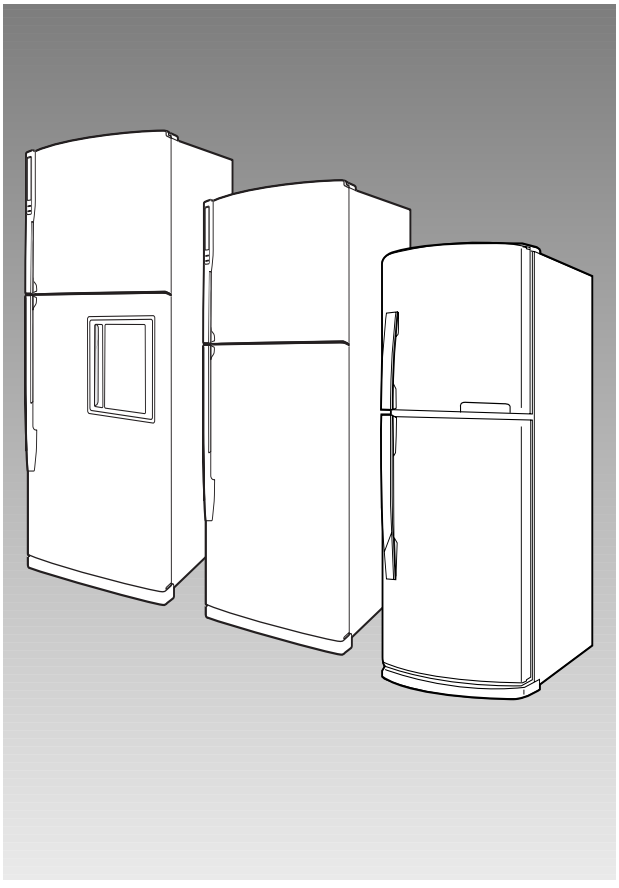
SAMSUNG

Model: SR-61KTC/SR-61NMC
SR-65KTC/SR-65NMC
SR-69NMC

SERVICE Manual

REFRIGERATOR



CONTENTS

1. Product specifications.

● Classification by Capacity

ITEM.		STANDARD				
MODEL NAME		510 MODEL		550 MODEL		590 MODEL
		SR-61KTC	SR-61MNC	SR-65KTC	SR-65NMC	SR69-NMC
NET CAPACITY	TOTAL	514LT		554LT		589LT
	FREEZER	153LT		165LT		165LT
	REFRIGERATOR	361LT		389LT		424LT
NET DIMENSION		840*761.5*1755.5	840*761.5*1760.5	840*761.5*1810.5		840*761.5*1854.5
NET WEIGHT		96 KG		97 KG		98 KG
ELECTRIC HEATING EQUIPMENT POWER		388W	378W	388W		378W

● Classification by Electric power

ITEM.	STANDARD					
MODEL NAME	SR-61KTC, 65KTC			SR-61NMC, 65NMC, 69NMC		
	AC127V / 60Hz	AC220V / 50~60HZ	AC240V / 50HZ	AC127V / 60Hz	AC220V / 50~60HZ	AC240V / 50HZ
REGULAR FREQUENCY	60Hz	50~60Hz	50Hz	60Hz	50~60Hz	50Hz
REGULAR VOLTAGE	AC 127V	AC 220V	AC 240V	AC 127V	AC 220V	AC 240V
ELECTRIC MOTOR REGULAR POWER						
SORT OF REFRIGERATOR	OCCASSIONAL COOLING TYPE REFRIGERATOR					
COOLING MASS	HFC-134α					
COOLING MASS SEALED QUANTITY	150 G					
FREEZER PERFORMANCE	4 STAR					

2.Safety precautions and warnings

xRead all instructions before using this product and keep to the instructions in order to prevent danger or property damage.

Warning/Caution

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

Description of symbols

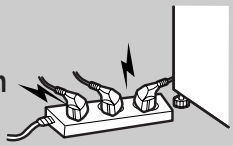
IN DICATES PROHIBITION
DO NOT DISASSEMBLE
DO NOT CONTANT
ADHERE THE INSTRUCTION STRICTLY
ONPLUP FROM THE ELECTRICAL AVOLD
EARTH THE APPLIANCE TO AVOID THE RISK OF AN ELECTRIC SHOCC

Warning

Do not insert the power cables.

- *May cause abnormal generation of heat or fire.*

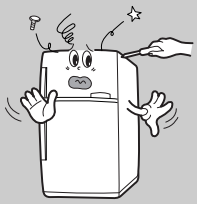
Prohibition



Do not disassemble to repair or alter.

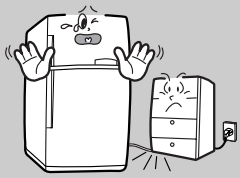
- *It may cause fire or abnormal operation which leads to injury.*

Do not disassemble



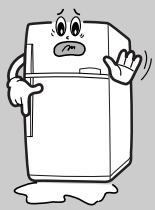
Do not bend the power cable with excessive force or do not have the power cord pressed by heavy article.

- *May cause fire.*



Check the operating environment.

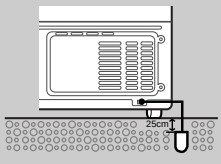
- *Deterioration of electric parts insulation may cause electric shock or fire.*



Make sure of the earth.

- *If power doesn't ground, it will cause breakdown and electric shock.*

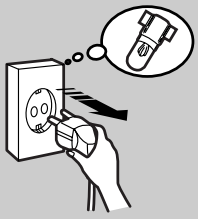
Earth



Pull the power plug out to exchange the interior lampof the refrigerator.

- *It may cause electric shock.*

Unplug

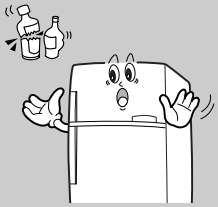


Caution

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

- *Freezing of the contents may inflict a wound.*

Prohibition



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

- *It may hurt you when refrigerator door open and close.*

Prohibition

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

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

Prohibition

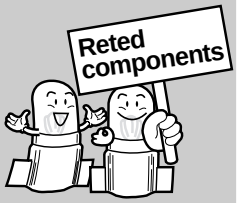
Do not store articles on the Refrigeration.

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

Prohibition

When replacing electric comporents, be sure to use rates comporents.

- *Check the model, rated voltage, rated current, operating temperature etc. of the component.*

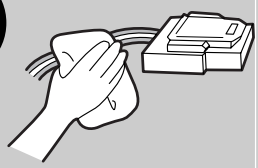


On repair, make sure that the wires such as harness are tightly bundled.

- *Tghtly bundle wires in order not to be detached by the external force and to be wetted.*

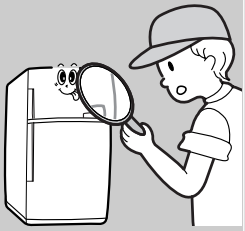
On repair, remove completely dust or other things of housing parts, harness parts, and check parts.

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



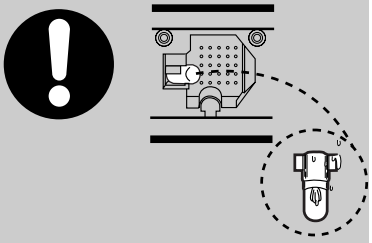
After repair, check the assembled state of components.

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



Check the electrical parts for the trace of moisture.

- *When the trace of moisture penetration is detected, replace the patt or try insulation tapping.*



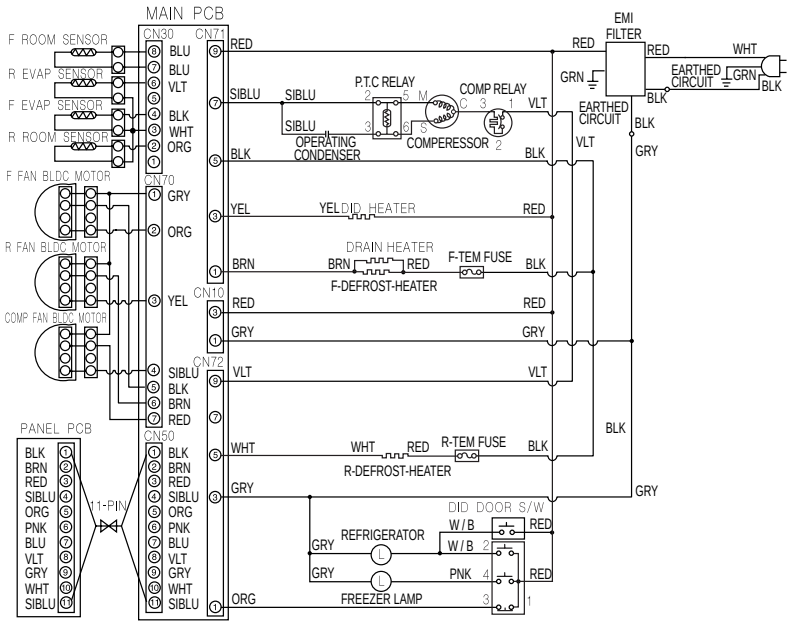
3. ELECTRIC PARTS STANDARD

ITEM			STANDARD			
			SR-61/65/69NMC / SR-61/65KTC			
			110~115V/60Hz	127V/60Hz	220V/50~60Hz	230~240V/50Hz
REFRIGERATION PARTS	COMPRESSOR	MODEL	DK172C-L2U	DK172P-L2U	SK190H-L2U	DK190Q-L2U
		STARTING TYPE	RSCR			
		OIL CHARGE	Freol α-15(ESTER)			
	COOLER	FREEZER	SPLIT FIN TYPE			
		REFRIIGERATOR	SPLIT FIN TYPE & TUBE TYPE		SPLIT FIN TYPE	
	CONDENSER		FORCED AND NATUAL CONUECTION TYPE			
	DRYER		MOLECULAR SIEVE XH-9			
	CAPILLARY TUBE		0.82X2500 4.26Kg/cm^2			
	REFRIGERANT		HFC-134a			
TEMPERATURE			ON(℃)	OFF(℃)	ON(℃)	OFF(℃)
	FREEZER	HIGH	-21℃	-23℃	-22℃	-24℃
		MID	-18℃	-20℃	-18℃	-20℃
		LOW	-15℃	-17℃	-15℃	-17℃
	REFRIGERATOR	HIGH	-0.5℃	-1.5℃	-0.5℃	-1.5℃
		MID	3.5℃	2.5℃	2.5℃	1.5℃
		LOW	6.5℃	5.5℃	5.5℃	4.5℃
DEFROST	FIRST CYCLE		4hours±10minute			
	CYCLE	REFRIGERATOR	10hours			
		FREEZER	20hours			
	PAUSE TIME		10minute±2minute			

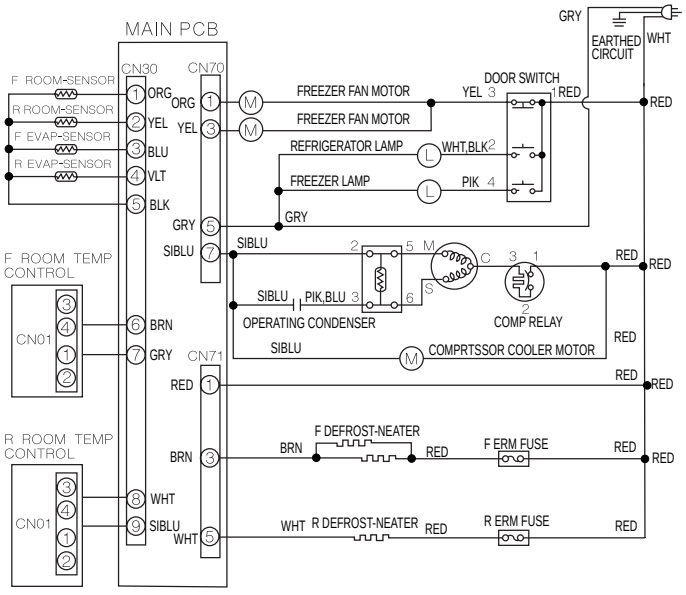
ITEM			SR-61/65/69NMC / SR-61/65KTC			
			110~115V/60Hz	127V/60Hz	220V/50~60Hz	230~240V/50Hz
ELECTRIC PARTS	SENSOR	F-SENSOR	502 AT			
		R-SENSOR	〃			
		F-DEF SENSOR	〃			
		R-DEF SENSOR	〃			
	HEATER	DRAIN HEATER	13W / 110V	13W / 127V	13W / 220V	13W / 240V
		F DEF HEATER	235W / 220V	235W / 127V	235W / 220V	235W / 240V
		R DEF HEATER	120W / 110V	120W / 127V	120W / 220V	120W / 240V
		DID HEATER	10W / 110V	10W / 127V	10W / 220V	10W / 240V
	F DEF FUSE		250V 10A 72±4˚C			
	R DEF FUSE		250V 10A 72±4˚C			
	CONDENSER	OPERATION	12㎌ / 250VAC		5㎌ / 350VAC	
	STARTING RELAY	MODEL	J531QE100M2002		J531Q34E100M350-2	J531Q35E330M385-2
		START	10Ω ±20%(SURROUNDING TEM 25˚C)		220Ω ±20% (SURROUNDING TEM 25˚C)	330Ω ±20% (SURROUNDING TEM 25˚C)
	O/L-PROTELTOR	MADEL	4TM437RHBYY-53		4TM314RHBYY-53	4TM265RHBYY-53
		ON TEM	69℃	69℃	69℃	61℃
		OFF TEM	130℃	125℃	130℃	130℃
	DC TRANS	SR-61/65/69NMC	115V 50/60Hz	127V 50/60Hz	220V 50/60Hz	240V 50/60Hz
	F-COOLER FAN MOTOR	SR-61/65/69NMC	110V 60Hz	127V 60Hz	220V 50/60Hz	240V 50Hz
		SR-61 / 65KTC	12V, DC - BLDC , SENSORLESS			
	R-COOLER FAN MOTOR	SR-61/65/69NMC	110V 60Hz	127V 60Hz	220V 50~60Hz	230~240v 50Hz
		SR-61 / 65KTC	12V, DC - BLDC , SENSORLESS			
	CYCLE FAN MOTOR	SR-61/65/69NMC	110V 60Hz	127V 60Hz	220V 50~60Hz	230~240v 50Hz
		SR-61 / 65KTC	12V, DC - BLDC , SENSORLESS			
	F-LAMP		110 / 130V 15W		240V 15W	
	R-LAMP		130V 30W		240V 25W	
	DID DOOR-S/W	SR-61 / 65KTC	250V/0.7A			
	DOOR-S/W		250V 0.7A			
	Power cord		EP-2,127V/7A	SPT-3,125V/7A	VCP-2,250V/10A	BF-3,250V/10A

4. Electric diagram

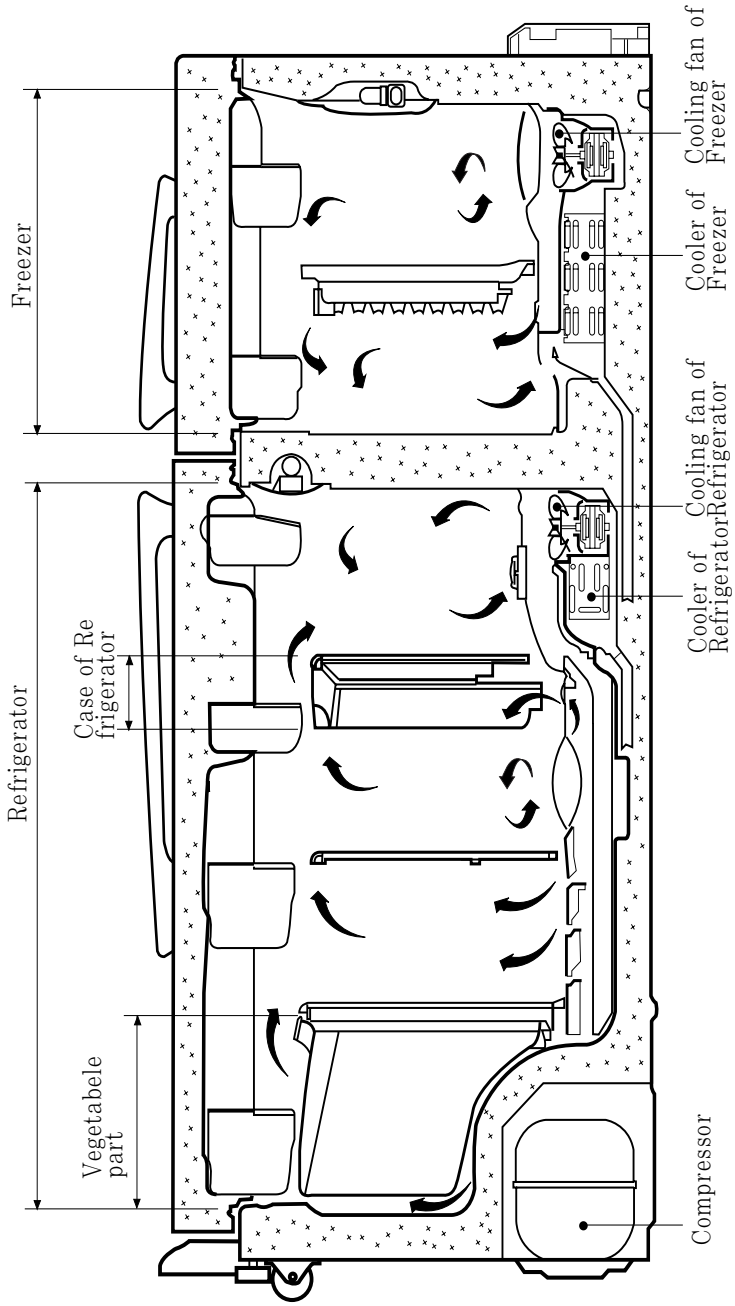
4-1. Electronic mode(SR-61KTC,65KTCT)



4-2) SEMI BASIC (SR-61NMC, 65NMC, 69NMC)

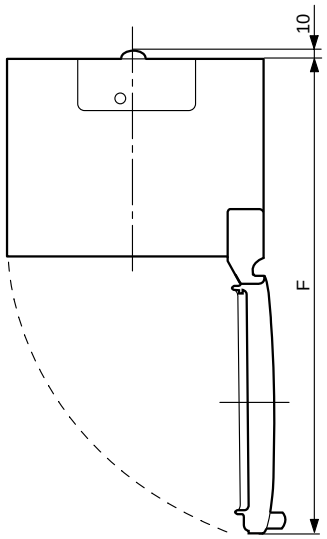


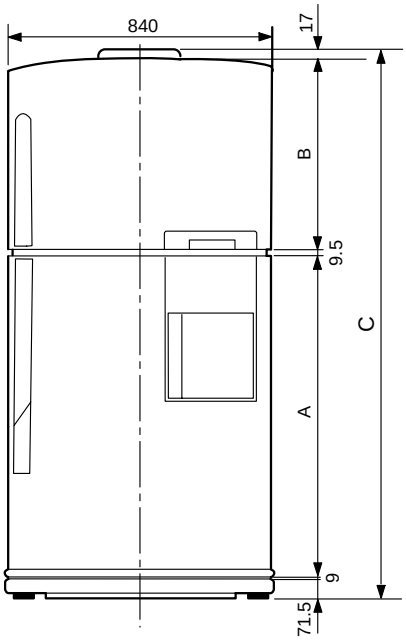
5. Cool Air Circulation

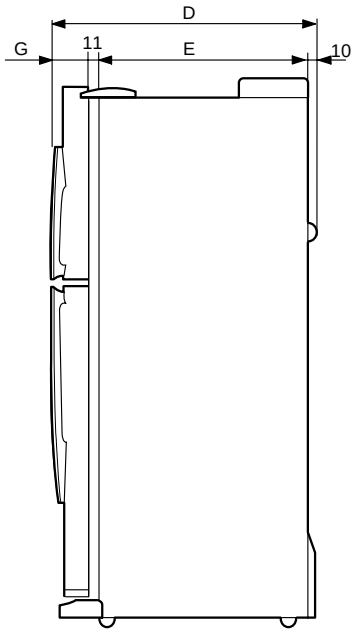


6. FUNCTIONS AND DIRECTIONS

6-1. THE OUTER SIZE





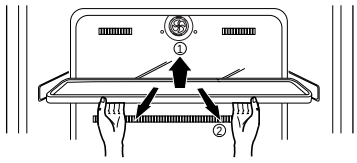


MODEL	A	B	C	D	E	F	G	
SR-61KTC	1066.5	580	1755.5	761.5	617.5	1479	123	
SR-61NMC	1066.5	580	1760.5	761.5	617.5	1479	123	
SR-65KTC/NMC	1096.5	600	1810.5	761.5	617.5	1479	123	
SR-69NMC	1140.5	600	1854.5	761.5	617.5	1479	123	

6-2. THE NAME OF EACH PARTS AND DISASSEMBLE METHOD

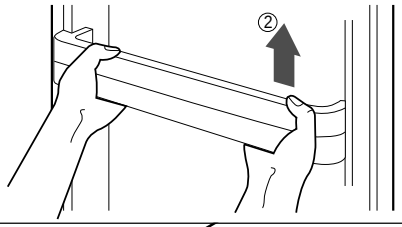
FREEZER SHELF

- Up the front of shelf to direction ① then pull and apart to direction②.

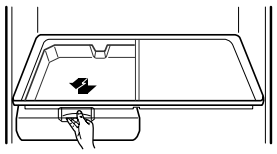


DOOR GUARD

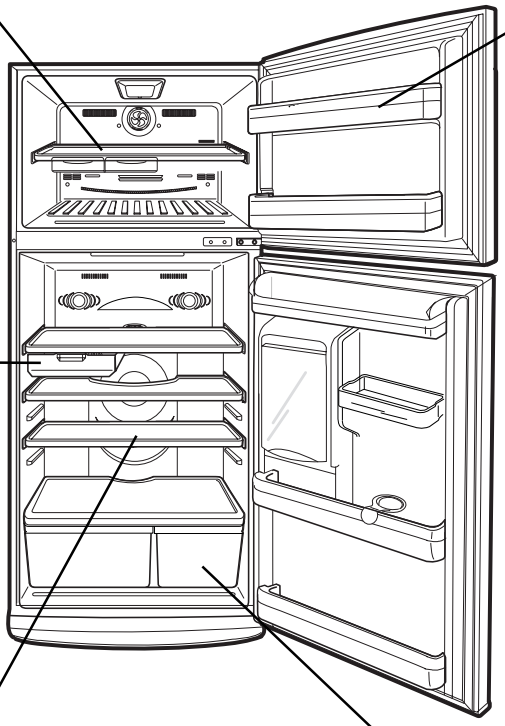
- Push to direction ②



CHILLED ROOM SHELF

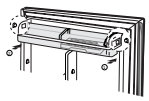


- Pull to the arrow direction then up and apart at the locking point.

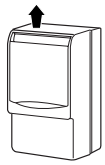


DID CASE

- Pull and apart display part of door guard.

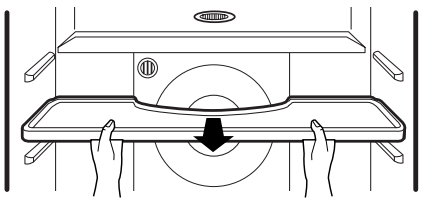


- Up and apart as showed.



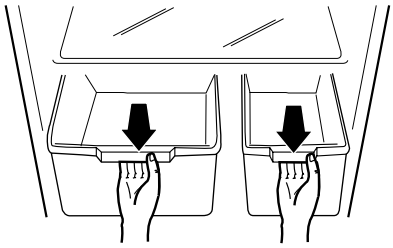
TEMPERRD GLASS TRAY

- Pull with both hands as showed
- The height can be adjusted according to the stored bowls.



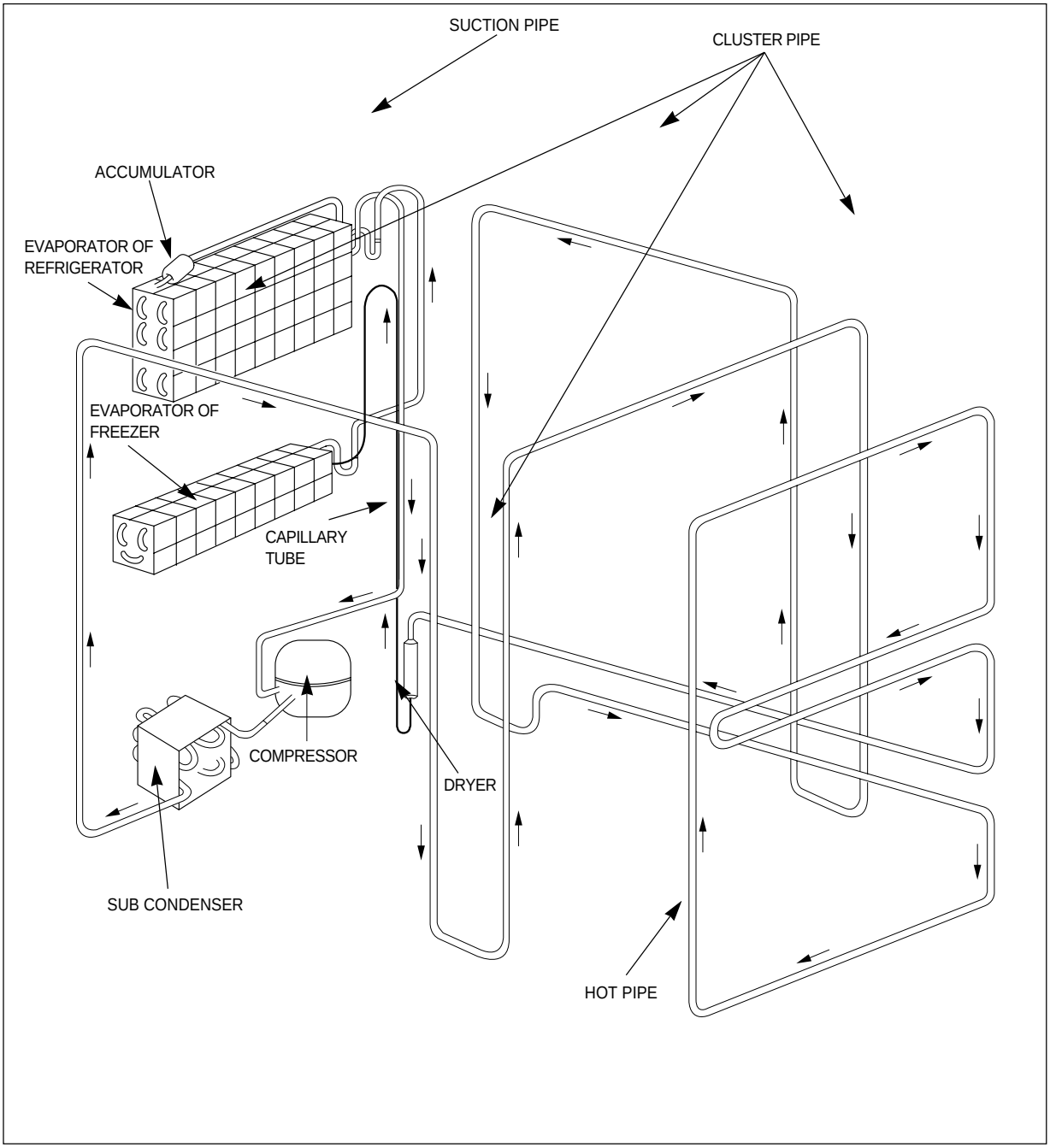
VEGETABLE/SALAD COVER AND CASE

- Upthe cover and apart then pull out the vegetable//salad compartment cover and case at the mid-point and up and pull to apart.



6-3. CYCLE OF FREEZING

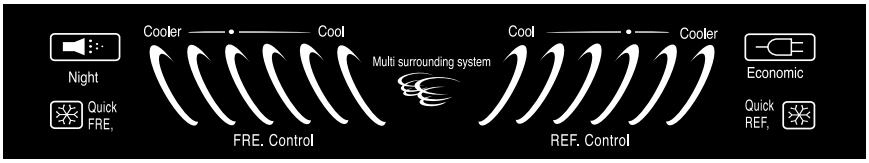
COMPRESSOR → SUB CONDENSER → CLUSTER PIPE → HOT PIPE → DRYER → CAPILLARY TUBE → EVAPORATOR OF REFRIGERATOR → EVAPORATOR OF FREEZER → ACCUMULATOR → SUCTION PIPE → COMPRESSOR

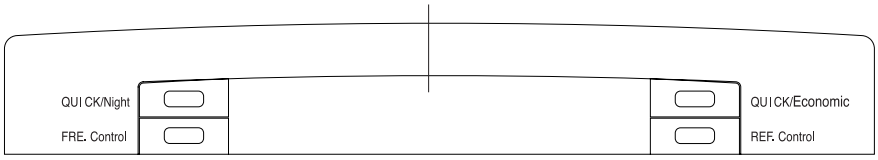


7. TEMPERATURE CONTROL AND THE OTHERS

7-1. ELECTRONIC MODE

1. DISPLAY DESIGN





2. Temperature control function

1) Freezer temperatur control

1-1) It consists of five steps as follows and selected by one button.

