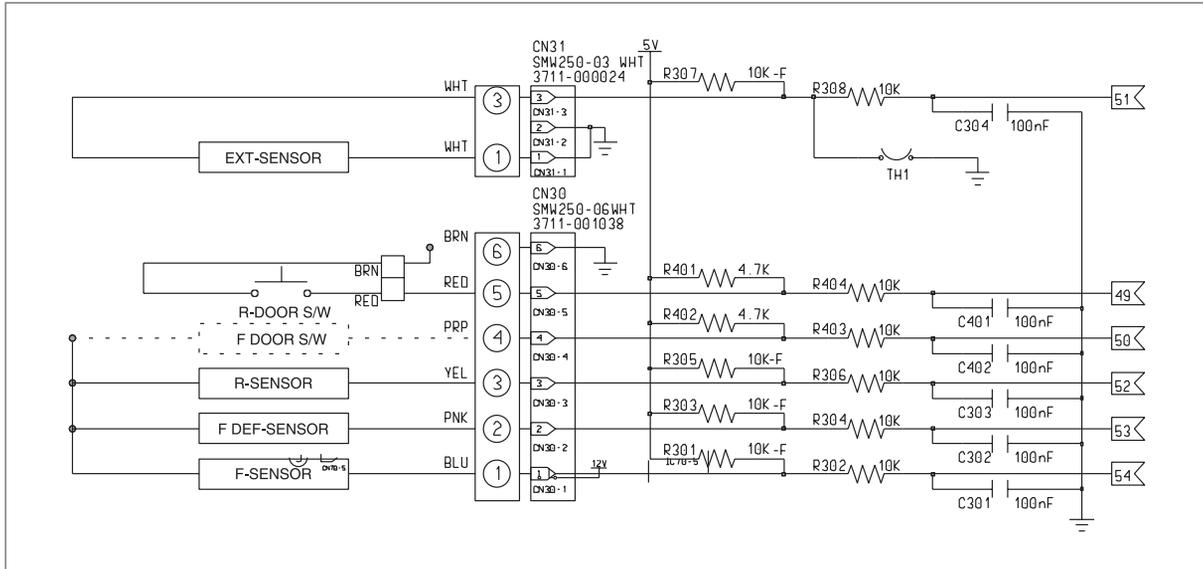
- 1) The door position of the refrigerator is detected by Vcc(5VDC) supplied to ⑤ of CN30 through R401 and the contact of the door switch is connected to Gnd. As the contact is connected to Gnd according to the position of the door, “HIGH”(5V) or “LOW”(0V) signal is sent to the MICOM. MICOM detects the open/close position of the refrigerator door with this voltage change.

Note) If the door switch has a fault, the damper in the refrigerator compartment can be incorrectly operated or the alarm function is initiated. The door switch should be checked on after-sales service. If the door opens, the damper in the refrigerator compartment is closed, but on fault, even though the door is closed, MICOM judges the door open and closes the damper.

Terminal	Voltage	MICOM	MICOM PIN Number
F compartment	Door Closed	0V(Low)	Number 49 or ⑤ of CN30
	Door Open	5V(HIGH)	

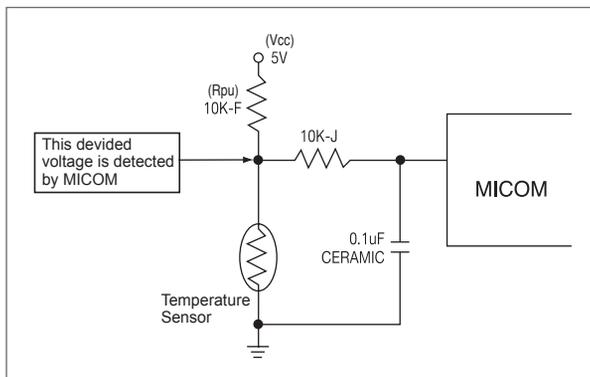
8. REFERENCE INFORMATION

8-3-6) Temperature Sensing Circuit Part



< Fig.1-1 Circuit Diagram for sensor part >

- 1) Temperature sensing (sensor part) is described with Fig. 1-1.
- 2) Using the Thermistor(Sensor) which has temperature coefficient of the negative resistance, the higher temperature the resistance is reduced and reversely the lower temperature the resistance is increased.
- 3) Regarding Freezer sensor, if the voltage input into MICOM is V_f , $V_f = \frac{R_{th} \times V_{cc}}{R_{pu}(R_{301}) + R_{th}}$ R_{th} is the resistance value of the thermistor corresponding to temperature. Refer to the table in this manual showing the resistance of the sensor corresponding to the temperature and the value converted to the voltage. As it also has the terminal voltage of the MICOM, refer to this on after sales service. (R_{th} is the resistance value of the sensor. As this value is changed by the temperature of the sensor, refer to the resistance value of the sensor corresponding to the temperature)
- 4) As all temperature sensors applied to the refrigerator are running in the way above, you can check the Sensors for the chammart compartment, defrosting, refrigerating, and the ambient temperature in the same way.



< Fig-2 The equivalent circuit of the sensor's action >

The terminals on the MICOM	Voltage
#54(Freezer sensor)	The change of the terminal voltage on MICOM corresponding to the temperature
#53(F-DEF-Sensor)	
#52(FRIDGE SENSOR)	
#51(Chammart Compartment-Sensor)	

