REFRIGERATOR MANUFACTURER

Turbo air

Turbo Air Speed up the Pace of Innovation

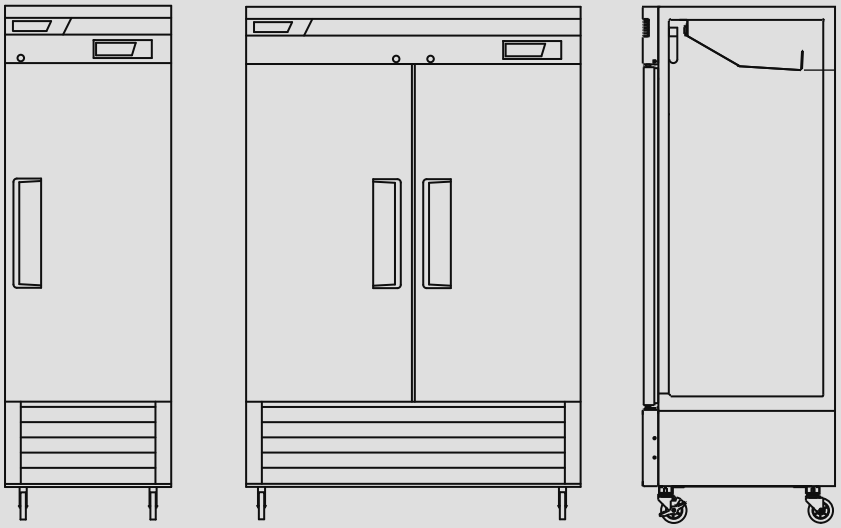
CAUTION!
PLEASE KEEP POWER
SWITCH ON BEFORE
OPERATING THIS EQUIPMENT

Commercial Refrigerator & Freezer Service Manual

Please read this manual completely before attempting to install or operate this equipment!

New Maximum Series
SOLID DOOR / GLASS DOOR

MSR-23NM
MSR-49NM
MSF-23NM
MSF-49NM
MSR-23G-1
MSR-49G-2
MSR-72G-3



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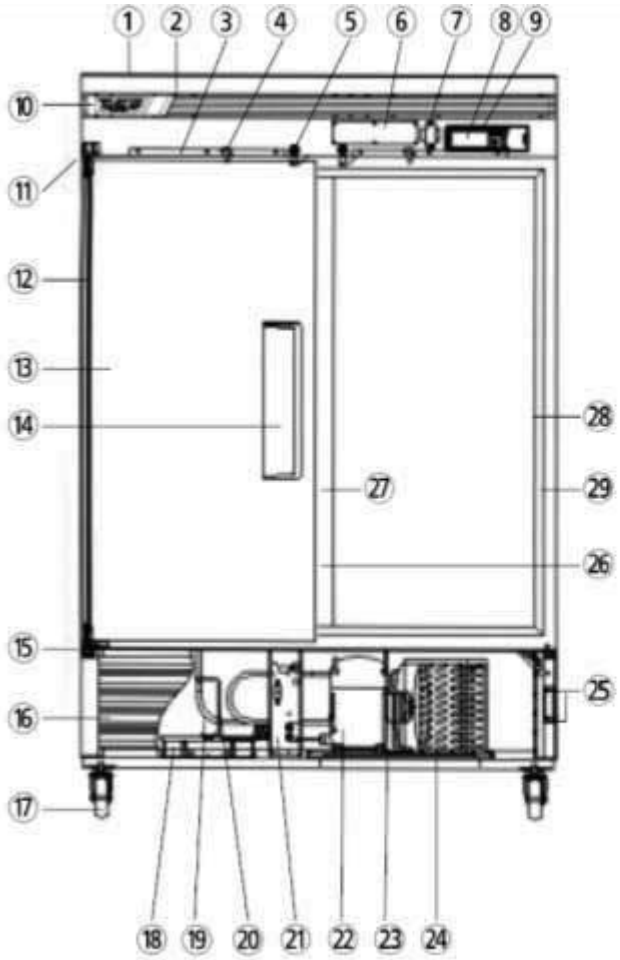
1. FEATURE CHART

1-1. FRONT VIEV (MSR-23NM, MSR-49NM, MSF-23NM, MSF-49NM)



1	TOP GRILLE PANEL
2	TOP GRILLE
3	TOP GRILLE FIXTURE
4	DOOR SWITCH
5	DOOR LOCK
6	MAIN PCB
7	TRANSFORMER
8	DISPLAY PCB
9	CONTROL BOARD HOUSING
10	BRAND LOGO
11	DOOR HINGE TOP ASSEMBLY
12	DOOR HINGE SPRING
13	DOOR ASSEMBLY
14	DOOR HANDLE
15	DOOR HINGE BOTTOM ASSEMBLY
16	BOTTOM GRILLE ASSEMBLY
17	CASTER
18	DRAIN PAN
19	SUCTION PIPE
20	CAPILLARY TUBE
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22	COMPRESSOR
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24	CONDENSER COIL
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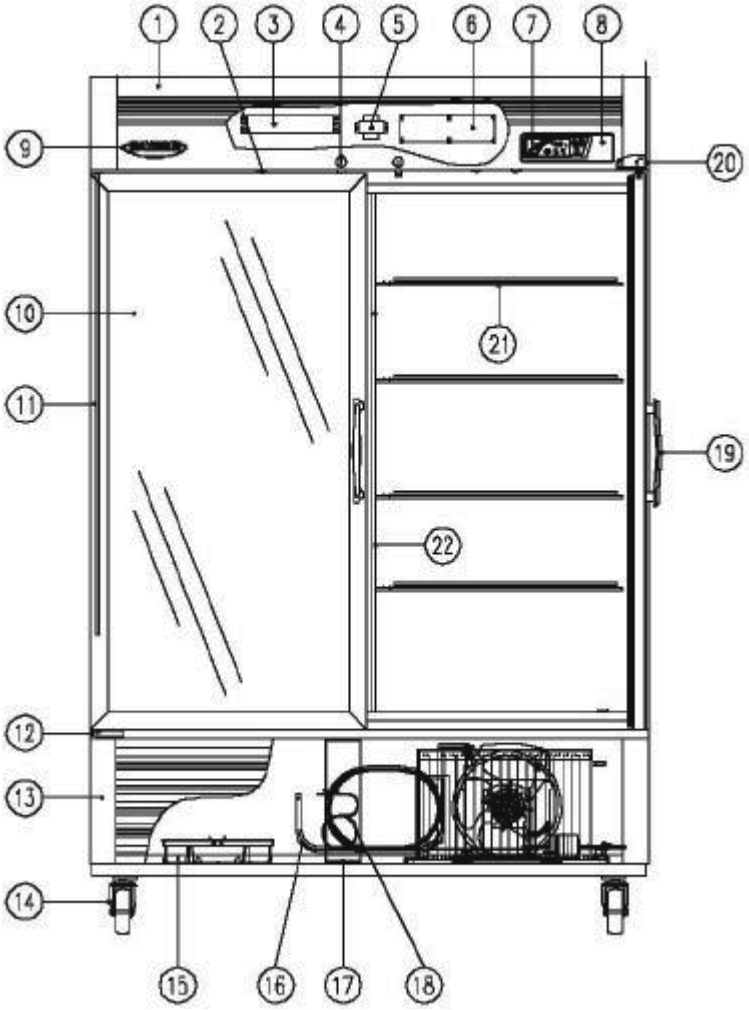
26	MULLION (CENTER POST)
27	MULLION HEATER
28	FRAME HEATER
29	FRAME COVER

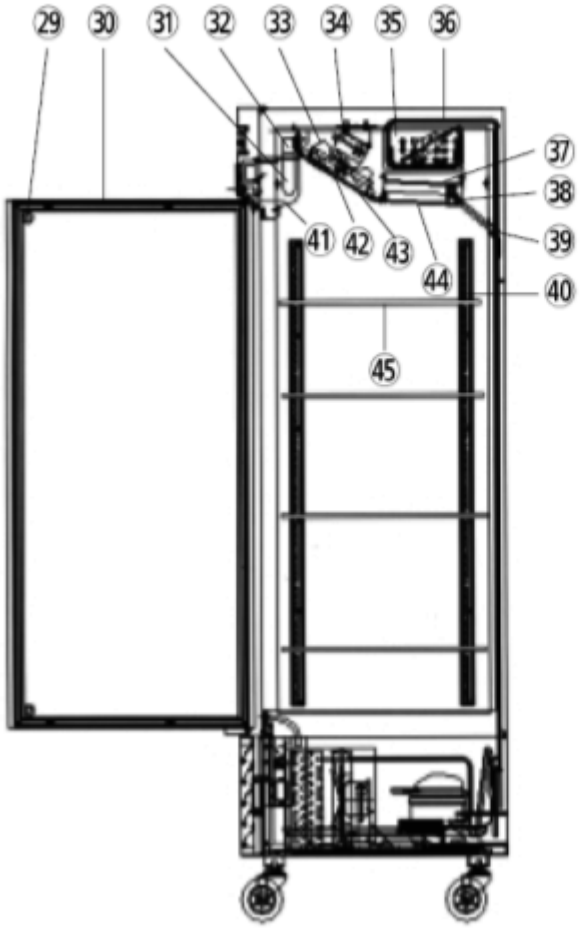
1. FEATURE CHART

1-1. FRONT VIEV (MSR-23G-1, MSR-49G-2, MSR-72G-3)



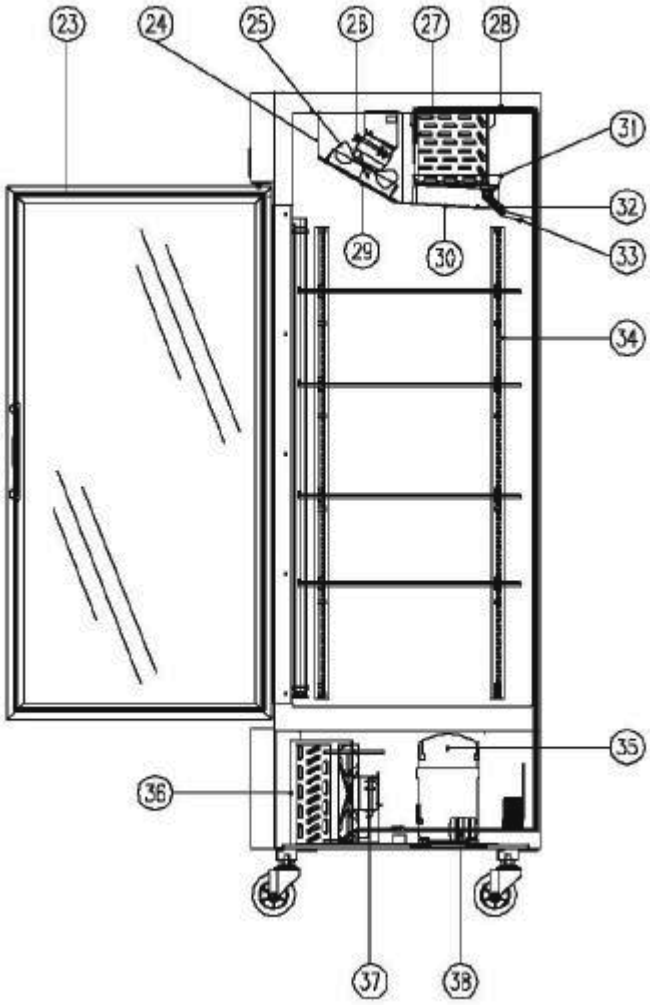
1. TOP GRILL
2. DOOR SWITCH
3. BALLAST
4. DOOR LOCK
5. TRANSFORMER
6. MAIN PCB
7. DISPLAY PCB
8. CONTROL BOARD HOUSING
9. BRAND LOGO
10. DOOR ASSEMBLY
11. DOOR HINGE SPRING
12. DOOR HINGE BOTTOM ASSEMBLY
13. BOTTOM GRILL ASSEMBLY
14. CASTER
15. DRAIN PAN
16. SUCTION PIPE
17. ELECTRICAL BOX
18. CAPILLARY TUBE
19. DOOR HANDLE
20. DOOR HINGE TOP ASSEMBLY
21. SHELF
22. MULLION(CENTER POST)

1-2. SIDE VIEW (MSR-23NM, MSR-49NM, MSF-23NM, MSF-49NM)



29	DOOR BUMPER
30	DOOR GASKET
31	LAMP BULB
32	LAMP SOCKET
33	EVAPORATOR FAN MOTOR BLADE
34	EVAPORATOR FAN MOTOR
35	EVAPORATOR COIL
36	SUCTION PIPE
37	EVAPORATOR DRAIN PAN
38	EVAPORATOR DRAIN ELBOW
39	DRAIN HOSE
40	SHELF STANDARD
41	LAMP SHIELD
42	EVAPORATOR FAN MOTOR GUARD
43	DUCT (A) 'FRONT'
44	DUCT (B) 'BOTTOM'
45	SHELF

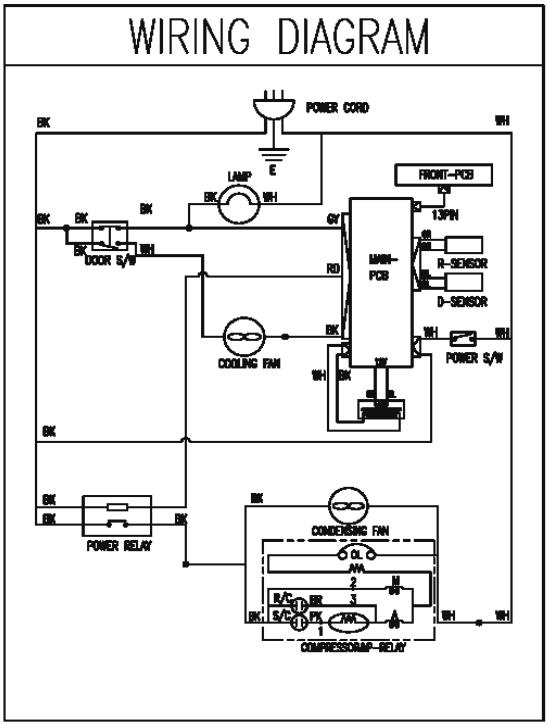
1-2. SIDE VIEW (MSR-23G-1, MSR-49G-2, MSR-72G-3)



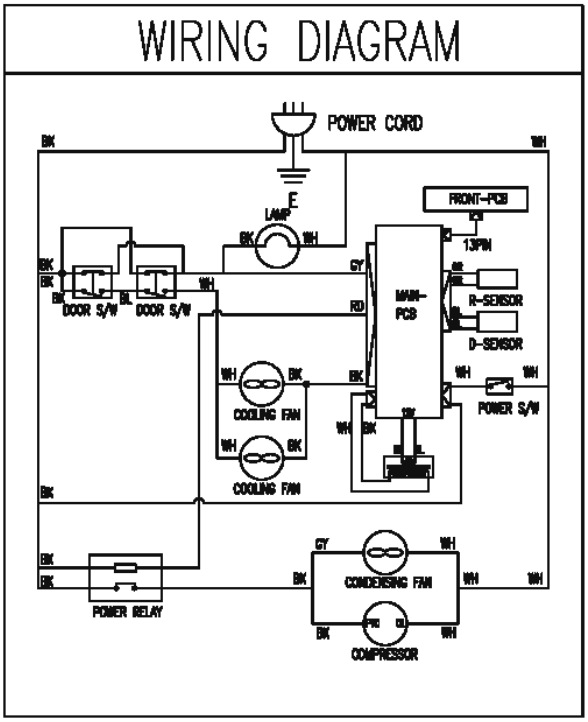
23. DOOR GASKET
24. DUCT(A) FRONT
25. EVAPORATOR FAN MOTOR BLADE
26. EVAPORATOR FAN MOTOR
27. EVAPORATOR COIL
28. SUCTION PIPE(A)
29. EVAORATOR FAN MOTOR GUARD
30. DUCT(B) BOTTOM
31. EVAPORATOR DRAIN PAN
32. EVORATOR DRAIN ELBOW
33. DRAIN HOSE
34. SHELF STANDARD
35. COMRESSOR
36. CONDENSER COIL
37. CONDENSER FAN MOTOR
38. DRYER