MID → MID,HIGH → NIGH → LOW → LOW,MID

1-2) setting up turn on a light in order by system of freezer cholce button.

(MID → MID,HIGH → NIGH → LOW → LOW,MID → MID...)

1-3) It set up "MID"automaticature during power on.

1-4) There is standard temperatically list of each notch part. (1/3H standard)

1-5) When inputting freezer key, display of LED change at once but actual operating start in 10 seconds

ITEM \ NOTCH	LOW	⊙	MID	⊙	HIGH
TEMPERATURE	-16.0℃	-17.5℃	-19.0℃	-20.5℃	-22.0℃

2) Refrigerator temperature control

2-1) It consists of five steps as follows and selected by one button.

MID → MID,HIGH → NIGH → LOW → LOW,MID

2-2) setting up turn on a light in order by system of freezer cholce button.

(MID → MID,HIGH → NIGH → LOW → LOW,MID → MID...)

2-3) It set up "MID"automaticature during power on.

2-4) There is standard temperatically list of each notch part. (1/3H standard)

2-5) When inputting freezer key, display of LED change at once but actual operating start in 10 seconds

ITEM \ NOTCH	LOW	⊙	MID	⊙	HIGH
TEMPERATURE	+6.0℃	+4.5℃	+3.0℃	+1.0℃	-1.0℃

3) Ppwer freezering / Regular condition /9in bed)

1) It select just power freezer / Regular condition.

2) If you press power freezing / regular freezing → Power freezing → Regular condition.

3) When first power on, lamp does appear.

CLASSIFICATION	First POWER ON	Pressed once	Pressed twice	
LAMP CHANGE	OFF	POWER freezing	Regular condition operating	

3-1) Power freeze function

A. Input power freeze/regular condetion key. When power freeze startes, LED signal change at once.
(Comp and F-fan runs continuously for two and a half hours when quick freeze sekected.)

B. During quick freezing the refrigerator controlled by setted notch.

3-2) Regular condition function

A. Judge the temp. of F/R room, F room is over comp on of "LOW" NOTCH or R room is over comp on of "LOW" NOTCH.
If so regular condition function isn't performed and LED is OFF below 0.5 seconds.

B. Input the function, judge temp. of F room or R room, F room is less than comp on of "LOW" NOTCH and R room is less than comp on of "LOW" NOTCH. If so regular condition function is operate and comp F,R-FAN is off without state of operation in recently.

C. When state the operation of regular condition, judge the temp. of F/R room, F room is over comp on of "LOW" NOTCH or R room is over comp on of "LOW" NOTCH. If son regular condition function is the end and it is returned before.

4) Power refrigerator/Power saving function

1) Select power refrigerator/power saving button
2) Press POWER/SAVING BUTTON at once. And it is selected "OFF"→"Power refrigerator"→"Saving operation".
3) Initial power on isn't signal.

CLASSIFICATION	INITIAL POWER ON	PRESS ONE	PRESS T ONE	NOTES
CHANGE OF SIGNAL LAMP	OFF	POWER REFRIGERATOR	SAVING OPERATION NOTES	

4-1) Power refrigerator function

A. Input power refrigerator/saving key. When power refrigerator started, LED signal change at once.
(Comp. and R-fan runs until the temperature of refrigerator reaches -4℃ when quick refrigeration selected.)

B. During power refrigerator the freezing controlled by setted notch.

4-2) Saving operation function.

A. Input saving operation button, F/R room temp. operate 0.8℃ rising. (When situation about NOTCH, rised 0.8℃)

B. When input power freezer or power refrigerator, saving function stop to the end of power function and saving operation is performed after the end of power function.

※ When power freeze and refrigeration selected at the same time

- Each function applied at the same time Power freeze runs Comp. and F-fan for two and half hours and power refrigeration runs Comp. and R-fan for -4℃ and power refrigeration runs.

3. Alarming

1) Button touch("Ding-Dong" sound)

1-1) Everytime the button pushed, the input confirmation, "Ding-Dong" sound.
1-2) Not sounds, if two keys are pushed at the same time or wrongly handled

2) Door-Open Warning

2-1) Two minutes after door opened, alarming sounds.
2-2) If door opened continuously, ten times of alarming sounds with one minute cycle.
2-3) Alarming stopped just after door closed.

3) Forced operating and defrosting (“Beep” sound)

3-1) If forced function selected the “Beep” sounds.

3-2) Alarming sounds until the forced operating canceled by automatically(24Hr) or manualy.

3-3) Alarming sounds until the forced defrosting canceled by automatiically(24Hr) or manualy.

4) Defrosting

1-1) From the first power on, defrosting started after 4 hours of total Comp on time.

1-2) After that defrosting cycle can be varied from 6 hours to 24 hours.(Comp on time)

5) Testing

◆ Testing is for PCB, product, function and service.

◆ After testing, turn the power on to start self diagmosis.

1) Fored operating

1-1) As the button on PCB pushed once, Comp starts immediately.

1-2) If fored operating selected the notch of freezer and refrigerator fixed to “HIGH” and “MID-HIGH”. Then comp and F-fan is controlled to pull down and R-fan is controlled to “MID-HIGH” notch.

1-3) Pull-down maintained just for 24 hours during forced operating, after that automatically defrost freezer and refrigerator and then stares nomal operating.

1-4) Turn the power off or select test cancel mode to cancel the forced operating.

1-5) Alarming (0.25 secon/0.75 sec off) continues until the forced operating finished. It continues without any relations to alarming key selection or cancel.

2) Forced defrosting

2-1) Push the test button one more time to run the forced defrosting of refrigerator.

2-2) One more push in the above status will run defrosting of freeaer and refrigerator simult a neously.

2-3) Forced operating cancelled automatically by starting forced defrosting and return to normal operating after campletion of defrosting.

3) Test cancel mode

3-1) One more push in the status of forced defrosting of F/R wiill run normal operating.

3-2) Alarming stopped in the test cancel mode.

4). Initial function of first POWER ON.

1) If power is impressed, it begins to make a self diagnosis and light all LED for 2 second if normal condition is confirmed.

2) After first self diagnosis find unstable sensor among temp. sensor. And LED is on and off 5 second periods.

3) During 2 second turn on all LED. AND F/R LED display “MID-MID”

4) Early state R-EVA and F-EVA sensor is all below 15℃.
And R defrosting HEATER and F defrosting HEATER is perform per 0.5 second turn on.

5) After early state R-EVA sensor temp. or F-EVA sensor is over 15℃ and F/R defrosting is end per 3 second,
COMP and F-FAN, R-FAN is turn on per 0.5 second and operated per 5 minutes without temp. condition.

6) Input TEST S/W among 4) and 5) movemen 5 it is the end and perform TEST function.

5. SELF DIAGNOSIS

1) SELF DIAGNOSIS AT FIRST POWER ON

1-1) As the power applied to the refrigerator first time, all dispays show operating and run the self diagnosis.

1-2) If no problem foundes, display returns to normal mode

1-3) If probiem foundes, on and off the related display lamp and start alarming.

1-4) Lamp displayed until the problem solved or seif diagnosis cancelled.

1-5) After problem solved the display mode return to nomal.

1-6) After refrigerator repaired, sure to power off and on to run self diagnosis.

1-7) Refer to belows for problem and related displays.

NO	ITEM	DISPLAY LED	SYMPTOM	REMARK
1	R-SENSOR	Refrigerator "LOW"	Refrigerator sensor houslng disconnection Faulty connection Wire open or short Faulty sensor	R-SENSOR temperature is over +50˚C or below -50˚C
2	RD-SENSOR	Refrigerator "MID"	Refrigerator defrost sensor houslng disconnection Faulty connection Wire open or short Faulty sensor	RD-SENSOR temperature is over +50˚C or below -50˚C
3	ROOM-TEMP SENSOR	Freezer "LoW"	Room-Temp senser LEAD disconnection Faulty connection(PCB MAIN) Wire open or short Faulty sensor	Room-Temp sensor temperature is over +50˚C or below -50˚C
4	F-SENSOR	Freezer "LOW,MID"	Freezer defrost sensor houslng disconnection Faulty connection Wire open or short Faulty sensor	ZF-SENSOR temperature is over +50˚C or below -50˚C
5	FD-SENSOR	Freezer "MID"	Freezer defrost sensor houslng disconnection Faulty connection Wire open or short Faulty sensor	FD-SENSOR temperature is over +50˚C or below -50˚C

(SELF-DIAGNOSIS DISPLAY TABLE))

6. LOAD STATUS DISPLAY

1) Press power freezing / regular conditing and power refrigerating / power saving key for five seconds then press temperature control key in the refrigerator after temperature display lamps on and off three times
2) This mode shows which lamps is being sourced signal from MICOM currently. This doesn't mean the load is operate due to the open wire or relay missing though the display shows the compressor operating.
3) Load status display return to normal mode after sixty seconds.
4) Follows are load status and related dispay.

NO	ITEM	DISPLAY LED	DISPLAY	
	FREEZER SUBORDINATE			
1	COMP	FREEZER "LOW"	RELEVANT LED ON DURING COMPRESSOR OPERATION	
2	F-FAN	FREEZER "LOW,MID"	RELEVANT LED ON DURING F-FAN OPERATION	
3	FREEZER DEFROST HEATER	FREEZER "MID"	RELEVANT LED ON DURING FREEZER DEFROST HEATER ON.	
	REFRIGERATOR SUBORDINATE			
4	R-FAN, S-FAN	REFRIGERATOR "LOW"	RELEVANT LED ON DURING S-FAN AND F-FAN OPERATION	
5	REFRIGERATOR DEFROST HEATER	REFRIGERATOR "MID"	RELEVANT LED ON DURING REFRIGERATOR DEFROST	
	MODE DISPLAY			
6	INITIAL MODE	POWER FREEZER	RELEVANT LED ON QITH INITIAL POWER INPUT.	
7	OVERLOAD	POWER REFRGERATOR	RELEVANT LED ON QHEN ROOM-TEMP. IS OVER 35℃	
8	LOW TEMP MODE	POWER SAVING	RELEVANT LED ON QHEN ROOM-TEMP. IS BELOW 15℃	

(LOAD STATUS DISPIAY TABLE)

7. operating of fan motor

1) FAN MOTOROperates BLDC MOTOR by dc power.
2) After first starting power, it operates "HIGH" rpm to off dot of fan and then operates "LOW" rpm
3) if binding motor or not sensing regular freguency of motor to pcb, motor will stop operating.
(After stopping, reoerating start in 10 seconds.)
※ F, R, C-FAN operate equal.

8. OPTION TABLE

1) Temperature change TABLE of Freezer (● : Pertinent DIODE)

SHIFT	4	3	2	1	SHIFT	4	3	2	1
STANDARD TEMPERATURE					+0.5	●			
-0.5				●	+1.0	●			●
-1.0			●		+1.5	●		●	
-1.5			●	●	+2.0	●		●	●
-2.0		●			+2.5	●	●		
-2.5		●		●	+3.0	●	●		●
-3.0		●	●		+3.5	●	●	●	
-3.5		●	●	●	+4.0	●	●	●	●

2) Temperature change TABLE of refrigerator (● : Pertinent DIODE)

SHIFT	8	7	6	5	SHIFT	8	7	6	5
STANDARD TEMPERATURE					+0.5	●			
-0.5				●	+1.0	●			●
-1.0			●		+1.5	●		●	
-1.5			●	●	+2.0	●		●	●
-2.0		●			+2.5	●	●		
-2.5		●		●	+3.0	●	●		●
-3.0		●	●		+3.5	●	●	●	
-3.5		●	●	●	+4.0	●	●	●	●

※ Personal Informatin

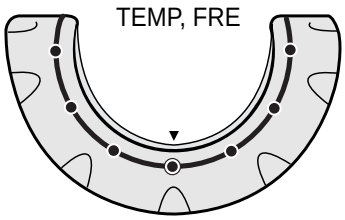
Micomport Voltage and Resisting force of sensor by Temperature.

TEMPERATURE (℃)	RESISTANCE	VOLTAGE (V)	TEMPERATURE (℃)	RESISTANCE	VOLTAGE (V)	TEMPERATURE (℃)	RESISTANCE	VOLTAGE (V)	TEMPERATURE (℃)	RESISTANCE	VOLTAGE (V)
-42	98870	4.541	-19	30920	3.778	4	11250	2.647	27	4650	1.587
-41	93700	4.518	-18	29500	3.734	5	10800	2.596	28	4487	1.549
-40	88850	4.494	-17	28140	3.689	6	10370	2.545	29	4329	1.511
-39	84150	4.469	-16	26870	3.644	7	9959	2.495	30	4179	1.474
-38	79800	4.443	-15	25650	3.597	8	9569	2.445	31	4033	1.437
-37	75670	4.416	-14	24510	3.551	9	9195	2.395	32	3894	1.104
-36	71800	4.389	-13	23420	3.504	10	8839	2.346	33	3760	1.366
-35	68150	4.360	-12	22390	3.456	11	8494	2.296	34	3631	1.322
-34	64710	4.331	-11	21410	3.408	12	8166	2.248	35	3508	1.298
-33	61480	4.301	-10	20480	3.360	13	7852	2.199	36	3390	1.266
-32	58430	4.269	-9	19580	3.310	14	7552	2.151	37	3276	1.234
-31	55550	4.237	-8	18730	3.260	15	7266	2.104	38	3167	1.203
-30	52840	4.204	-7	17920	3.209	16	6992	2.057	39	3062	1.172
-29	50230	4.170	-6	17160	3.159	17	6731	2.012	40	2962	1.143
-28	47770	4.134	-5	16430	3.108	18	6481	1.966	41	2864	1.113
-27	45450	4.098	-4	15740	3.057	19	6242	1.922	42	2770	1.085
-26	43260	4.061	-3	15080	3.006	20	6013	1.878	43	2680	1.057
-25	41190	4.023	-2	14450	2.955	21	5792	1.834	44	2593	1.030
-24	39240	3.985	-1	13860	2.904	22	5581	1.791	45	2510	1.003
-23	37390	3.945	0	13290	2.853	23	5379	1.749	46	2429	0.977
-22	35650	3.905	1	12740	2.801	24	5185	1.707	47	2352	0.952
-21	33990	3.863	2	12220	2.750	25	5000	1.667	48	2278	0.928
-20	32430	3.822	3	11720	2.698	26	4821	1.626	49	2206	0.904

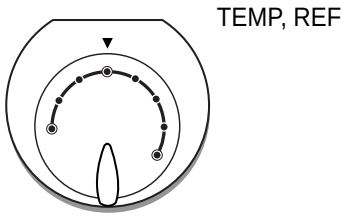
7-2, SEMI ELECTRONIC MODE

A. Temperature control part design

Freezer temperature control



refrigerator temperature control



B. Temperature control function

1) Tempera ture choice of freezer

- You can choose to ⑧ From ①
- Follows are control temperature by KNOB position.

KNOB position	①	②	③	④	⑤	⑥	⑦	⑧
control temperature	-16.0	-17.0	-18.0	-19.0	-20.0	-21.0	-22.0	-23.0

2) Temperature choice of refrigerator

- You can choose to ⑧ From ①
- Follows are control temperature by KNOB position.

KNOB position	①	②	③	④	⑤	⑥	⑦	⑧
control temperature	5.0	4.0	3.0	2.0	1.0	0	-1.0	-1.0

NOTE) Temperature contol of freezer and refrigerator is position control by ROTRAY S/W, if it get out of position it control NOTCH

C. Defrost function

1) Defrost set up by time of COMP ON.
2) Defrost tun Heating → Rest time
3) When initial power on, initial defrost run defrost of freezer and refriger ator in 4 hours of COMP ON. Since initial
   (R →R, F →R →R, F ... Cycle operating))
4) ON/OFF of defrost - heater control by EVA-SENSOR If EVA-SENSOR is problem (short 10 pen), it run just rest time and then finishes defrost function without heating.
5) During defrosting it maintain COMP and FAN state and after finish defrost-heating rest time is 10 minutes.
6) Follows are defrost heating ON point and OFF point that operate by EVA-SENSOR.

	REFRIGERATOR	FREEZER	REMARK
HEATER ON dot	BEIOW+10℃	BEIOW -5℃	
HEATER OFF dot	17℃		

D. TEST FUNCTION

▶ TEST function is function for test,SVC and fair test of PCB and product.

▶ TEST S/W choose and confirm function of product and then POWER ON to run self diagnosis.

1) FORCED OPERATING FUNCTION

- Pressed once TEST S/W on MAIN PCB. If so COMP and F-FAN run at once. Thus be careful because occur COMP over load.
  (Refrigerator FAN control ON/OFF by temperature)
- Since it set up forced operating function, it always run COMP and F-FAN and display lamp on MAIN PCB with ON/OFF 0.1 second periodically.
  (Refrigerator FAN control ON/OFF by temperature)
- In 24 hours forced operating function of freezer and refrigerator operate and finish then run normal mode by KNOB position of temperature setting up.
- During forced operating function if you want to stop it first power OFF and then power on or choose TEST cancellation mode.

2) Forced defrost function

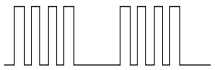
- For forced operating pressed once TEST S/W button, it cancel forced operating at once and refrigerator forced defrst function with display forced defrost position ON/OFF lamp on MAIN PCB 0.5 secoonds periodically. If press one more TEST S/W bueeon display refrigerator and freezer defrosting.
- If forced defrost choose, COMP and FAN power OFF and defrost heater on at once, At this time, if sensing temperature of EVA-SENSOR over 12℃ defost heater power off and operate rest time normal mode.
- After heating finish it need 10 minal mode

3) TEST FUNCTION CANNCELLATION MODE

- Duting refrigerator and freezer run forced defrost function press one more TEST S/W button if so forced defrost cancel and rest in 10 minutes and then turn normal mode.

E. self diagnosis function

1) Power on refrigerator and it run seif diagnosis function about 2 seconds at the inner part.
2) If no preblem it turns normal mode.
3) If find prebiem display lamp of PCB show errw position like lower list and everything don' t operate until repair error position.
4) After refrigerator power off and then power on for confirming conditiom.
5) Thus if you want to know OPEN/SHORT of temperature sensor on SVC, power off and on if it run self diagnosis function.
6) When error occur LAMP display method.(Lamp on time : 0.3 seconds (ON/OFF) Lamp off time : 2 seconds)

No.	ITEM	Led Display	Problem	Remark
1	F DEFROST SENSOR	On Off 	-.OPEN ERROR -.SHORT ERROR	-. SENSOR IS BELOW -50˚C -. SENSOR IS BELOW +50˚C
2	R DEFROST SENSOR	On Off 	-.OPEN ERROR -.SHORT ERROR	-. SENSOR IS BELOW - 50˚C -. SENSOR IS BELOW +50˚C
3	F SENSOR	On Off 	-.OPEN ERROR -.SHORT ERROR	-. SENSOR IS BELOW - 50˚C -. SENSOR IS BELOW +50˚C
4	R SENSOR	On Off 	-.OPEN ERROR -.SHORT ERROR	-. SENSOR IS BELOW - 50˚C -. SENSOR IS BELOW +50˚C
5	F Rotary S/W	On Off 	-.OPEN ERROR	
6	R Rotary S/W	On Off 	-.OPEN ERROR	
7	NORMAL MODE	On Off 		Vntil operating initial 5minutes

● In case of many problems find it display error position in order.

<Example of error display>

① When problem R-ROOM SENSOR display lamp operating.
(0.3 seconds ; ON/OFF) Four times →2 seconds OFF - REPEAT -

② When problem R-ROOM SENSOR and F-ROOM sensor at the same time display method.
(0.3 seconds ; ON/OFF) Three times →2 seconds OFF - REPEAT -

※ Tem perature contre control operating by ROTRAY SWITCH

	INITIAL SEIF DIAGNOSIS(OFF/ON)	OPERATING
OPEN ERROR	STOP ERROR DISPLAY OPERATING	OPERATING BEFORE OPEN STEP
SHORT ERROR	"HIGH"	"HIGH"
SECTION	"MID"	OPERATING BEFORE SETTING UP STEP

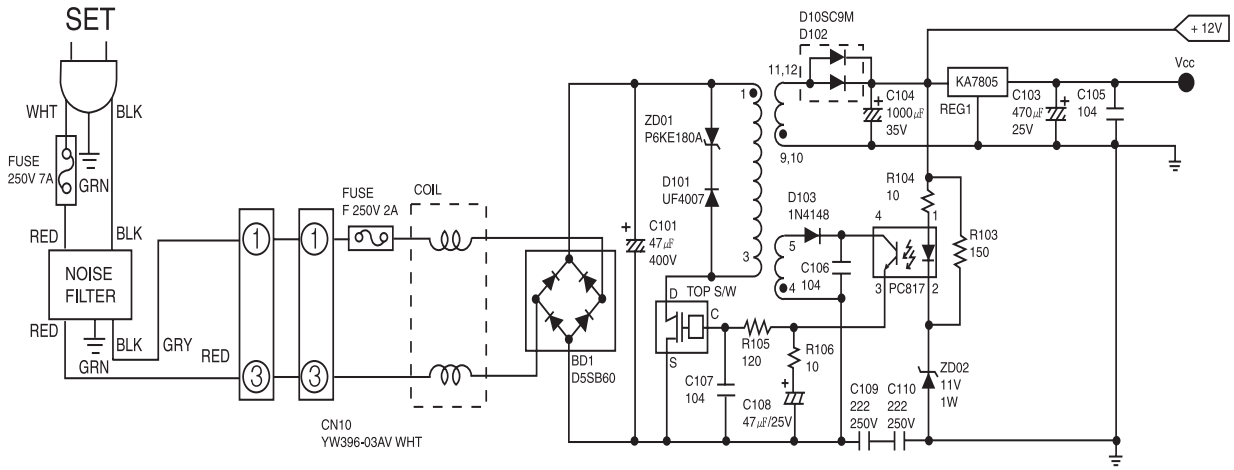
F. Quick heating operating

1) If freezer heating sensor OPEN/SHORT error at freezer heating it runs just rest time without heating..
2) If refrigerator heating sensor OPEN/SHORT error at refrigerator heating it runs jest time without heating.

8. CIRCUIT OPERATING THEORY

8-1. ELECTRONIC MODE

1. Power suooly part



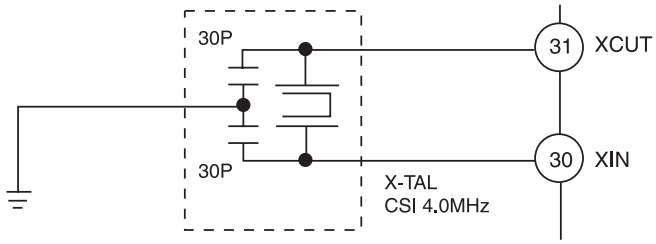
1) Power is on and makes about DC 300V through BD1.

2) TOP S/W is switching the best condition automatically.

Electric current run between D and S of TOP S/W and occur electric current in TRANS and when power of D-s is off storing electric current of TRANS pass to secondary voltage.

3) Voltage main 12V. This is applied to display, relay and 5V power of sourcr and Main PCB

2. OSCILLATOR

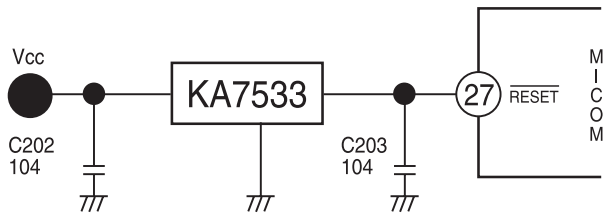


TERMINAL	FREQUENCY
Xin(#30)	4MHz
Xout(#31)	4MHz

1) Tish needs function for CLOCK occurrence and time calculation.

In case of SPEC of RESONATOR change abnormal mode run because of changing Timming system of MICOM.

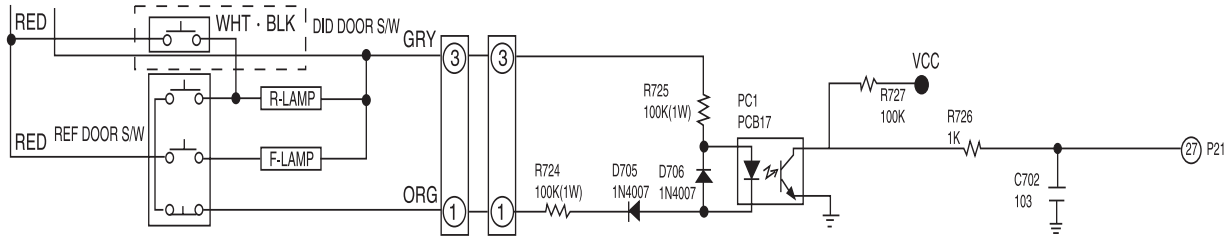
3. RESET PART



TERMINAL	VOLTAGE
Vcc	DC 5V
RESET	DC 5V

1) RESET part is intialize RAM of MICOM and others when power is on or power is inferruoted for some time It will make whole program runs from the first status. When power is supplied, reset voltage is "LOW" status for a few seconds and turn into "HIGH" (Vcc Voltage) status in the normal opweating.

4. DOOR S/W SENSING PART



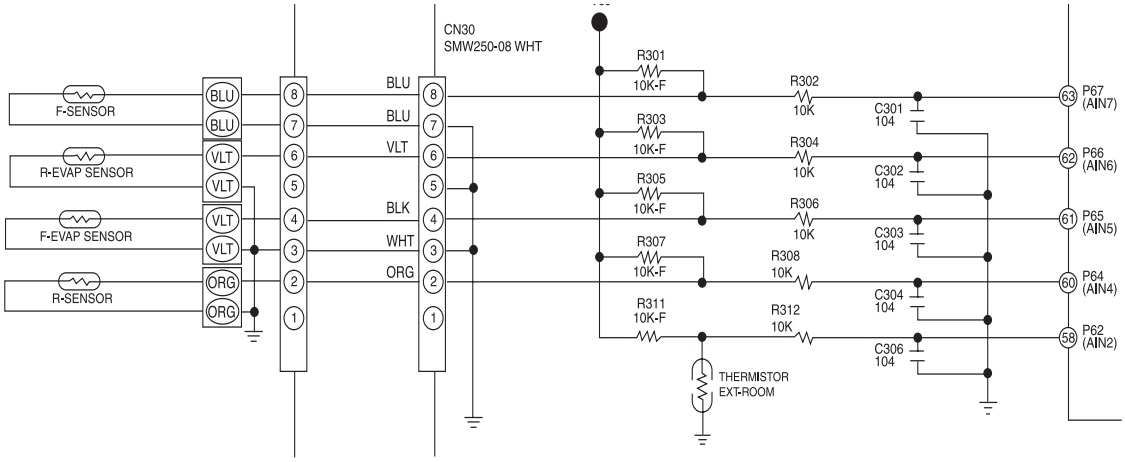
ITEM	DOOR CONDITIONS	DOOR S/W CONTACT	LAMP	CN72PIN NO1 CONTACT	MICOM INPUT VOLTAGE
F	CLOSE	OPEN	OFF	ON	OUTMODE
	OPEN	CLOSE	ON	OFF	5V
R	CLOSE	OPEN	OFF	ON	OUTMODE
	OPEN	CLOSE	ON	OFF	5V

1) DOOR S/W sensing part doesn,t sense Door of Fand R room on each micom.
2) Lamp control door is opened, door S/W pin NO 3 opened and voltage no touching No1 of CN 27 and MICOM input Then the door-open is sensed.
3) When the door is opened, Door S/W pin No 3 opened and voltage no touching No 1 of CN No 27 and MICOM input. Then the door-open is sensed.

→ It makes door alarm after 2 minutes
This time F,R DOOR must close at the same time for stopping Door alarm.

4) DID DOOR S/Whave no each sensing parts and control lamp ON/OFF by contact dot of DOOR.