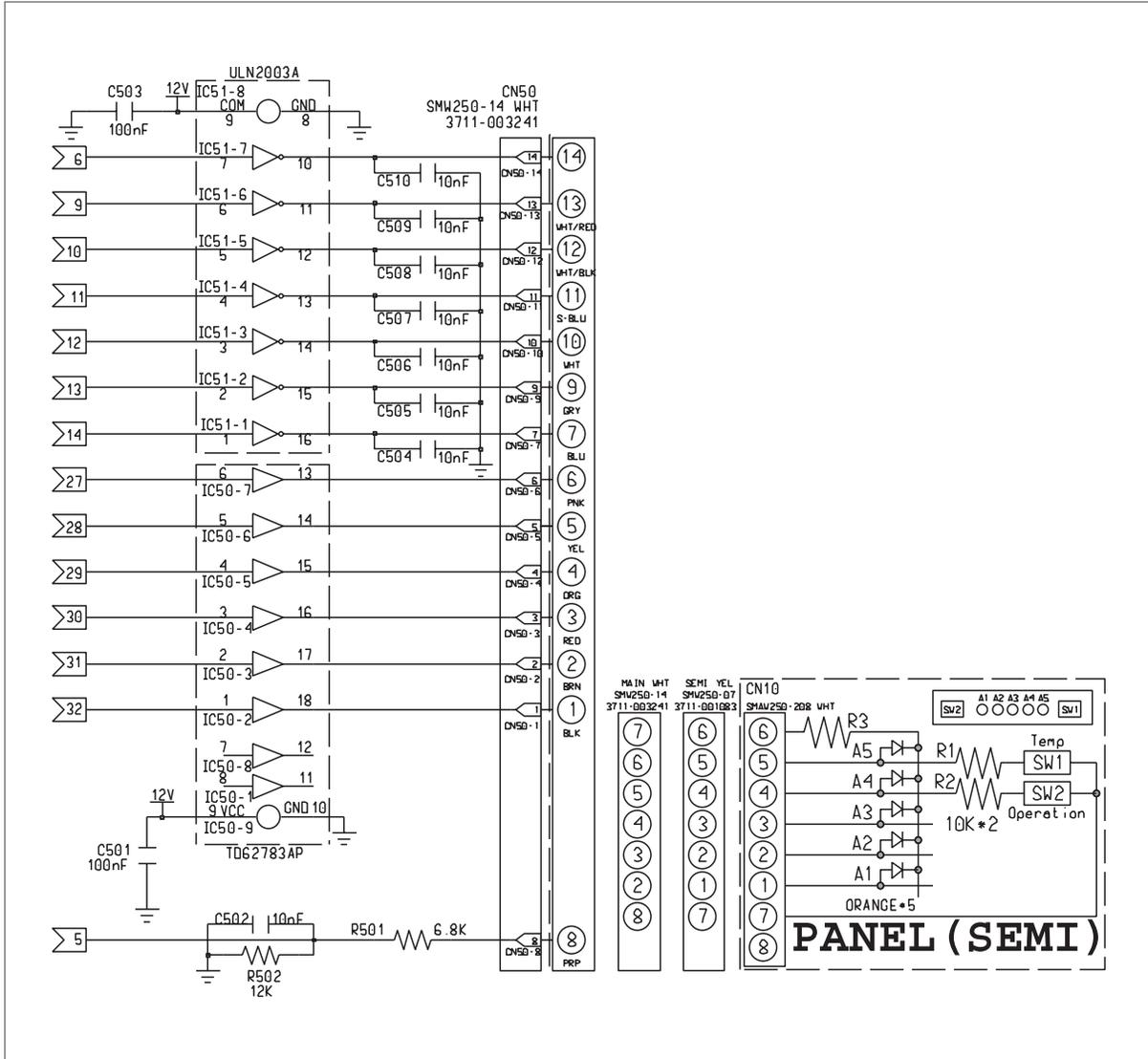
8. REFERENCE INFORMATION

The Table for resistances & temperatures

Temp.(°F)	Temp.(°C)	Resistance(kΩ)	Voltage(V)	Temp.(°F)	Temp.(°C)	Resistance(kΩ)	Voltage(V)	Temp.(°F)	Temp.(°C)	Resistance(kΩ)	Voltage(V)
-50	-58	4.694	153319	-5	23	3.107	16419	40	104	1.153	2997
-49	-56.2	4.677	144794	-4	24.8	3.057	15731	41	105.8	1.124	2899
-48	-54.4	4.659	136798	-3	26.6	3.006	15076	42	107.6	1.095	2805
-47	-52.6	4.641	129294	-2	28.4	2.955	14452	43	109.4	1.068	2714
-46	-50.8	4.622	122248	-1	30.2	2.904	13857	44	111.2	1.040	2627
-45	-49	4.602	115631	0	32	2.853	13290	45	113	1.014	2543
-44	-47.2	4.581	109413	1	33.8	2.802	12749	46	114.8	0.988	2462
-43	-45.4	4.560	103569	2	35.6	2.751	12233	47	116.6	0.963	2384
-42	-43.6	4.537	98073	3	37.4	2.700	11741	48	118.4	0.938	2309
-41	-41.8	4.514	92903	4	39.2	2.649	11271	49	120.2	0.914	2237
-40	-40	4.490	88037	5	41	2.599	10823	50	122	0.891	2167
-39	-38.2	4.465	83456	6	42.8	2.548	10395	51	123.8	0.868	2100
-38	-36.4	4.439	79142	7	44.6	2.498	9986	52	125.6	0.846	2036
-37	-34.6	4.412	75077	8	46.4	2.449	9596	53	127.4	0.824	1973
-36	-32.8	4.385	71246	9	48.2	2.399	9223	54	129.2	0.803	1913
-35	-31	4.356	67634	10	50	2.350	8867	55	131	0.783	1855
-34	-29.2	4.326	64227	11	51.8	2.301	8526	56	132.8	0.762	1799
-33	-27.4	4.296	61012	12	53.6	2.253	8200	57	134.6	0.743	1745
-32	-25.6	4.264	57977	13	55.4	2.205	7888	58	136.4	0.724	1693
-31	-23.8	4.232	55112	14	57.2	2.158	7590	59	138.2	0.706	1642
-30	-22	4.199	52406	15	59	2.111	7305	60	140	0.688	1594
-29	-20.2	4.165	49848	16	60.8	2.064	7032	61	141.8	0.670	1547
-28	-18.4	4.129	47431	17	62.6	2.019	6771	62	143.6	0.653	1502
-27	-16.6	4.093	45146	18	64.4	1.974	6521	63	145.4	0.636	1458
-26	-14.8	4.056	42984	19	66.2	1.929	6281	64	147.2	0.620	1416
-25	-13	4.018	40938	20	68	1.885	6052	65	149	0.604	1375
-24	-11.2	3.980	39002	21	69.8	1.842	5832	66	150.8	0.589	1335
-23	-9.4	3.940	37169	22	71.6	1.799	5621	67	152.6	0.574	1297
-22	-7.6	3.899	35433	23	73.4	1.757	5419	68	154.4	0.560	1260
-21	-5.8	3.858	33788	24	75.2	1.716	5225	69	156.2	0.546	1225
-20	-4	3.816	32230	25	77	1.675	5039	70	158	0.532	1190
-19	-2.2	3.773	30752	26	78.8	1.636	4861	71	159.8	0.519	1157
-18	-0.4	3.729	29350	27	80.6	1.596	4690	72	161.6	0.506	1125
-17	1.4	3.685	28021	28	82.4	1.558	4526	73	163.4	0.493	1093
-16	3.2	3.640	26760	29	84.2	1.520	4369	74	165.2	0.481	1063
-15	5	3.594	25562	30	86	1.483	4218	75	167	0.469	1034
-14	6.8	3.548	24425	31	87.8	1.447	4072	76	168.8	0.457	1006
-13	8.6	3.501	23345	32	89.6	1.412	3933	77	170.6	0.446	978
-12	10.4	3.453	22320	33	91.4	1.377	3799	78	172.4	0.435	952
-11	12.2	3.405	21345	34	93.2	1.343	3670	79	174.2	0.424	926
-10	14	3.356	20418	35	95	1.309	3547	80	176	0.414	902
-9	15.8	3.307	19537	36	96.8	1.277	3428	81	177.8	0.404	877
-8	17.6	3.258	18698	37	98.6	1.253	3344	82	179.6	0.394	854
-7	19.4	3.208	17901	38	100.4	1.213	3204	83	181.4	0.384	832
-6	21.2	3.158	17142	39	102.2	1.183	3098	84	183.2	0.375	810

