SERVICING PRECAUTIONS

Features of refrigerant (R600a)
- Achromatic and odor less gas.
- Flammable gas and the ignition (explosion) at 494°C.
- Upper/lower explosion limit: 1.8%~8.4%/Vol.

Features of the R600a refrigerator
- Charging of 60% refrigerant compared with a R134a model
- The suction pressure is below 1bar (abs) during the operation.
- Because of its low suction pressure, the external air may flow in the cycle system when the refrigerant leak, and it causes malfunction in the compressor.
- The displacement of compressor using R600a must be at least 1.7 times larger than that of R134a.
- Any type of dryer is applicable (XH-5, 7, 9).
- The EVAPORATOR or any other cycle part that has welding joint is hidden in the foam. (If not hidden inside, the whole electric parts must be tested with the LEAKAGE TEST according to the IEC Standard.)
- The compressor has label of the refrigerant R600a.
- Only the SVC man must have an access to the system.

Installation place
- Must be well ventilated.
- Must be 20 m^3 or larger.
- Must be no-smoking area.
- No ignitable factors must be present.

Utilities
- Refrigerant cylinder (MAX NET 300g)
- Manometer
- Vacuum pump (600ℓ/min)
- Piercing Clamp
- Quick coupler
- Hoses (5m-1EA, 1m-3EA)
- LOKRING
- Portable Leakage detector (3g/year↓)
- Nitrogen cylinder (for leakage test)
- Concentration gauge

Make sure before Servicing
- Refrigerant
  Confirm the refrigerant by checking Name Plate and the label on the compressor, after opening the COVER ASSY, BACK-M/C.
- If the refrigerant is R600a, you must not weld or apply a heat source.

Air Recharging in Compressor
Before refilling the refrigerant, you must perform the test according to Chapter 5 (TROUBLESHOOTING CHART). When the defects are found, you must discharge the residual refrigerant (R600a) in the outdoor. For discharging the refrigerant R600a, break the narrow portion of tube extension by hand or with a pipe cutter as shown in Figure 1. Leave it for 30min in outside to stabilize the pressure with ambient. Then, check the pressure by piercing the dryer part with piercing pliers. If the refrigerant is not completely discharged, let the refrigerator alone for more 30min in outside.

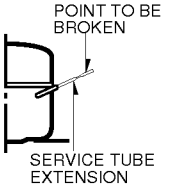


Figure 1

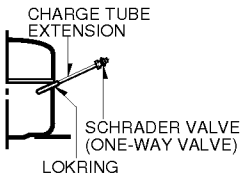


Figure 2

Attach the service tube installed with a Schrader valve (one-way valve) by using the LOKRING (Figure 2). Then, connect the Schrader valve (one-way valve) to the pump that is connected to the discharging hose leading to the outside. When discharging the residual refrigerant, repeat 3 cycle that includes 3min of the pump running->pump off->30sec of the compressor running.

After the refrigerant (R600a) is completely discharged, repair any defective parts and replace the dryer. At any case you must use the LOKRING for connecting or replacing any part in the cycle (No Fire, No Welding). Connect the Schrader valve to pump with the coupler. And then turn the pump on for vacuum state (Figure 3). Let the pump run until the low-pressure gauge indicates the vacuum (gauge pressure 0, absolute pressure -1atm or -760mmHg). Recommended vacuum time is 30 min. Charge the N_2 gas in order to check for leakage from welding points and the LOKRING. If leakages are found, repair the defects and repeat the vacuum process.

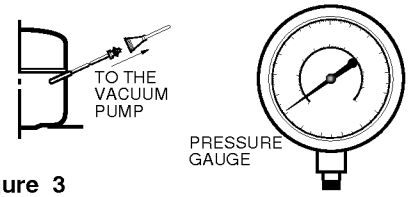


Figure 3

After the system is completely vacuumed, fill it with the refrigerant R600a up to what has been specified at your refrigerator Name Plate. The amount of refrigerant (R600a) must be precisely measured within the error of ±2g by an electron scale (Figure 4).

If you use the manifold connected with both the refrigerant (R600a) cylinder and the vacuum pump simultaneously, make sure the pump valve is closed (Figure 5).