2. WIRING DIAGRAM

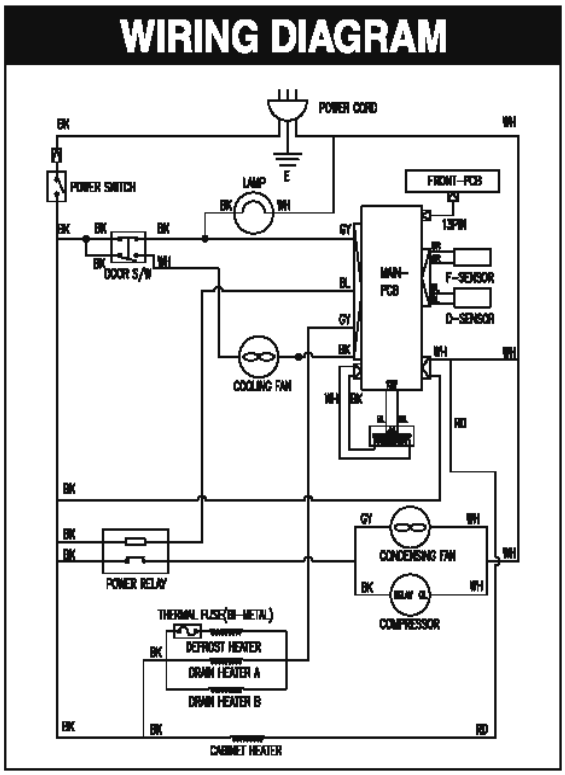
2-1. MSR-23NM



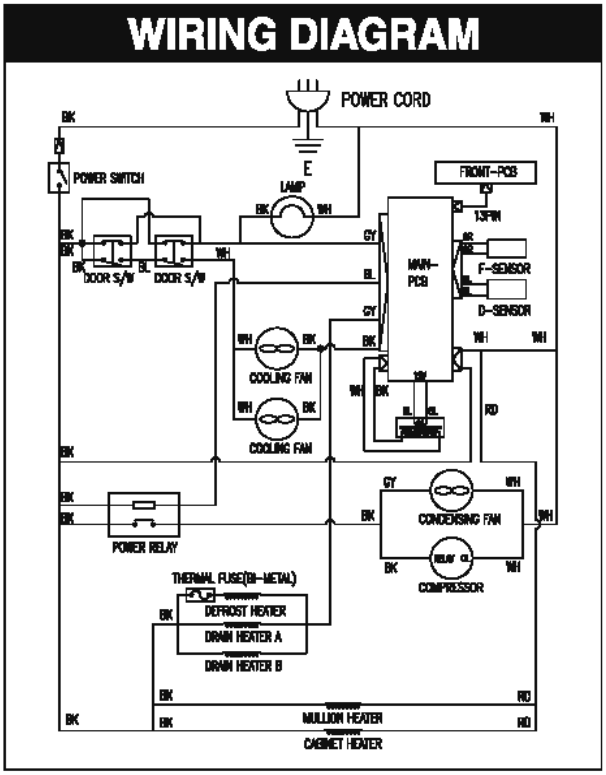
2-2. MSR-49NM



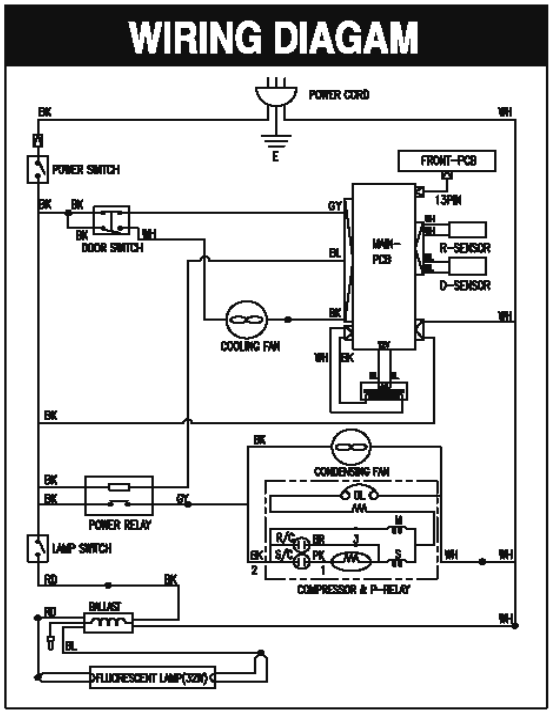
2-3. MSF-23NM



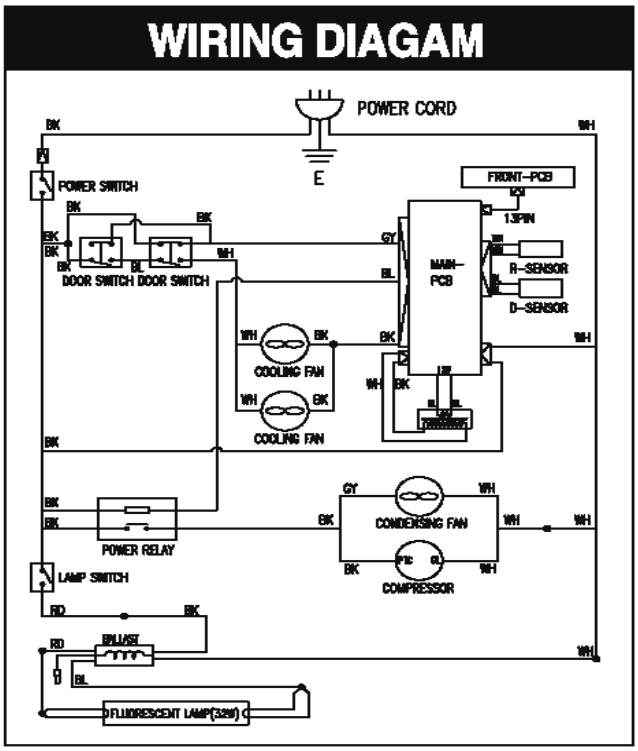
2-4. MSF-49NM



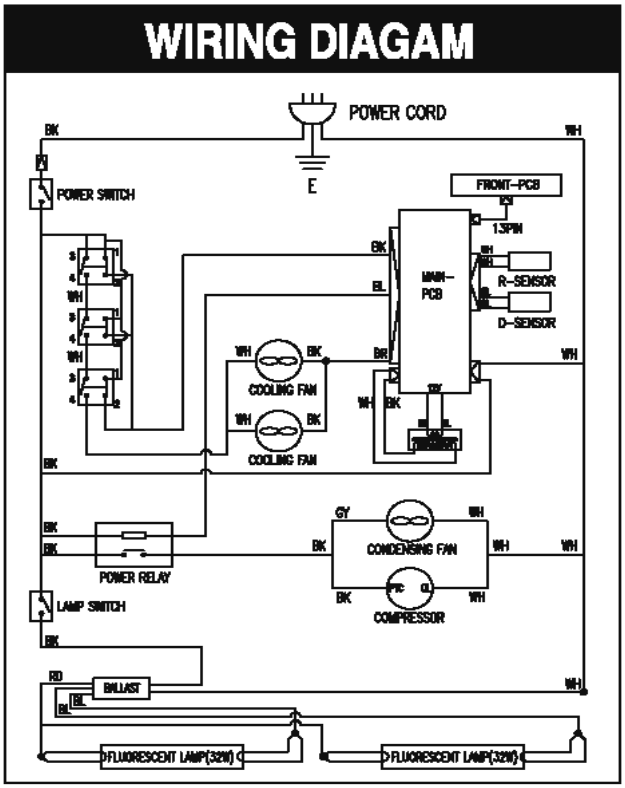
2-5. MSR-23G-1



2-6. MSR-49G-2

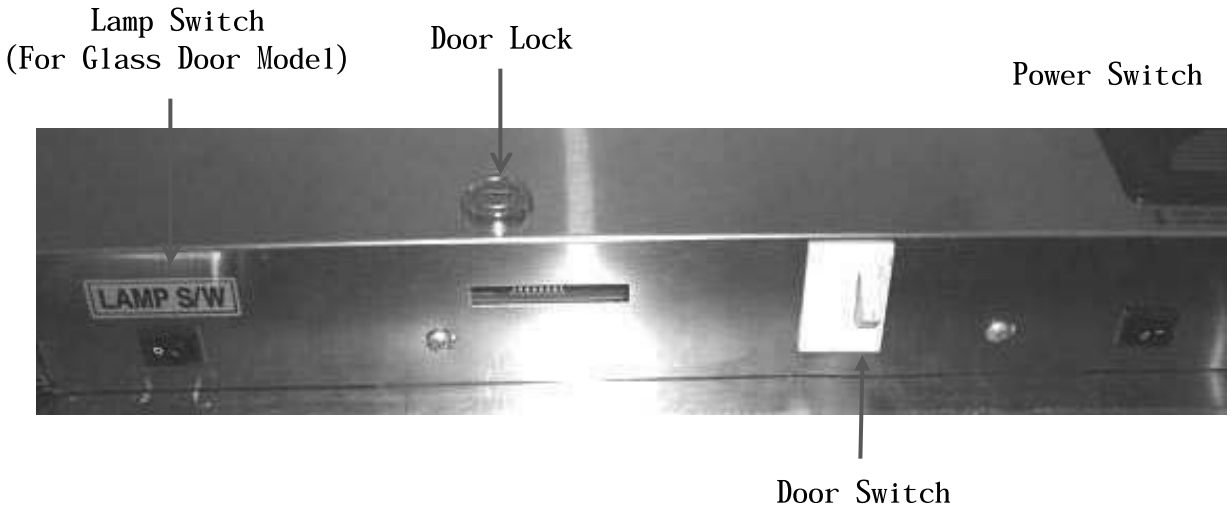


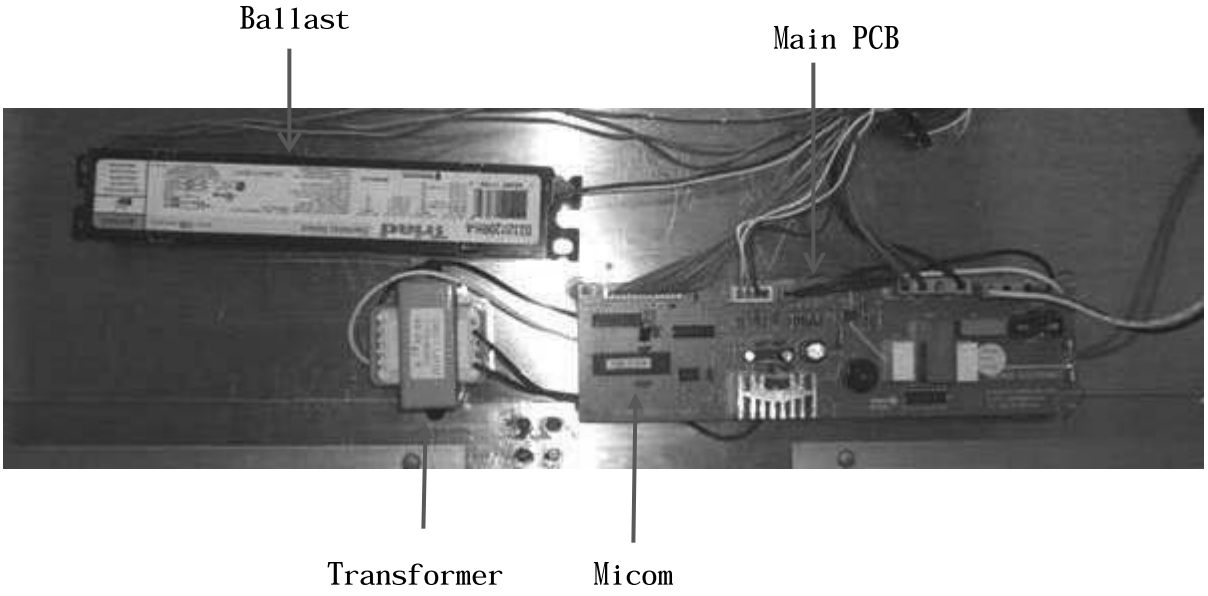
2-7. MSR-72G-3



3. PART DETAILS

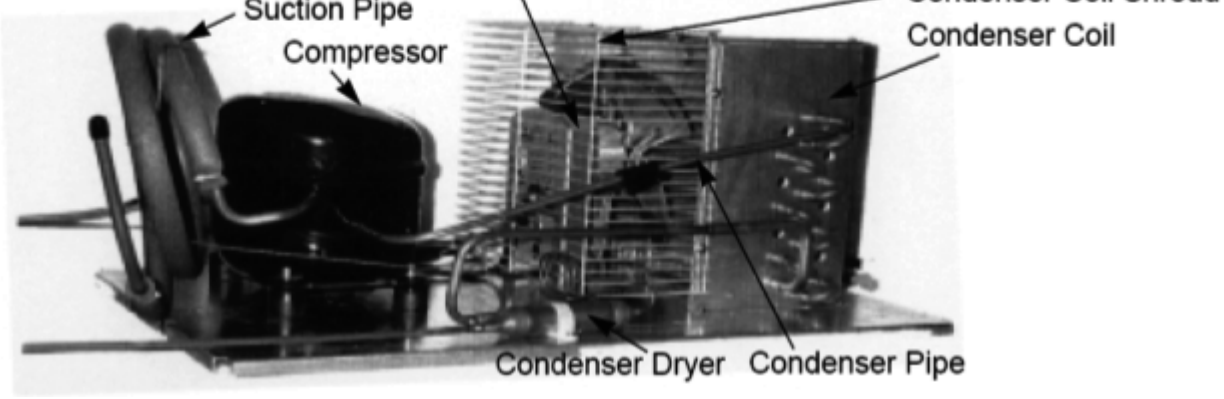
3-1. TOP GRILLE



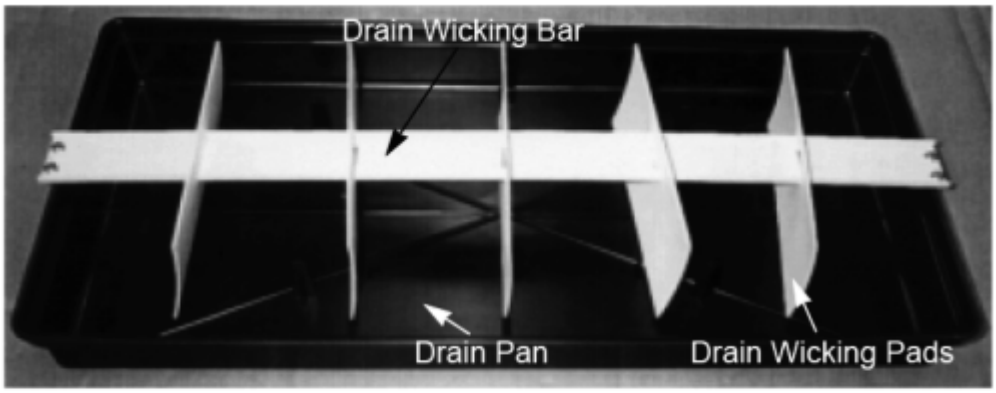


3-2. REFRIGERATION COMPARTMENT

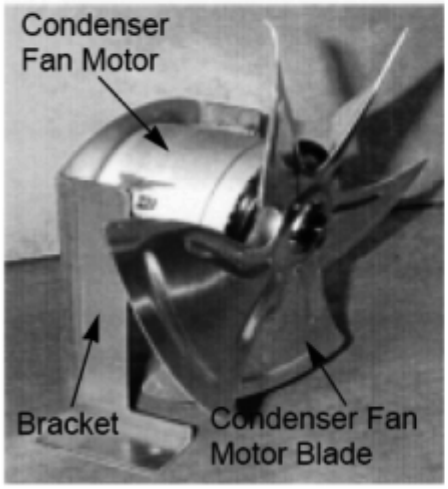
Cycle Assembly



Drain Pan Assembly



Condenser Fan Motor Assembly

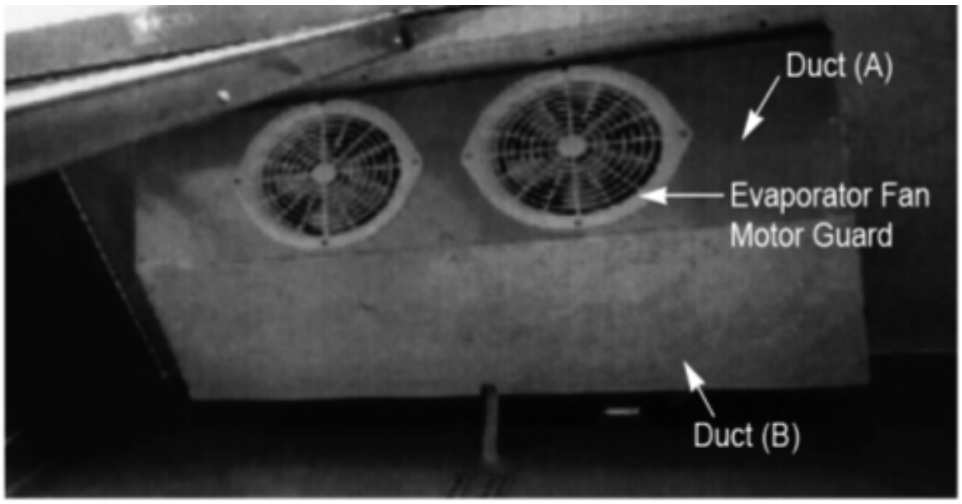


3-3. ELECTRICAL BOX

3-4. DOOR

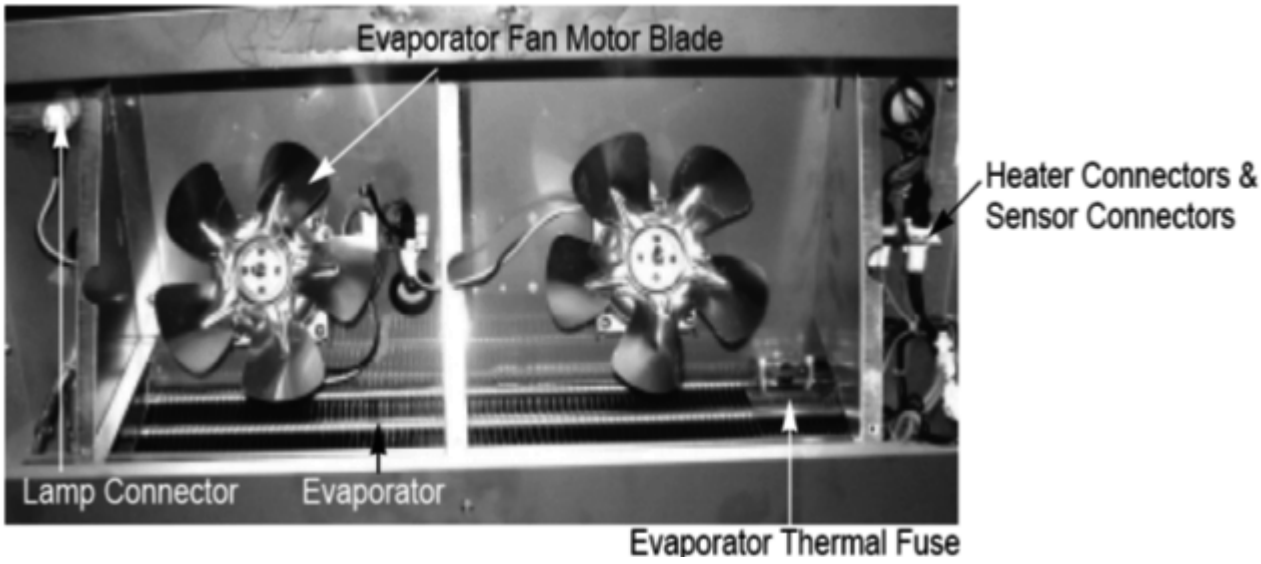
3-5. COOLING COMPARTMENT

Fan Duct(MSR-49NM, MSF-49NM, MSR-49G-2, MSR-72G-3 TYPE)



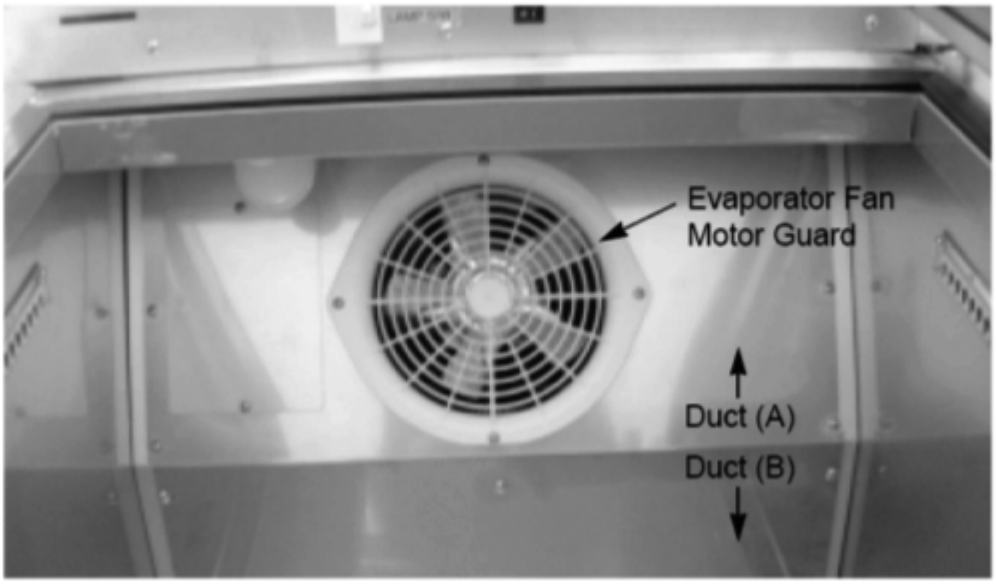
Fan Duct(MSR-49NM, MSF-49NM, MSR-49G-2, MSR-72G-3 TYPE)

▶ Heater and Thermal Fuse is used only for MSF-49NM



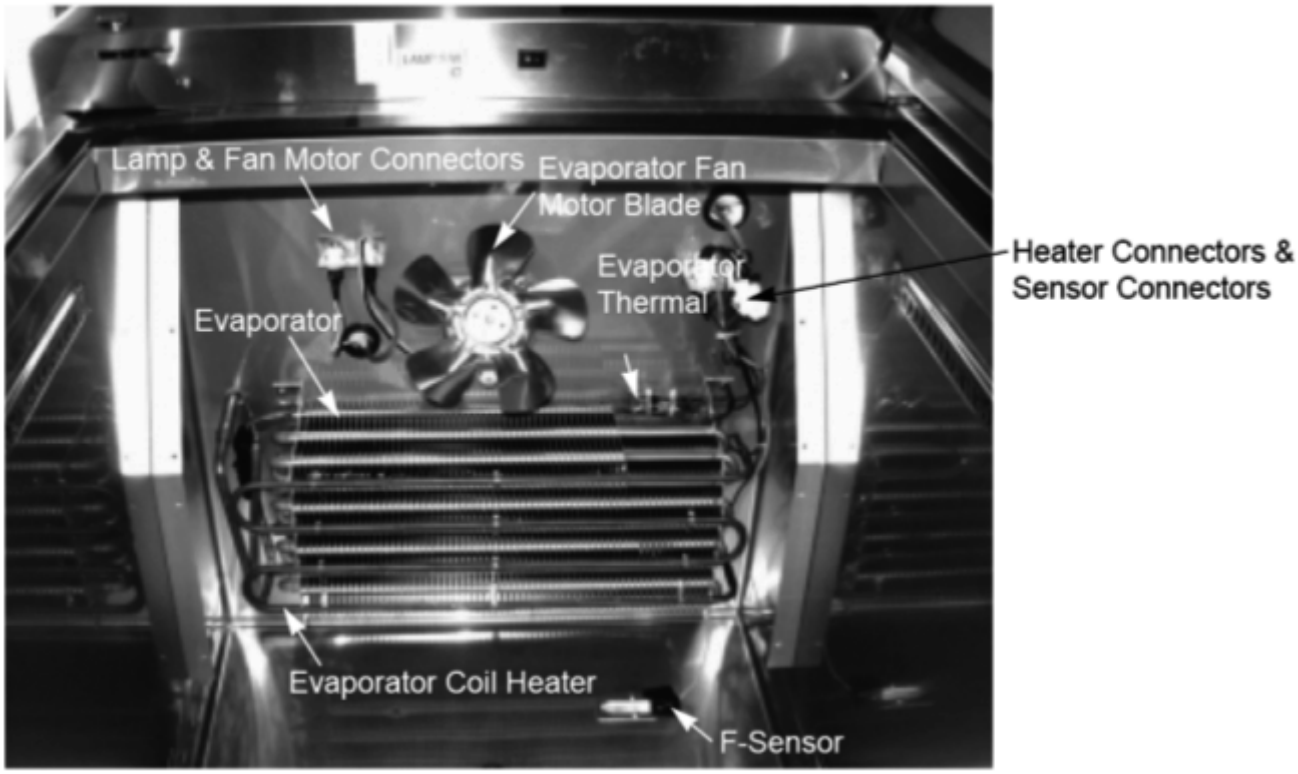
PART DETAILS

Fan Duct(MSR-23NM, MSF-23NM, MSR-23G-1 TYPE)



Fan Duct (MSR-23NM, MSF-23NM, MSR-23G-1 TYPE)

▶ Heater and Thermal Fuse is used only for MSF-23NM



3-6. Lamp

** Solid Door Model(MSR-23NM, MSR-49NM, MSF-23NM, MSF-49NM)

** Glass Door Model(MSR-23G-1, MSR-49G-2, MSR-72G-3)

4. MAIN COMPONENTS

1. COMPRESSOR

MODEL	PART NAME	PART NO.	HORSE POWER	CAPACITY	TYPE OF MOTOR	Current (RLA)	MAKER
MSR-23NM MSR-23G-1	HBL27YE-1	3952127G10	1/4 HP	896 BTU/h (226 Kcal/h)	LBP CSR	3.7A	DAEWOO
MSR-49NM MSR-49G-2	SK1A1C-L2W	30200Q1200	1/3 HP	1,202 BTU/h (303 Kcal/h)	LBP CSR	4.0A	SAMSUNG
MSR-72G-3	T6217Z	3020014570	2/3 HP	7,638 BTU/h (1,925 Kcal/h)	HBP CSIR	11.2A	EMBRACO
MSF-23NM	CAE2420Z	30200R1100	1/2 HP	2,268 BTU/h (572 Kcal/h)	LBP CSIR	6.7A	TECUMSEH
MSF-49NM	CAJ2432Z	30200R1000	2/3 HP	3,202 BTU/h (808 Kcal/h)	LBP CSR	8.9A	TECUMSEH

	BASIC COMPRESSOR			EXCHANGEABLE COMPRESSOR		