8. REFERENCE INFORMATION

8-3-7) Display Circuit Part

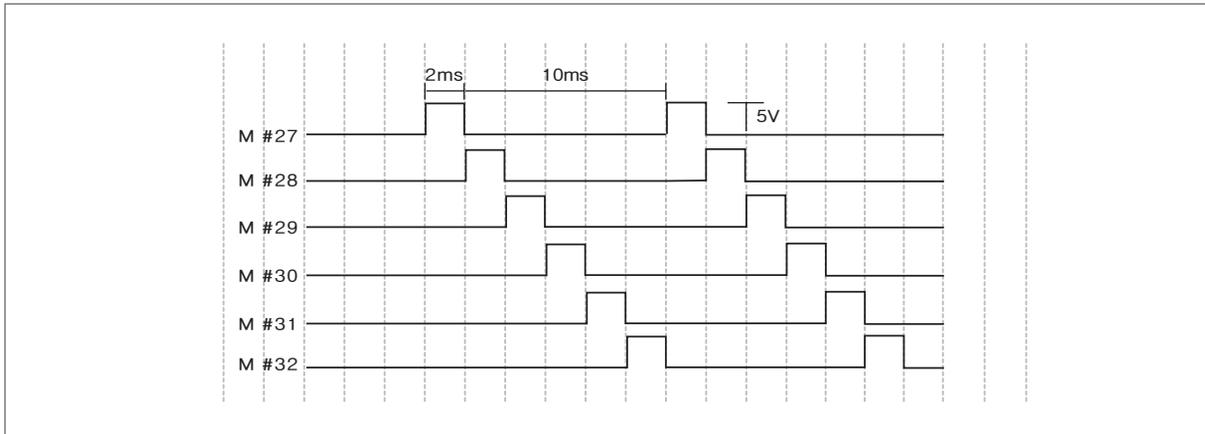


1) KEY SCAN and DISPLAY Driving Principle

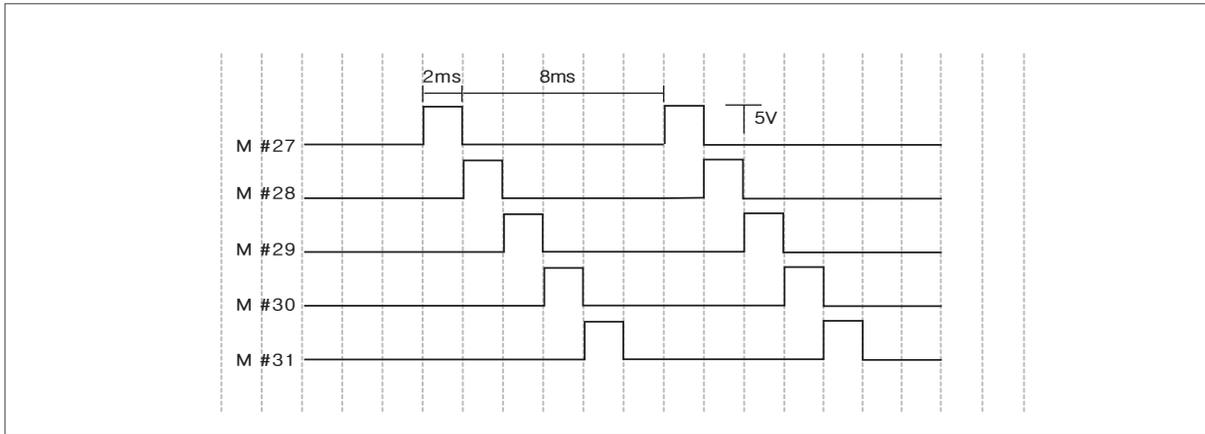
As the waveforms of each part shown below, through the 6 terminals of the MICOM Port No. # 27, 28, 29, 30, 31, 32 (In case of the Semi Panel, using 5 terminals, #27, 28, 29, 30, 31), the MICOM sends "HIGH" output of 2ms plus in a 12ms by turns. These signals are sent to the output terminals through the input terminals of the IC50 (TD62783AP or KID65783AP). The square-wave voltage, which is a MICOM output, is around 5VDC and the below is the type of the output waveform. (Oscilloscope is need)

8. REFERENCE INFORMATION

- 2) The output waveforms of MICOM
 - The electronic type (Segment Type)

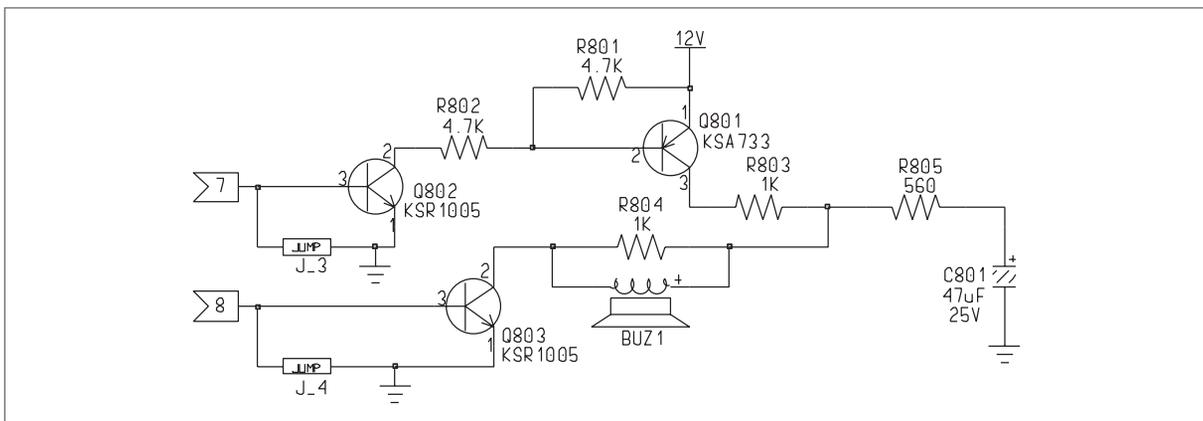


- The semi-electronic type (LED Bar Type)



※ As the display applied to the Semi LED type commonly uses the PCB Main, This type is produced with the specific terminals only for this and program modification

8-3-8) Buzzer Circuit Part



8. REFERENCE INFORMATION

3) Comparison between High RPM and Low RPM

	The voltage impressed to the motor	Remark
	Freezer Fan	In normal operation of the motor, the constant frequency is input to the MICOM No. 33(F) and with this signal, MICOM checks whether the motor is in normal operation or not. (Frequency (Hz) X 15 = Motor rpm)
On HIGH PRM	10.86V	
On LOW RPM	10.86V	

※ The voltage error is less than +/-0.2V

Note) While the fan motors in the freezer compartments are running at high RPM or low RPM depending on the condition, the present model is set with one RPM. (To improve performance, the RPM, voltage, frequency, etc. of the motor can be changed without notice in advance.)

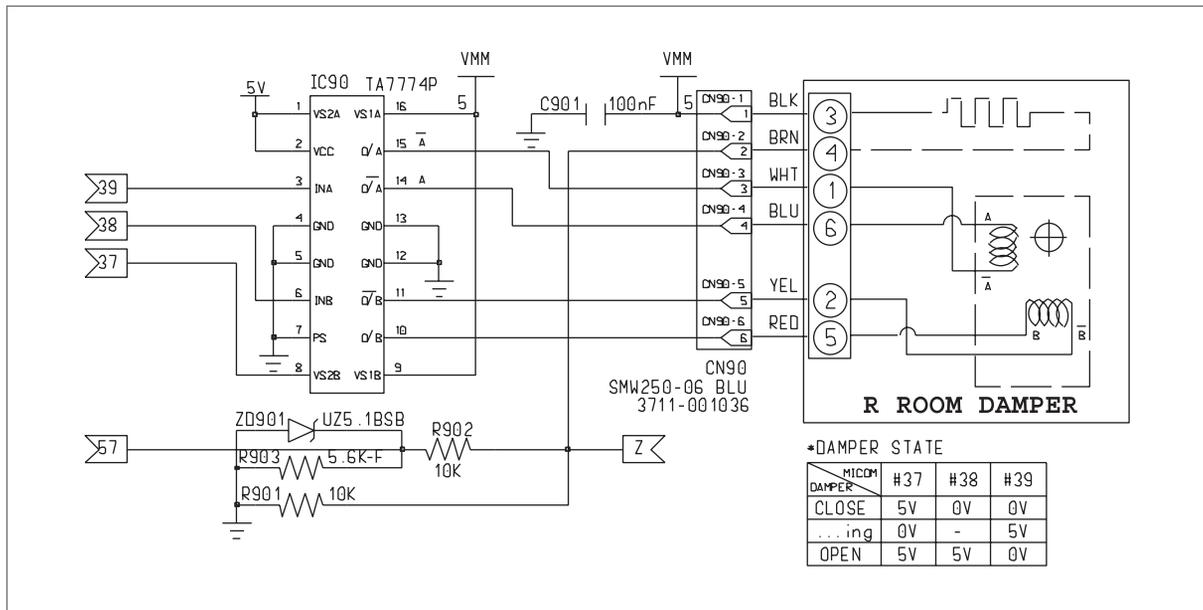
4) When the fault is detected on the motor (In case that the speed is lower than 600-700rpm), the motor stops and restarts after 10 seconds. At this time, if the motor is running with normal speed, the motor state is judged as normal. But, if the normal RPM is not input to the MICOM, the motor restarts after 10 seconds again. In case that the motor can not run at the normal speed even after restarting 5 times, the motor stops for 10 minutes. After 10 minutes, the restarting procedure is tried again in the way of 5-time restarting every 10 seconds and a stop for 10 minutes. If you make self-supervision function started by the front panel of the freezer, the LED related to the faulty motor is lit to indicate that fault.