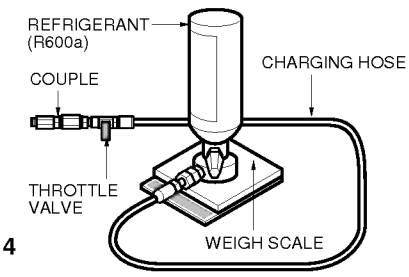


Figure 4

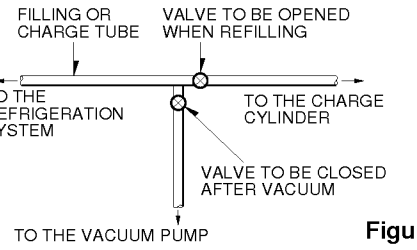


Figure 5

Connect the charging hose (that is connected to the refrigerant (R600a) cylinder) to the Schrader valve installed on the service tube. Then, charge the refrigerant (R600a) by controlling the Throttle valve. When you do so, do not fully open the Throttle valve because it may make damage to the compressor. Gradually charge the refrigerant (R600a) by changing open and close the Throttle Valve (5g at each time). The charging hose must use a one-way valve to prevent the refrigerant refluence. Close the Schrader valve cap after the refrigerant (R600a) is completely recharged.

After you completely recharge the refrigerant (R600a), perform the leakage test by using a portable leakage detector or soapy water. Test the low pressure (suction) parts in compressor off time and high pressure parts in compressor on time. If the leakages are found, restart from the refrigerant (R600a) discharging process and repairs defects of leaks.

After the leakage test, check the temperature of each parts of the cycle. Check with hands if the CONDENSER and the case (HOT-LINE pipe) that is contacted to the door gasket are warm. Confirm that frost is uniform distributed on the surface of the EVAPORATOR.

SPECIFICATIONS

1.Ref. No: GR-409/409P

ITEMS		SPECIFICATIONS
DIMENSIONS (mm)		595(W)x626(D)x1880(H)
NET WEIGHT (kg)		77
COOLING SYSTEM		Fan Cooling
TEMPERATURE CONTROL	REFRIGERATOR	Knob Dial
	FREEZER	Button
DEFROSTING SYSTEM		Full Automatic
		Heater Defrost
DOOR FINISH		Pre-Coated Metal or Vinyl Coated Metal
OUT CASE		Painted Steel Sheet
INNER CASE		ABS
INSULATION		Polyurethane Foam
DEFROSTING DEVICE		Heater, Sheath & Heater, Cord-L
REFRIGERANT		R600a(60g)
LUBRICATION OIL		FREOL S10(280 cc)

ITEMS	SPECIFICATIONS
REFRIGERATOR COMPARTMENT	Transparent Shelf(3 EA)
	Vegetable Container(1 EA)
	Vegetable Container Cover(1 EA)
	Fresh Zone Container(1 EA)*
DOOR POCKET	Dairy Pocket Cover(2 EA)
	Egg Tray(2 EA)
	Little Pocket(5 EA) 4 or 3 EA
	Bottle Pocket(1 EA)
FREEZER COMPARTMENT	Tray Drawer(4 EA)
	Ice Tray(1 EA)
COMPRESSOR	PTC Starting Type
EVAPORATOR	Fin Tube Type
CONDENSER	Side & Wire Condenser
WATER DISPENSER	WATER TANK(1 EA)*