	PART NAME	MOTOR TYPE	MAKER	PART NAME	MOTOR TYPE	MAKER
MSR-23NM MSR-23G-1	HBL27YE-1	LBP(CSR)	DAEWOO	AEA1410YXA	LBP(RSIR)	USA TECUMSEH
MSR-49NM MSR-49G-2	SK1A1C-L2W	LBP(CSR)	SAMSUNG	AEA4440YXA	HBP(CSIR)	USA TECUMSEH
MSR-72G-3	T6217Z	HBP(CSIR)	EMBRACO	AKA4460YXA	HBP(CSIR)	USA TECUMSEH
MSF-23NM	CAE2420Z	LBP(CSIR)	FRENCH TECUMSEH	AJA2419ZXA	LBP(CSR)	USA TECUMSEH
MSF-49NM	CAE2432Z	LBP(CSR)	FRENCH TECUMSEH	AJA2425ZXA	LBP(CSR)	USA TECUMSEH

2. COMPRESSOR RELAY, OVERLOAD

MODEL	RELAY	PART NO.	OVERLOAD	PART NO.	MAKER	NOTE
MSR-23NM MSR-23G-1	S068	3952127G10	4TM-783SHBZZ	3817910600	DAEWOO	
MSR-49NM MSR-49G-2	SK1A1C-L2W	-	4TM-795TFBZZ	-	SAMSUNG	
MSR-72G-3	9660C-3027	-	MRT00AF	-	EMBRACO	
MSF-23NM	3ARR12	-	T0889	-	TECUMSEH	
MSF-49NM	3ARR3*5**	-	GA3PJU00	-	TECUMSEH	

3. COMPRESSOR CAPACITOR

MODEL	STARTING	PART NO.	RUNNING	PART NO.	MAKER	NOTE
MSR-23NM MSR-23G-1	220V/100㎌	3017906900	230V/10㎌	381791600	DAEWOO	
MSR-49NM MSR-49G-2	125V / 125㎌	-	250V / 12㎌	-	SAMSUNG	
MSR-72G-3	330V/189-227㎌	-	-	-	EMBRACO	
MSF-23NM	160V/315㎌	-	-	-	TECUMSEH	
MSF-49NM	160V/315㎌	-	440V / 30㎌	-	TECUMSEH	

4. EVAPORATOR FAN MOTOR

MODEL	PART NAME	PART NO.	POLE	INPUT	BLADE	SIZE	MAKER
ALL	IS4420DWSN-2A	3963328120	4P	47W	AL 5	175mm	SUNG-SHIN

5. CONDENSER FAN MOTOR

MODEL	PART NAME	PART NO.	POLE	INPUT	BLADE	SIZE	MAKER
ALL	IS-4420DWSG-1	3963320410	4P	1EA	AL 5	250mm	SUNG-SHIN

6. MAIN PCB

PART NAME	MICOM	PART NO.	MODEL	MAKER
MAIN PCB	1RF1158	30243L0320	MSR-23NM, MSR-49NM	DAE-SHIN
MAIN PCB	1RF1159	30243L0330	MSR-23(49,72)G-1(2,3)	
MAIN PCB	1FF1158	30243L0350	MSF-23NM, MSF-49NM	

7. PCB TRANSFORMER

PART NAME	SPEC	PART NO.	MODEL	MAKER
TRANSFORMER	DWS-115U	30284L0100	ALL	NAM-SUNG

8. LAMP & BALLAST

PART NAME	SPEC	PART NO.	MODEL	NOTE
INCANDENSENT LAMP	25W/120V	30236L0100	MSR-23NM, MSF-23NM, MSR-49NM, MSF-49NM	

PART NAME	SPEC	PART NO.	QTY	MODEL	NOTE
LAMP	TLD32W/865	30236D0511	1	MSR-23G-1, MSR-49G-2	
			2	MSR-72G-3	
BALLAST	B232I120RH-A	30200F7320	1	MSR-23G-1, MSR-49G-2	
	B232I120RH-A	30200H7420	1	MSR-72G-3	