If you turn off the power, the fault recording data is deleted. You have to check first before turning it off when visiting a customer for service.

Note) During maintenance work, if it is expected that there is an error on the fan motor or the motor is tripped, execute the self-supervision function to check the state of the refrigerator.

8. REFERENCE INFORMATION

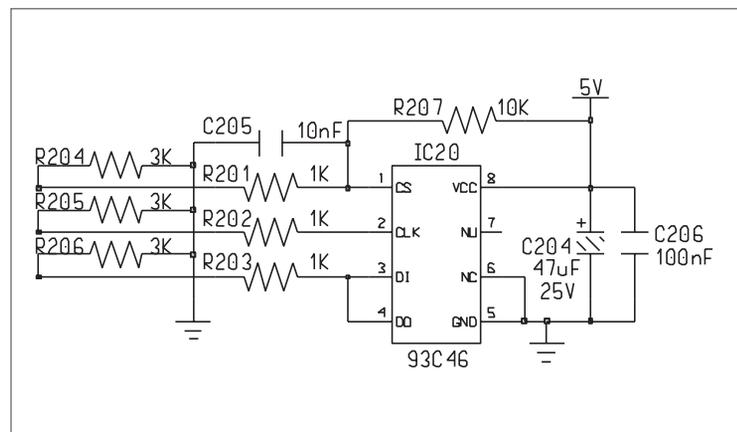
8-3-10) The driving circuit part for the dampers in the refrigerator and chammart compartment



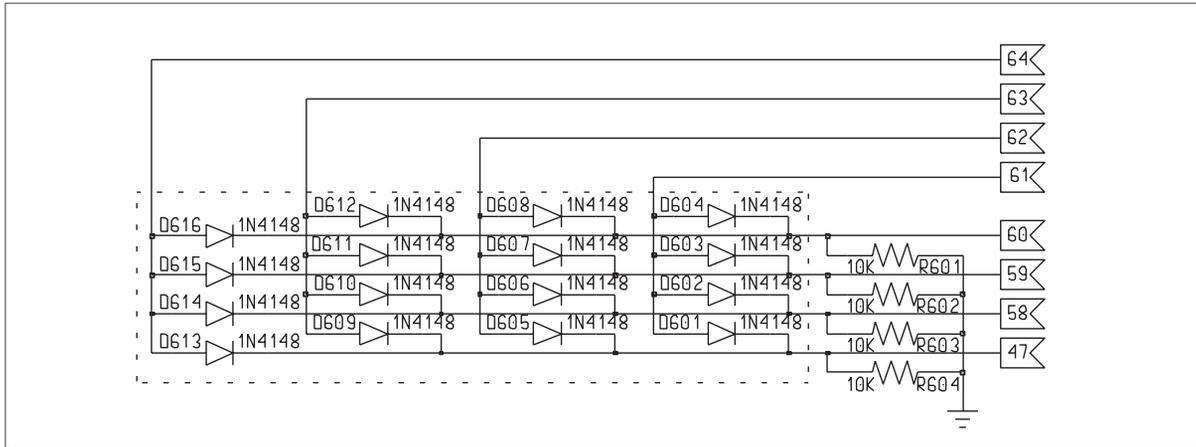
- 1) The damper in the chammart compartment is controlled by MICOM.
- 2) The damper in the refrigerator compartment repeats opening and closing. (But, because this is for the refrigerator compartment, the damper in the refrigerator compartment is operated until the temperature in the refrigerator compartment is adjusted in condition.) By IC90, the electric power is supplied to the damper motor (stepping motor) through the 4 wires which are A/A, B/B. The motor rotated forward and in reverse.
- 3) To check whether the damper motor has a fault or not, disconnect the connectors of CN90 (the damper of the refrigerator compartment) and measure the resistance values between ③-④ and between ⑤-⑥. If the value is between 400~600 Ω, it is normal and if ∞Ω, it is that the wire is disconnected.

8-3-11) EEPROM Circuit Part

EEPROM is a semiconductor memory that data is not deleted even though the power is off. Using EEPROM, This model can save the data of the refrigerator which the customer has set even in the area that the electric power is not stable such as momentary interruption. This also has a function to conduct the input and output process for the data selected as options.



8. REFERENCE INFORMATION



Using DIODE (1N4148), this circuit is checked on initial energizing.

When the option circuit is modified, the power should be off. After work, turn it on again.

The option is selected as shown in the table below. Except special situation, you are requested to operate as the specification when the product is shipped.

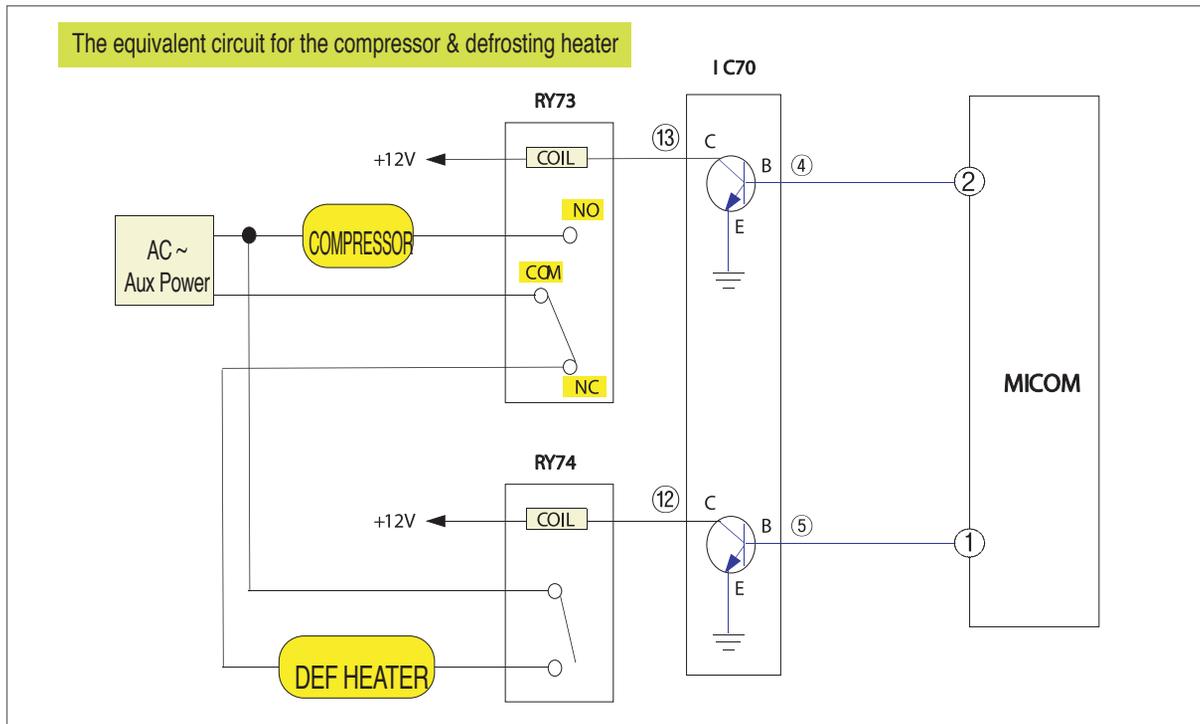
(※ At present, the standard options are under evaluation)