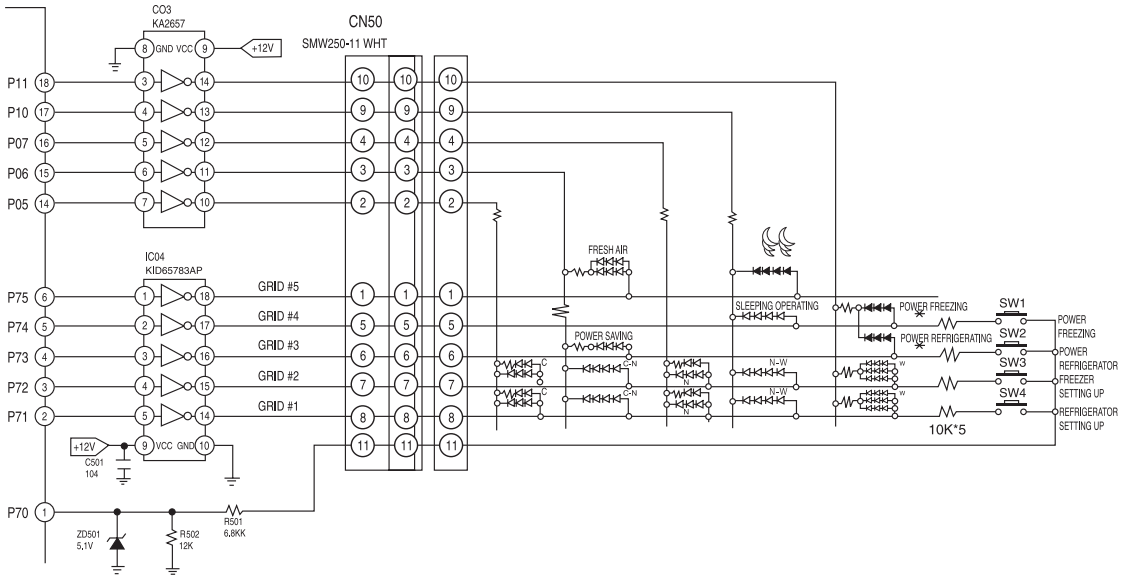
5. TEMP · SENSING PART



1) Thermistor is used for sensing which has negative resistance coffiecient to the temperature.
R 302, 4, 6, 8, 12, C301~C306 are pares for preventing noise.

2) MICOM input voltage, Vf of sensor is Vf=(R+hx x Vcc)/(R301+Rth) (Rth : sensor resistance)

6. KEY SCAN AND DISPLAY PARTS



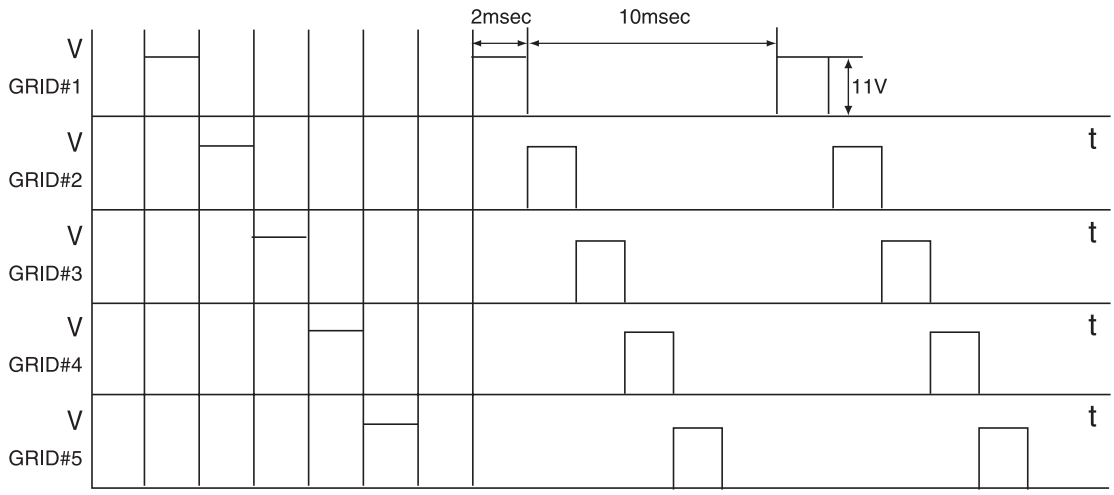
1) KEY SCAN and display operating

It is used for No 5 of MICoM NO #2, 3, 4, 5, 6,

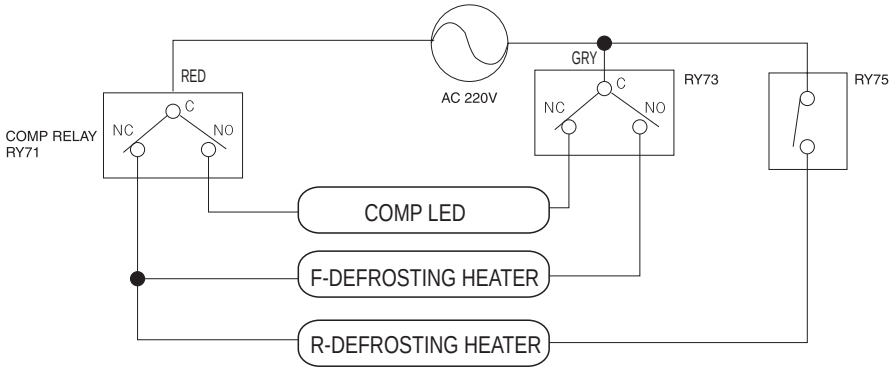
It operates "high" 10 msec periodically for 2 msec cycle : MICOM pin No : #2 → #3 → #4 → #5 → #6

This signal pass by IC 04 (UDN 2981 or KID 65783AP) from Input dot to Dotput dot.

Voltage of peak to peak is about 11V (DC RMS 1.5V)



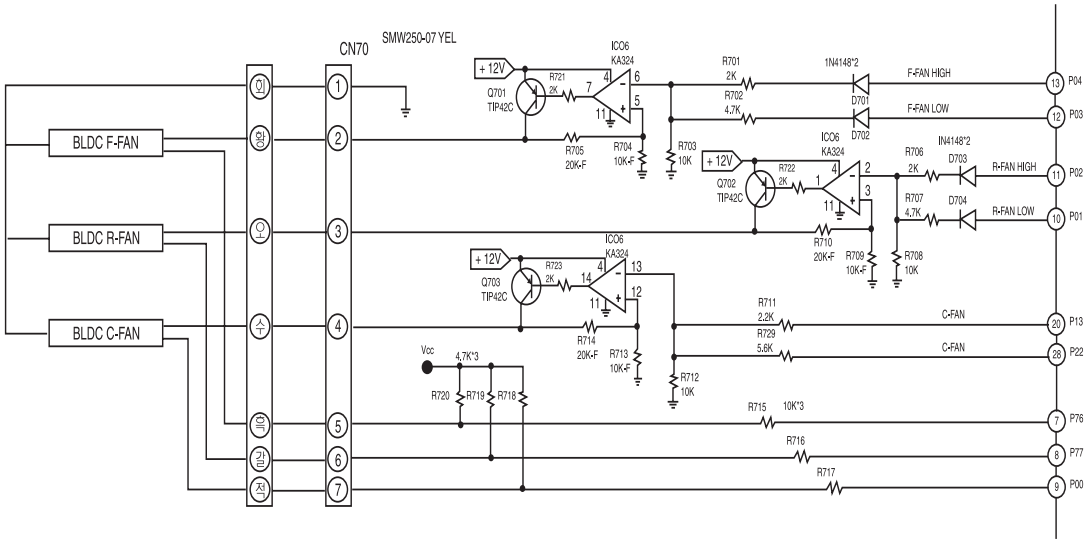
7. COMP AND DEFROSTING HEATER OPERATING



As it is seen above block diagram. 220V line is connected to the commons of comp relay, Ry 71 and defrosting heater relay, Ry 73, Ry 75. When those relays are off state comp and defrosting heater are also off. As comp relay moves to on and AC 220V applied to comp load it starts operating On the other hand defrost heater runs if defrost heater relay moves to on. There is no chance that both comp and defrost heater runs together so it's useful for safety aspect.

STATES		LOAD	REMARK
COMP	F DEFROSTING HEATER		
ON	OFF	COMP OPERATION	preverting power of F-DEFROSTING HEATER
ON	ON	COMP OFF, F-DEFROSTING HEATER OFF	
OFF	ON	F-DEFROSTING HEATER ON	PREVENTING COMP POWER
OFF	OFF	COMP OFF, F-DEFROSTING HEATER OFF	

8. BLDC MOTOR Operation Circuit



1) Operate description of BLDC MOTOR First, if FAN became before operate condition of FANMOTOR, condition of in the temp. are high temp. more than FAN of recently institutionn NOTCH is operated condition.

ex)CONNECTOR CN 70' S third voltage : Input VL, Vcc 5V(Used Diode regard DROP)

Perated High RPM

V L = Gain * Ei

Gain = (R705+R704)/R704 = (20K + 10K)/10K =3

Ei = R703/(R701+R703) * Vcc = 10K/(820 + 10K)*4.4 = 4.07

V L = 4.07*3=12.24 (Change it for resistance error)

1-1) FANMOTOR in the freezer(F-FAN)

A. If refrigerator' s power is confimated, check the temp. of F-FAN and temp. more than F-FAN on is operated "HIGH RPM" to sign of MICOM #13 PORT. After arrived FAN OFF, if FAN is OFF and separate function of ON.OFF isn' t confimated always NICOM #12 PORT is confimate sign and operated "LOW RPM"

B. "HIGH RPM" is determinated the resistance of R701, LOW RPM is determinated the resistance of R702.

C. When check RPM, check the wire to resistance of R715 and it is knew to MOTOR RPM.(wire *4)

D. Operated condition to Motor is received wire sign to MICOM #7 PORT but if it isn' t regular wire, FAN is stopped and operate again after 5 minutes.

※ When power freeze and forced operation, always operated "HIGH RPM" without temp. of freezer.

1-2) FAN MOTOR IN THE FREEZER (R-FAN)

A. If refrigerator's power is confimated, check the temp. of R-FAN and temp. more than R-FAN ON is operated "HIGH RPM" to sign of MICOM #11PORT. After arrived FANOFF, if FAN is OFF and separatre function of ON/OFF isn't confimated always MICOM#10PORT is confimate sign and operated "LOW RPM".

B. "HIGH RPM" is determinated the resistance of R706, LOW RPM is determinated the resistance of R707.

C. When check RPM, check the the wire to resistance of R716 and it is knew to MOTOR RPM.(wirw*4)

D. Operated condition to MOTOR is received wire sign to MICOM #8PORT but if it isn't regular wire, FAN is stopped and operate again after 5minutes.

※ When power refrigerate and forced operation, always operated "HIGH RPM" without temp. of freezer.

1-3) COMP FAN MOTOR

A. If refrigerator's power is confimated, check the operated condition of F,R-FAN and F,R-FAN is HIGH RPM is operated #HIGH RPM to sign of MICOM #20PORT. After arrived F,R-FAN OFF, if FAN is OFF and seperate function of ON/OFF isn't confimated always operated "LOW RPM"

B. "HIGH RPM" is determinated the resistance of R711, LOW RPM is determinated the resistance of R711,R729.

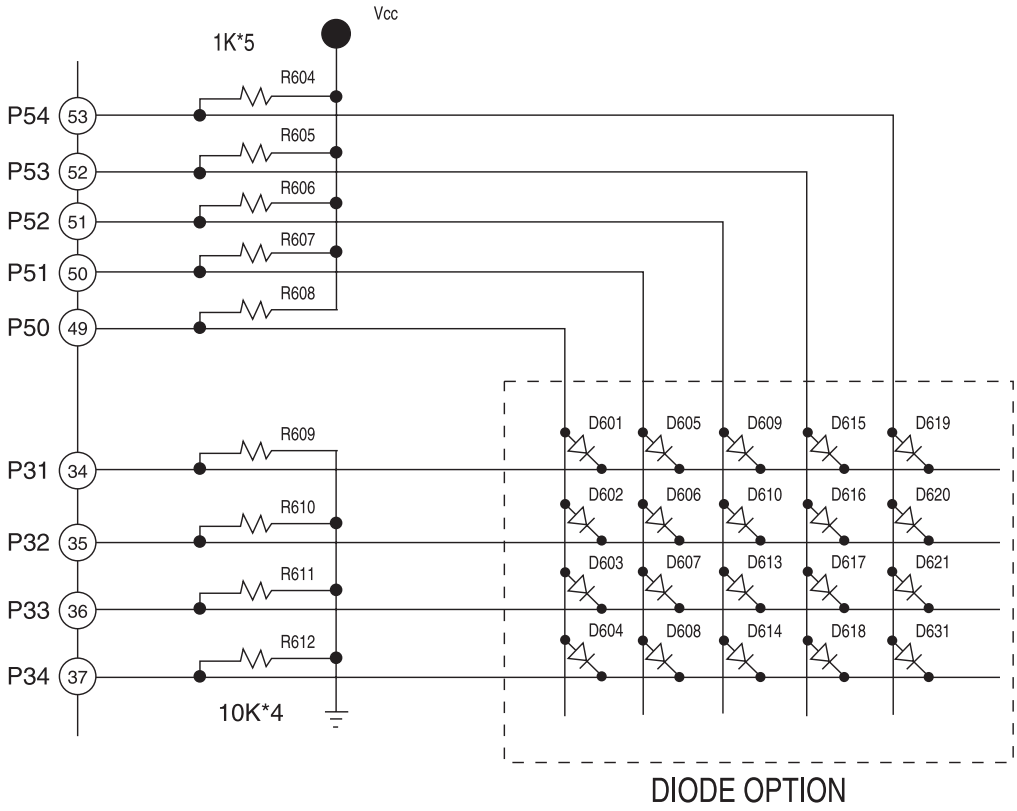
C. When check RPM, check the wire to resistance of R717 and it is knew to MOTOR RPM (wire *4).

D. Operated condition to MOTOR is received wire sign to MICOM #9PORT but if it isn't regular wire, FAN is stopped and operate again after 10minutes.

E. COMP FAN is always HIGH RPM, if it is HIGH RPM.

※ When power freeze and refrigerate, forced operation, always operated "HIGH RPM"

9. POTION PART



1) PRINCIPIE OF MAVEMENT

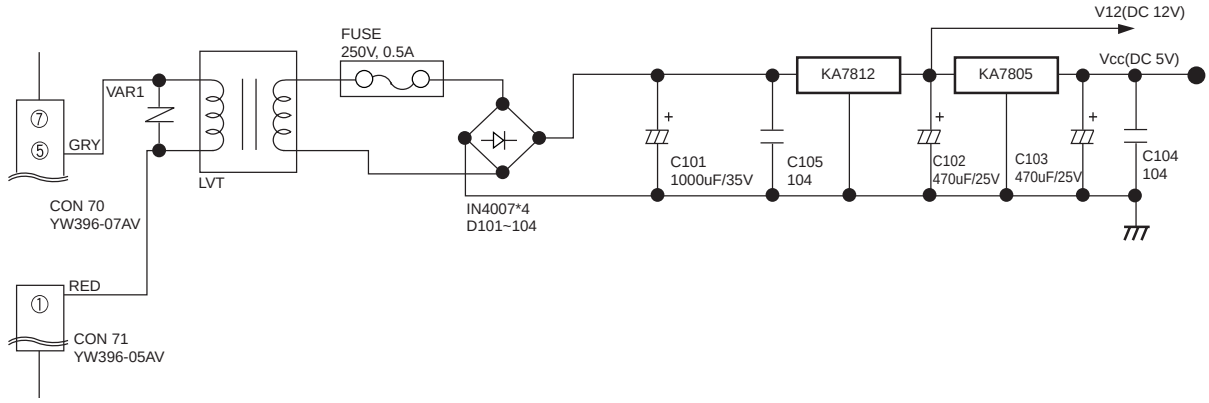
Like the GRID waves appear in initial POWER ON is reaeved through SWITCHING DIODE and OPION is judged for MATRIX method.

NAME	STANDARD	REMARK
R-CARBON	10Kohm-J (1/4)	
R-CARBON	1Kohm-J (1/4)	

※ when OPTION Changed power turns off, after change and power turn on.

8-2. SEMI ELECTROMAGNETIC

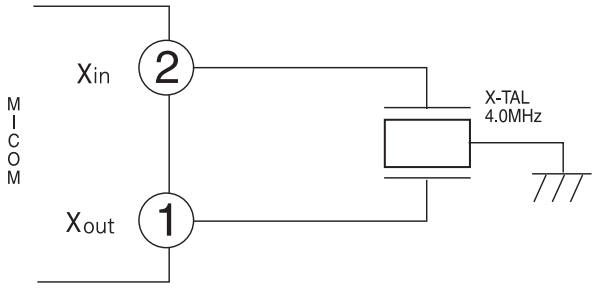
9-1. POWER PART.



POWER	CIRCUIT OF USING
- ● Vcc(DC 5V)	POWER AROUND MICOM OR SENSOR SENSING PART
- ▶ V12(DC12V)	RELAY RUNNING PART

AC220V input power is decompressed through LVT(DC-TRANS), the power is changed DC vltg through DIODE rectification. It is an archery practive bow through 1000uF/35V CAPACITOR. And regular DC 12V is output through REGULATOR 7812, it is used to the RELAY runing power. The other of LVT(DC-TRANS) is an archery pratice bow through DIODE rectification or 1000Uf/35V CAPACITOR and it is output the regular DC5V through REGULATOR 7805.
And it is used sircumference circuit or various signal(Sensor,Switch) input power.

9-2. Departure circuit PART

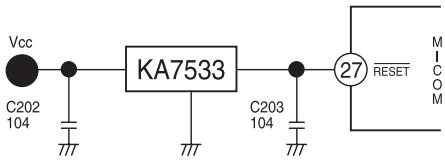


TERMINAL	ERUPTION QAVEIENGTH
Xin	4.00MHz
Xout	4.00MHZ

less than ±0.5% error

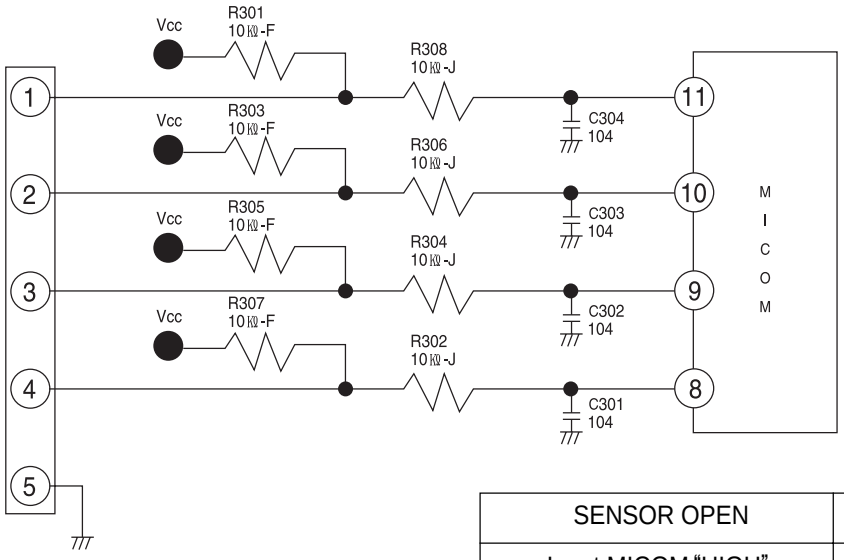
Element of inside MICOM is copper ware clock production of informations transmission, reception and eruption circuit for time calculation.
In a case change SPEC of X-TAL use the standard parts or SPEC because it changes calculated time at MICOM or doesn't run.

9-3. RESET CIRCUIT PART



RESET circuit part is performed the eariy state all program furction when input power and confimate power to MICOM for suddeniy electricity failure, it is initialed to PAM of inside MICOM. when confimate power RESET' S vltg is "LOW" state during sevweal tens uses and it is "HIGH" state as nomal operation state.

9-4. SENSING OF TEMP PART



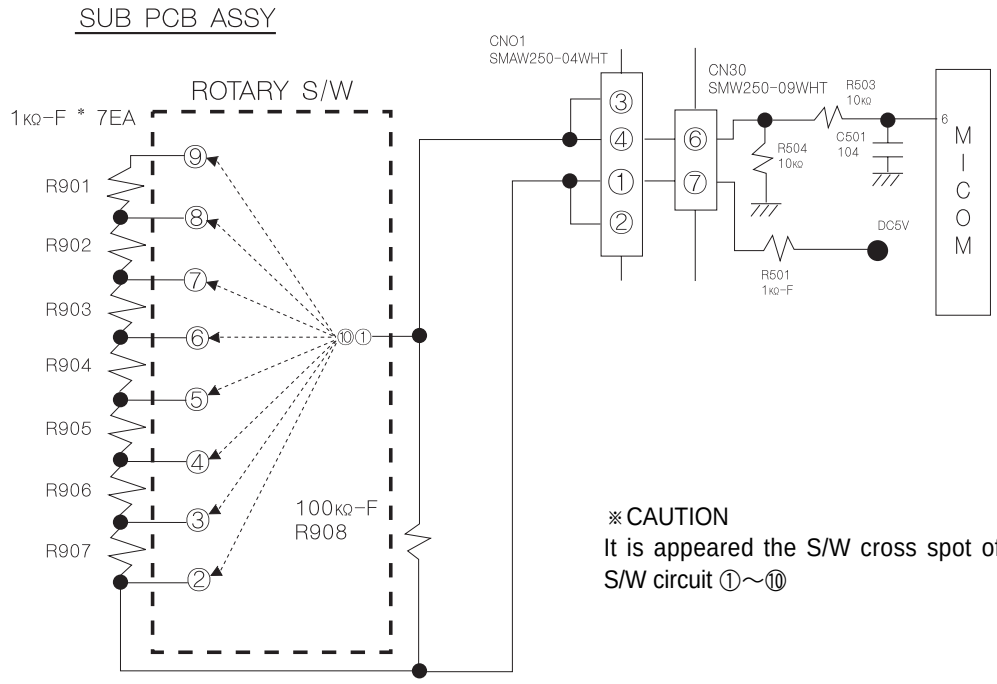
SENSOR OPEN	SENSOR SHORT
Inpat MICOM "HIGH"	Inpat MICOM "LOW"

1) SENSOR is vsing the THER with labor coefficint, if temp. is high, resistance is low on the contrary if temp. is iow, reissitarce is high.
2) According to sensor, voltage of input to MICOM is calculate,

$$Vf = \frac{Rth}{Rth + 10㏀} \times Vcc \text{(Vcc:5V, Rth:SENSOR RESISTANCW)}$$

9-5. TEMP. CONTROL CIRCUIT.(ROTARY S/W)

A. FREEZER TEMP.



※CAUTION
It is appeared the S/W cross spot of ROTARY S/W circuit ①～⑩

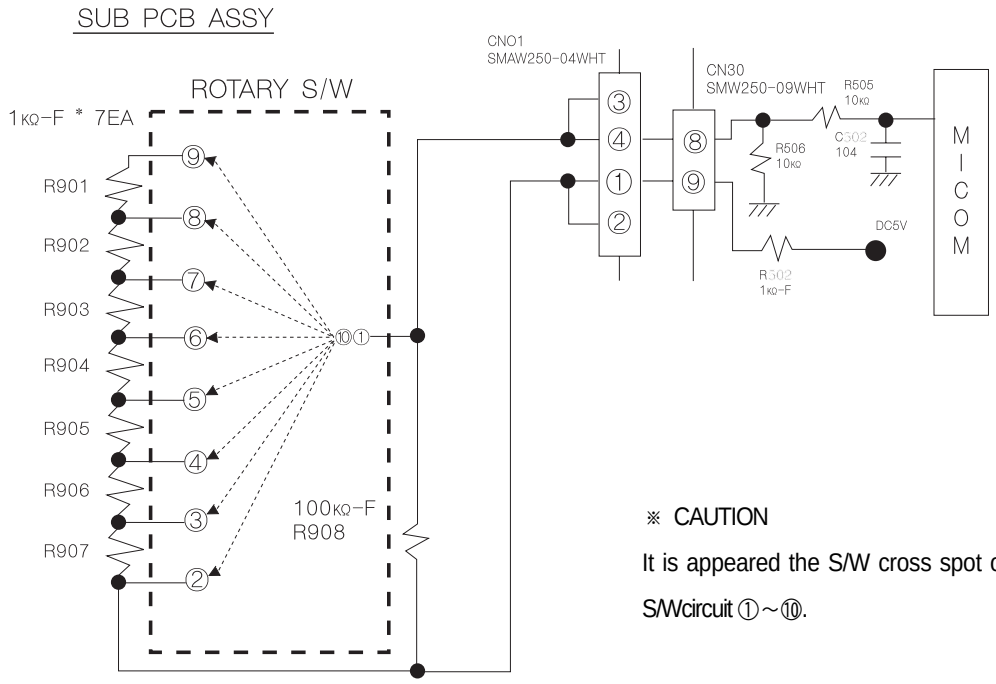
Temp. control is changed KNOB of contructed ROTARY S/W in the freezer and it is possible the temp. control 1 step to 8 step.

Temp. control SETTING become partial pressure for R 501 resistance and ROTARY S/W resistance.
(Row composition resistance of resistance charge to R 908 and ROTARY S/W direction)
And partial pressure is delivered to MICOM through R 503 resistance and recognited temp. control and it become SETTING to temp. contol.
Voltage or resistance charge of MAIN PCB MICOM input for SUB PCB Ass's ROTARY S/W cross spot direction is same the below.
(When Measure the resistance charge, connector of MAIN PCB CN 30 is separated and measure the connector terminal.)

Section	1 STEP (9PIN)	2 STEP (8PIN)	3 STEP (7PIN)	4 STEP (6 PIN)	5 STEP (5 PIN)	6 STEP (4 PIN)	7 STEP (3PIN)	8 STEP (2 PIN)	WHEN OPEN THE OPEN SPOT
Voltage (R504)	2.77 ±0.15V	2.94 ±0.15V	3.12 ±0.15V	3.33 ±0.15V	3.57 ±0.15V	3.84 ±0.15V	4.16 ±0.15V	4.54 ±0.15V	0.1~0.7V
Resistance (CN30⑥~⑦)	6.54㏀± 1%	5.66㏀± 1%	4.76㏀± 1%	3.84㏀± 1%	2.91㏀± 1%	1.96㏀± 1%	0.99㏀± 1%	0Ω	100㏀±1%

※ To upside, when measure the resistance charge isn't appeared the resistance in the case SUB PCB ASSY connection is disconnection or crack situation of PCB board.

B. REFRIGERATOR TEMP



※ CAUTION

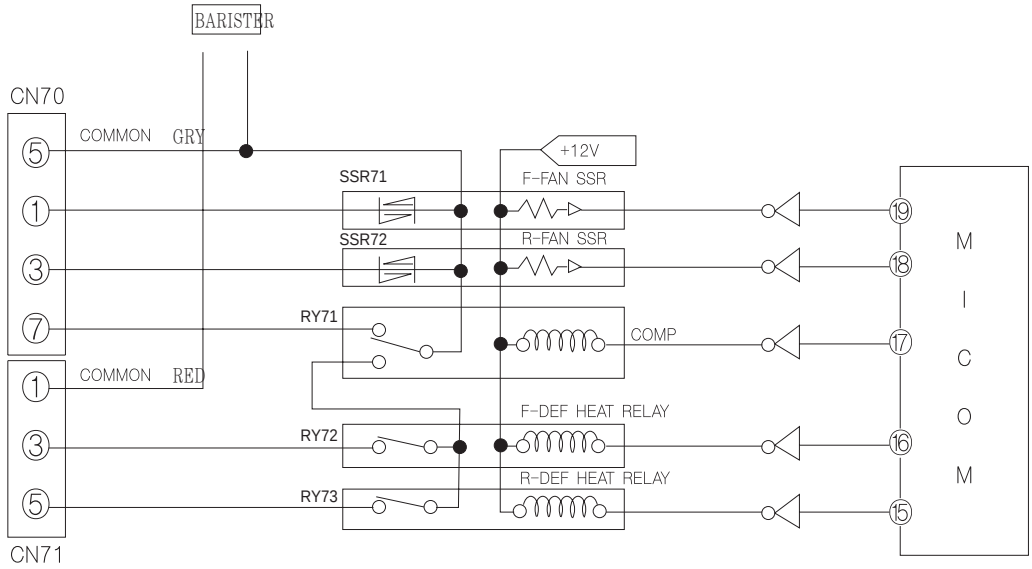
It is appeared the S/W cross spot of ROTARY S/Wcircuit ①~⑩.