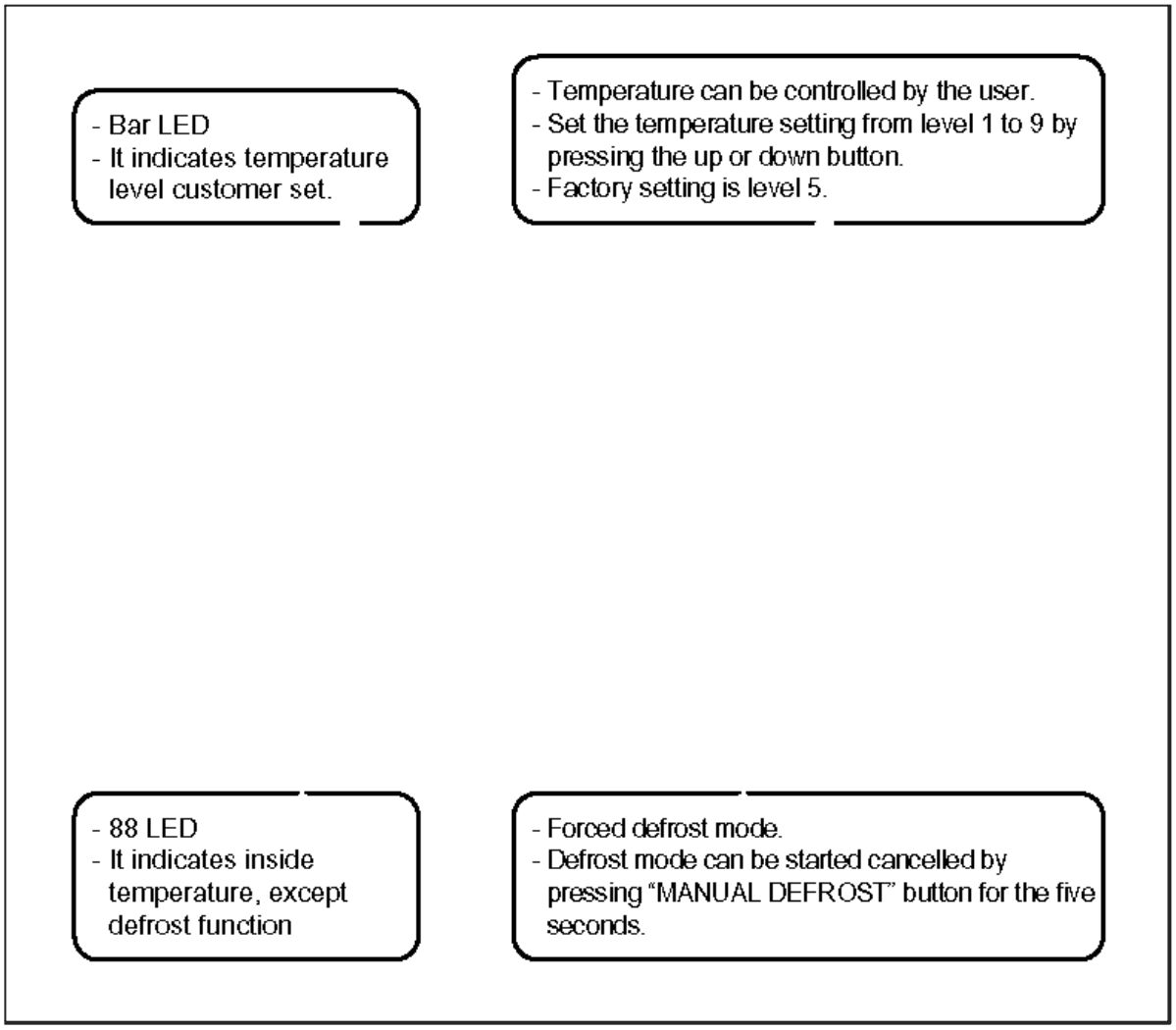
9. DEFROST HEATER

MODEL	PART NAME	SPEC	PART NO.	NOTE
MSF-23NM	DEFROST HEATER	445W	30228L0802	
MSF-49NM	DEFROST HEATER	600W	30228L0700	

5. ELECTRONIC CONTROLLER INSTRUCTION

5-1. FREEZER CONTROLLER(MSF-23NM, MSF-49NM)

5-1-1. HOW TO USE THE PANEL



5-1-2. FUNCTION TABLE

<table>
<tr><th>No</th><th>Function</th><th>Controled Parts</th><th>Description</th></tr>
<tr><td>1</td><td>Initial Operation</td><td>Buzzer
Fan or
Door Lamp
Bar LED
88 LED</td><td>1. Buzzer will be ring 2 sec. after Plug-In.
2. 88 LED display real inside temperature
3. Compressor will be run if evaporator's temperature is higher than 38.3°F(3.5℃) compressor will be run 3 minutes after plug-in, If eva. Temp is lower than 38.3°F(3.5℃)</td></tr>
<tr><td>2</td><td>Temperature Control</td><td>Compressor
F-fan
C-fan
LED</td><td>1. The temperature can be changed by pushing up/down buttons.
2. 88 LED indicate real inside temperature.
3. Buzzer buzzes 1 time whenever each button is pressed.
4. Compressor automatically on and off by F-sensor (Except error mode)
5. After Comp. Is Off, comp. Will not be on for 3 min. even though the F-sensor is at On point.
6. F-fan run continuously except when door is opened.
7. F-fan will start 3 sec. after door closed.
8. Comp. On/off temperature(°F)
<table>
<tr><td>LEVEL</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td></tr>
<tr><td>Comp On</td><td>5.0</td><td>3.2</td><td>1.4</td><td>-0.4</td><td>-2.2</td><td>-3.1</td><td>-4.0</td><td>-4.9</td><td>-5.8</td></tr>
<tr><td>Comp Off</td><td>-2.2</td><td>-4.0</td><td>-5.8</td><td>-7.6</td><td>-9.4</td><td>-10.3</td><td>-11.2</td><td>-12.1</td><td>-13</td></tr>
</table></td></tr>
<tr><td>3</td><td>Defrost Interval time</td><td>Heater
Compressor
F-fan
C-fan</td><td>1. Defrost function is controlled by the time interval setting.
2. Time interval can be set in "Time interval settign mode"
3. Push the up button during 5 seconds the mode will be changed.
4. Time interval setting value can be changed by pushing down buttons.
5. Each time when down button is pressed, the number 6,8,10,12 are dislayed in order.
6. The number is defrost interval time(hours)
7. Choose the number and do not press any keys during 10 seconds. and then defrost time interval is changed.
8. Factory setting is 6 hours
9. The first defrost function start half value of setting time interval after plug-in the unit.</td></tr>
</table>

ELECTRONIC CONTROLLER INTRUCTION

<table>
<tr><th>No</th><th>Function</th><th>Controled Parts</th><th>Description</th></tr>
<tr><td>4</td><td>Defrost Function</td><td>Heater
Compressor
F-fan
C-fan</td><td>
1. Defrost step
<table>
<tr><td></td><td>Pre-cool</td><td>DefrostHeater</td><td>Pause</td><td>Fan Delay</td></tr>
<tr><td>Comp.</td><td>on</td><td>off</td><td>off</td><td>on</td></tr>
<tr><td>F-fan</td><td>on</td><td>off</td><td>off</td><td>off</td></tr>
<tr><td>C-fan</td><td>on</td><td>off</td><td>off</td><td>on</td></tr>
<tr><td>Heater</td><td>off</td><td>on</td><td>off</td><td>off</td></tr>
<tr><td>Max time</td><td>30min</td><td>40min</td><td>3min</td><td>5min</td></tr>
<tr><td></td><td></td><td>If D-sensor temperature is over 50°F, heater goes off.
If D-sensor is in erro r
heater goes off automatically 40 min after from activated.</td><td>If D-sensor temp. lower than 14°F then F-fan turn on immediately</td><td></td></tr>
</table>
A. Pre-Cool Step
a. It prevent exceed temperature rising during defrost function.
b. Comp. C-fan and F-fan run continuously during pre-cool step.
c. 88 LED indicate inside temp. and bar LED indicate setting temp. level.
d. Maximum pre-cool time is 30 min.
e. If F-sensor detects 1.8°F lower temp. than of lowest comp. Off temp. in a 30 min, pre-cool step goes off.
B. Heater defrost step
a. The defrost heater is energized.
b. 88 LED displays "dF" and bar LED indicate setting temp. level.
c. The defrost heater warms the evaporator coil thereby melting all frost accumulated during the previous refrigeration cycle.
d. When D-sensor is higher than 50°F(10℃), heater goes off.
e. If for any reason D-heater's On time excess 40 min., a back-up defrost termination is also provided.
f. If D-sensor's temp. didn't reach 50°F(10℃) in 40 min., error code will be recorded on a MICOM.
C. Pause step
a. Time = 3 min.
b. 88 LED displays 'dF' and bar LED indicate setting temp. level.
D. Fan delay step
a. Max. Time = 5 min
b. Only Comp. and C-fan are On.
c. If D-sensor temp. go down under 14°F in 5 min., then F-fan turn on immediately.
</td></tr>
<tr><td>5</td><td>Forced Defrost</td><td>Comp
F-fan
C-fan
Heater</td><td>
a. Press the MANUAL DEFROST button for the 5 seconds.
b. Forced defrost mode.
1) The pre-cool step is omitted.
2) Start from heater defrost step.
3) Next procedure is same as that of the defrost function.
c. Defrost mode can be canceled by pressing "MANUAL DEFROST" button for the five seconds.
</td></tr>
</table>

ELECTRONIC CONTROLLER INTRUCTION

Function	Controled Parts	Description
Comp Restart	Comp C-fan	1. After comp. is Off, comp. will not be On for 3 min. even though the F-sensor is at on point.
Power Failure	Comp. F-fan C-fan	1. Compressor will not be run for 3 min. after power failure. 2. F-fan is on.
Door opening Alarm function	Buzzer LED	1. If door is opened, fan goes off and lamp on. 2. If door is opened for more than 30 seconds, chirpy sound alarm buzzes 3 times. 3. If door is opened for more than 60 seconds, chirpy sound alarm buzzes 5 times. 4. If door is opened for more than 5 minutes, chirpy sound alarm buzzes contunuously.
Buzzer Function	Buzzer	1. Alarm buzzes 1 time after initial power on. 2. Alarm buzzes whenever each button is pressed. 3. Alarm buzzes if door open certain time period. (See door opening alarm function)
Error Display	LED	1. If inside temp. is lower than -50°F or higher than 50, 88 LED indicate 'Lo' or 'Hi' respectively. 2. Press up button 5 times with pressing and holding both down button and Manual Defrost button. Above procedure switches normal display to error display mode. 3. If there was no error occurred before, there will be no change on the 88 LED. If there was any error occurred before, 88 LED will display error code. 4. Next error code will be displayed by pressing down button. 5. 10 seconds after the last button pressed, error display mode will be switched to normal display mode.

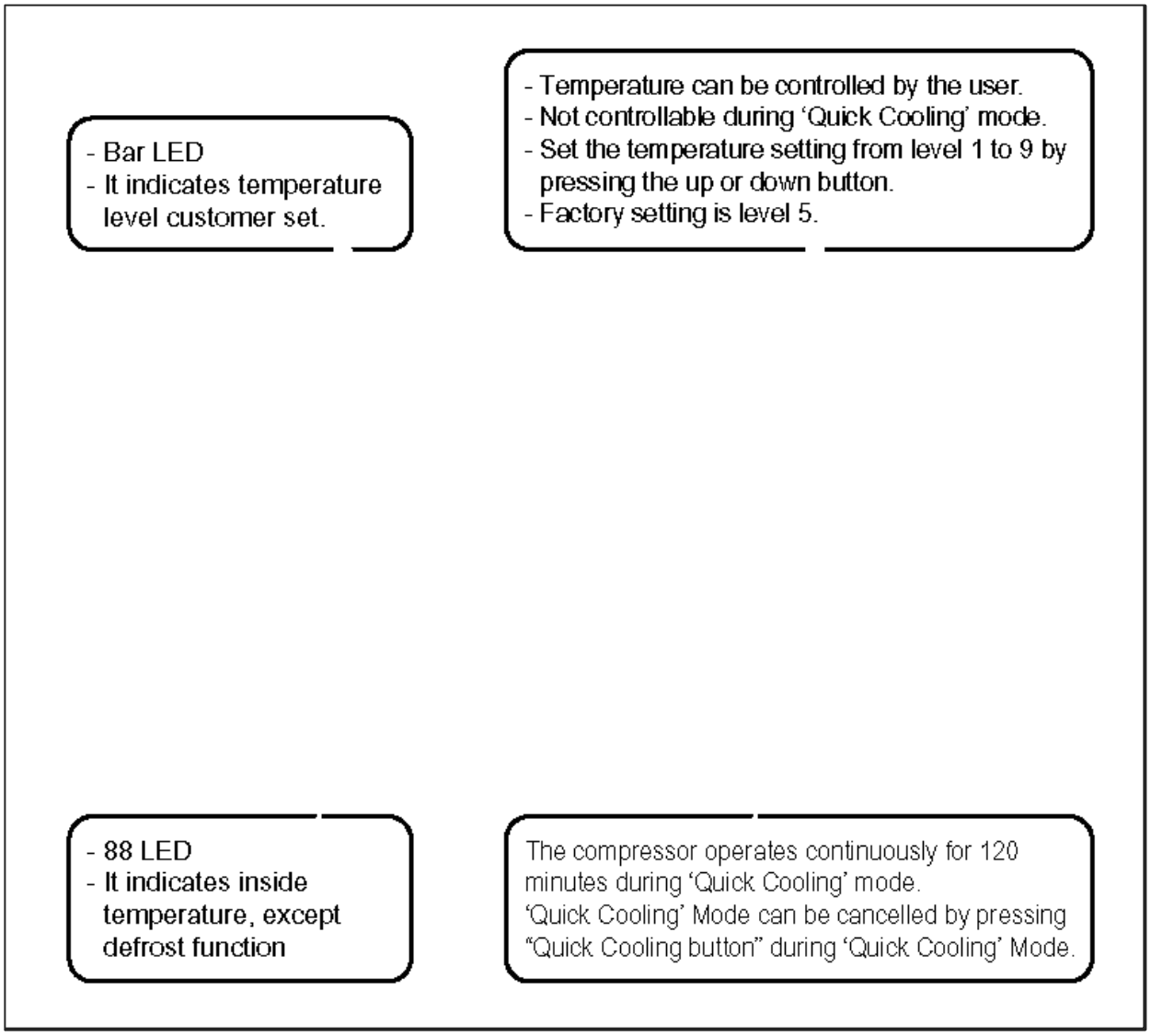
5-1-3. ERROR CODE TABLE

Code	Content	Perception Method	Refrigerator operation state
F1	F-sensor Malfunction	- short circuit - wire disconnection	- The comp. runs for 30 minutes and rest for 5 minutes. - Above action will repeat until fixed.
D1	D-sensor Malfunction	- short circuit - wire disconnection	- Heater turns on for at least 20 minutes, irrespective of D-sensor. - If F-sensor temp. is higher than 28.4°F then heater goes off. - Heater turns on for 20 min, if F-sensor is in error mode, too.
C1	Cycle, Comp Malfunction	- When the temp. of the D-sensor is over 32°F although the comp. has been running for 30 min.	- Normal operation
F3	Defrost Malfunction	When the D-sensor temp. doesn't reach 50°F in a 40 min.	- Reattempt normal defrost function repeatedly.