8-3-12) Load Driving Circuit Part

- 1) Most loads of the electronic type refrigerator are controlled by the main PCB.
- 2) The compressor (F FAN(option)), the defrosting heater, and the lamps in the refrigerator are controlled by the relay.
- 3) Let me explain about the defrosting heater as an example. To run the defrosting heater, the HIGH(5V) signal comes out from the Pin no. 1 of the MICOM. This signal goes to No. 5 of IC70 as an input. The Pin no. 5 of the IC70 is operated as a base of the NPN TR and the output terminal, Pin no.12 is operated as a collector of the TR. So, if the Pin no. 5 of the IC70 gets 5V input, the No.12 of the IC70 is turned on and conducted to the GND. The end of the COIL connected to the RY74 and the No. 12 of the IC70 becomes LOW(0V) and the power, +12 V, on the other end of the RY74 COIL flows to the GND through No.12 of the IC70. As magnetic lines of force (electromagnet) are generated during flowing current though the coil, the contact of the secondary side (load side) in the RY74 is closed and then, the AC input (220~240VAC) across the defrosting heater turns on the heater.

In case that the Pin no. 1 of the MICOM becomes LOW(0V), the Pin no. 12 of the IC70 opens (Switch off state) and the power is off. So, the current on the relay RY74 is off, the magnetic lines (electromagnet) are disappeared, the contact of the secondary side opens, and the defrosting heater is off.

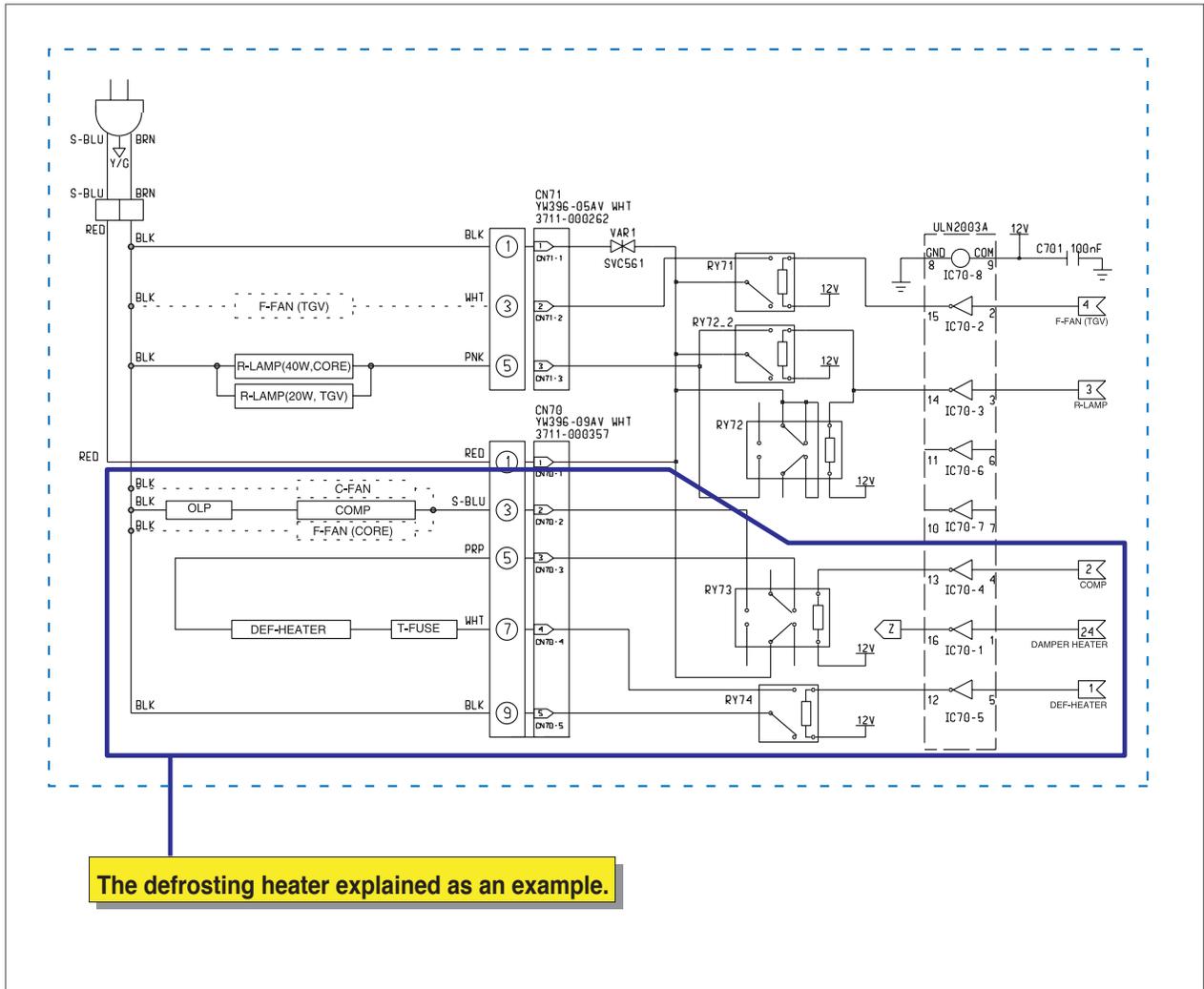
8. REFERENCE INFORMATION



- 4) The other loads are operated in the same principle. (The compressor and the lamps in the refrigerator compartment)
- 5) AC Fan motor in the refrigerator compartment is an option. The model LED display applied has two selections - BLDC motor or AC Fan motor. The AC Fan Motor is wired in link with the compressor. In case that the compressor is off, the fan is off. In case that the compressor is "on", the fan is "on"
- 6) As the lamp part is an option, the circuit was designed to be commonly used. The relay is designed to use both "Small" and "Large" in parallel. If the lamp is larger than 40W, the relay for "big" should be inserted in the socket. (RY72: Relay for large capacity, RY72-2: Relay for small capacity)