Temp. control is changed KNOB of contructed ROTARY S/W in the refrigerator and it is possible the temp. control 1 step to 8 step.
Temp. control SETTING become partial pressure for R502 resistance and ROTARY S/W resistance.(Row composition resistance of resistance charge to R908 and ROTARY S/W direction). And partical pressure is delivered to MICOM through R505 resistance and recognited temp. control and it become SETTING to temp. control. Voltage or resistance charge of MAINPCB MICOM input for SUBPCB Assy's ROTARY S/W cross spot direction is same the below.(When measure the resistance charge, connector of MAINPCB CN30is separated and measure the connector terminal.

Section	1 STEP (PIN #9)	2 STEP (PIN #8)	3 STEP (PIN #7)	4 STEP (PIN #6)	5 STEP (PIN #5)	6 STEP (PIN #4)	7 STEP (PIN #3)	8 STEP (PIN #2)	WHEN OPEN THE CROSS SPOT
Voltage (R506)	2.77 ±0.15V	2.94 ±0.15V	3.12 ±0.15V	3.33 ±0.15V	3.57 ±0.15V	3.84 ±0.15V	4.16 ±0.15V	4.54 ±0.15V	0.1~ 0.7V
Resistance (CN30⑥~⑦)	6.54㏀± 1%	5.66㏀± 1%	4.76㏀± 1%	3.84㏀± 1%	2.91㏀± 1%	1.96㏀± 1%	0.99㏀± 1%	0Ω	100㏀±1%

※ To upside, when measure the resistance charge isn't appeared the resistance in the case SUBPCB ASSY connection is disconnection or crack situation of PCB board.

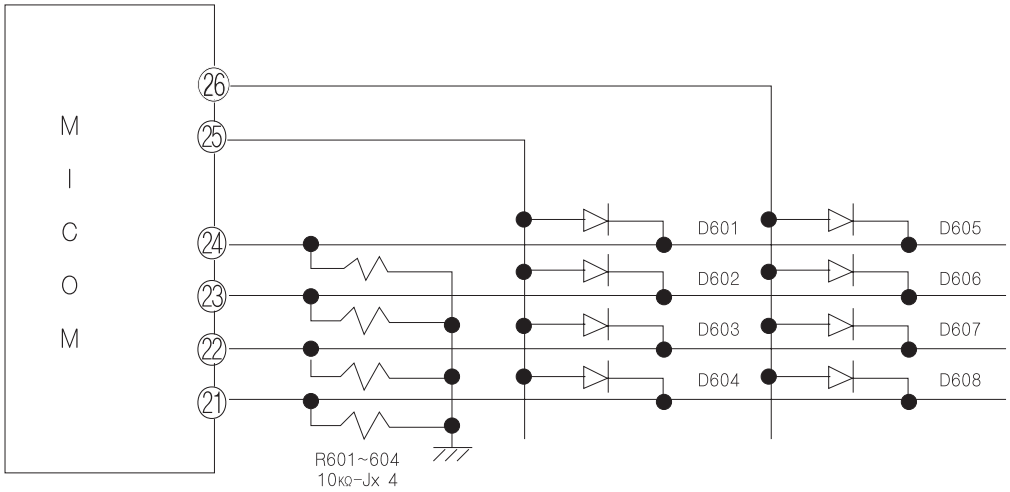
6. ELECRICAL LOAD SIGNAL LAMP CONTROL PART



Like the above circuit, pin 1 of CN71 suply the power. And electrical load suply the power when electricaload operated. operated refrigerator, freezer to fact comp operation And if it is needness of defrosting operation, performed comp' s electrical load is off, it is security of circuit. In fact, each operation is operated to temp. sensor and absoluteness defrosting isn' t operated with comp.

7. POTION PART

A. circuit way



B. MOVEMENT PRINCIPAL

like the grid waves appear in initial power on is recieved throngh switching diode and option is judged for matrix method.

when option changed power furnd off, after change and power turns on.

C. TEMP SHIFT

FREEZER TEMP SHIFT

(UNIT : ℃)

SHIFT	602	601
STONDAR		
D -1.0		●
-2.0	●	
+1.0	●	●

REFRIGERATOR TEMP SHIFT

(UNIT : ℃)

SHIFT	604	603
STONDAR		
D -1.0		●
-2.0	●	
+1.0	●	●

FROSTING TEMP SHIFT

(UNIT : ℃)

SHIFT	605
STONDAR	10 hours
D	7 hours

※ CAUTION

Don't change DIODE OPTION escape D601~D605, becase it is related to Refrigerator's frust.

※ PERSANAL INFORMA

sensor resistance power and MICOMPORT voltage by temperature.

TEMPERATURE (℃)	RESISTANCE (Ω)	VOLTAGE (V)	TEMPERATURE	RESISTANCE (Ω)	VOLTAGE (V)	TEMPERATURE (℃)	RESISTANCE (Ω)	VOLTAGE (V)	TEMPERATURE (℃)	RESISTANCE (Ω)	VOLTAGE (V)
-42	98870	4.541	(℃)	30920	3.778	4	11250	2.647	27	4650	1.587
-41	93700	4.518	-19	29500	3.734	5	10800	2.596	28	4487	1.549
-40	88850	4.494	-18	28140	3.689	6	10370	2.545	29	4329	1.511
-39	84150	4.469	-17	26870	3.644	7	9959	2.495	30	4179	1.474
-38	79800	4.443	-16	25650	3.597	8	9569	2.445	31	4033	1.437
-37	75670	4.416	-15	24510	3.551	9	9195	2.395	32	3894	1.104
-36	71800	4.389	-14	23420	3.504	10	8839	2.346	33	3760	1.366
-35	68150	4.360	-13	22390	3.456	11	8494	2.296	34	3631	1.322
-34	64710	4.331	-12	21410	3.408	12	8166	2.248	35	3508	1.298
-33	61480	4.301	-11	20480	3.360	13	7852	2.199	36	3390	1.266
-32	58430	4.269	-10	19580	3.310	14	7552	2.151	37	3276	1.234
-31	55550	4.237	-9	18730	3.260	15	7266	2.104	38	3167	1.203
-30	52840	4.204	-8	17920	3.209	16	6992	2.057	39	3062	1.172
-29	50230	4.170	-7	17160	3.159	17	6731	2.012	40	2962	1.143
-28	47770	4.134	-6	16430	3.108	18	6481	1.966	41	2864	1.113
-27	45450	4.098	-5	15740	3.057	19	6242	1.922	42	2770	1.085
-26	43260	4.061	-4	15080	3.006	20	6013	1.878	43	2680	1.057
-25	41190	4.023	-3	14450	2.955	21	5792	1.834	44	2593	1.030
-24	39240	3.985	-2	13860	2.904	22	5581	1.791	45	2510	1.003
-23	37390	3.945	-1	13290	2.853	23	5379	1.749	46	2429	0.977
-22	35650	3.905	0	12740	2.801	24	5185	1.707	47	2352	0.952
-21	33990	3.863	1	12220	2.750	25	5000	1.667	48	2278	0.928
-20	32430	3.822	2	11720	2.698	26	4821	1.626	49	2206	0.904

ABOUT CIRCUIT LINK LIST

NO	CODE-NO	MODEL NAME	SPEC	Quantity	Remark
1	DA32-10109H	R-SENSOR ASSY	502AT	1	
2	DA32-10109A	F-SENSOR ASSY	502AT	1	
3	DA32-10105G	EVA SENSOR ASSY	502AT	2	GENERALLY SEMI
4	DA41-00048A	MAIN PCB ASSY	AC220V/50,60Hz	1	
5	DA41-00012A	SUB PCB ASSY	-	2	
6	DA26-30116A	DC-TRANS	AC220V/50,60Hz	1	
7	DA41-00053A	MAIN PCB ASSY	AC220V/50,60Hz	1	Applicating SEMI DID HEATE

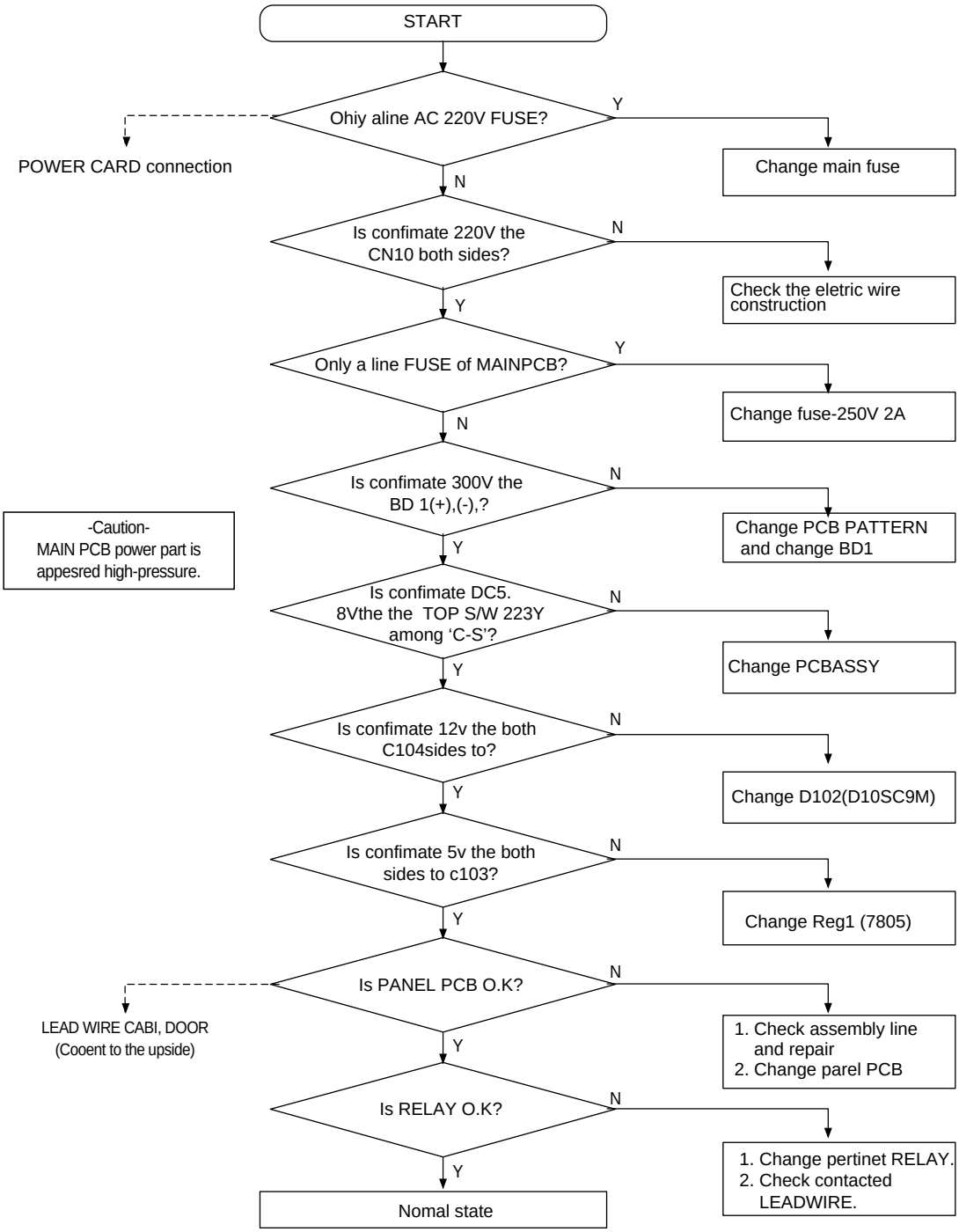
9. Diagnosis of disorder and method of repair

1. ELECTRICAL (SR-61KTC,65KTC)

Preliminary examamination

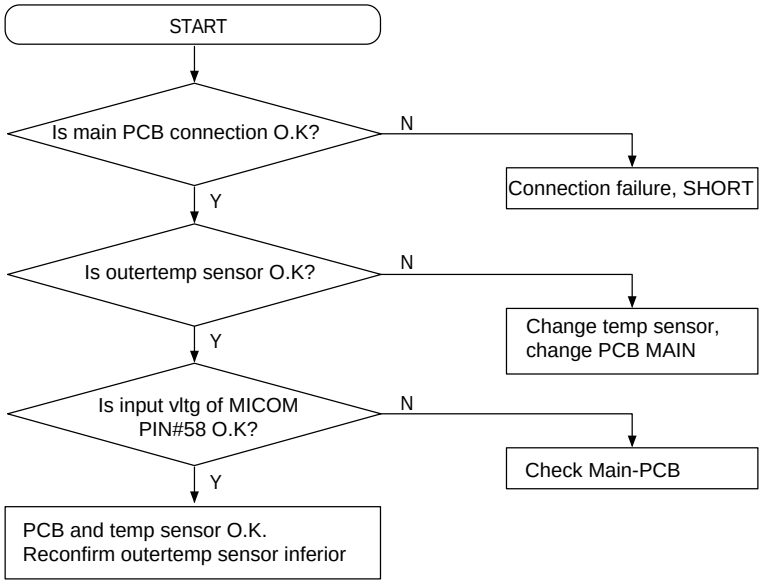
1. Check the power of consent and power code
2. Check it based on the :References" on the next pages.

1. No input Power

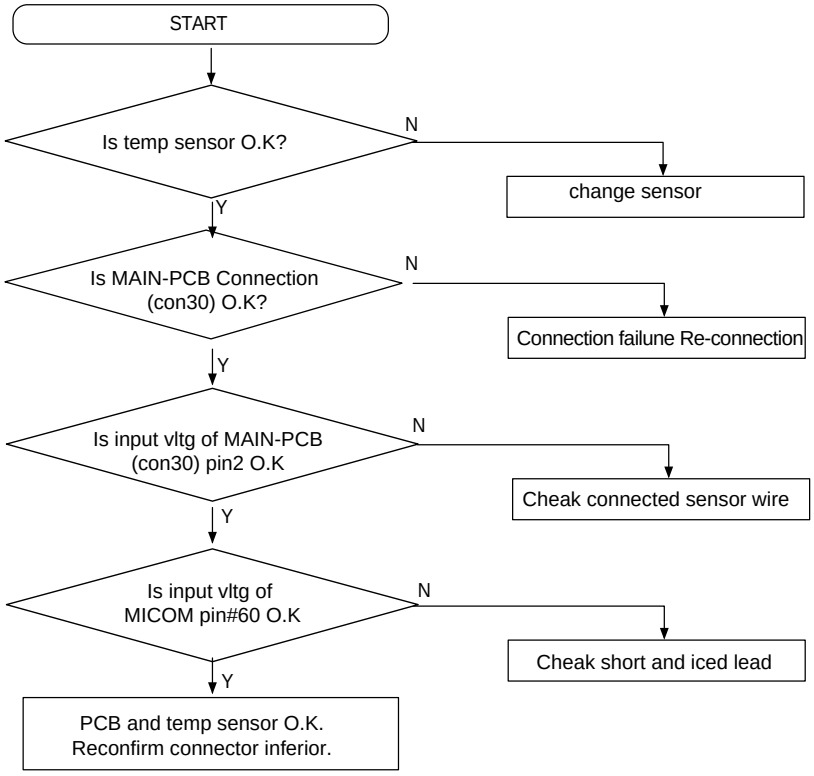


2. Self diagnosis failure

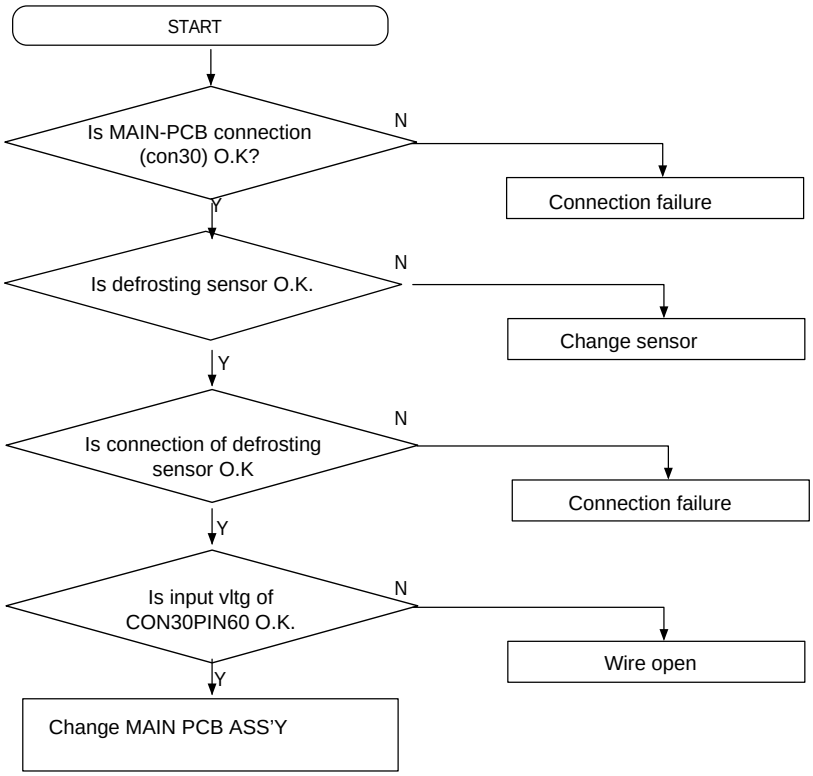
① Outer temper ature sensor failure



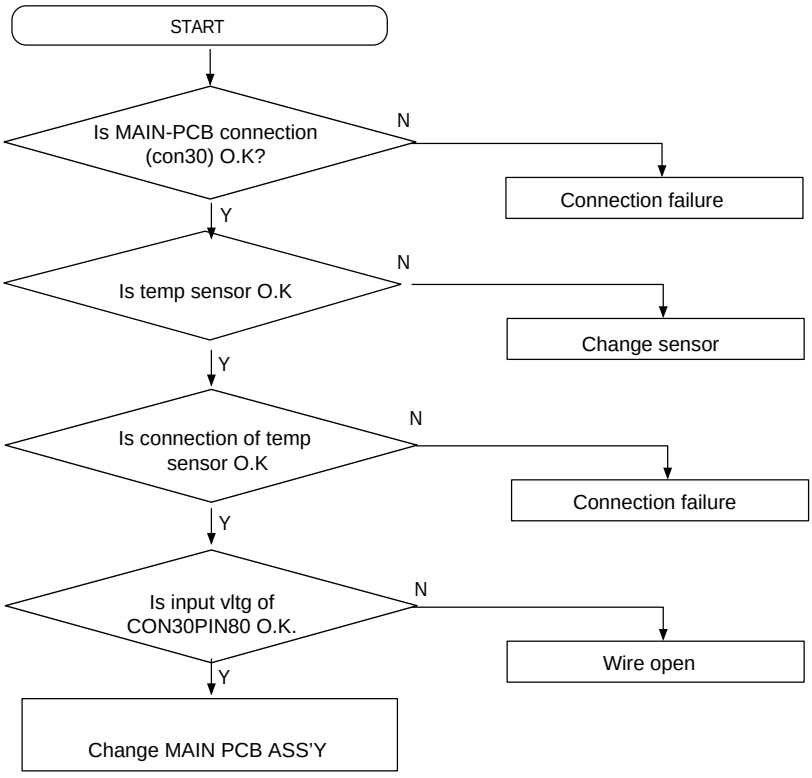
② Refrigerator temp, sensor failure



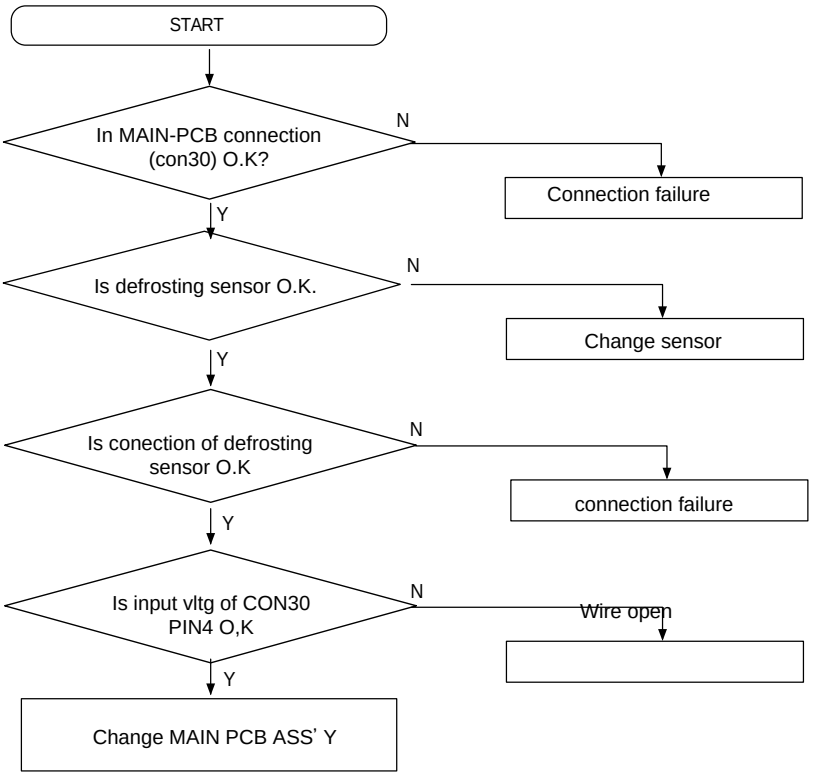
③ Refrigerator' s defrosting sensor failure



④ Freezer tem sensor failare



⑤ Freezer' s defrosting sensor failure

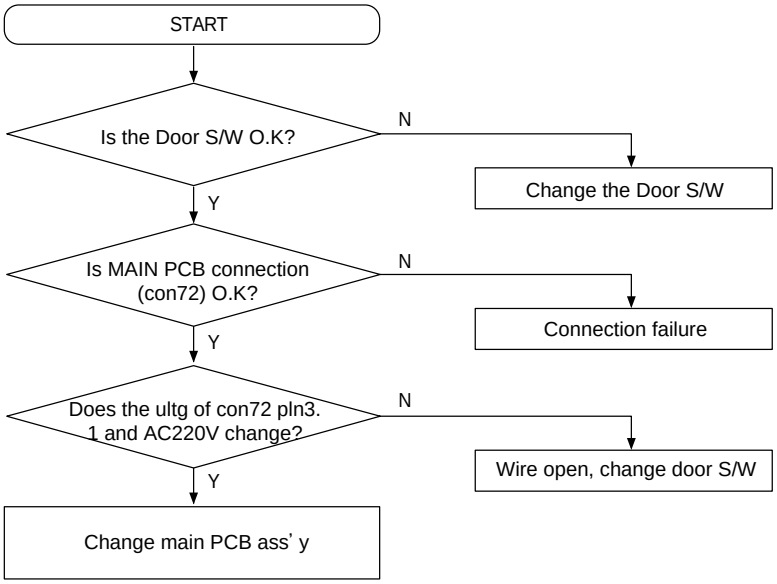


3. In case of contiunous alarming

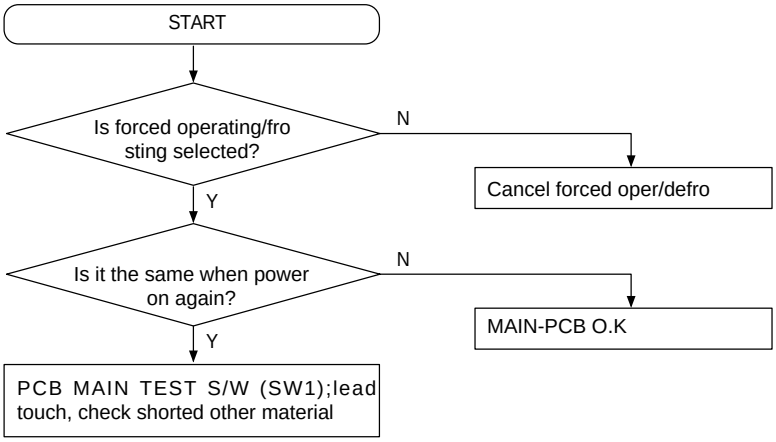
REFRENCES

- F/R door open alarms for ten seconds after 2 minutes later.
  IF door opens continuously, door open alarms for ten seconds with one minute cycle. cten times of "Ding-Ding"
- If there is moisture in door S/W, it is shorted and alarms due to the MICOM' S misjudgement, In this case the inside lamps of freezer and refrigerator turns off so the lamp do not turns on thaugh you open the door.
- If the door S/M is rusted, the sighal of door open do not reach to MICOM and no alarms and lamps turhed off continuously.

① In case of continous Melody



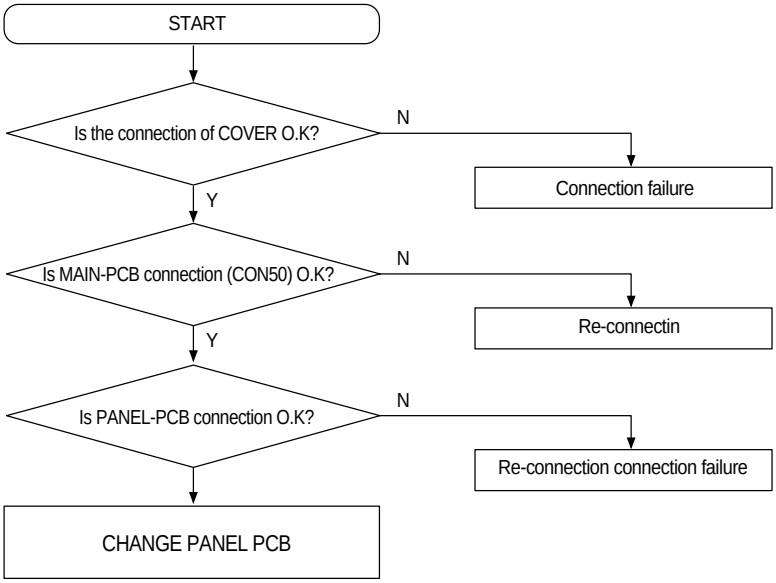
② In case of “Beep-Beep” alarming



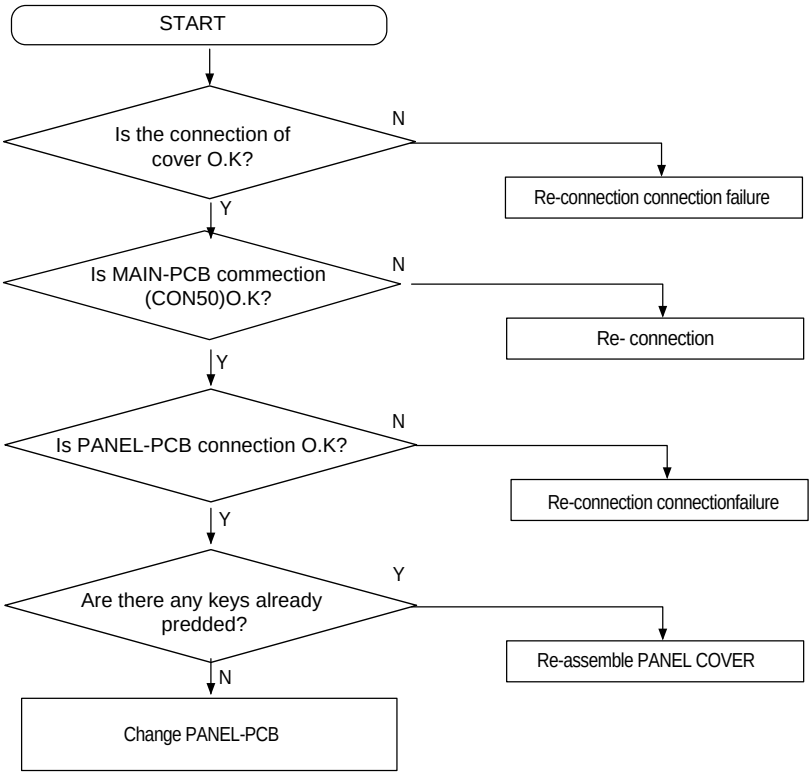
REFRENCES

- There is on “beep-beep” alarming except the forced operating/frosting or sensing troble during self diagnosis
- If self diagnosis sensed troble, it is displayed on the PANEL PCB, so easy to check, If not, the forced operating/frosting is selected the NOTCH status are “High” -” Mid,High” at that time.

③ In case of no PANEL PCB display



④ In case of the panel PCB Key selection is impossible.