5-2. REFRIGERATOR CONTROLLER

(MSR-23NM, MSR-49NM, MSR-23G-1, MSR-49G-2, MSR-72G-3)

5-2-1. HOW TO USE THE PANEL



5-2-2. FUNCTION TABLE

<table>
<tr><th>No</th><th>Function</th><th>Controlled Part</th><th>Description</th></tr>
<tr><td>1</td><td>Initial Operation</td><td>Buzzer, Fan or Door Lamp
Bar LED
88 LED</td><td>1. Buzzer will ring 2 sec. after Plug-In.
2. 88 LED displays micom version initially and does inside temperature in 2 sec.
3. Compressor runs, if evaporator temperature is higher than 41.0°F(5.0°C). Compressor will run 3 minutes after plug-in, if eva. temperature is lower than 41.0°F(5.0°C).</td></tr>
<tr><td>2</td><td>Temperature Control</td><td>Compressor
F-fan
C-fan
LED</td><td>1. The temperature can be changed by pushing up/down buttons.
2. 88 LED displays inside temperature.
3. Buzzer buzzes 1 time whenever a button is pressed.
4. Compressor automatically turns on and off by D-sensor (Except error mode)
5. After Comp. is off, comp. will not start for 3 min. even though the D-sensor is at on point.
6. F-fan runs continuously except when door is opened.
7. F-fan will start 3 sec. after door is closed.
8. Comp. on/off temperature(°F)
<table><tr><th>No.</th><th>1</th><th>2</th><th>3</th><th>4</th><th></th></tr><tr><td>Comp Off</td><td>24.6</td><td>23.9</td><td>23.0</td><td>22.1</td><td></td></tr><tr><td>Comp On</td><td>37.4</td><td>37.4</td><td>37.4</td><td>37.4</td><td></td></tr><tr><th>No.</th><th>5</th><th>6</th><th>7</th><th>8</th><th>9</th></tr><tr><td>Comp Off</td><td>21.2</td><td>20.3</td><td>19.4</td><td>18.5</td><td>17.6</td></tr><tr><td>Comp On</td><td>37.4</td><td>37.4</td><td>37.4</td><td>37.4</td><td>37.4</td></tr></table></td></tr>
<tr><td>3</td><td>Turbo Cooling</td><td>Compressor
F-fan
C-fan
LED</td><td>1. If Turbo Cooling button is pressed, Turbo Cooling mode will start.
2. If the Turbo Cooling button is pressed during Turbo Cooling mode, Turbo Cooling mode can be canceled.
3. During Turbo Cooling mode, the temperature control button will not affect the temperature control.
4. All bar LEDs are fully lighted during Turbo Cooling mode.
5. The comp., F-fan and C-fan operate continuously for 120min.
If D-sensor temperature comes to 14°F(-10°C), they stop regardless of 120min.
6. Turbo Cooling mode will start after defrost is completed. If you press the Turbo Cooling button during defrost function.
7. Defrost function starts after Turbo Cooling mode if defrost function occurs during Turbo Cooling mode.
 
NOTE
D-sensor : Thermistor (Electrical resistance varyes with temperature changing)
Act like thermostat. Detect eva. coil's temp. Wire color is blue.
R-sensor : Thermistor
Act like thermometer. Detect inside air temp. Wire color is white.</td></tr>
</table>

ELECTRONIC CONTROLLER INTRUCTION

No	Function	Controled Parts	Description
4	Defrost Interval time	Compressor F-fan C-fan	1. Defrost function is controlled by the time interval setting. 2. Time interval can be set in "Time interval settign mode" 3. Push the up button during 5 seconds the mode will be changed. 4. Time interval setting value can be changed by pushing down buttons. 5. Each time when down button is pressed, the number 24,36,48,60 are dislayed in order. 6. The number is defrost interval time(hours) 7. Choose the number and do not press any keys during 10 seconds. and then defrost time interval is changed. 8. Factory setting is 24 hours 9. The first defrost function start half value of setting time interval after plug-in the unit.
5	Defrost Function	Compressor F-fan C-fan	1. It becomes defrost cycle time, the refrigerator or executes defrost function. 2. Defrost method is to operate only F-fan with comp. off. 3. Defrost function terminates when D-sensor temperature comes to above 50°F(10℃). 4. During defrost period, 88 LED does not dislay "dF" but inside temerature, in difference to " Freezer Model", But, if inside temerature is above 39.2°F(4℃). during defrost period, LED displays 39.2°F(4℃) imagunarilly. 5. After defrost completed, if inside temperature comes to go down below 39.2°F(4℃) LED displays real time temperature.

No	Function	Controlled Part	Description
6	Forced Defrost	Comp F-fan C-fan	a. Press the Turbo Cooling button 5 times while pressing both up/down button and defrost mode starts, immediately. b. Next procedure is same as that of the defrost function.
7	Comp Restart Prevent	Comp C-fan	1. After comp. is off, comp. will not start for 3 min, even though the D-sensor is at on point.
8	Power Failure Back-Up Function	Comp F-fan C-fan	1. Compressor will not start for 3 min. after power failure. 2. F-fan is on.
9	Door opening Alarm function	Buzzer LED	1. If door is opened, fan goes off and lamp on. 2. If door is opened for more than 30 seconds, chirpy sound alarm buzzes 3 times. 3. If door is opened for more than 60 seconds, chirpy sound alarm buzzes 5 times. 4. If door is opened for more than 5 minutes, chirpy sound alarm buzzes continuously.
10	Buzzer Function	Buzzer	1. Alarm buzzes 1 time after initial power on. 2. Alarm buzzes whenever each button is pressed. 3. Alarm buzzes if door remains open for certain period. (See door opening alarm function)
11	Error Display	LED	1. If inside temp. is lower than 14°F or higher than 69, 88 LED indicates 'Lo' or 'Hi' respectively. 2. Press 'up' button 5 times with pressing and holding both 'down' button and 'Turbo Cooling' button. Above procedure switches normal display to error display mode. 3. If there was no error occurred before, there will be no change on the 88 LED. If there was any error occurred before, 88 LED will display error code. 4. Next error code will be displayed by pressing down button. 5. 10 seconds after the last button pressed, error display mode will be switched to normal display mode.

5-2-3. ERROR CODE TABLE

Code	Content	Perception Method	Refrigerator operation state
R1	R-sensor Malfunction	- short circuit - wire disconnection	- Normal operation
D1	D-sensor Malfunction	- short circuit - wire disconnection	- Comp. is controlled to be turned on/off with fixed time interval. (On: 30min., Off: 30min.) - If R-sensor temp. is higher than 50.0°F then defrost mode is over. - To make matters worse, if R-sensor is in error, too, defrost mode lasts for only 40min.
C1	Cycle, Comp Malfunction	- When the temp. of the D-sensor is over 32°F although the comp. has been running for 30 min.	- Normal operation

6. PARTS LIST

PART NAME	CODE	DESCRIPTION	MODEL						
			R-23NM	R-23G	R-49NM	R-49G	F-23NM	F-49NM	R-72G
CASTER									
CASTER	30265L0200	TP5040-22-HDP	2	2	2	2	2	2	2
CASTER BRAKE	30265L0100	TP5040-22-HDP-TLB	2	2	2	2	2	2	2
COMPRESSOR									
COMPRESSOR RELAY HARNESS	30227L3100		1	1	1	1			
COMPRESSOR RELAY HARNESS	30227L2801						1		
COMPRESSOR RELAY HARNESS	30227L0510							1	
COMPRESSOR RELAY HARNESS	30227L0530								1
POWER RELAY	30281H0350	GMC-30P2 110V (LS)	1	1	1	1	1	1	
ELECTRICAL BOX HARNESS	30227L0810		1	1	1	1			
ELECTRICAL BOX HARNESS	30227L0804						1	1	1
MAIN POWER CORD	30213A1014	125V / 15A	1	1	1	1	1	1	1
CONDENSER									
CONDENSER COIL	30200L4001		1	1					
CONDENSER COIL	30200L4202				1	1			
CONDENSER COIL	30200L4105						1		
CONDENSER COIL	30200L4303							1	1
CONDENSER FAN									
CONDENSER FAN MOTOR BLADE	30218A0300	AL, Φ250	1	1	1	1	1	1	1
CONDENSER FAN MOTOR	3963220410	IS-4420DWSG-1	1	1	1	1	1	1	1
DOOR									
DOOR ASSEMBLY	30200L3100	EXCLUDING GASKET	1				1		
DOOR ASSEMBLY	30200Q9300	INCLUDING GASKET		1					
DOOR ASSEMBLY (LEFT)	30200L2600	EXCLUDING GASKET			1			1	
DOOR ASSEMBLY (RIGHT)	30200L2700	EXCLUDING GASKET			1			1	
DOOR ASSEMBLY (LEFT)	30200Q8700	INCLUDING GASKET				1			1
DOOR ASSEMBLY (RIGHT)	30200Q8800	INCLUDING GASKET				1			2
DOOR GASKET	30223L0211	PVC-S	1		2		1	2	
DOOR GASKET	30223R0201	PVC-S		1		2			3
DOOR HINGE TOP ASSEMBLY LEFT	30229L0800				1			1	
DOOR HINGE TOP ASSEMBLY RIGHT	30229L0900		1		1		1	1	
DOOR HINGE BOTTOM ASSEMBLY LEFT	30229L0100				1			1	
DOOR HINGE BOTTOM ASSEMBLY RIGHT	30229L0200		1		1		1	1	
DOOR HINGE TOP ASSEMBLY LEFT	30229L1300					1			1
DOOR HINGE TOP ASSEMBLY RIGHT	30229L1200			1		1			2
DOOR HINGE BOTTOM ASSEMBLY LEFT	30229L1500					1			1
DOOR HINGE BOTTOM ASSEMBLY RIGHT	30229L1400			1		1			2

PARTS LIST

PART NAME	CODE	DESCRIPTION	MODEL						
			R-23NM	R-23G	R-49NM	R-49G	F-23NM	F-49NM	R-72G
DRAIN									
DRAIN PAN	30211L0700	HIPS	1	1			1		
DRAIN PAN	30211J0103	HIPS			1	1		1	1
EVAPORATOR									
EVAPORATOR COIL	30270L0120		1						
EVAPORATOR COIL	30270L0113			1					
EVAPORATOR COIL	30270L0220				1				
EVAPORATOR COIL	30270L0213					1			
EVAPORATOR COIL	30270L0506						1		
EVAPORATOR COIL	30270L0606							1	
EVAPORATOR COIL	30270Q0201								1
EVAPORATOR SENSOR	30227Q1200	F-D SENSOR					1	1	
EVAPORATOR SENSOR	30227Q1300	R-D SENSOR	1	1	1	1			1
EVAPORATOR THERMAL FUSE	30272L0400	PST-3(80/10)					1	1	
EVAPORATOR DEFROST HEATER	30228L0802	445W					1		
EVAPORATOR DEFROST HEATER	30228L0700	600W						1	
EVAPORATOR DRAIN PAN HEATER	30228L1400	90W					1		
EVAPORATOR DRAIN PAN HEATER	30228L1500	90W						1	
DRAIN HOSE HEATER	30228L1310	10W					1	1	
EVAPORATOR FAN MOTOR BLADE	30218F0200	AL, Φ175	1	1	2	2	1	2	2
EVAPORATOR FAN MOTOR	3963328120	IS-4420DWSN-2A	1	1	2	2	1	2	2
TOP GRILLE									
TOP GRILLE PANEL ASSEMBLY	30224L4120	INCLUDE ACCESSORIES	1						
TOP GRILLE PANEL ASSEMBLY	30224L4100	INCLUDE ACCESSORIES			1				
TOP GRILLE PANEL ASSEMBLY	30224L4130	INCLUDE ACCESSORIES					1		
TOP GRILLE PANEL ASSEMBLY	30224L4110	INCLUDE ACCESSORIES						1	
TOP GRILLE PANEL ASSEMBLY	30200Q9200	INCLUDE ACCESSORIES		1					
TOP GRILLE PANEL ASSEMBLY	30200Q8900	INCLUDE ACCESSORIES				1			
TOP GRILLE PANEL ASSEMBLY	30200Q3830	INCLUDE ACCESSORIES							1
TRANSFORMER	30284L0100	DWS-115U	1	1	1	1	1	1	1
MAIN PCB	30243L0320	FOR REFRIGERATORS	1	1					
MAIN PCB	30243L0350	FOR FREEZERS					1	1	
MAIN PCB	30243L0330	FOR GLASS DOOR			1	1			1
BOTTOM GRILLE									
BOTTOM GRILLE ASSEMBLY	30224L1410	SUS 430	1	1			1		
BOTTOM GRILLE ASSEMBLY	30224L1400	SUS 430			1	1		1	
BOTTOM GRILLE ASSEMBLY	30200Q4102	SUS 430							1
LAMP									
INCANDESCENT LIGHT BULB	30236L0100	25W / 120V	1		1		1	1	
FLUORESCENT LIGHT LAMP	30236D0511	TLD32W/865		1		1			2
BALLAST	30200F7320			1		1			
BALLAST	30200H7420								1
SHELF									
SHELF CLIP	30220L0900	PA-6	12	12	24	24	12	24	36
SHELF	30278Q0103	PE COATING	3				3		
SHELF	30278Q0203	PE COATING			6			6	
SHELF	30278L0300	PE COATING		3					
SHELF LEFT	30278L0400	PE COATING				3			
SHELF RIGHT	30278L0500	PE COATING				3			
SHELF MEDIUM	30278L0600	PE COATING							3
SHELF LEFT	30278L0700	PE COATING							3
SHELF RIGHT	30278L0800	PE COATING							3

7. REPLACEMENT OF MAIN COMPONENTS

7-1. TOP GRILL PARTS

- MAIN PCB or TRANSFORMER
- DISPLAY PCB
- DORR LOCK or POWER SWITCH(ROCKER SWITCH)

A. Unscrew the screw located both sides of top grill panel.

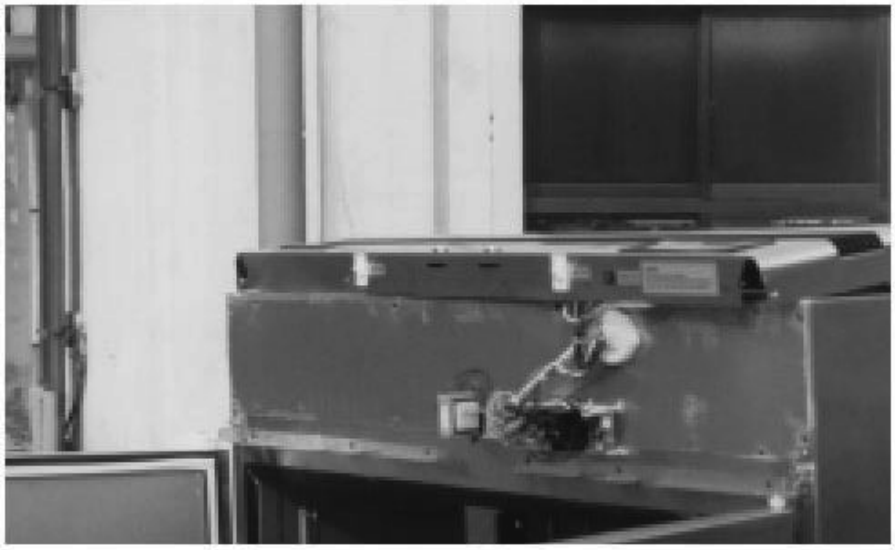
B. Unscrew the screws located on top of top grill pandel

C. Unscrew the screws located on bottom of top grill panel

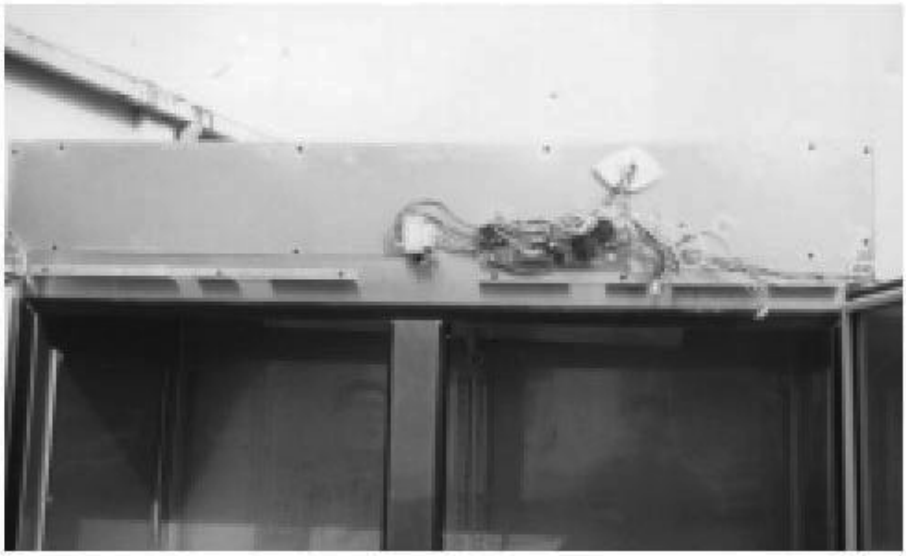
* Caution : When unscrewing, hold top grille panel

Falling down top grille may cause bruise.