8. REFERENCE INFORMATION

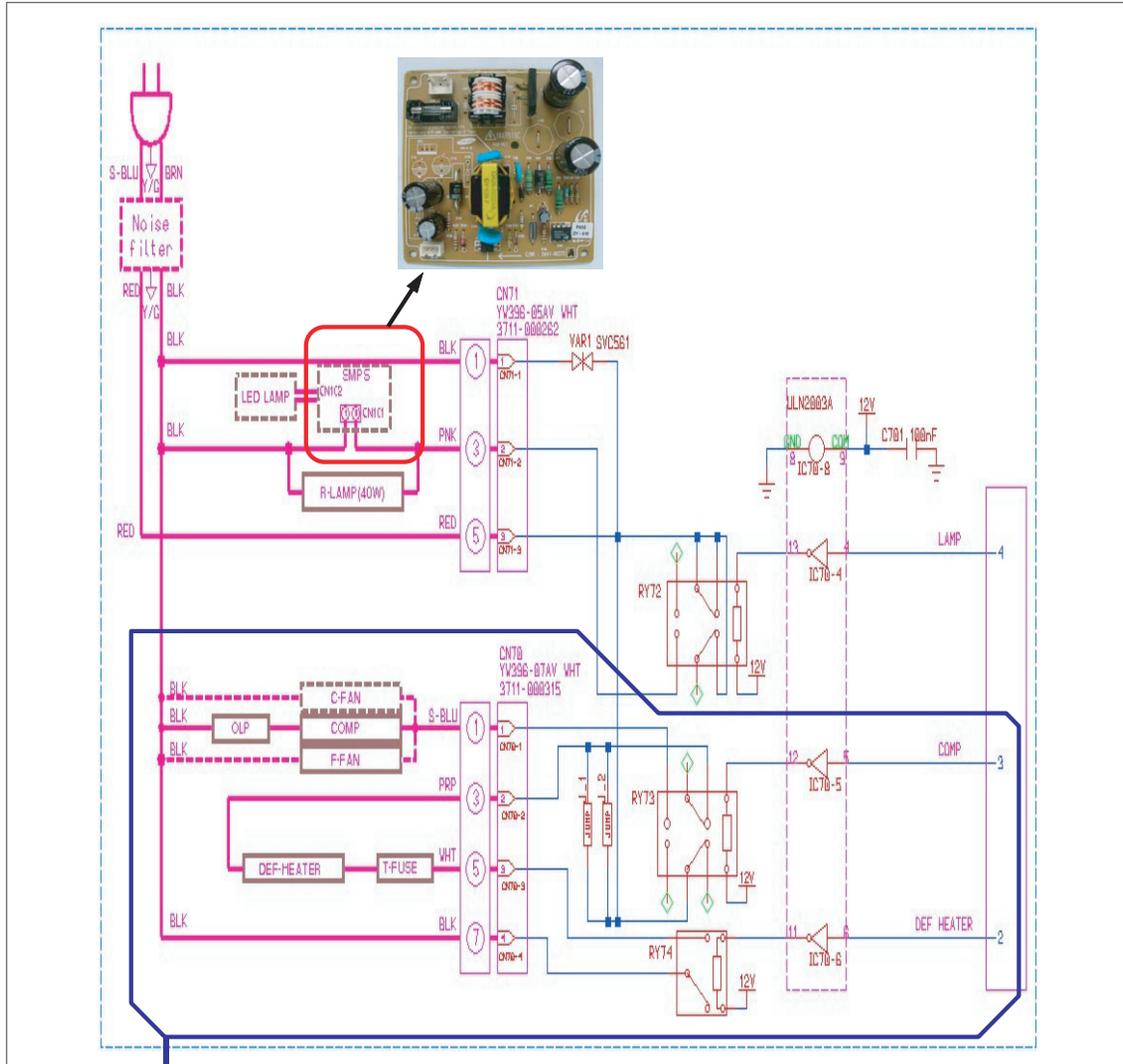
Load Driving Circuit Part (PCB Circuit)



8. REFERENCE INFORMATION

8-4. Reference (LCD Model)

8-4-1) Reference (Measuring Load Terminal)



* Measure the following after plugging out the unit and MAIN PCB CN70 & 71 terminals.

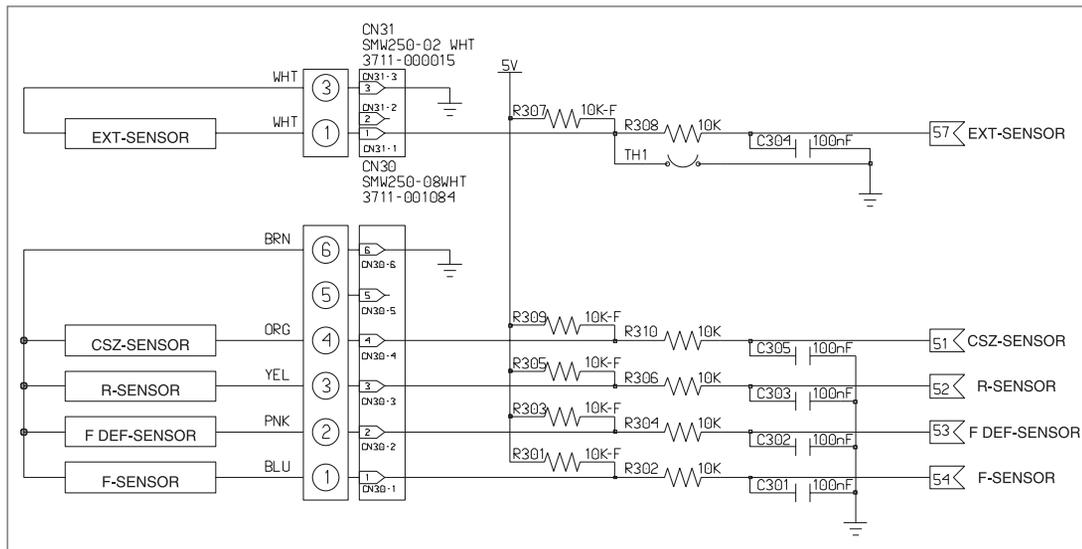
Load	Terminal (Based on Counterpart #)	When measuring	Failure Item	Remarks
Freezer defrost HEATER	Between CN70 ③ and ⑤	0 Ω	THERMISTOR, HEATER, WIRE-SHORT	Normal Heater Value (220V: 202ohm)
		∞ Ω	THERMISTOR, HEATER, WIRE-OPEN	
F FAN MOTOR (AC FAN MOTOR OPTION)	Between CN70 ① and ⑦	0 Ω	MOTOR, WIRE-SHORT	Normal Motor Value
		∞ Ω	MOTOR, WIRE-OPEN or SLIPPED-OUT HOUSING	
R LAMP (AC LAMP OPTION)	Between CN71 ① and ③	0 Ω	MOTOR, WIRE-SHORT	Normal Lamp Value
		∞ Ω	MOTOR, WIRE-OPEN or SLIPPED-OUT HOUSING	

8. REFERENCE INFORMATION

* Turn on the unit and according to the load status, check the status of the relay and driver circuit as follows.