4. In case of FAN do not run

REFRENCES

"Be sure to check cooling FAN under forced operation"

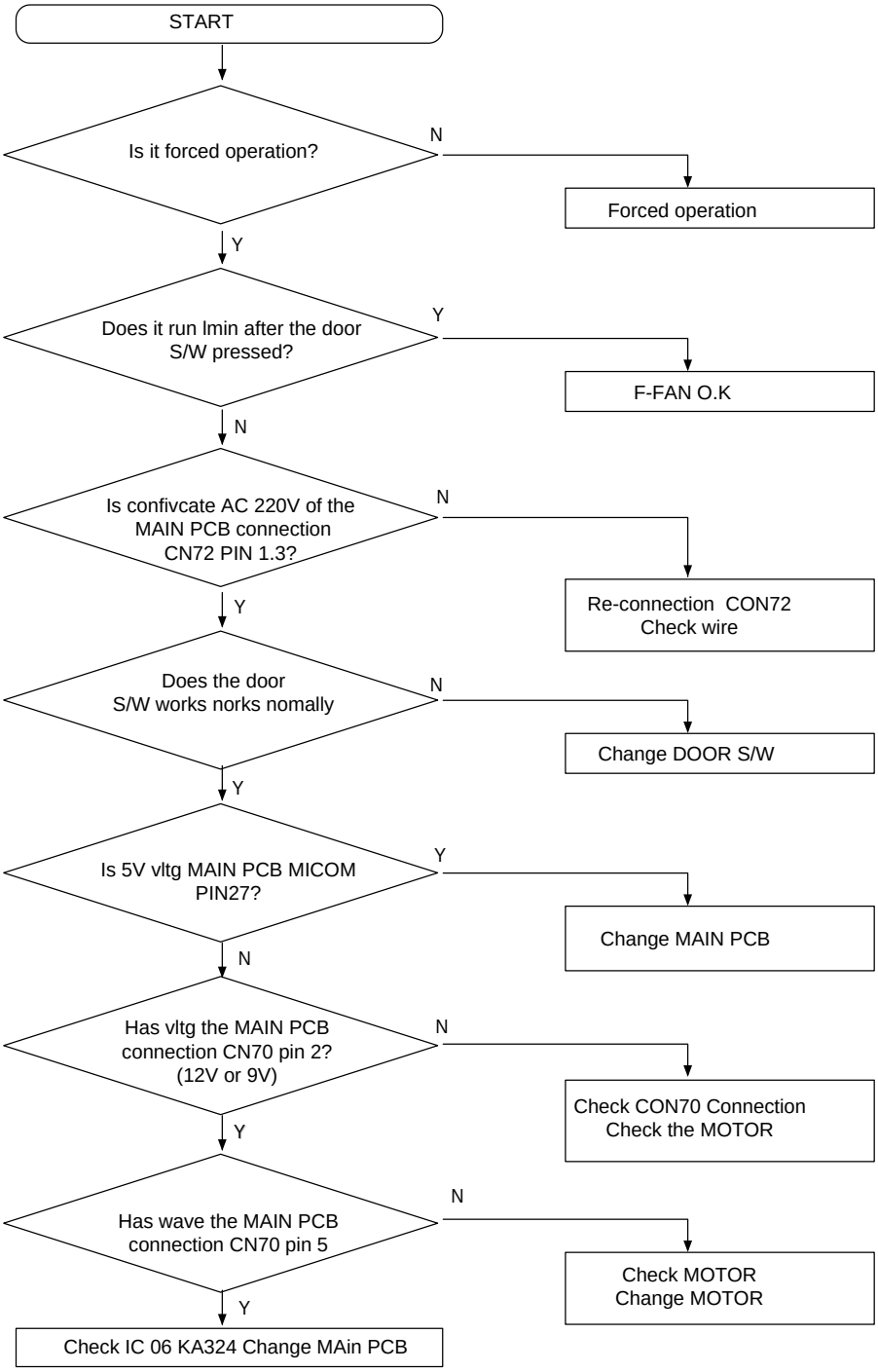
1. F-FAN, R-FAN and COMP COOLING are off when COMP is off.

2. Though the comp is on, the R-FAN is not always on because the FAN is off when the tem perature was reached to the set point.

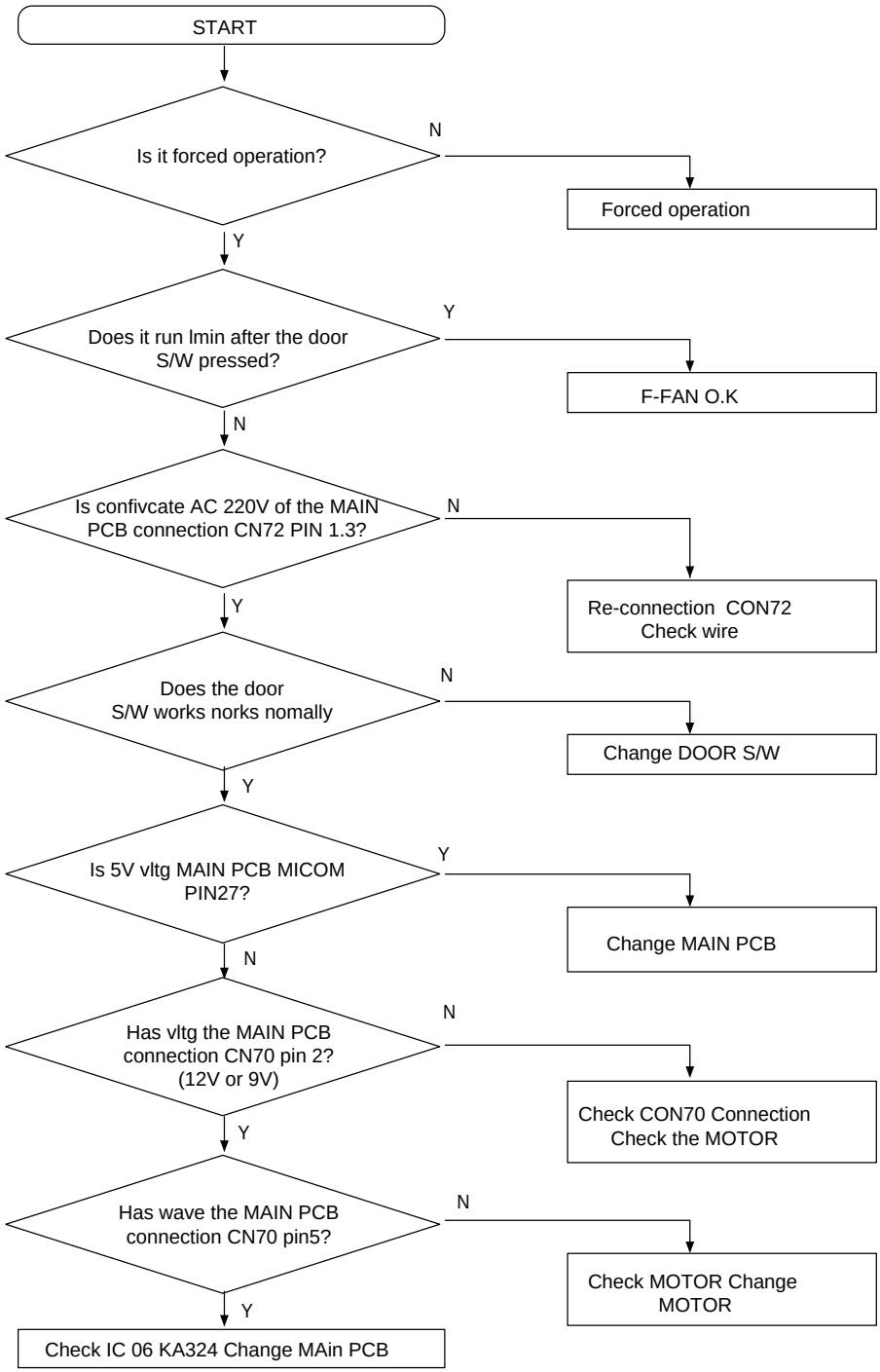
3. There is delaying time to run the fan after door open (COMP ON state). thedelay time varys from ten seconds to one minute, (Forced operation included)

4. When closed MOTOR, it is stop state (After stopped, it is ON/OFF at ten minutes)

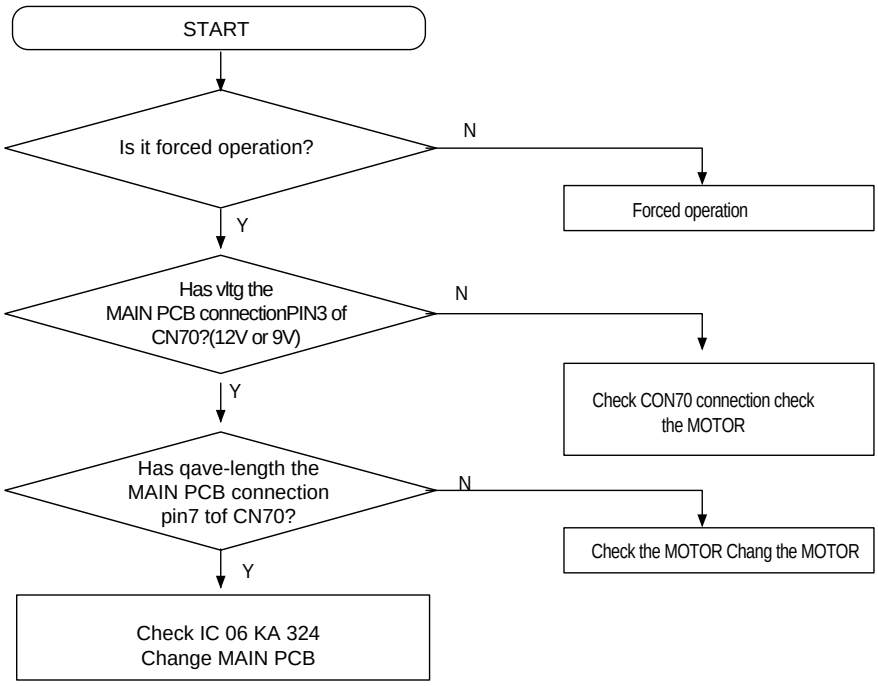
① In case of F-FAN doesn’ t run (Run the DC voltage)



② In case of R-fan doesn't run (Run the DC voltage)
(Reference BLDC MOTOR run circuit)



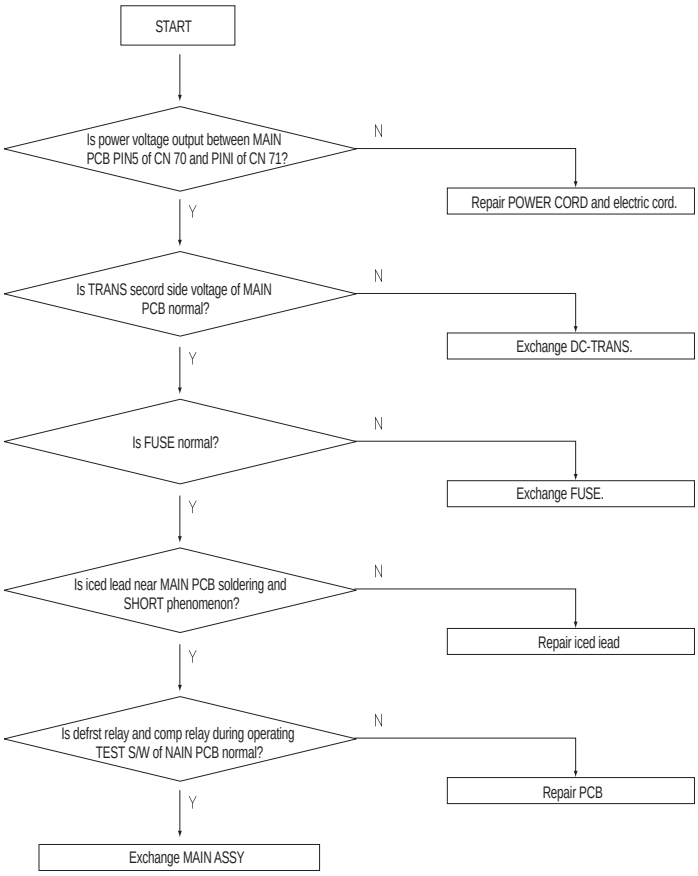
③ In case of COMP FAN doesn't run (run the DC voltage)
(Reference the BLDC MOTOR run circuit.)



9. Diagnosis of disorder and method of repair.

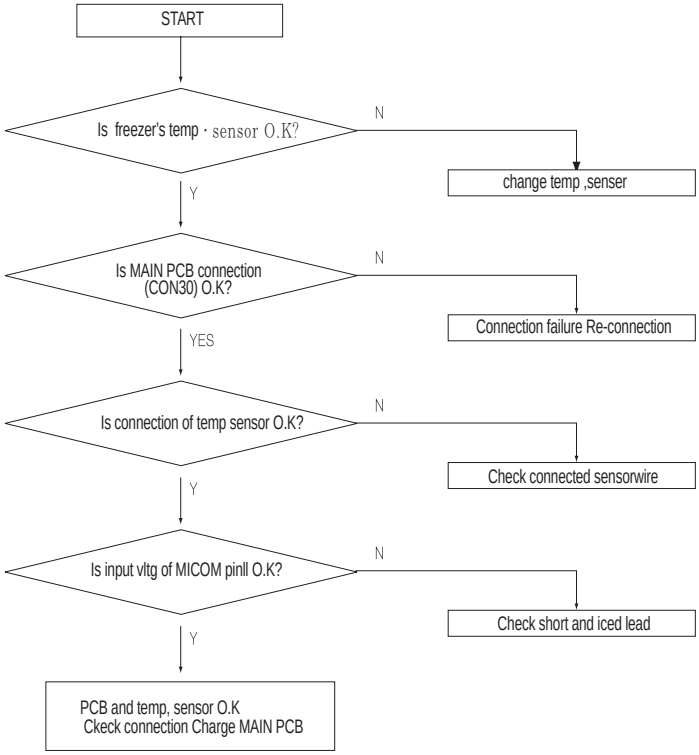
2. SENMI electronic mode (SR-61NMC, 65NMC)

1. When not operating Power

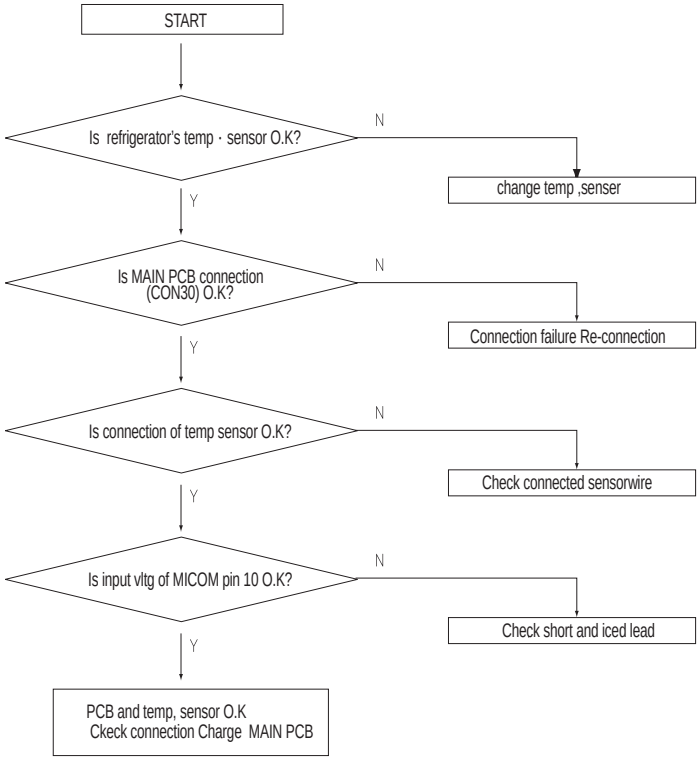


2. Self diagnosis failure

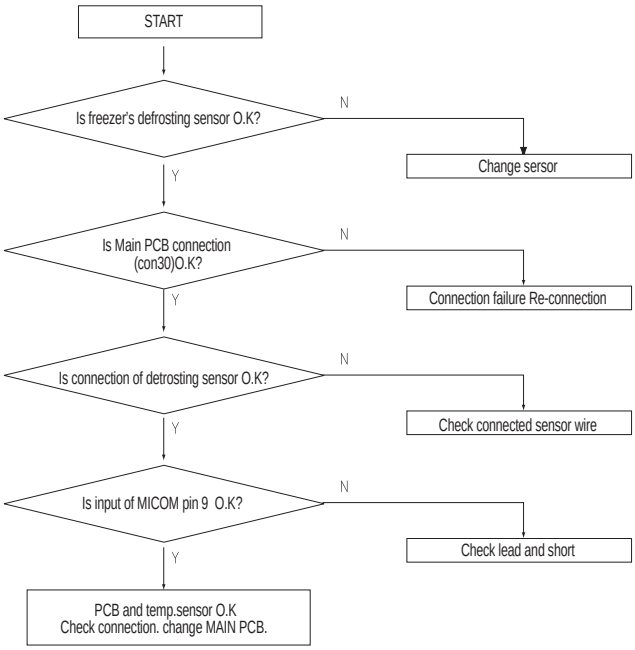
A. Freezer' s temp · sensor failure



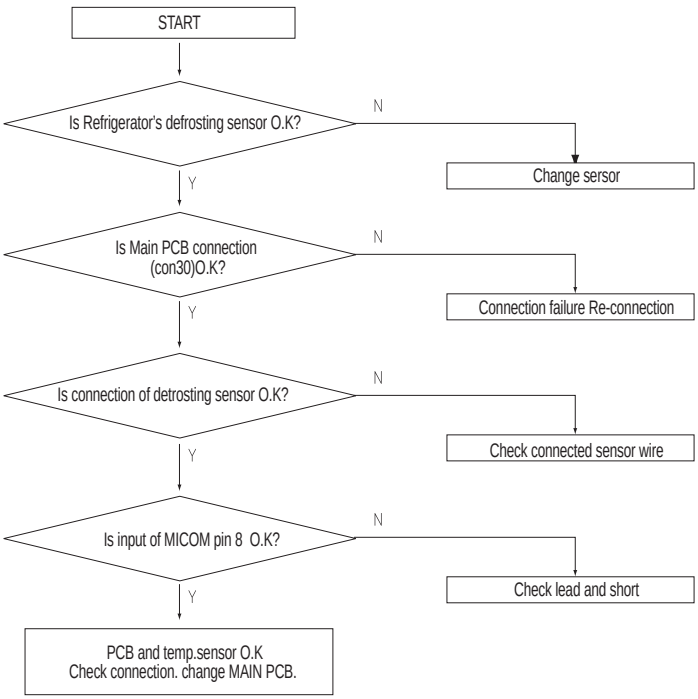
B. Refrigerator' s temp, senser failure



C. Freezer's defrosting sensor failure



D. Refrigerator's defrosting sensor failure



3.In case of FAN in the refrigerator doern't run

REFRENCES

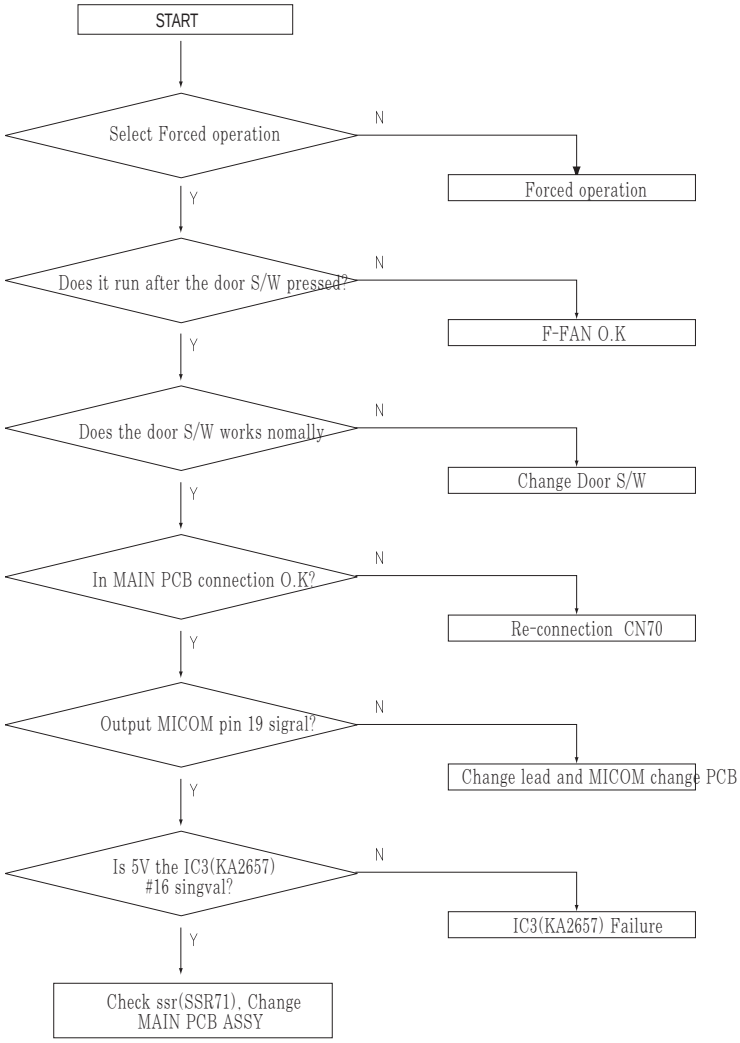
"Be sure to check cooling FAN under forced operation"

1. Freezer FAN, refrigerator FAN and COMP COOLING are off when COMP is off.

2. Though the COMP is on, the FAN is not always on because the FAN is off when the temperature was reached to the set point (Forced operation included)

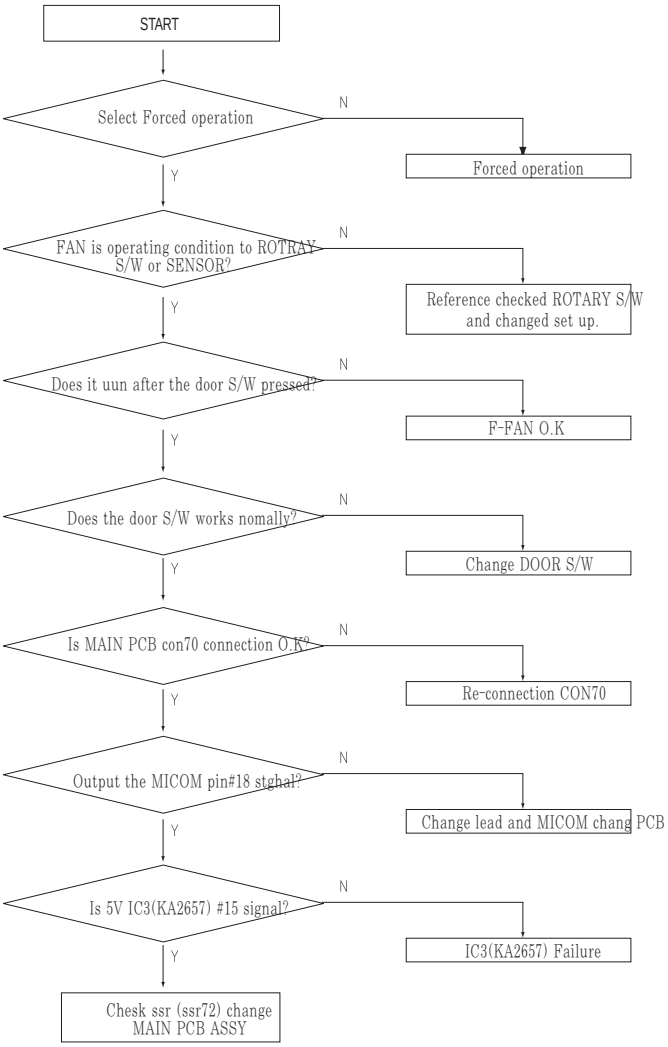
3.There isn't delaying time to run the fan after door open (COMP on state)