D. Place the top grille panel on the top of the cabinet.



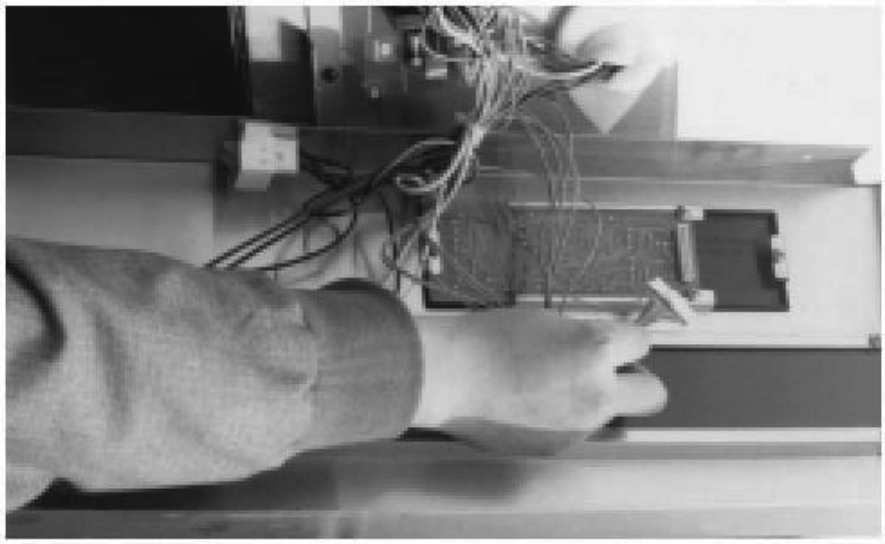
E. You can replace PCB & Transformer & Ballast



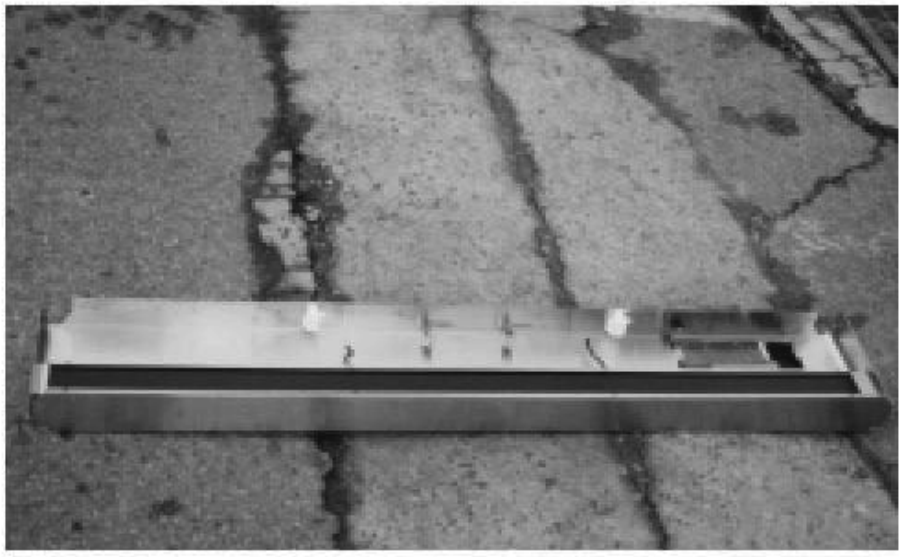
F. Pull-out the harness located back of top grille panel.

You can separate top grille panel.

You can replace power switch, door switches and control board housing.



G. To re-assemble, do reversed in order.

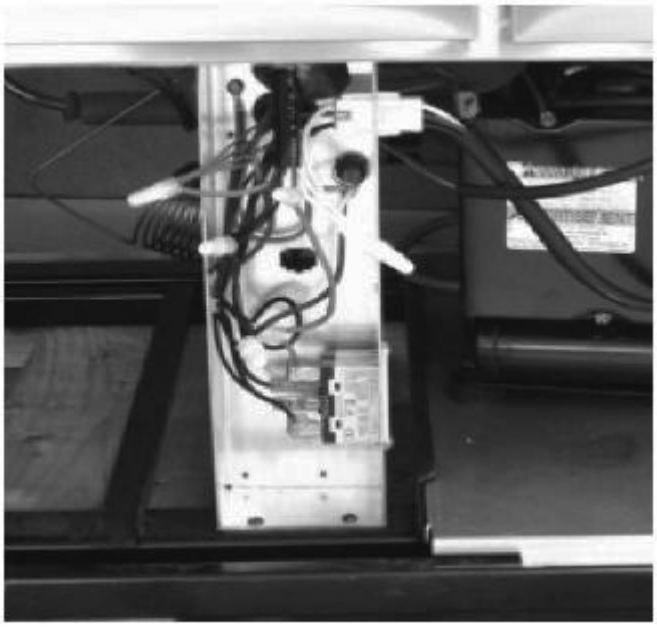


7-2. REPLACING DOOR

A. Disassemble top grille panel as described section 7-1 A,B,C,D.

B. Remove Bottom grille By unscrewing the four screws located on each side of the bottom grille.

C. Open the electrical Box, Then uncap the door Heater wire(Freezer Model only)



D. The figure of the disassembled top grille panel.

E. Unscrew the hinge.

F. Unscrew the last screw with pushing the hinge.

E. After unscrewing the hinge will rotate about 90 ¢ (CCW), of it self.

H. Lift the door hinge and pull out the door heater's lead wire.

I. Replace the door with the new one.

J. Ready the hinge as below. It is important to set initial position(angle).

K. Initial position of the hinge must be as below.

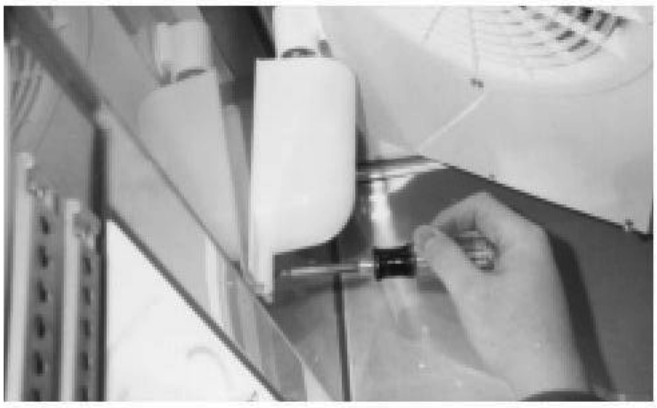
L. Turn the hinge 90 ºCW. This turning causes torsion strength of the bar spring that shuts the door(s) automatically.

M. Screw the hinge with pushing it. After installation of the door(s), assemble the top grille panel.

7-3. REFRIGERATION COMPARTMENTS PARTS

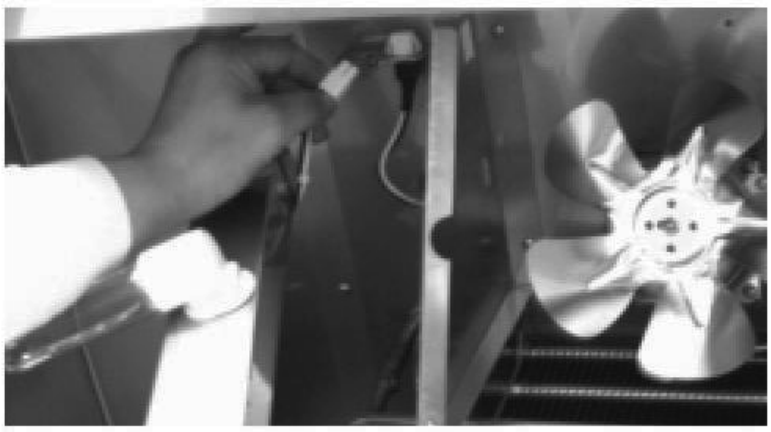
A. Disassemble lamp shield
- LAMP BULB or LAMP SHIELD
- EVAPORATOR FAN MOTOR
- F/D SENSOR or R/D SENSOR
- EVAPORATOR DEFROST HEATER
- EVAPORATOR COIL

(A) (C) Is only for solid door model (MSR-23NM, MSR-49NM, MSF-23NM, MSF-49NM)



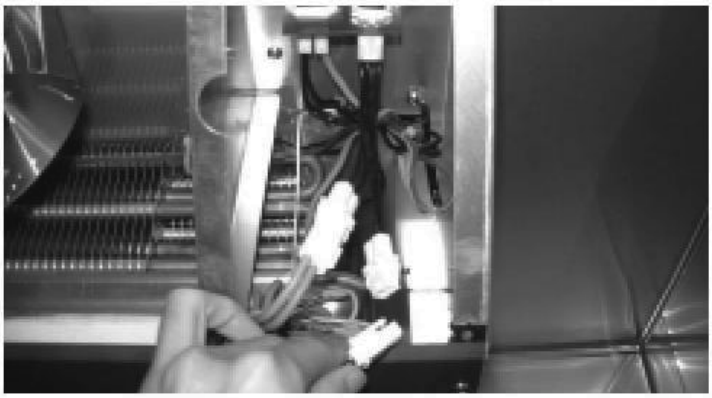
B. Disassemble Duct(A).

C. Pull out the lamp harness

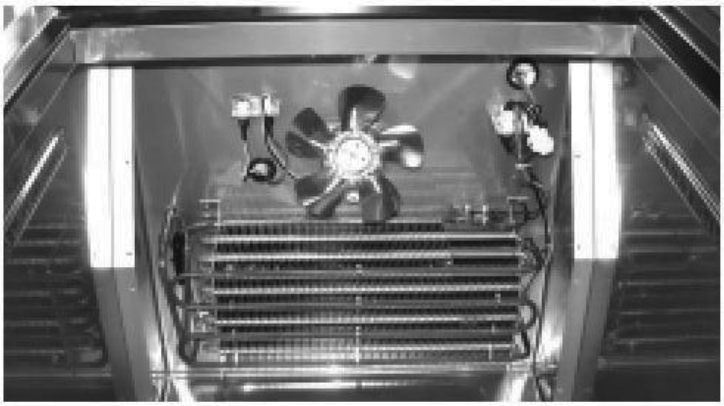


D. Disassemble duct (B).

E. Pull-out the evaporator drain pan heater's leadwire.



F. Figure of disassembled refrigeration compartments.



In this situation, you can replace fan motor, F/D sensor, Evaporator ETC.

G. Replace the evaporator fan motor

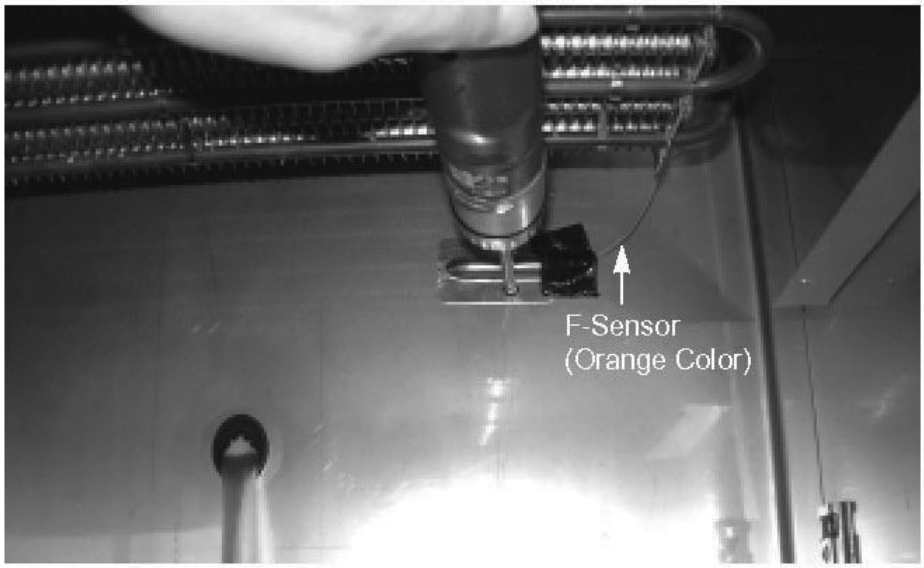
F-1. Pull out the fan motor's connector.

F-2. Unscrew the four screws which located on bottom of fan motor.

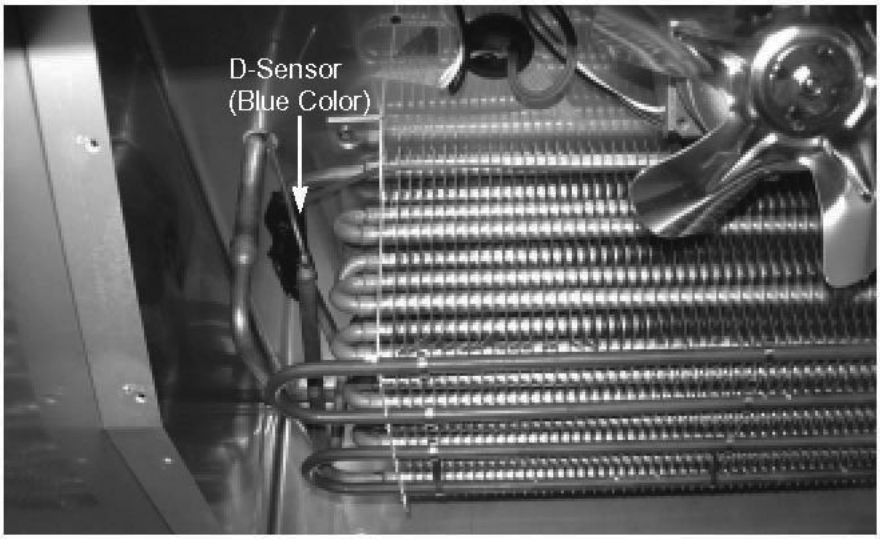
G. Replacing F/D Sensor of R/D Sensor

H-1. F-Sensor of Freezer

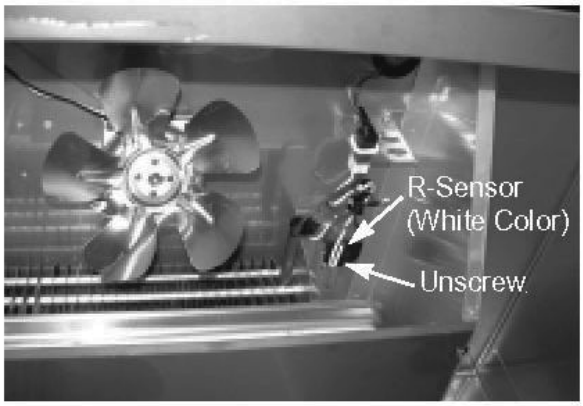
Unscrew as illustrated below and pull out the F-Sensor from the cover.