Operation Status	RELAY	Measurement Terminal(Target Material No. Standard)	Measurement Results	Determination when differing from the Measurement Results
Defrost & COMPRESSOR OFF	RY74	CN70 ⑤ - ⑦	Input Power	RY74 CONTACT SHORT or Defective Driver Circuit
	RY73	CN71 ⑤ - ⑦ - CN70 ①	Input Power	RY73 NO CONTACT SHORT or Defective Driver Circuit
COMPRESSOR Working (F FAN(OPTION))	RY73	CN71 ⑤ - ⑦ - CN70 ①	0V	RY73 NO CONTACT OPEN or Defective Driver Circuit
	RY74	CN70 ⑤ - ⑦	25 ~ 50V	Defective RY74, RY73 NC CONTACT SHORT or Defective Driver Circuit
Defrosting	RY74	CN70 ⑤ - ⑦	0V	Defective RY74, RY73 NC CONTACT SHORT or Defective Driver Circuit
	RY73	CN71 ⑤ - ⑦ - CN70 ①	Input Power	RY73 NO CONTACT SHORT or Defective Driver Circuit
R LAMP On	RY72	CN70 ③ - ⑤	0V	RY72 CONTACT OPEN or Defective Driver Circuit (DOOR SWITCH, DRIVER IC)

8-4-2) Reference (Measuring Sensor Terminal)



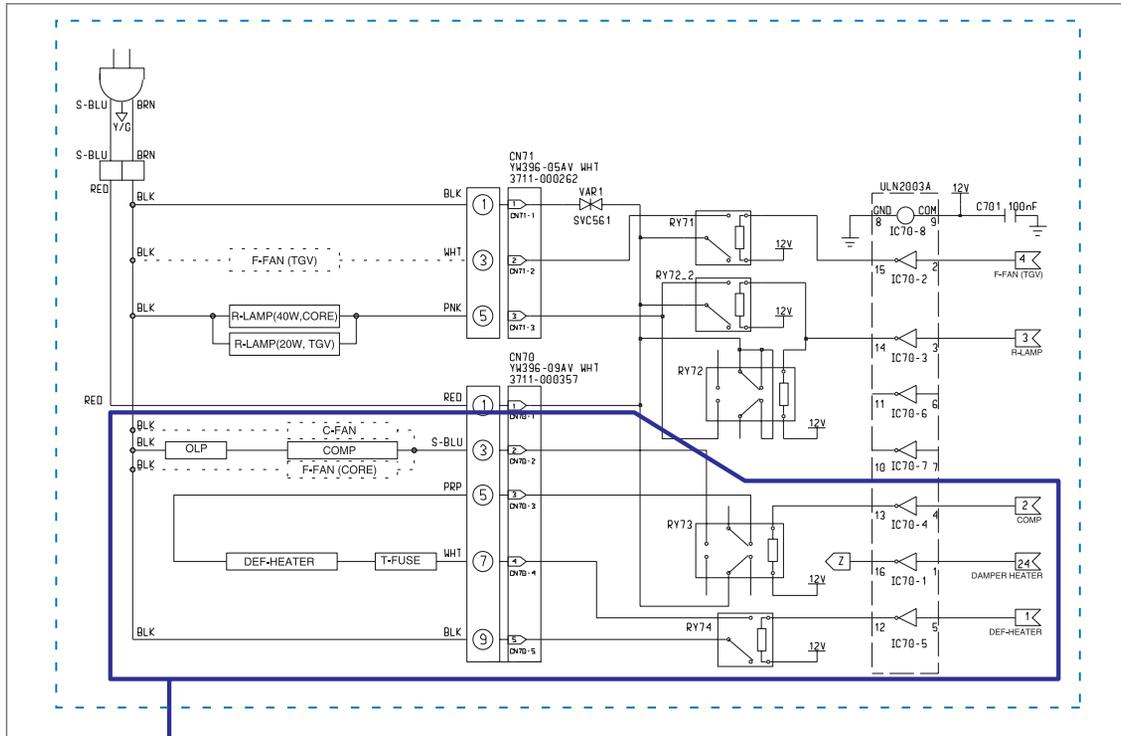
* Measure the following after plugging out the unit and MAIN PCB CN30 & 31 terminals.
* When the temp increases, its resistance decreases (NTC TYPE Sensor).

1. Fridge Sensor: Measure between CN30 ③-⑥
2. Freezer Sensor: Measure between CN30 ①-⑥
3. Fre-D Sensor: Measure between CN30 ②-⑥
4. CoolSelect Zone Sensor: Measure between CN30 ④-⑥
5. Ambient Sensor: Measure between CN30 ①-③
6. Compare the above values with them in 12. LCD Type 1-6. Temp-to-Sensor Resistance Table and evaluate them.

8. REFERENCE INFORMATION

8-5. Reference (LED Model)

8-5-1) Reference (Measuring Load Terminal)

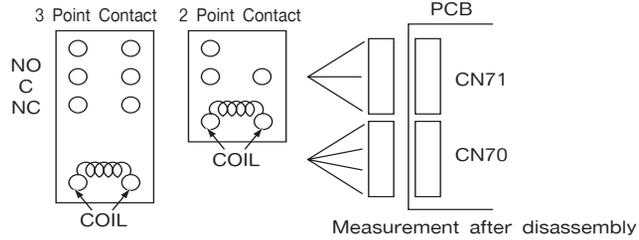


* Measure the following after plugging out the unit and MAIN PCB CN70 & 71 terminals.

Load	Measurement Terminal PCB MAIN	When measuring	Failure Item	Remarks
Freezer defrost HEATER	Between CN70 ⑤ and ⑦	0 Ω	THERMISTOR, HEATER, WIRE-SHORT	Normal Heater Value (220V: 202ohm)
		∞ Ω	THERMISTOR, HEATER, WIRE-OPEN	
F FAN MOTOR (AC FAN MOTOR OPTION)	Between CN70 ③ and ⑨	0 Ω	MOTOR, WIRE-SHORT	Normal MOTOR VALUE
		∞ Ω	MOTOR, WIRE-OPEN or SLIPPED-OUT HOUSING	
R LAMP	Between CN71 ① and ⑤	0 Ω	MOTOR, WIRE-SHORT	Normal LAMP Value
		∞ Ω	MOTOR, WIRE-OPEN or SLIPPED-OUT HOUSING/LAMP	

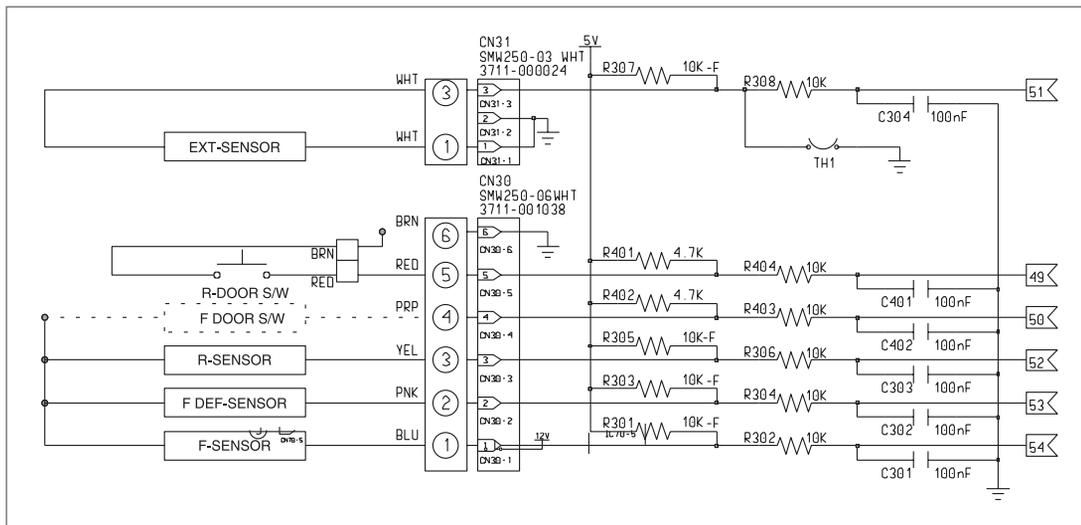
8. REFERENCE INFORMATION

* Turn on the unit and according to the load status, check the status of the relay and driver circuit as follows.