A. In case of F-Fan do not run

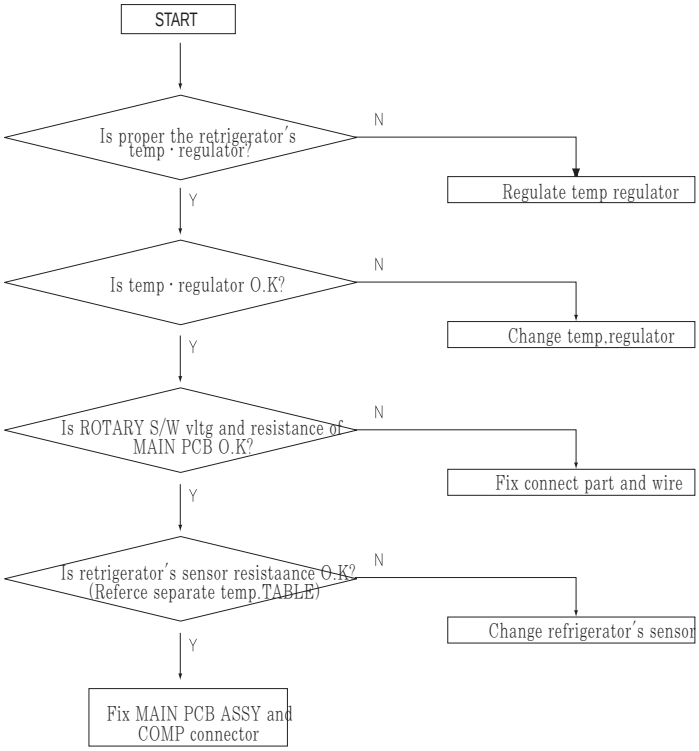


B. In case of R-FAN do not run.

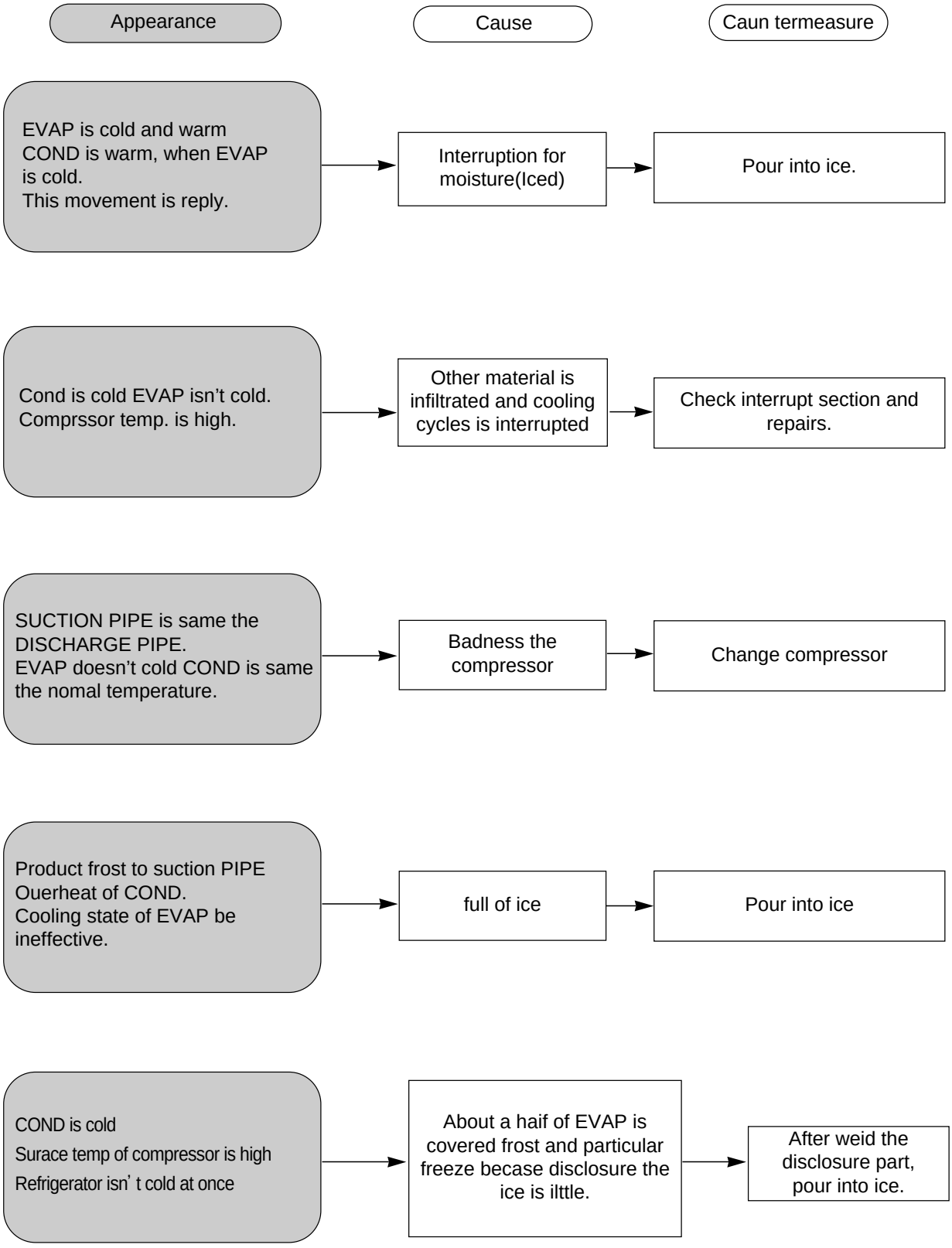
① Check



② Check ROTARY S/W

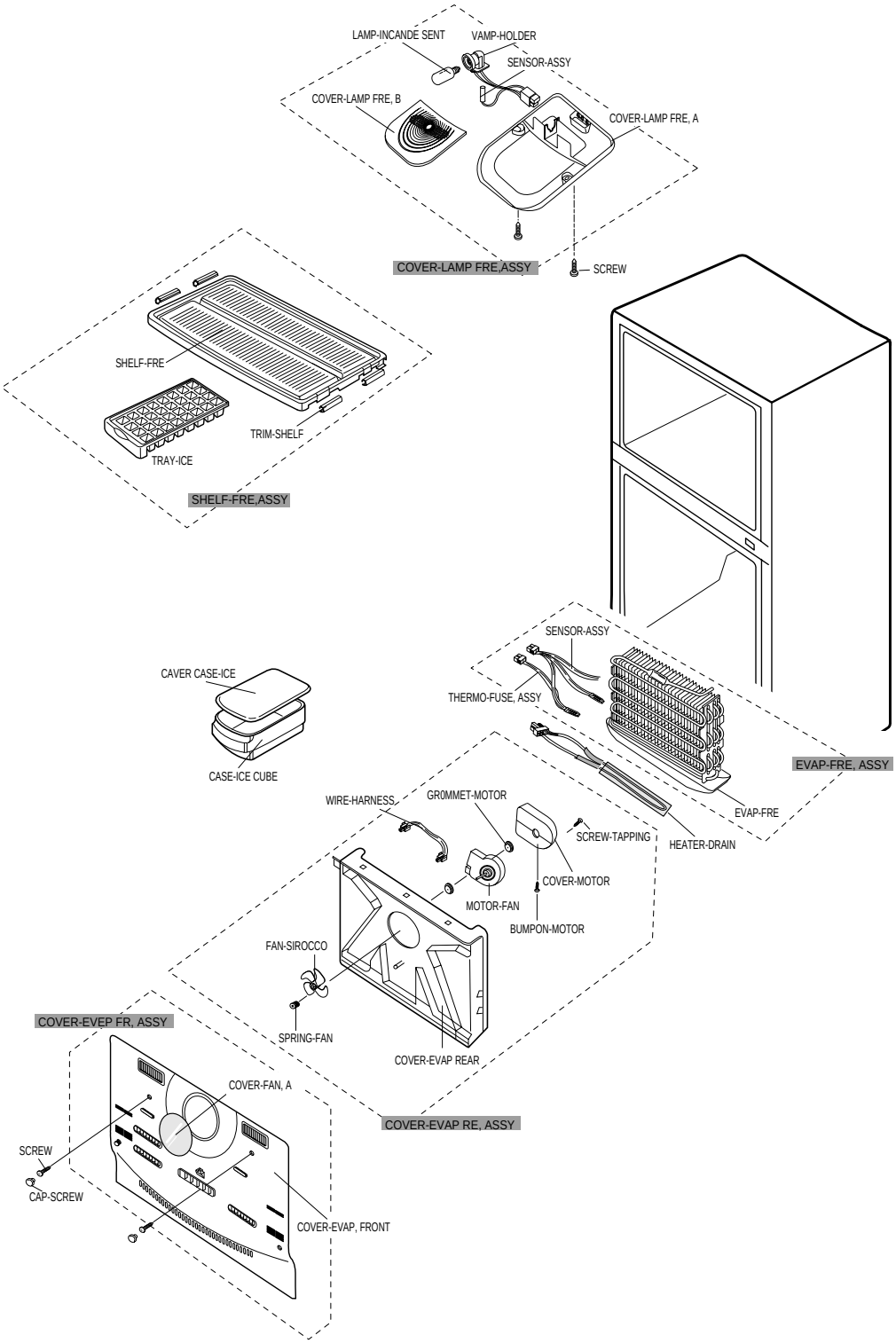


4. Badress management of freeze cycle

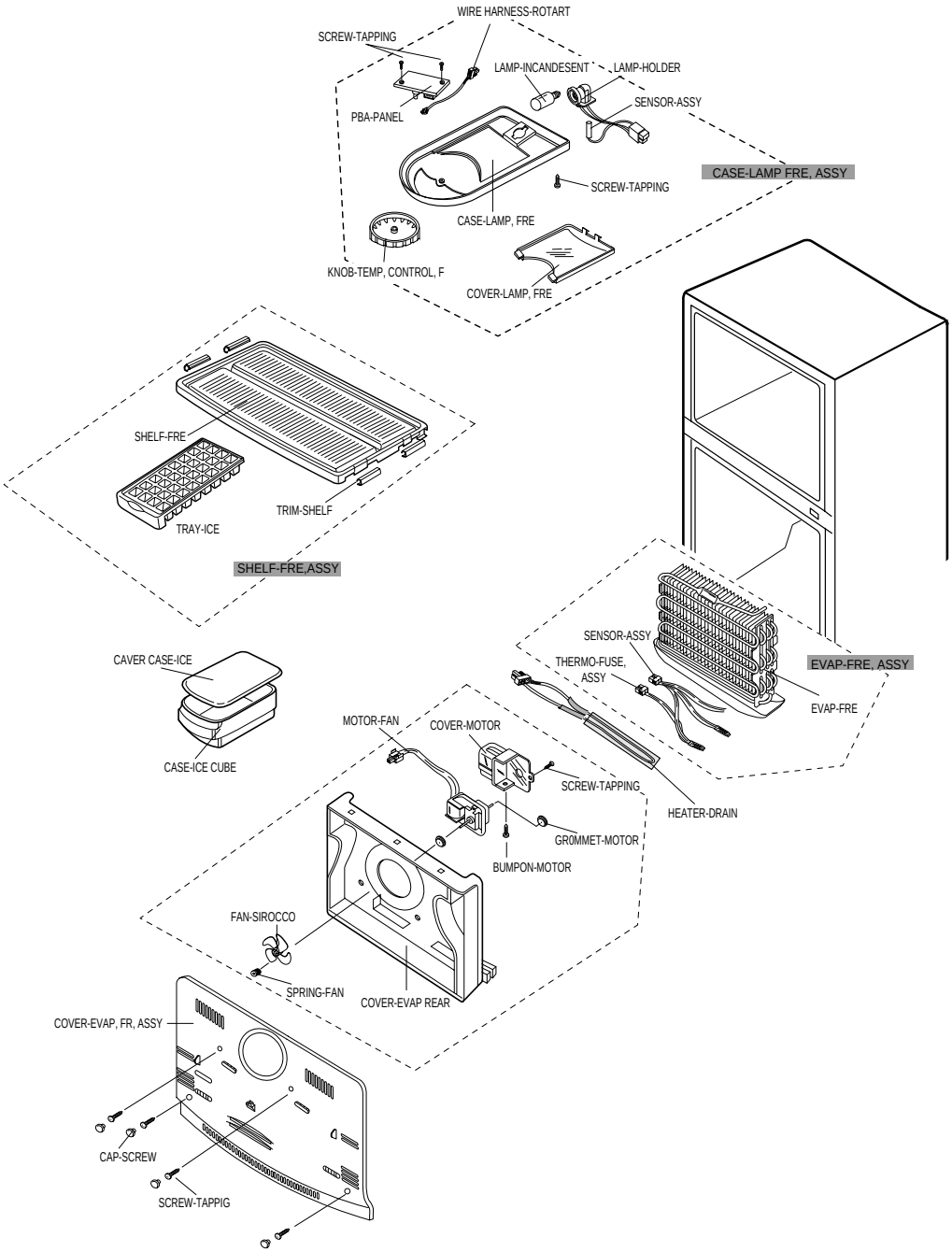


10. Disassemble and Assemble Drawing And Parts List

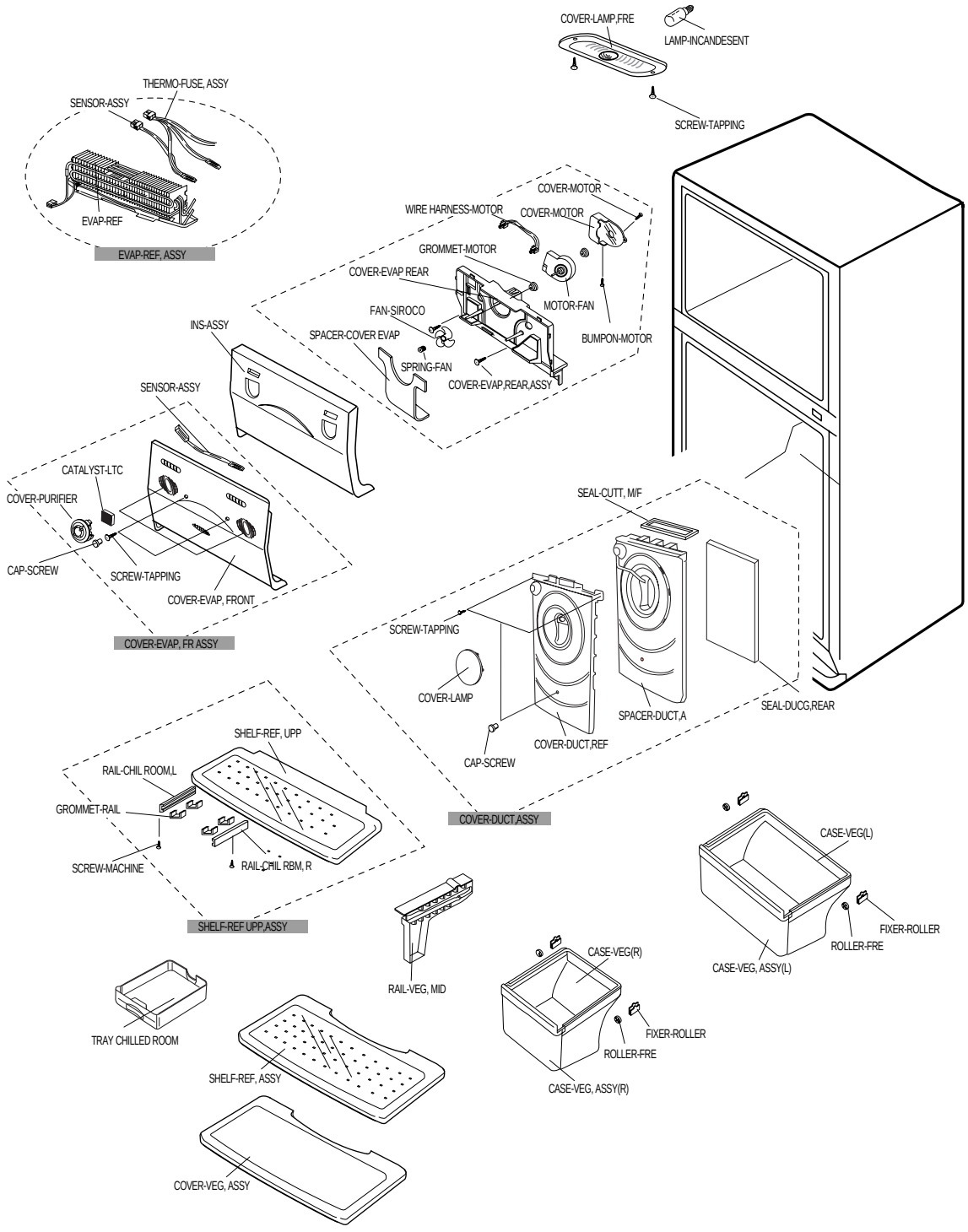
10-1. Freezer comoartment(SR-61KTC, 65KTC)



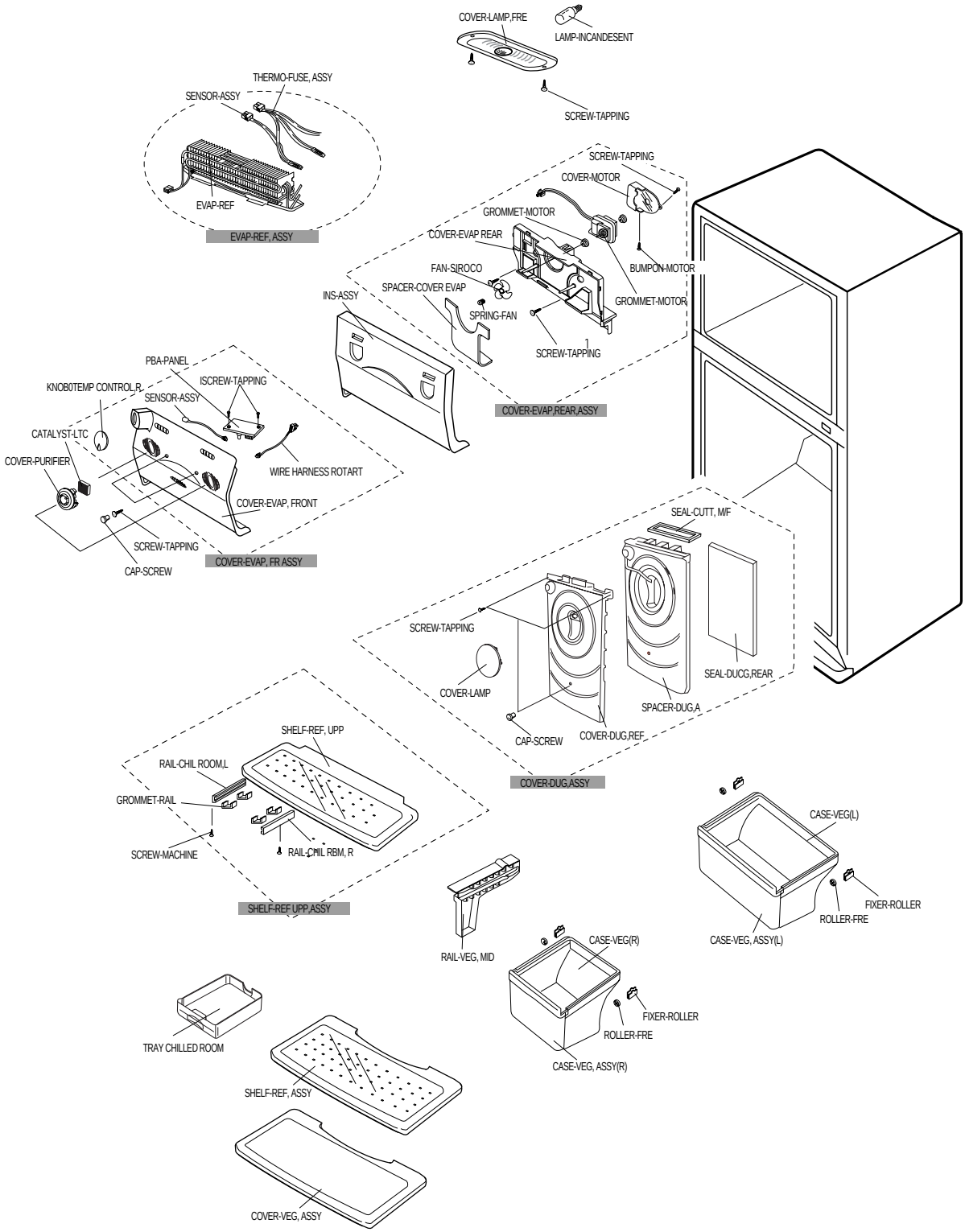
10-2. Freezer compartment (SR61NMC,65NMC,69NMC)



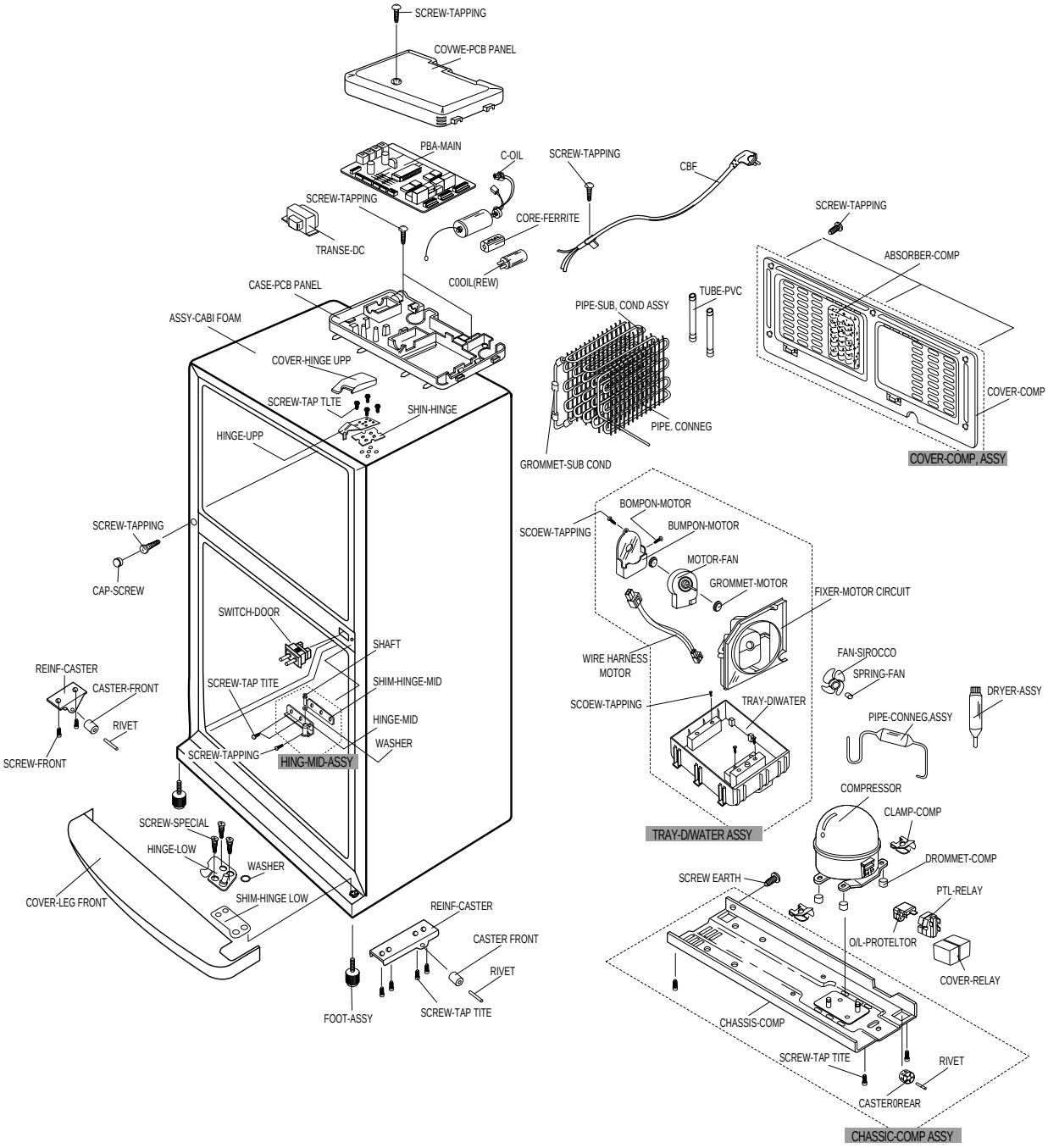
10-3. Refrigerator Compartment (SR-61KTC, 65KTC)



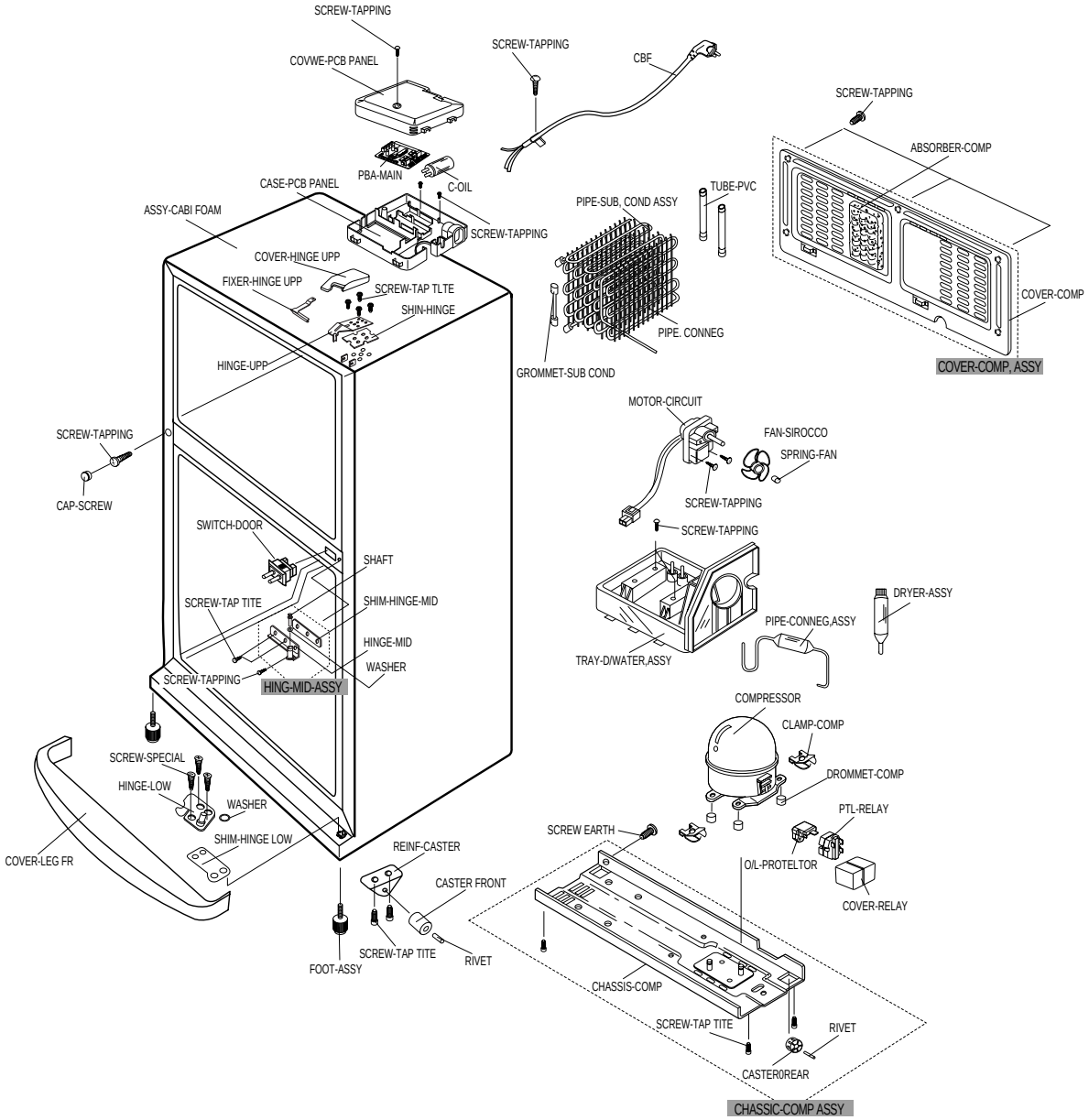
10-4. Refrigerator Compartment (SR-61NMC,65NMC,69NMC)



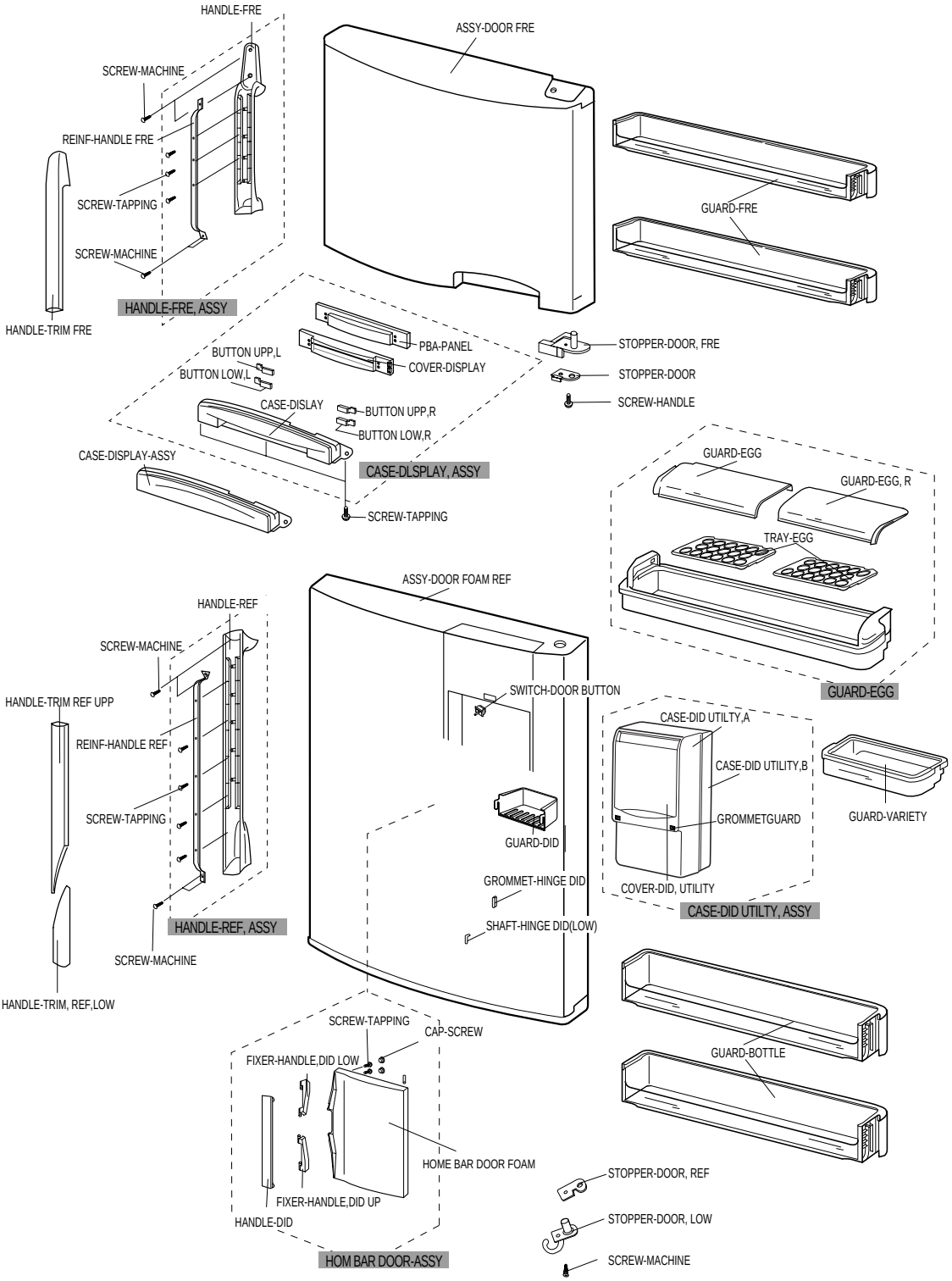
10-5. Related Components of CABI & UNIT (SR-61KTC,SR-65KTC)



10-6. Related Components of CABI & UNIT (SR-61NMC,SR-65NMC,69NMC)