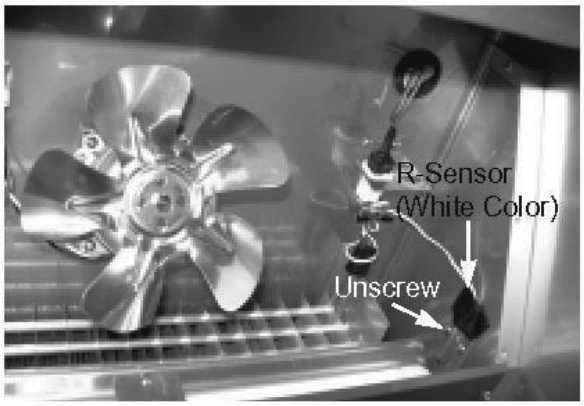
H-2. D-Sensor of Freezer(Evaporator Defrost Sensor)
Disassemble the D-Sensor from evaporator's end plate.



H-3. R-Sensor of Refrigerator
Unscrew as illustrated below and pull out the R-Sensor from the cover.



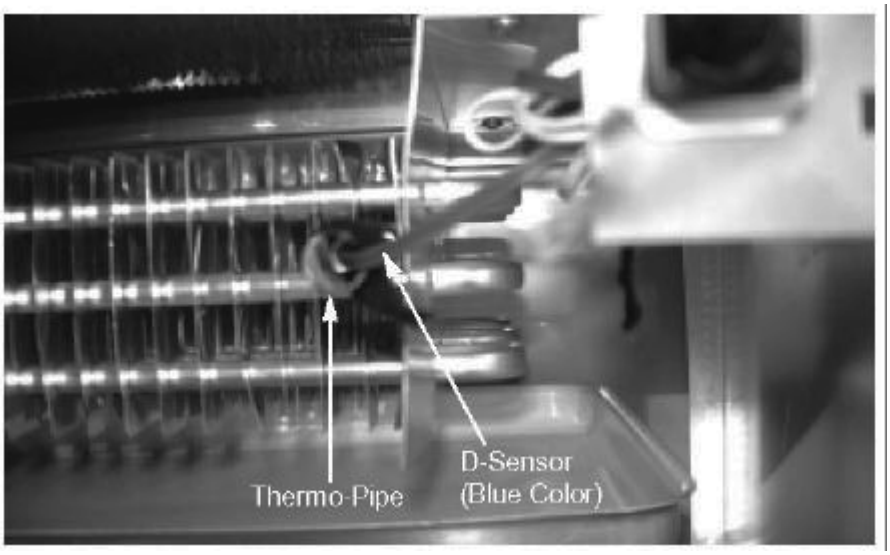
MSR-49NM, MSR-49G-2
MSR-72G-3



MSR-23NM, MSR-23G-1

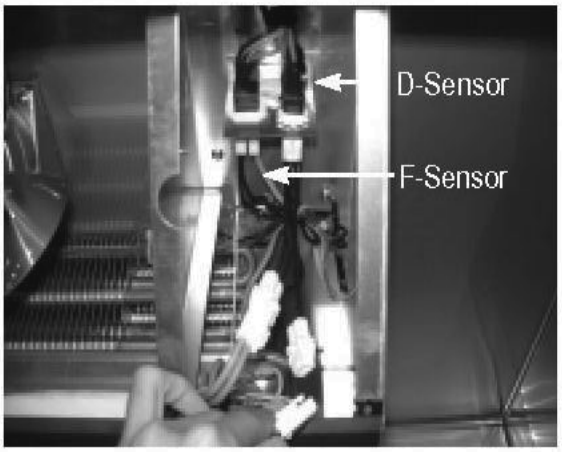
H-4. D-Sensor of Refrigerator

Remove the absorber pad at the end of the thermo -pipe and pull out D-sensor

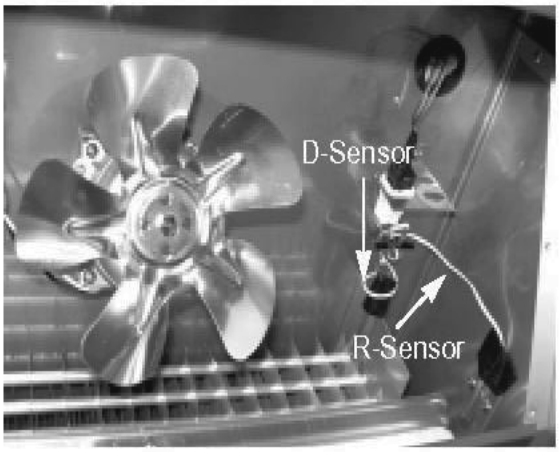


H-5. F/D-Sensor or R/D Sensor

After unplug each sensor. Pull out the sensor's lead wire.



F/D Sensor
(F-Sensor : Orange Color.
D-Sensor : Blue Color)

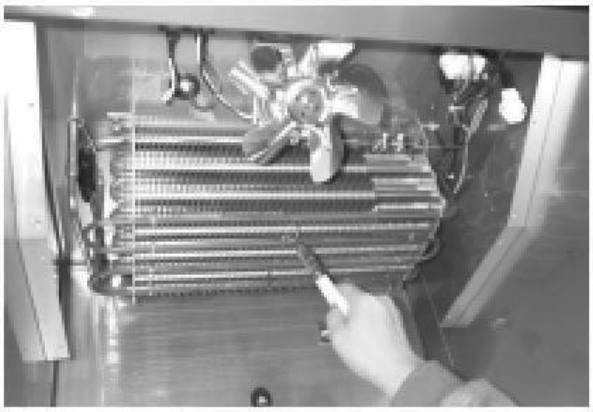


R/D Sensor
(R-Sensor : White Color.
D-Sensor : Blue Color)

REPLACING EVAORATOR DEFROST HEATER (FREEZER ONLY)

A. After disassembling the duct(A) and duct(B), get ready as below for replacing the evaporator defrost heater.

B. Pull out the pins from the bottom of the evaporator using the nipper, etc.

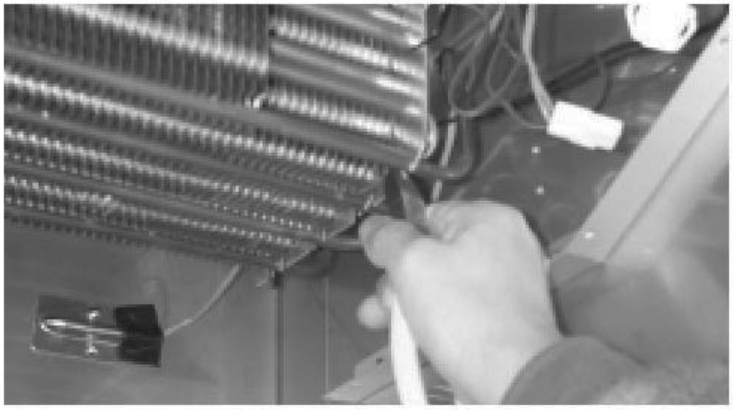


C. Split the hooks of the evaporator.

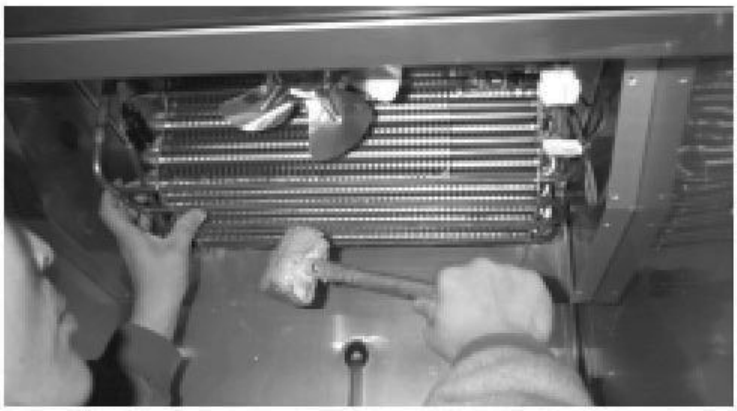
D. After removing all pins, disconnect the connectors from the thermal fuse and the main harness.

E. Take apart the evaporator defrost heater from the evaporator.

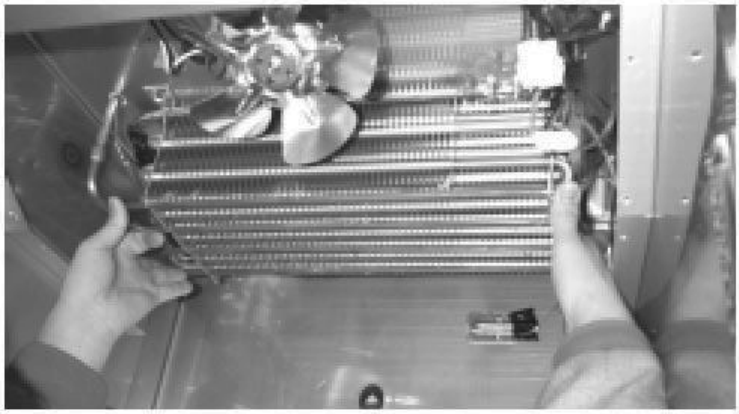
F. Install the new evaporator defrost heater in original position.



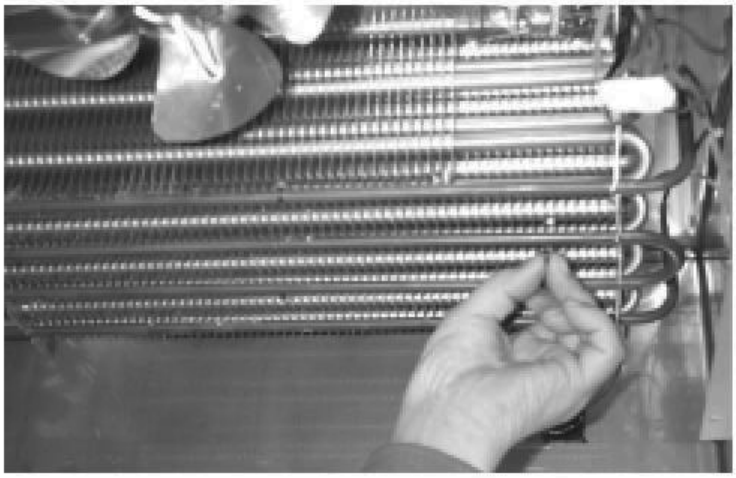
G. Pat the evaporator defrost heater with the soft hammer.



H. Pinch the hooks of the evaporator.



I. Assemble the pins in original positions.



J. Connect the connectors of the evaporator defrost heater to them of the thermal fuse and the main harness.

- NOTE.

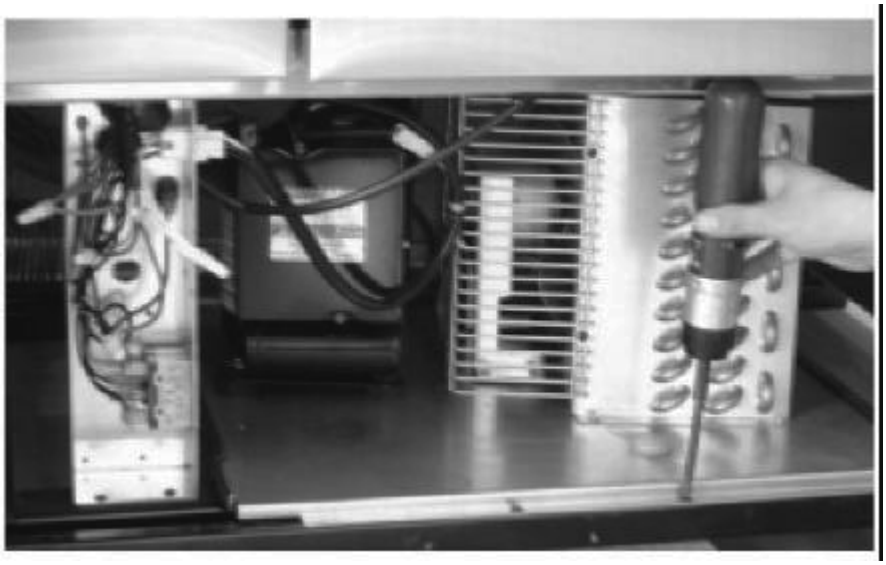
Why is always 115 voltage detected between connectors of the evaporator defrost heater in the main harness?
The SNUBBER(located min PCB) holds two AC power lines simultaneously.
The SNUBBER prevents Main PCB malfunction from sparks occurred by other electrical component's ON/OFF. (SNUBBER = Spark Killer)
Because of the SNUBBER, 115 voltage is always detected. But electrical current in this case is very little(small Amps.) So, this electrical current is not enough to operate the evaporator defrost heater.
How to measure the Amps. Of the evaporator defrost heater.
Disconnect the connectors of the evaporator defrost heater.
Then prepare the additional Power Source(115V/60Hz) and the Amp. Meter.
Connect the evaporator defrost heater to the additional power source and read amp value from the Amp. Meter

7-4. CONDENSING UNIT

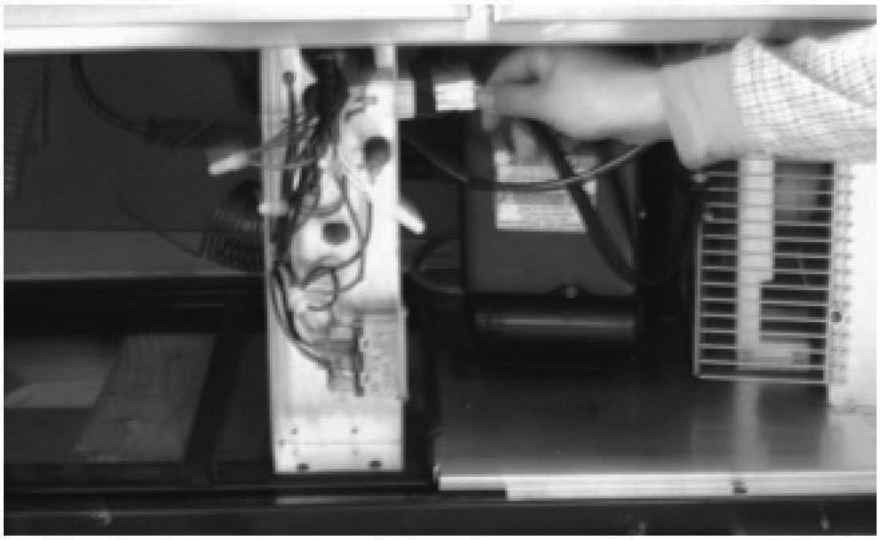
- Condensing units : Compressor, Condenser Fan Motor, Condenser coil, Dryer....,
- Others : Relay Harness, Power Cord, Electrical Box, ETC.,

A. Disassemble Bottom Grille as described section 7-2, B

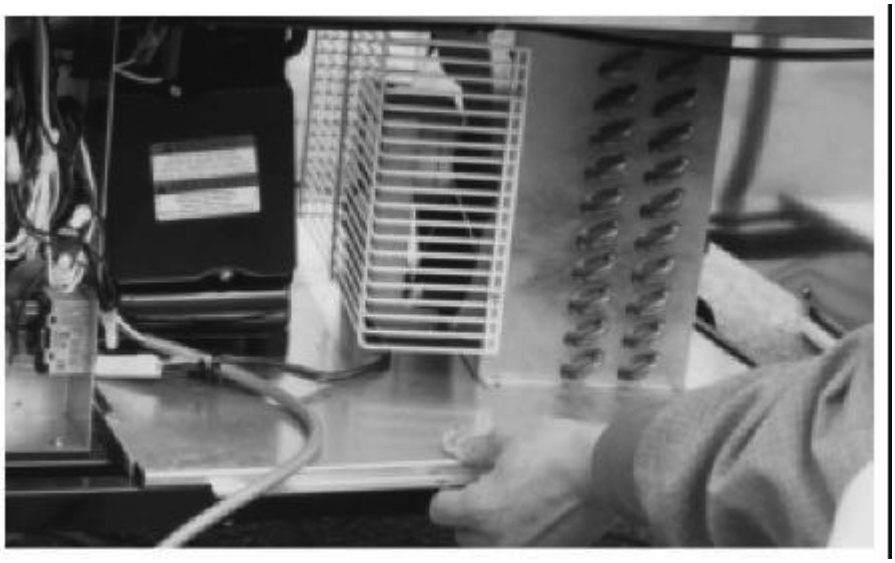
B. Unscrew two screws as below.