Working Status	RELAY	Measurement Terminal(Target Material No. Standard)	Measurement Results	Determination when differing from the Measurement Results
Defrost & COMPRESSOR OFF	RY74	CN70 ⑦ - ⑨	Input Power	RY74 CONTACT SHORT or Defective Driver Circuit
	RY73	CN70 ① - ③	Input Power	RY73 NO CONTACT SHORT or Defective Driver Circuit
COMPRESSOR Working (F FAN(OPTION))	RY73	CN70 ① - ③	0V	RY73 NO CONTACT OPEN or Defective Driver Circuit
	RY74	CN70 ⑦ - ⑨	25 ~ 50V	Defective RY74, RY73 NC CONTACT SHORT or Defective Driver Circuit
Defrosting	RY74	CN70 ⑦ - ⑨	0V	Defective RY74, RY73 NC CONTACT SHORT or Defective Driver Circuit
	RY73	CN70 ① - ③	Input Power	RY73 NO CONTACT SHORT or Defective Driver Circuit
R LAMP Working	RY72	CN71 ⑤ - CN70 ①	0V	RY72 CONTACT OPEN or Defective Driver Circuit (DOOR SWITCH, DRIVER IC)

8-5-2) Reference (Measuring Sensor Terminal)



* Measure the following after plugging out the unit and MAIN PCB CN30 & 31 terminals.
* When the temp increases, its resistance decreases (NTC TYPE Sensor).

1. Fridge Sensor: Measure between CN30 ③-⑥
2. Freezer Sensor: Measure between CN30 ①-⑥
3. Fre-D Sensor: Measure between CN30 ②-⑥
4. Ambient Sensor: Measure between CN30 ①-③
5. Compare the above values with them in 12. LED Type 2-6. Temp-to-Sensor Resistance Table and evaluate them.

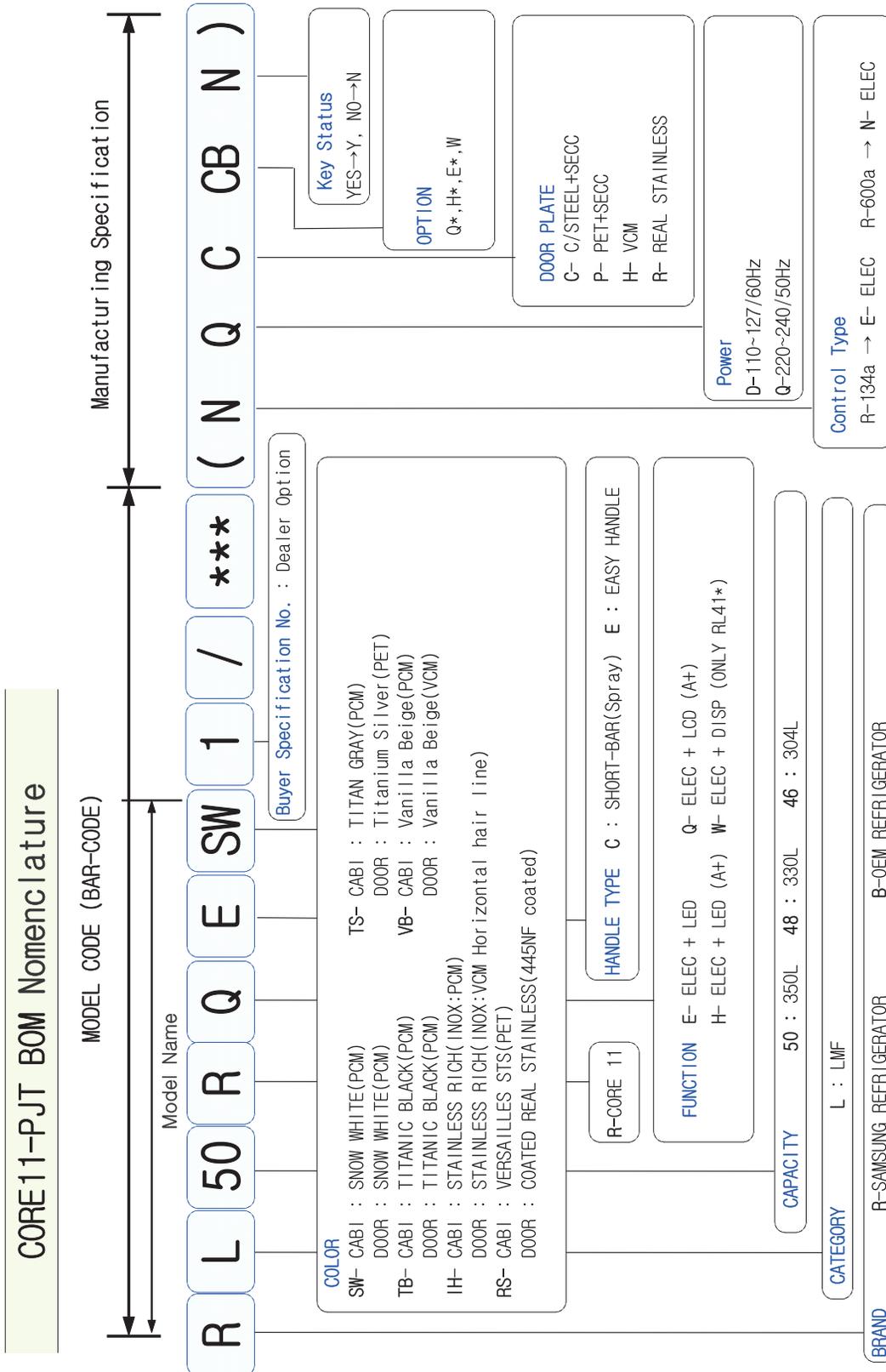
8. REFERENCE INFORMATION

8-5-3) Reference (Circuit Service Material LIST)

NO	Item	SPEC	CODE NO	Remarks
1	PBA MAIN	CORE LCD	DA41-00364A	BLDC MOTOR
		CORE LCD	DA41-00364B	AC MOTOR
		CORE LED	DA41-00362D	BLDC MOTOR(RL41H)
		CORE LED	DA41-00362H	BLDC MOTOR(RL38H)
		CORE LED	DA41-00362A	AC MOTOR(RL44/RL41)
		CORE LED	DA41-00362G	AC MOTOR(RL38)
		CORE SEMI LED	DA41-00362C	AC MOTOR(RL44/RL41)
		CORE SEMI LED	DA41-00362F	AC MOTOR(RL38)
2	PBA PANEL	CORE LCD	DA41-00371A	
		CORE LED	DA41-00369A	
		CORE SEMI LED	DA41-00370A	
3	PBA SMPS	LED SUB	DA41-00372A	LED LAMP power
4	TRANS DC	220~240V/50Hz	DA26-00009K	
5	SENSOR	Defrost Sensor	DA32-00006B	
		CoolSelect Zone Sensor	DA32-00011N	Only for LCD model
		Freezer Sensor	DA32-00006G	
		Fridge Sensor	DA32-10105R	
		True Taste Sensor	DA32-00011P	
<p>* The final digit (DA41-XXXXX?) for MAIN PCB ASS'Y code subjects th change. So, make sure you have the correct one."</p>				

8. REFERENCE INFORMATION

9-6) Nomenclature





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FAX : 82-62-950-6829

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