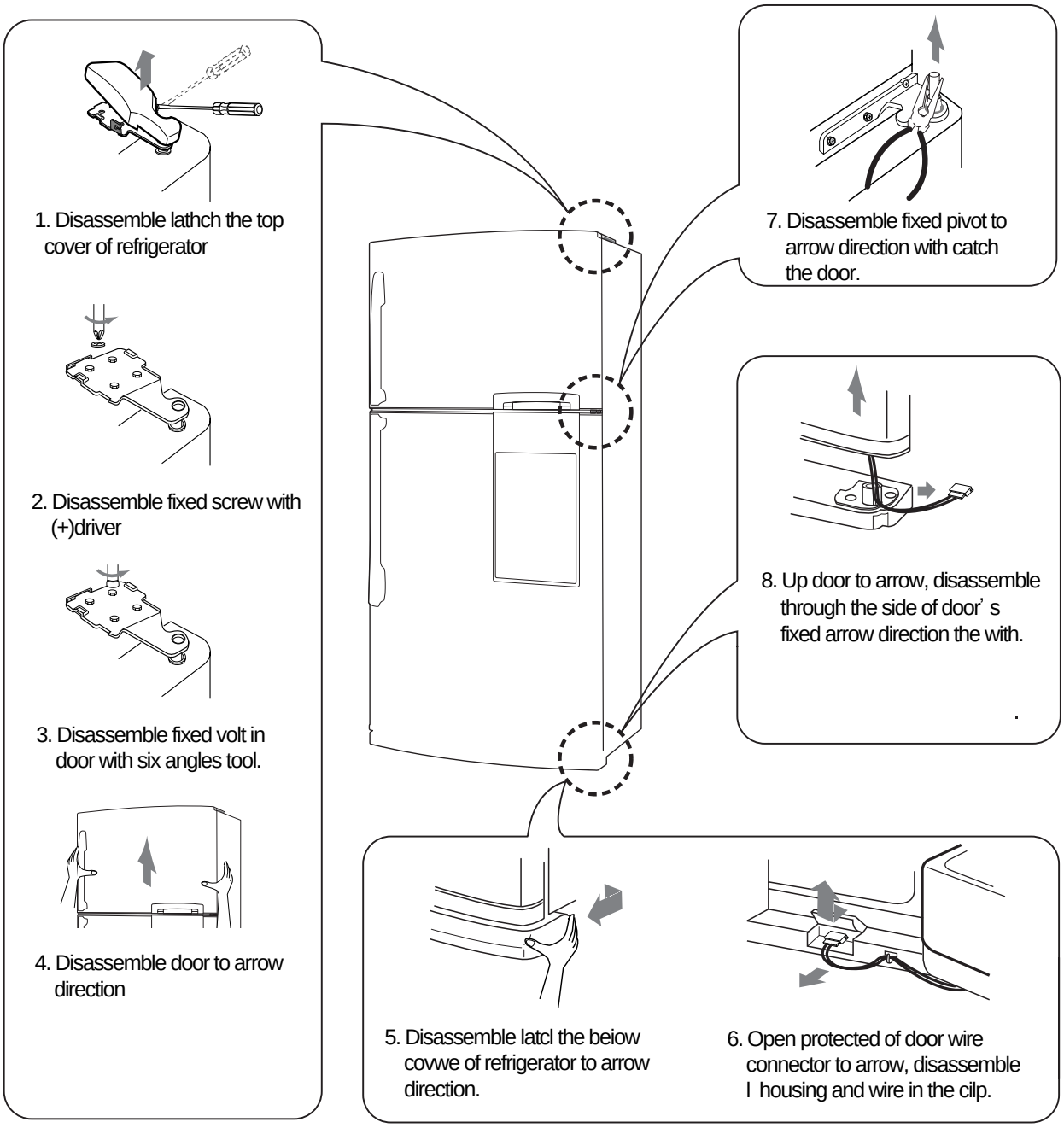


10-7. Related Components of DOOR



11. DISASSEMBLE & ASSEMBLE METHOD (TURN OFF THE POWER OF REFRIGERATOR)

11-1. Disassemble and Assemble method of DOOR in nefrigerator



1. Disassemble lathch the top cover of refrigerator

2. Disassemble fixed screw with (+)driver

3. Disassemble fixed volt in door with six angles tool.

4. Disassemble door to arrow direction

5. Disassemble latcl the beiow covwe of refrigerator to arrow direction.

6. Open protected of door wire connector to arrow, disassemble l housing and wire in the cilp.

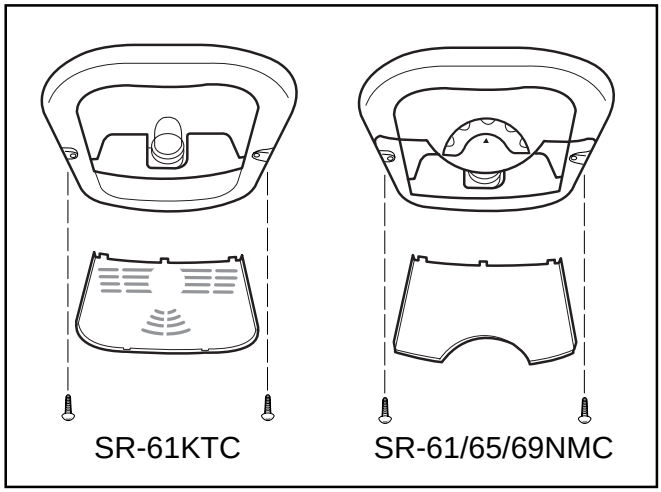
7. Disassemble fixed pivot to arrow direction with catch the door.

8. Up door to arrow, disassemble through the side of door' s fixed arrow direction the with.

11-2. Replacement of freezer in door lamp

1) Remove the back cover lamp and then in door lamp.

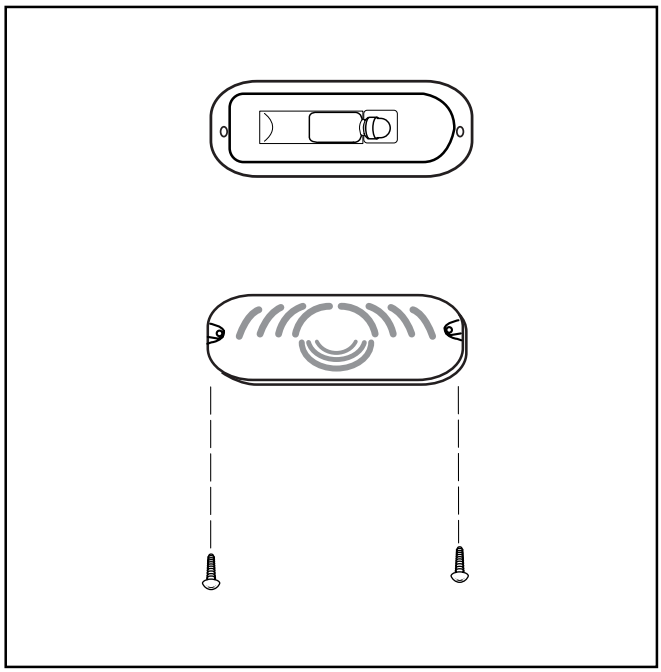
2) Fix the cover of in door lamp.



11-3. Replacement of refrigerator in door lamp

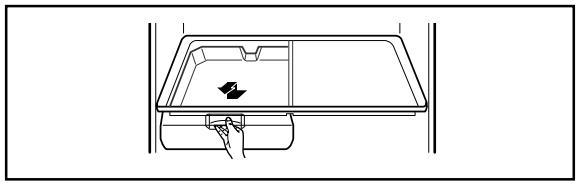
1) Remove a screw from cover and disassemble the cover like example.

2) After replacing the indoor lamp, assemble the back latch of cover and then fia screw.

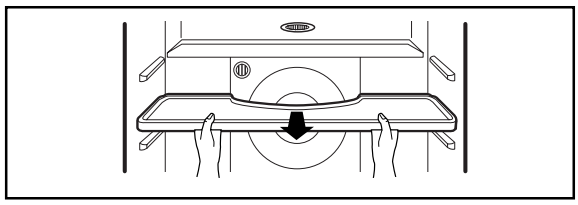


11-4. Disassemble of refrigerator cooling part

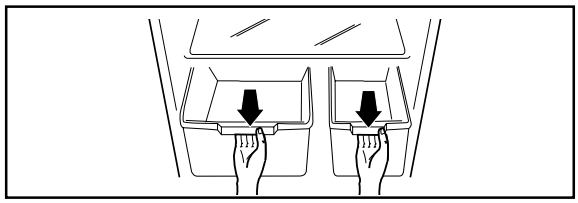
1) Push the cold storage and remove it



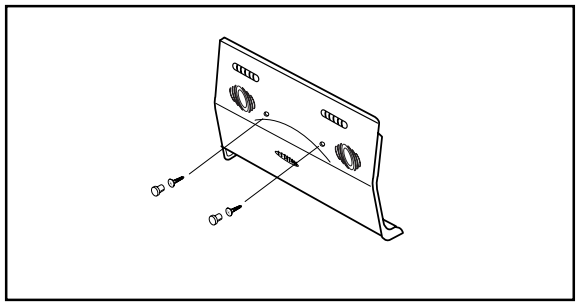
2) Remove foods and shelves inside the Refrigerator



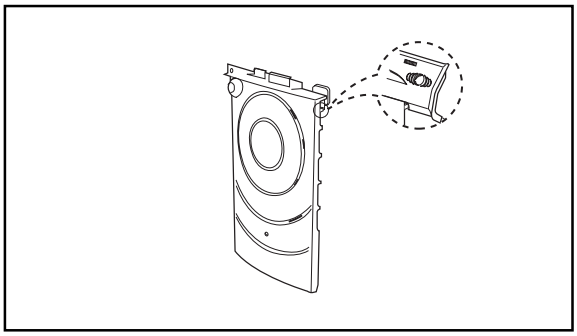
3) Push the cover of vegetable / fruit room and box and pull it out.



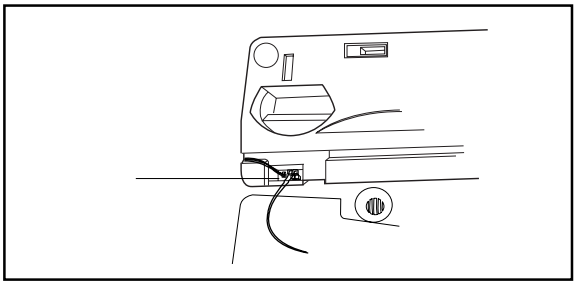
4) disassemble the cap with (-)driver and remove the 2 screws with (+)driver.



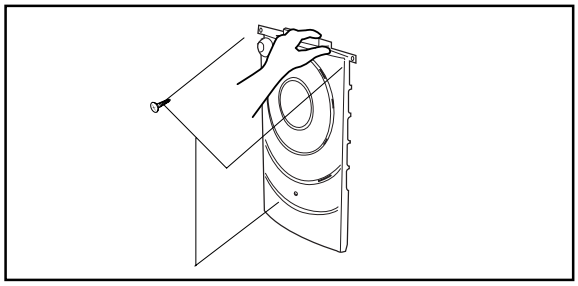
5) Push top of the cover in cooling part and remove the locking point of lower step.



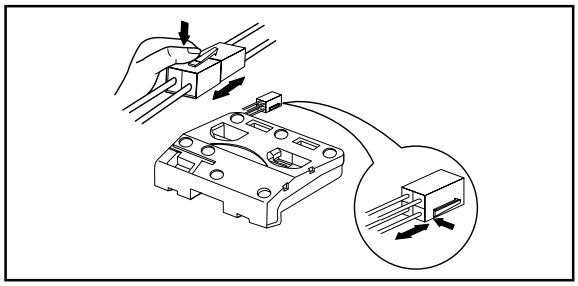
6) Disassemble the wire housing of electric assembly in the left.



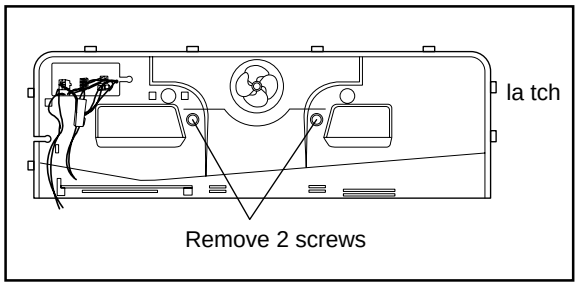
7) Remove 3 screws of pull appart and disassemble it.



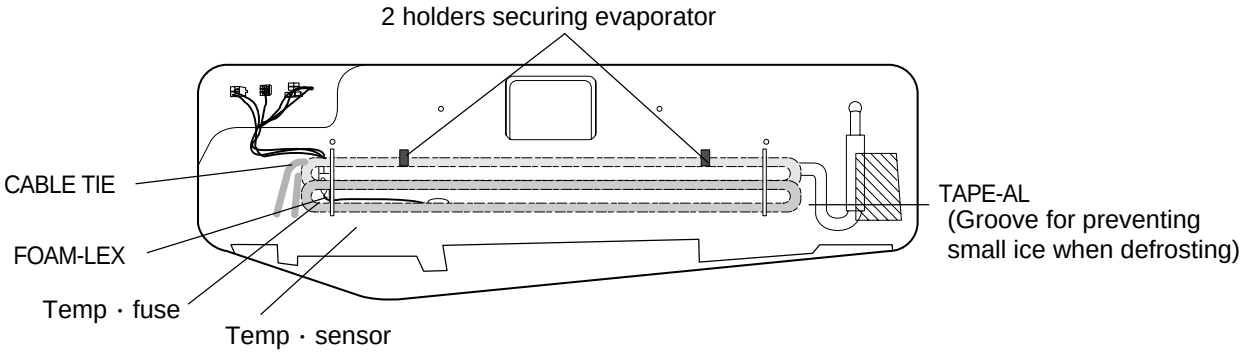
8) Pull the insulating material and disassemble the electric housing.



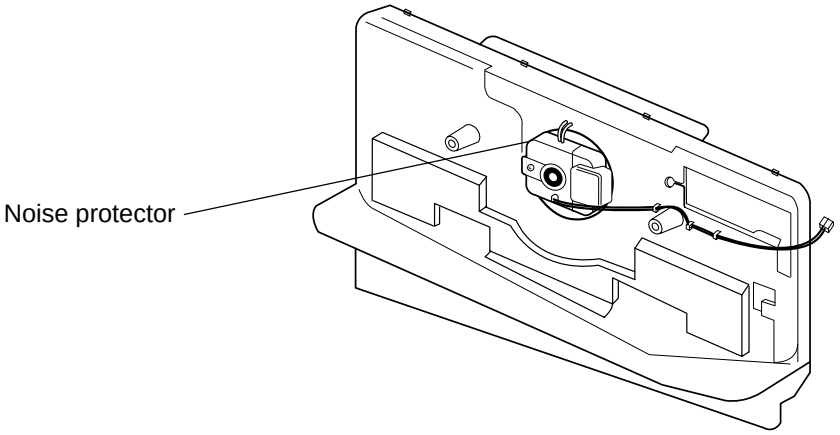
9) Remove screws of evap. cover rear and release the looking part of both left and right using (-)driver.



● Cooling cycle unit assembly in refrigerating compartment

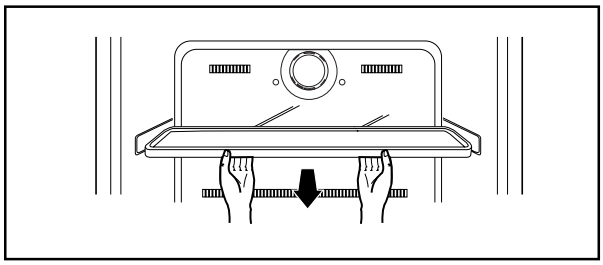


● Cooling cycle unit cover assembiy in the refrigerating

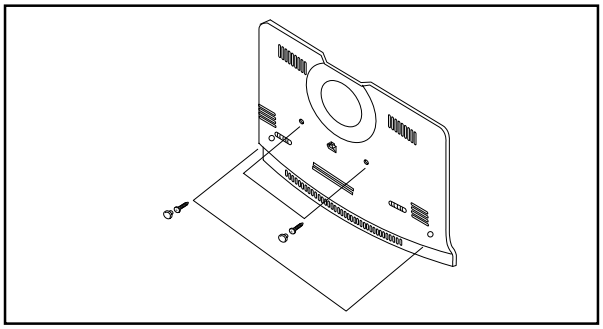


11-5. Disassembly of cooling part in the freezing room

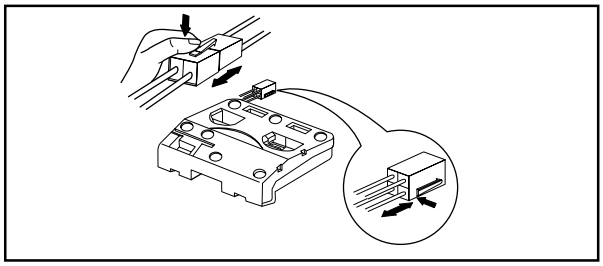
1) Pull out the shelf.



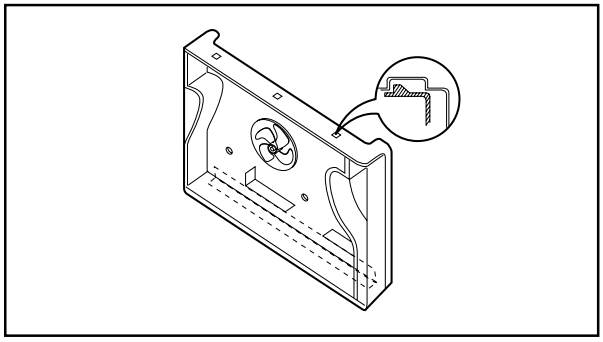
2) Remove screws of evap covwe and release the CAP SCREW vsing (-)driver.



3) Disconnect the each terminal of wire housing on top of the left side.

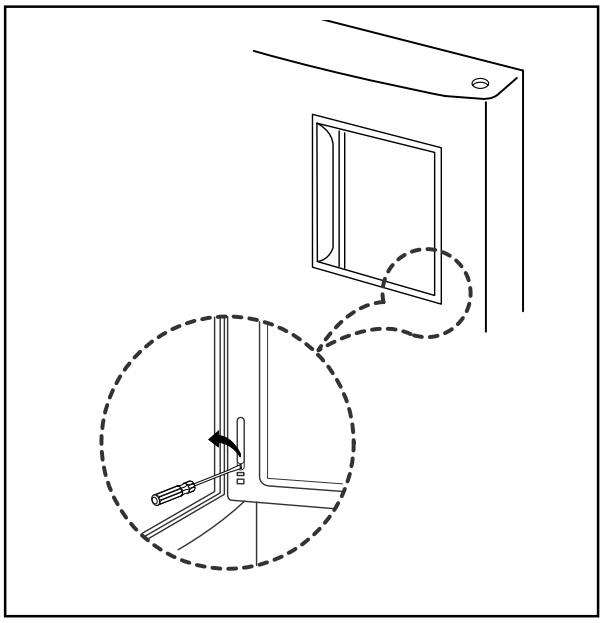


4) Remove screws of evap cover rear and release the locking point using (-)driver.

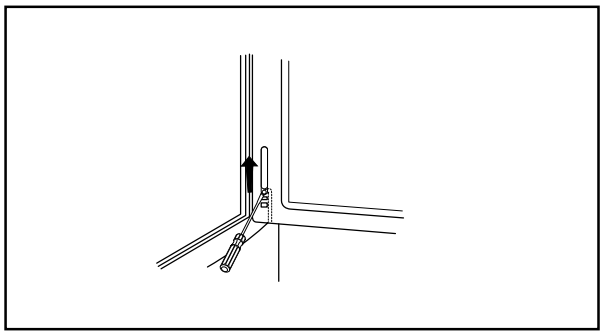


11-6. Disjonting of DID door

1) Disassembie inner lower GROMMET of DID door

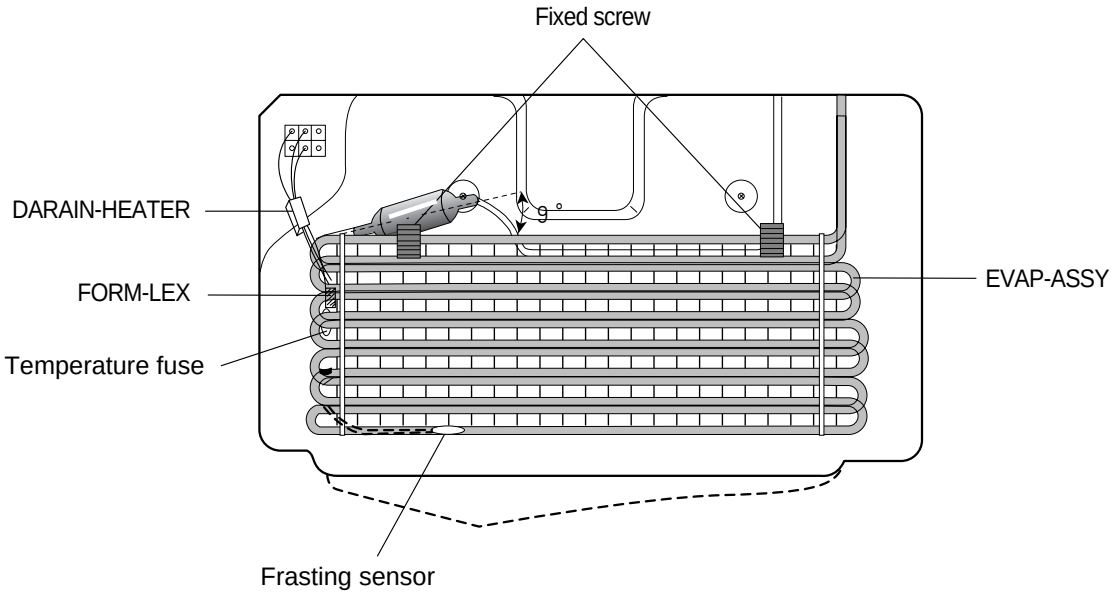


2) Disassemble DID door with up the iower HINGE



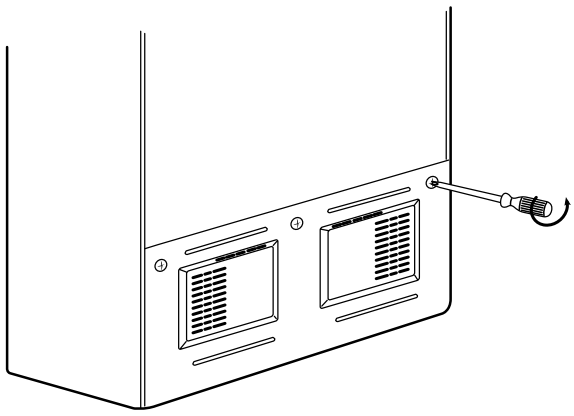
3)Assemble reverce order of disassemble,

● Assembly specifcation of Freezer cooler part

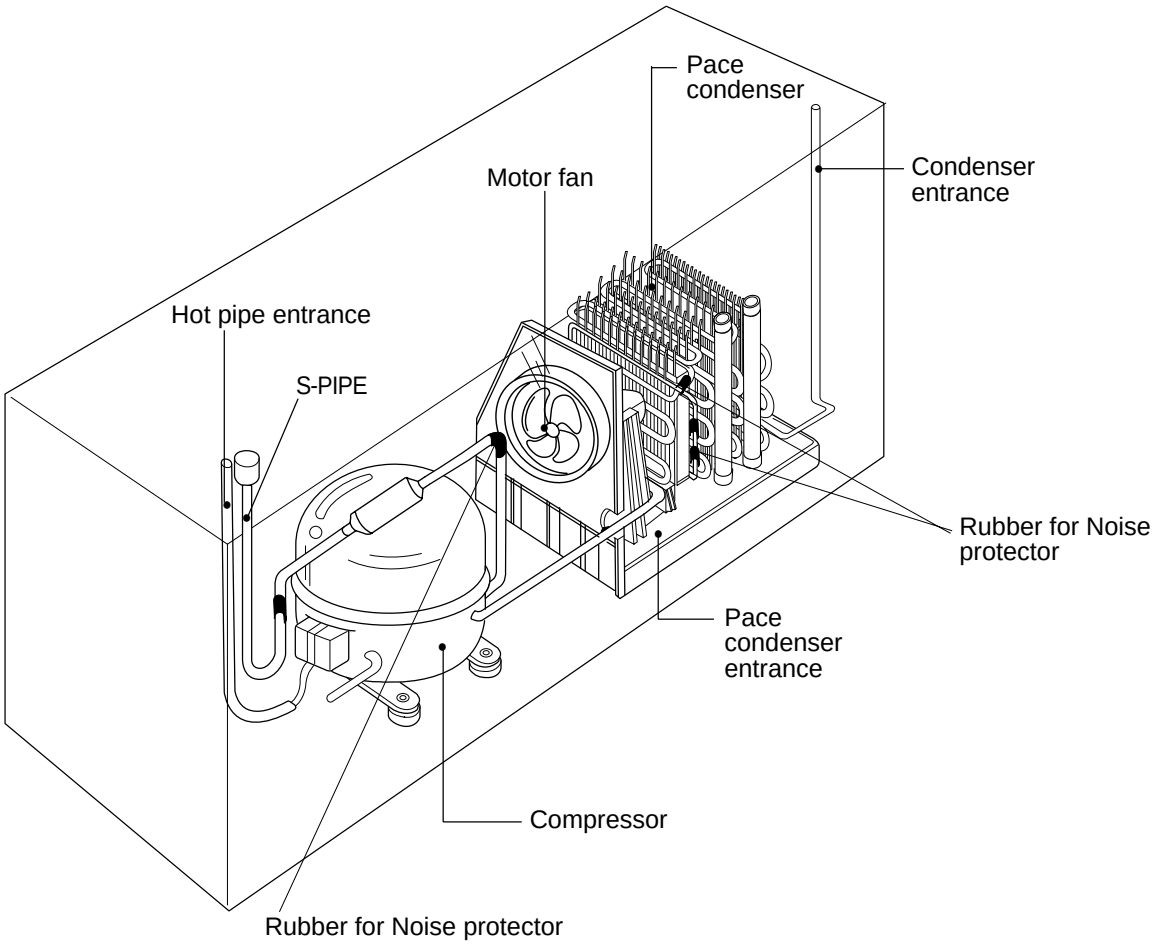


11-7. Unit assembly

1. Remove a screw from the back lower cover of unit.

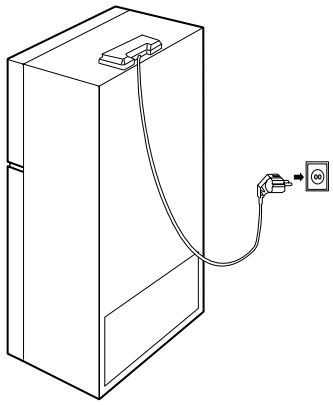


2. Assemble specification of unit. (SR-61/65KTC, SR-61/65/69NMC)

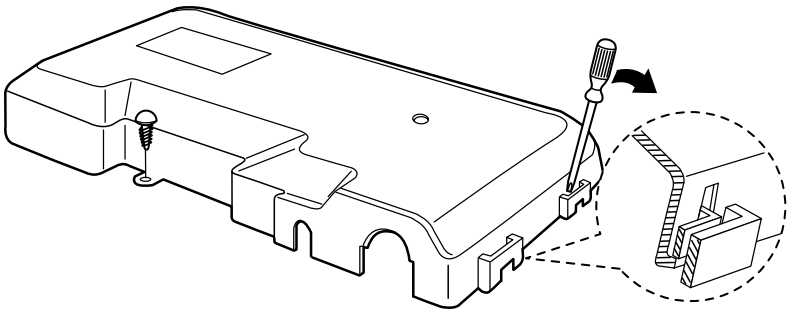


11-8. Electric box assembly

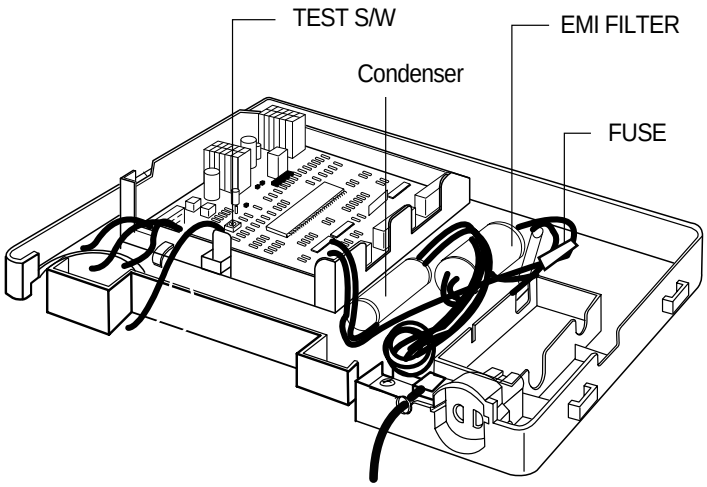
1. Disconnect the power cord.