C. Unplug the compressor's power plug.



D. Pull out the condensing unit.

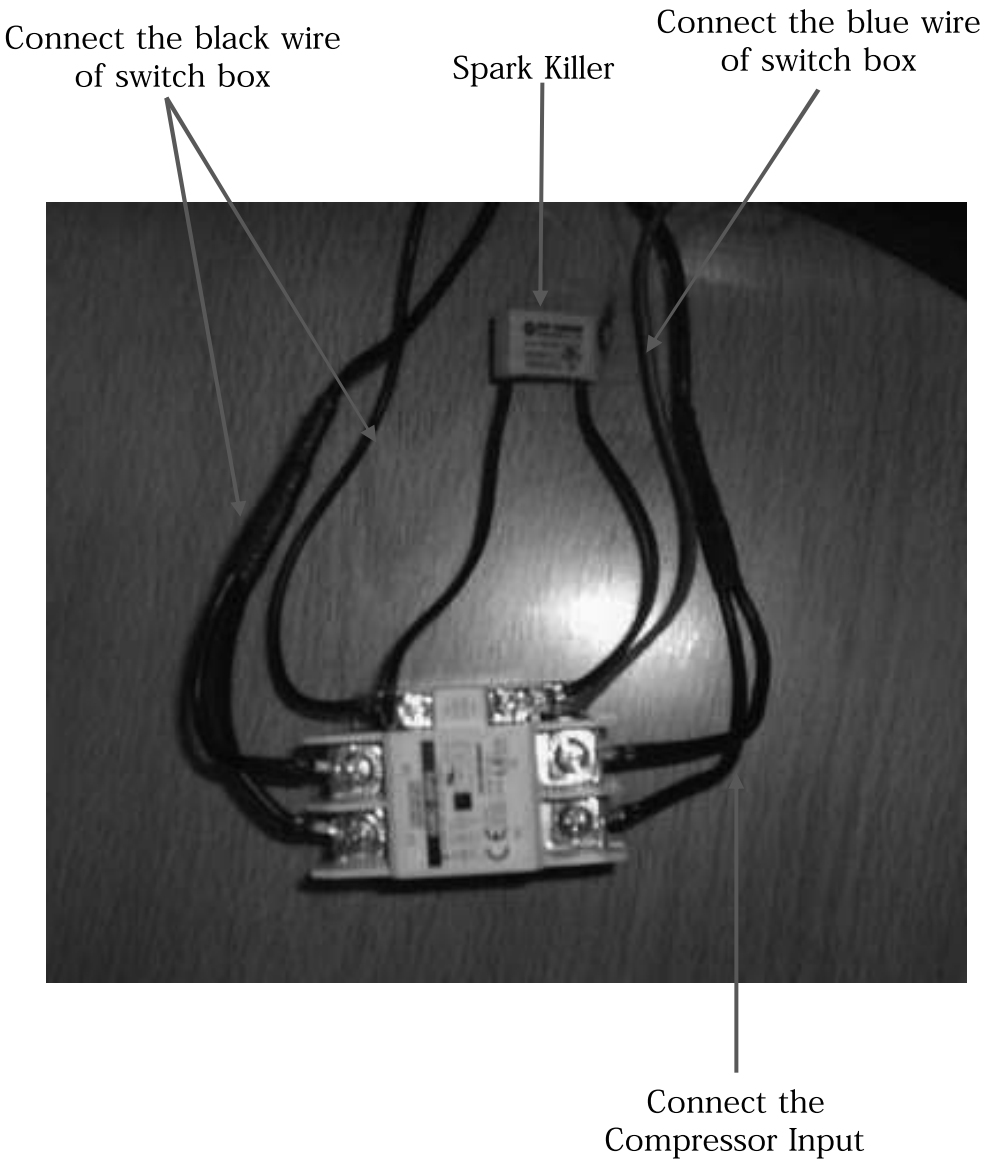


7-5. REPLACING POWER RELAY

A. Remove Bottom grille By unscrewing the four screws located on each side of the bottom grille.

B. Open the electrical Box, Unscrew the power relay.

C. Replace the Power Relay



7-6. REPLACING LAMP

7-6-1 . SOLID DOOR(MSR-23NM, MSR-49NM, MSF-23NM, MSF-49NM)

A. Turn off the power switch.

B. Disassemble lamp shield

C. Replace the lamp

7-6-2 . GLASS DOOR(MSR-23G-1, MSR-49G-2, MSR-72G-3

A. Turn off the Lam Switch.

B. Disassemble the Lamp.

C. Disassemble the lamp cap.

D. Change the lamp.

7-7. REPLACING CABINET FRAME HEATER AND MULLION HEATER

This article is only for solid door model
(MSR-23NM, MSR-49NM, MSF-23NM, MSF-49NM)

A. Insert the and edge of -' type screw driver into the gap between the frame and the frame cover

B. Take apart the frame cover from the frame

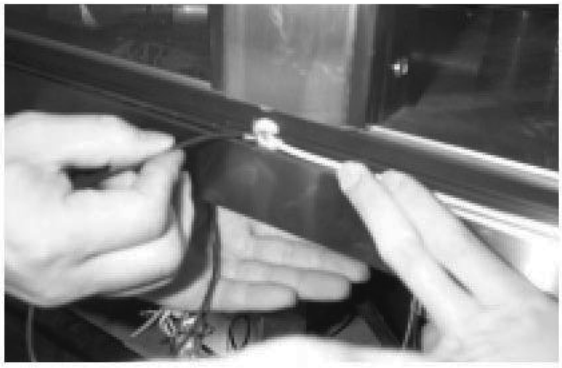
C. Separate the frame cover by sliding the screw driver.

B. Do just like above instruction in order parts(bottom slide, right side and top side)

E. Below picture shows the inlet of the cabinet frame heater toward the electrical box.

F. Uncap connectors of the cabinet frame heater.

G. Pull out the heater wire from the inlet.



h. Insert the new cabinet frame heater wire to the inlet, after surrounding if along the frame.

I. Assemble the frame cover with the frame. Push and slide the frame cover toward corner.

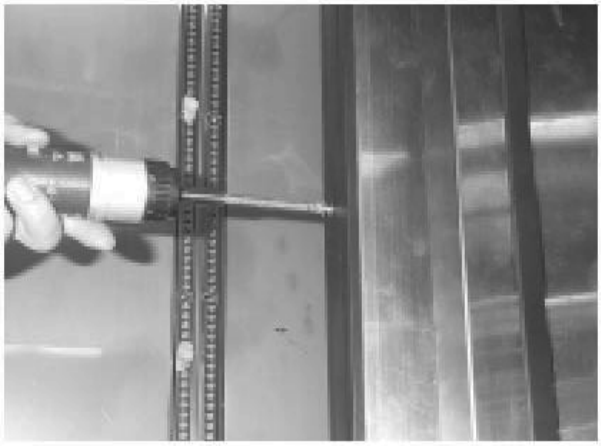
J. Fit the end lines of the frame cover each other.

K. Fit the other side of the frame cover, too.

L. Part the frame cover with the soft hammer, etc.

M. Do like above instruction in other parts(left side, right side and top side).

N. Unscrew the screws from the mullion.



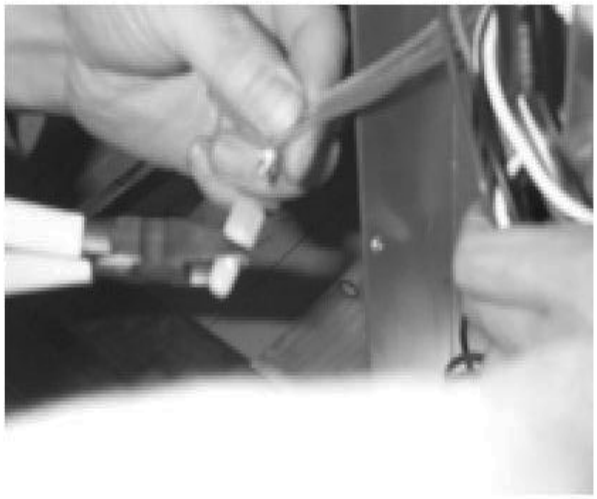
O. Take apart the mullion cover from the mullion.

P. Take care for the mullion heater not to be hurt.(It does not matter, if this heater is out of order).

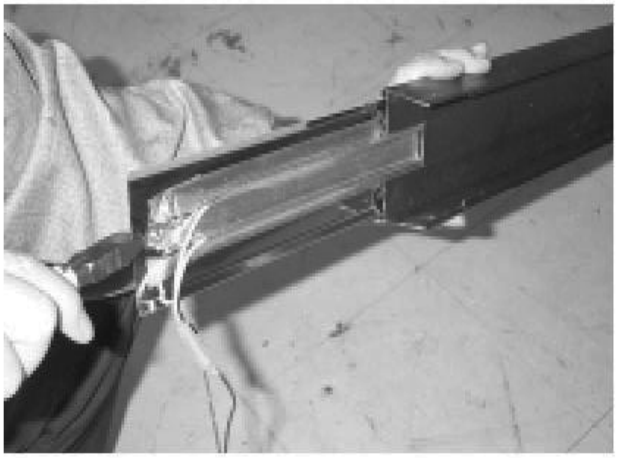
Q. Pull out the insulator from inside.

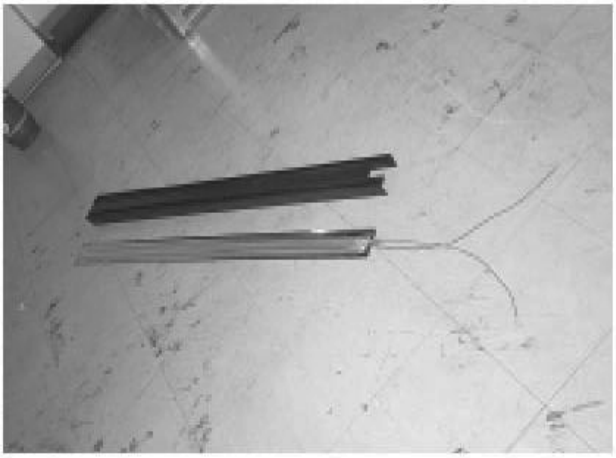
R. Uncap the connectors of the mullion heater.

S. Pull out the heater wire from the inlet.

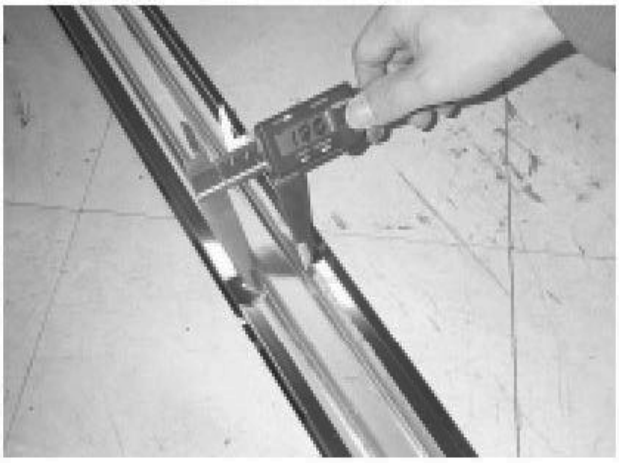


T. Pull out the mullion cover(SUS) from the mullion cover(ABS).

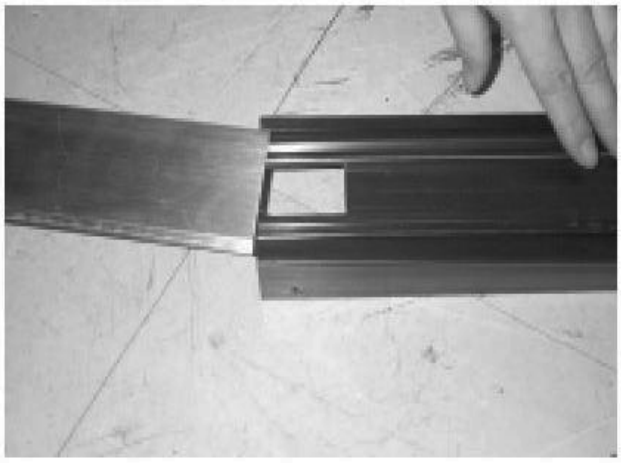




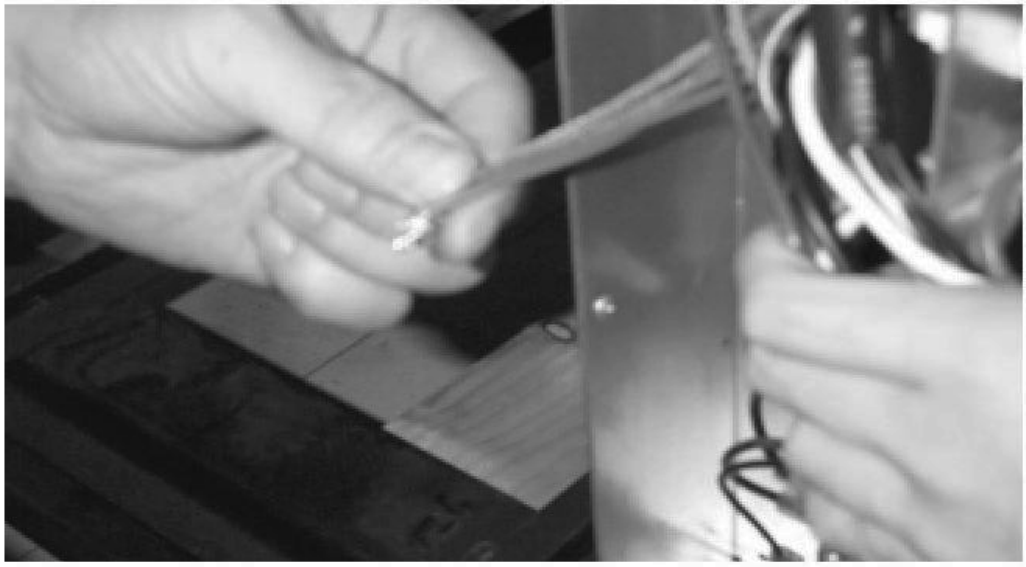
U. Change the old mullion heater and install the new one with the gap between wires 1.2 inch.



V. Insert the mullion cover(SUS) into the original position.



W. Connect the heater wires with the main harness and the electrical box harness.



X. Cover the caps on the connection parts and press the tightly.