2. Remove the cover of electrical box with insert driver.

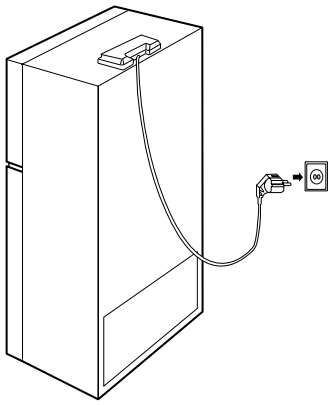


3. Assembly specification of electric box.

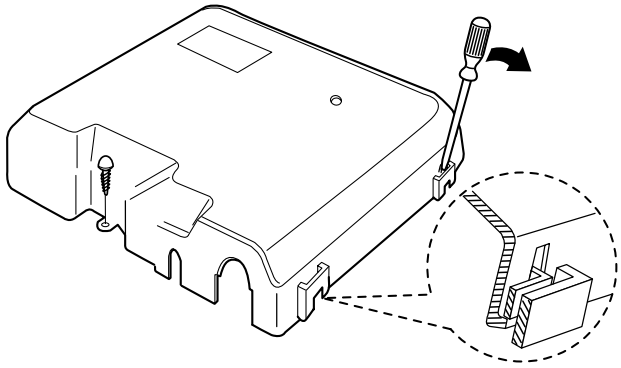


11-9. Electric box assembly

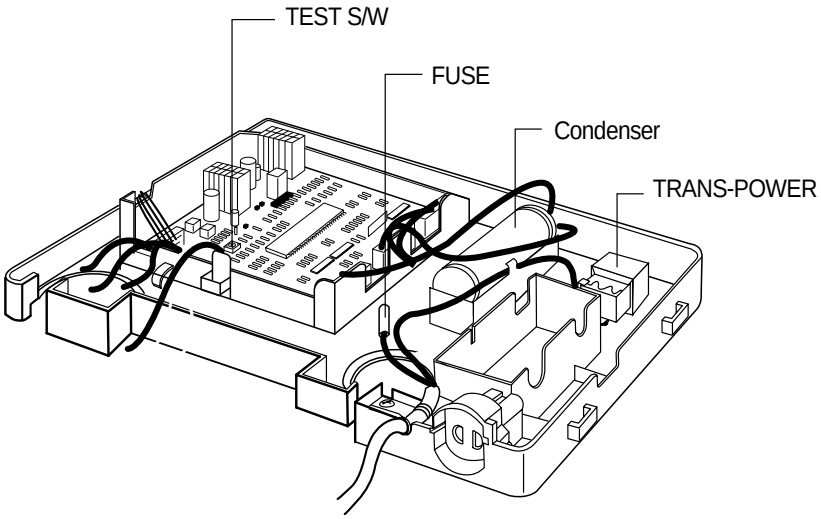
1. Disconnect the power cord.



2. Remove the cover of electrical box with insert driver.

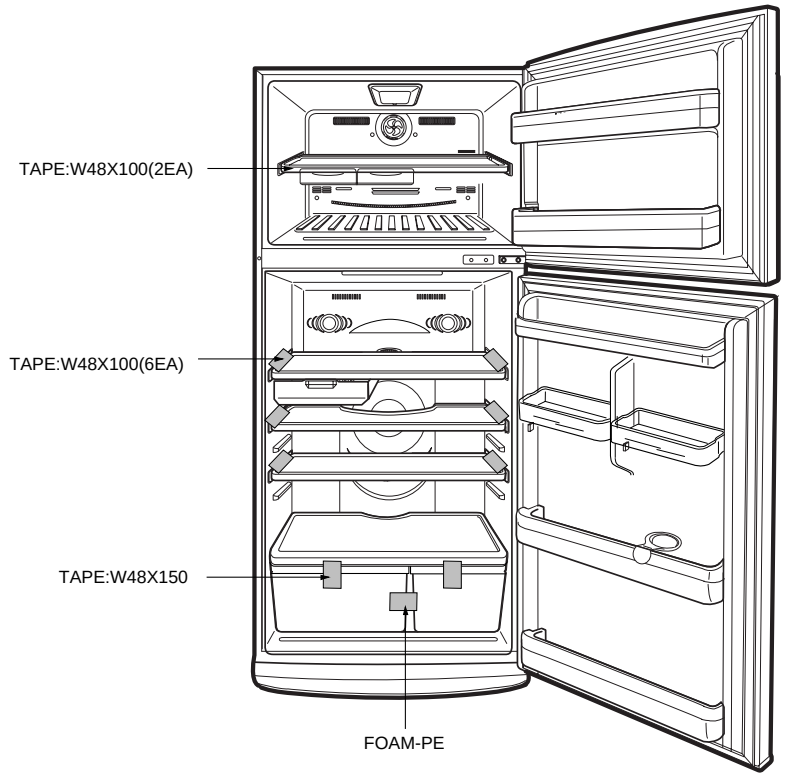


3. Assembly specification of electric box.



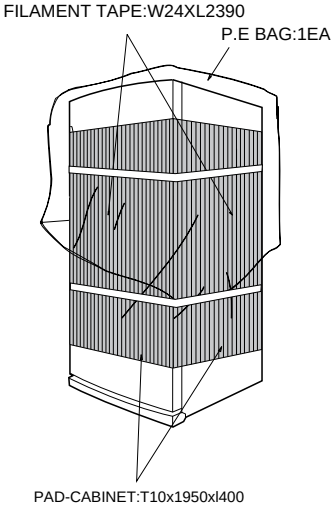
12. PACKING

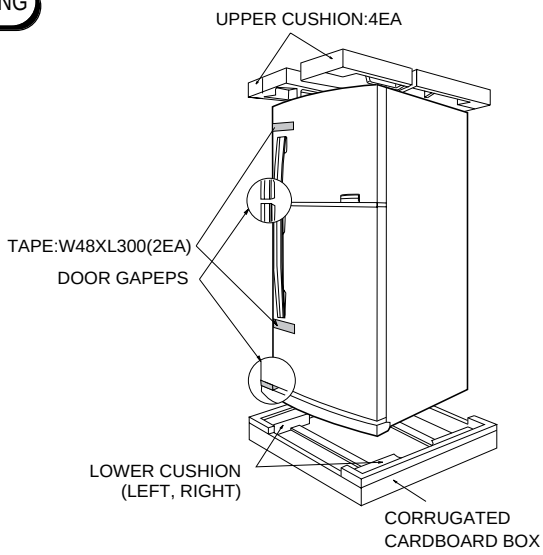
PACKING OF DOOR AND CABINET

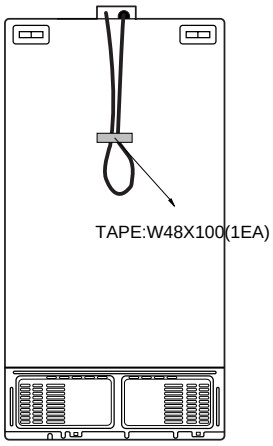


PACKING EXAMPLE OF FRONT SIDE AND BACK SIDE.

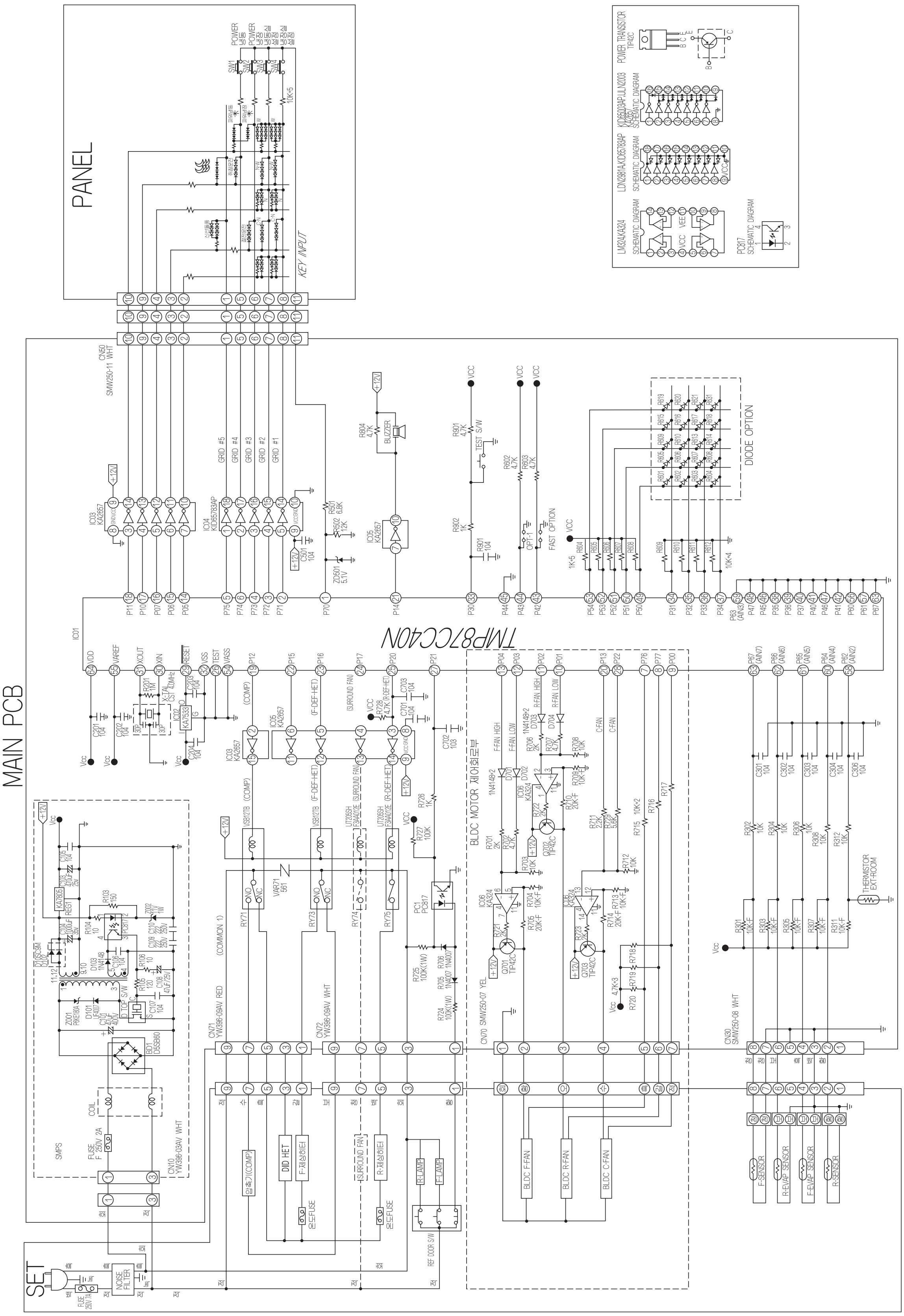
EXAMPLE OF PERFECT PACKING







Circuit way

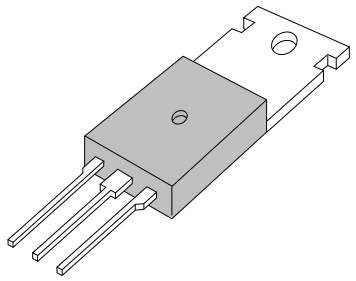


13-1) REGULATOR

3-TERMINAL 1A POSITIVE VOLTAGE REGULATORS

The KA78XX series of three-terminal positive regulators are available in the TO-220 package and with several fixed output voltages, making them useful in a wide range of applications. Each type employs internal current limiting, thermal shut-down and safe area protection, making it essentially indestructible. If adequate heat sinking is provided, they can deliver over 1A output current. Although designed primarily as fixed voltage regulators, these devices can be used with external components to obtain adjustable voltages and currents.

TO-220



1:Input 2:GND 3:Output

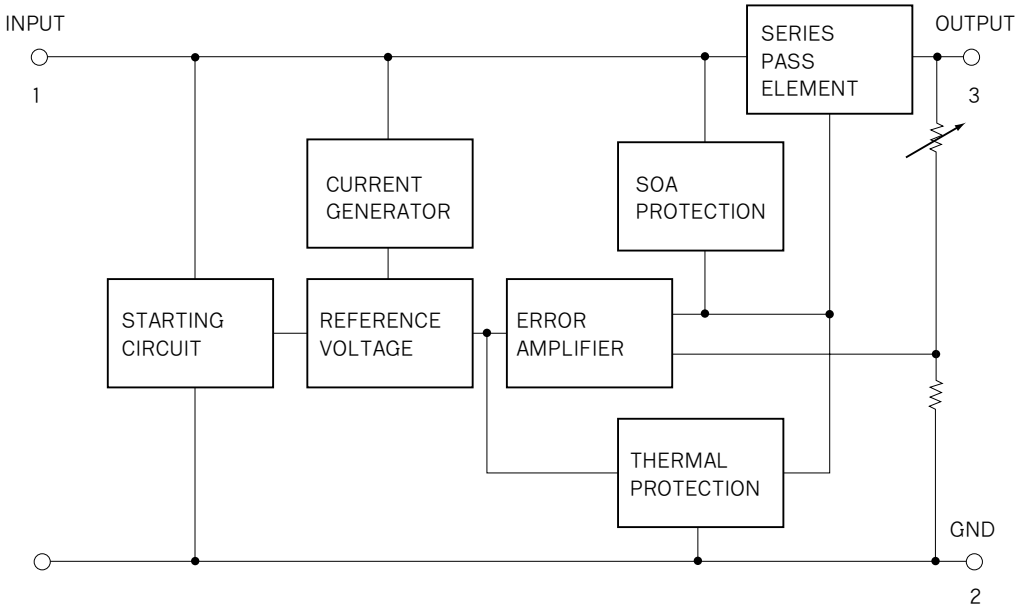
■ FEATURES

- Output Current up to 1A
- Output Voltages of 5; 6; 8; 9; 10; 11; 12; 15; 18; 24V
- Thermal Overload Protection
- Short Circuit Protection
- Output Transistor SOA Protection

■ ORDERING INFORMATION

Device	Package	Operating Temperature
KA78XX	TO-220	0 ~ +125℃
KA78XXA	TO-220	
KA78XXI	TO-220	-40 ~ +125℃

■ BLOCK DIAGRAM



ABSOLUTE MAXIMUM RATINGS (T_A = 25℃ unless otherwise specified)

Characteristic	Symbol	Value	Unit
Input Voltage (for Vo = 5V to 18V)	V_I	35	V
(for Vo = 24V)	V_I	40	V
Thermal Resistance Junction-Cases	$R_{\theta JC}$	5	℃/W
Thermal Resistance Junction-Air	$R_{\theta JA}$	65	℃/W
Operating Junction Temperature Range KA78XX/A	T_{OPR}	0 ~ +125	℃
KA78XXI		-40 ~ +125	℃
Storage Temperature Range	T_{STG}	-65 ~ +150	℃

ELECTRICAL CHARACTERISTICS KA7805/I

(Refer to test circuit, $T_{MIN} < T_J < T_{MAX}$, I_O = 500mA, V_I = 10V, C_I = 0.33μF, C_O = 0.1μF, unless otherwise specified)

Characteristic	Symbol	Test Conditions		KA78051			KA7805			Unit
				Min	Typ	Max	Min	Typ	Max	
Output Voltage	V_o	T_J = 25℃		4.8	5.0	5.2	4.8	5.0	5.2	
		5.0mA ≤ 1.0A, P_O ≤ 15W								V
		V_I = 7V to 20V					4.75	5.0	5.25	
		V_I = 8V to 20V		4.75	5.0	5.25				
Line Regulation	$\triangle V_o$	T_J = 25℃	V_I = 7V to 25V		4.0	100		4.0	100	mV
			V_I = 8V to 12V		1.6	50		1.6	50	
Load Regulation	$\triangle V_o$	T_J = 25℃	I_O = 0.5mA to 1.5A		9	100		9	100	mV
			I_O = 250mA to 750mA		4	50		4	50	
Quiescent Current	I_Q	T_J = 25℃			5.0	8		5.0	8	mA
Quiescent Current Change	$\triangle I_Q$	I_O = 5mA to 1.0A			0.03	0.5		0.03	0.5	mA
		V_I = 7V to 25V						0.3	1.3	
		V_I = 8V to 25V			0.3	1.3				
Output Voltage Drift	$\triangle V_o/\triangle T$	I_O = 5mA			-0.8			-0.8		mV/℃
Output Noise Voltage	V_N	f = 10Hz to 100KHz T_A = 25℃			42			42		μV
Ripple Rejection	RR	f = 120Hz		62	73		62	73		dB
		V_I = 8 to 18V								
Dropout Voltage	V_o	I_O = 1A, T_J = 25℃			2			2		V
Output Resistance	R_o	f = 1KHz			15			15		mΩ
Short Circuit Current	I_{SC}	V_I = 35V, T_A = 25℃			230			230		mA
Peak Current	I_{PK}	T_J = 25℃			2.2			2.2		A

* T_{MIN} 〈 T_J 〈 T_{MAX}
  KA78XXI : T_{MIN} = -40℃, T_{MAX} = 125℃
  KA78XX, T_{MIN} = 0℃, T_{MAX} = 125℃
* Load and line regulation are specified at constant junction temperature.
  Changes in VO due to heating effects must be taken into account separately.
  Pulse testing with low duty is used.

ELECTRICAL CHARACTERISTICS KA7812/I

(Refer to test circuit, $T_{MIN} < T_J < T_{MAX}$, I_O = 500mA, V_I = 19V, C_I = 0.33μF, C_O = 0.1μF, unless otherwise specified)

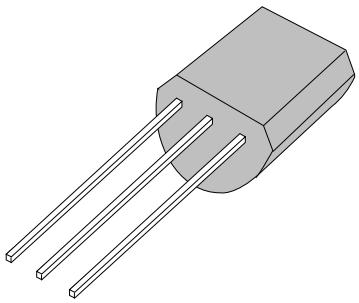
Characteristic	Symbol	Test Conditions	KA7812I			KA7812I			Unit
			Min	Typ	Max	Min	Typ	Max	
Output Voltage	V_O	T_J = 25℃	11.5	12	12.5	11.5	12	12.5	V
		5.0mA ≤ 1.0A, P_D ≤ 15W V_I = 14.5V to 27V				11.4	12	12.6	
		V_I = 15.5V to 27V	11.4	12	12.6				
Line Regulation	ΔV_O	T_J = 25℃, V_I = 14.5 to 30V		10	240		10	240	mV
		T_J = 25℃, V_I = 16 to 22V		3.0	120		3.0	120	
Load Regulation	ΔV_O	T_J = 25℃, I_O = 5mA to 1.5A		11	240		11	240	mV
		T_J = 25℃, I_O = 250mA to 750mA		5.0	120		5.0	120	
Quiescent Current	I_Q	T_J = 25℃		5.1	8		5.1	8	mA
Quiescent Current Change	ΔI_Q	I_O = 5mA to 1.0A		0.1	0.5		0.1	0.5	mA
		V_I = 14.5V to 30V					0.5	1.0	
		V_I = 15V to 30V		0.5	1.0				
Output Voltage Drift	$\Delta V_O/\Delta T$	I_O = 5mA		-1			-1		mV/℃
Output Noise Voltage	V_N	f = 10Hz to 100KHz, T_A = 25℃		76			76		μV
Ripple Rejection	RR	f = 120Hz V_I = 15V to 25V	55	71		55	71		dB
Dropout Voltage	V_O	I_O = 1A, T_J = 25℃		2			2		V
Output Resistance	R_O	f = 1KHz		18			18		mΩ
Short Circuit Current	I_{SC}	V_I = 35V, T_A = 25℃		230			230		mA
Peak Current	I_{PK}	T_J = 25℃		2.2			2.2		A

* T_{MIN} < T_J < T_{MAX}
  KA78XXI : T_{MIN} = -40℃, T_{MAX} = 125℃
  KA78XX, T_{MIN} = 0℃, T_{MAX} = 125℃
* Load and line regulation are specified at constant junction temperature.
  Changes in V_O due to heating effects must be taken into account separately.
  Pulse testing with low duty is used.

3.3V VOLTAGE DETECTOR

The KA7533 prevents error of system from supply voltage below normal voltage level at the time the power on and instantane ous power off in systems.

TO-92



1:Input 2:GND 3:Output

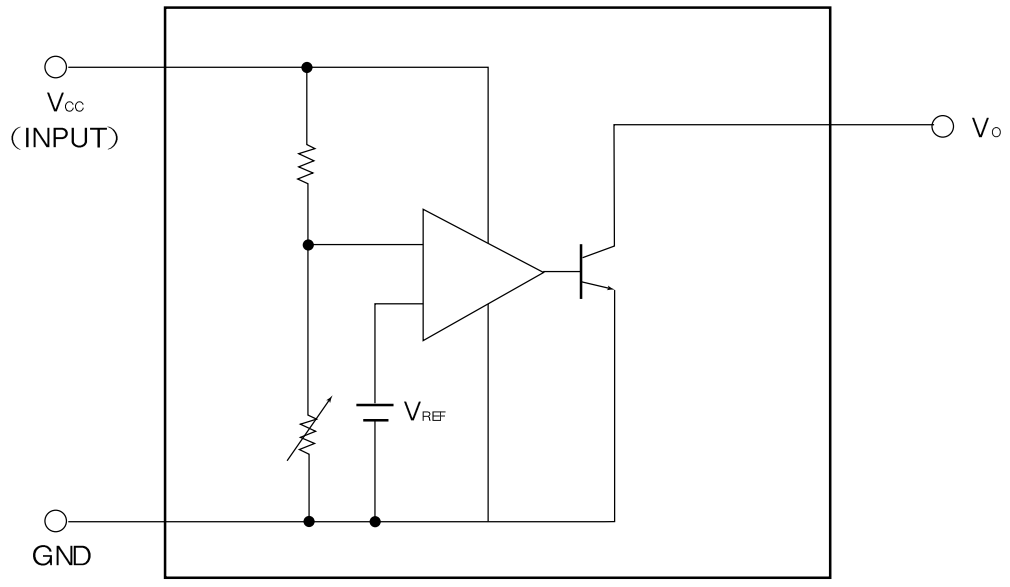
■ FEATURES

- Detecting against error operations at the power ON/OFF.
- Resetting function for the low voltage microprocessor.
- Checking low battery.

■ ORDERING INFORMATION

Device	Package	Operating Temperature
KA7533Z	TO-92	-30 ~ +75℃

■ BLOCK DIAGRAM



■ ABSOLUTE MAXIMUM RATING (T_A = 25℃)

Characteristic	Symbol	Value	Unit
Supply Voltage	V_{CC}	-0.3 ~ +15.0	V
Detecting Voltage	V_{DET}	3.3	V
Hysteresis Voltage	R_{HYS}	50	mV
Operating Temperature	T_{OPR}	-30 ~ +75	℃
Storage Temperature	T_{STG}	-50 ~ +150	℃
Power Dissipation	P_D	200	mW
Detecting Voltage Temperature Coefficient	$\triangle V_{DET}/\triangle T$	±0.01	%/℃

■ ELECTRICAL CHARACTERISTICS (T_A = 25℃)

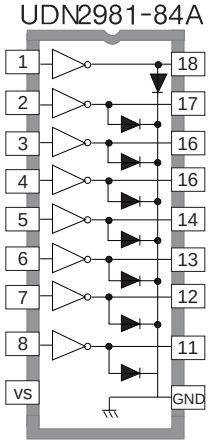
Characteristic	Symbol	Test Conditions	Min	Typ	Max	Unit
Detecting Voltage	V_{DET}	R_L = 200 Ω , V_{OL} ≤ 0.4V	3.15	3.3	3.45	V
Low Output Voltage	V_{OL}	R_L = 200 Ω	-	-	0.25	V
Output Leakage Current	I_{LKG}	V_{CC} = 15V	-	-	0.1	μV
Hystersis Voltage	V_{HYS}	R_L = 200 Ω	30	50	100	mV
Detecting Voltage Temperature Coefficient	$\triangle V_{DET}/\triangle T$	R_L = 200 Ω		±0.1		%/℃
Circuit Current (at on time)	I_{CCL}	V_{CC} = $V_{DET(MIN)}$-0.05V	-	300	500	μA
Circuit Current (at off time)	I_{CCH}	V_{CC} = 5.25V	-	30	50	μA
Threshold Operating Voltage	$V_{TH(OPR)}$	R_L = 200 Ω , V_{OL} ≤ 0.4V	0.6	0.8	1.0	V
"L" Transmission Delay Time	t_{DL}	R_L = 1.0 KΩ , C_L = 100pF	-	10	15	μS
"H" Transmission Delay Time	t_{DM}	R_L = 1.0 KΩ , C_L = 100pF	-	15	20	μS
Output Current (at on time Ⅰ)	$t_{OL\ I}$	V_{CC} = $V_{DET(MIN)}$ - 0.05V, T_C = 25℃	10	18	28	mA
Output Current (at on time Ⅱ)	$t_{OL\ II}$	V_{CC} = $V_{DET(MIN)}$ - 0.05V, T_C = -30 ~ +75℃	8	16	30	mA

2981THRU 2984

8-CHANNEL SOURCE DIRVERS

UDN2982/84LW

UDN2981-84A



Dwg. No. A-10,243

ABSOLUTE MAXIMUM RATINGS

at 25℃ Free-Air Temperature

Output Voltage Range, V_{CE}
(UDN2981A & ..... 5 V to 50 V
UDN2982A/LW)
(UDN2983A &
UDN2984A/LW)..... 35V to 80 V

Input Voltage V_{IN}
(UDN2981A & UDN2983A)..... 15V
(UDN2982A/LW &
UDN2984A/LW)..... 20V

Output Current, I_{OUT}.....-500mA

Package Power Dissipation,
P_D..... See Graph

Operating Temperature Range,
T_A ..... -20℃ to +85℃

Storage Temperature Range,
T_S ..... -55℃ to +150℃

Note that the ULN2000A Series (dual in-line package) and ULN2000L series (small-outline IC package) are electrically identical and share a common pin number assignment.

Recommended for high-side switching applications that benefit from separate logic and load grounds, these devices encompass load supply voltages to 80 V and output currents to -500mA. The UDN2981A through UDN2984A/LW 8-channel source drivers are useful for interfacing between low-level logic and high-current loads. Typical loads include relays, solenoids, lamps, stepper and/or servo motors, print hammers, and LEDS.

All devices may be used with 5 V logic systems - TTL, Schottky TTL, DTL, and 5 V CMOS. The UDN2981A and UDN2982A/LW are interchangeable, will withstand a maximum output OFF voltage of 50 V and operateto a minimum of 5 V;the UDN2983A and UDN2984A/LW drivers are interchangeable, will whthstand an output voltage of 80 V, and operate to a minimum of 35 V. All devices in this series integrate input current limiting resistors and output transient suppression diodes, and are activated by an active high input.

The suffix'A'(all devices) indicates an 18-lead plasitic dual in-line package with copper lead frame for optimum power dissipation. Under normal operating conditions, these devices will sustain 120 mA continuously for each of the eight outputs at an ambient temperature of +50℃ and a supply of 15 V

The suffix 'LW' (UND2982LW and UDN2984LW only) indicates a surface-mountable wide-body SOIC pakage. All devices are also available for operation between-40℃ and +85℃. To order, change the prefix form 'UDN' to 'UDQ'.

■ FEATURES

- TTL, DTL, PMOS, or CMOS Compatible inputs
- 600mA Output Source Current Capabilty
- Transient-Protected Outputs
- Output Breakdown Voltage to 80 V
- DIP or SOIC Package

Always order by complete part number, e.g., UDN2981A
Note that all devices are not available in both package types.

⚠ FOR SAFETY OF SERVICE CAUTION

● Turn off the power of refrigeration when the change and repair of electric control equipment.
→ Be caful electric shock

● use the regular parts when change the electric control equipment.
→ check the named MODEL, regular power, regular electric current and movement temp.

● When repaired, cross line of HARNESS is firm and no dangerous of water infiltration.
→ When the regular force, it isn't seperate.

● When repaired, remove the HOUSING parts, cross line parts, point of contact parts and so on.
→ Prevent danger of fine the TRACKING, SHORT and others

● Check the infiltrate marks of water in electric control equipment.
→ Be infiltrate marks of water, change parts and others.

● Check assemble state of parts after repair the trouble
→ Keep the same state before it

● Check using environment of refrigerator.
→ Change the using direction when it is full of moisture, water and unstable the institution state.

● When ground connection needs, It could do it.
→ Especially, it is ground connection when danger of electric leakage about moisture or water.

● Do not plug multiple electrical appliances into the same outlet.

● Check be damaged, pressed, impressed, raging fire of power plug and outlet.
→ Badness the power plug or power outlet, it is repair.
→ Manage power code what it isn't impressed and pressed.

● Don't store unstable the food and at the freezer bottle.

● Don't repair the manufacture to consumer.

● Never store expect the foods in the refrigerator.
→ Medical supplies, chemical fertilizer: Difficult the exactly temp. maintenance
→ The inflammables(Alcoholes, benzene, ether, LP gas, etc): dange of explosion.

ELECTRONICS

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