* Optional Parts

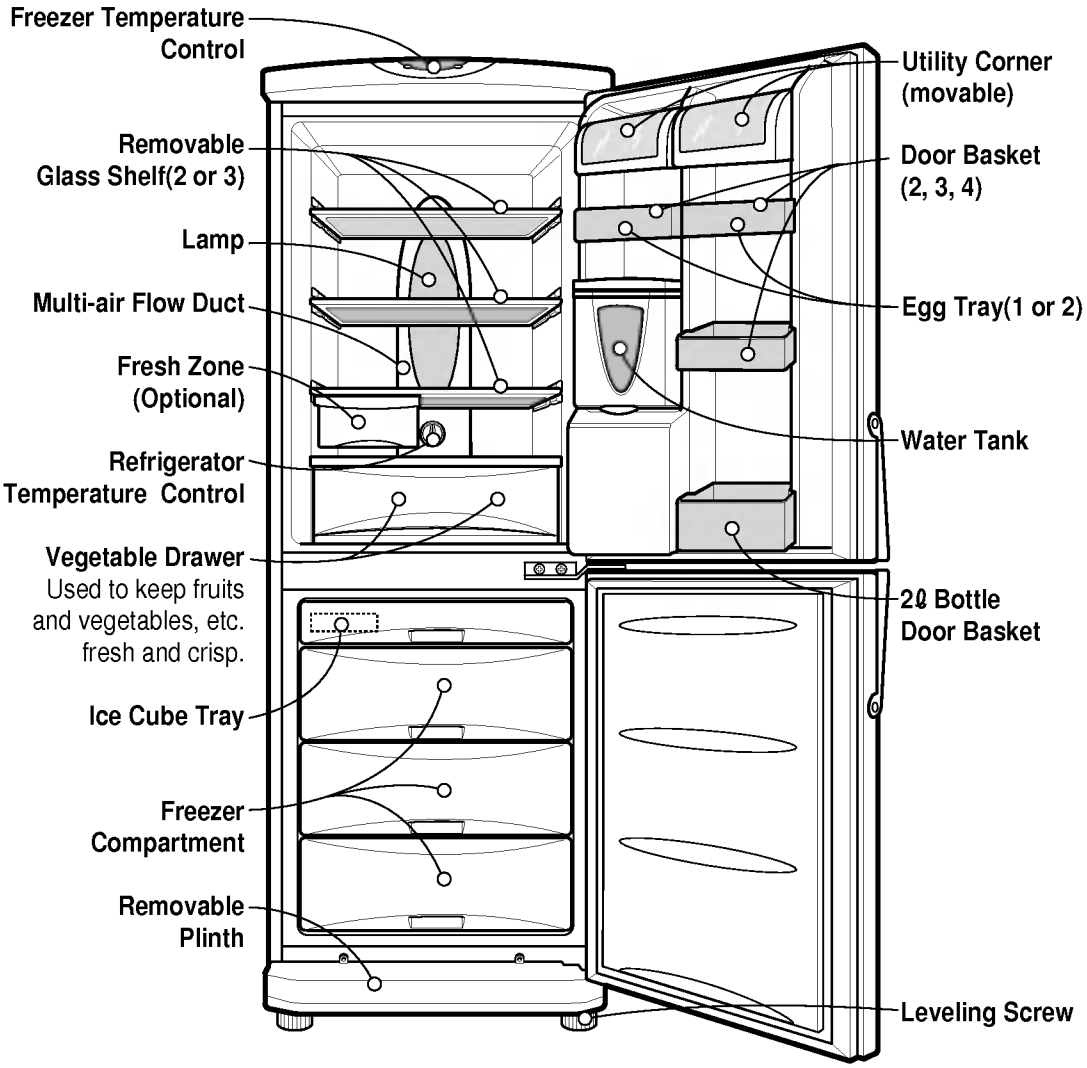
2.Ref. No: GR-369

ITEMS		SPECIFICATIONS
DIMENSIONS (mm)		595(W)x626(D)x1710(H)
NET WEIGHT (kg)		72
COOLING SYSTEM		Fan Cooling
TEMPERATURE CONTROL	REFRIGERATOR	Knob Dial
	FREEZER	Button
DEFROSTING SYSTEM		Full Automatic
		Heater Defrost
DOOR FINISH		Pre-Coated Metal or Vinyl Coated Metal
OUT CASE		Painted Steel Sheet
INNER CASE		ABS
INSULATION		Polyurethane Foam
DEFROSTING DEVICE		Heater, Sheath & Heater, Cord-L
REFRIGERANT		R600a(60g)
LUBRICATION OIL		FREOL S10(280 cc)

ITEMS	SPECIFICATIONS
REFRIGERATOR COMPARTMENT	Transparent Shelf(2 EA)
	Vegetable Container(1 EA)
	Vegetable Container Cover(1 EA)
	Fresh Zone Container(1 EA)*
DOOR POCKET	Dairy Pocket Cover(2 EA)
	Egg Tray(1 EA)
	Little Pocket(3 EA)
	Bottle Pocket(1 EA)
FREEZER COMPARTMENT	Tray Drawer(4 EA)
	Ice Tray(1 EA)
COMPRESSOR	PTC Starting Type
EVAPORATOR	Fin Tube Type
CONDENSER	Side & Wire Condenser

* Optional Parts

PARTS IDENTIFICATION



NOTE : This is a basic model. The shape of refrigerator is subject to change.

DISASSEMBLY

1 DOOR

● **Freezer Door**

1) Loosen 2 screws and pull the Lower Cover.
2) Loosen hexagonal bolts fixing the lower hinge to the body to remove the freezer door only.

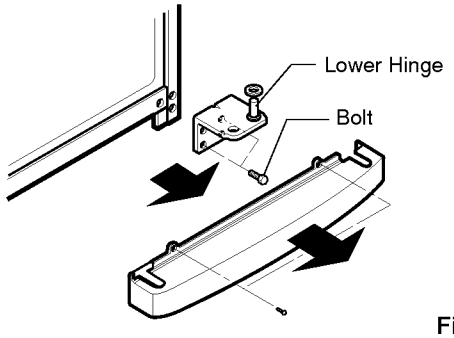


Figure 6

3) Pull out the Door Gasket to remover from the Door Foam Assy, F.

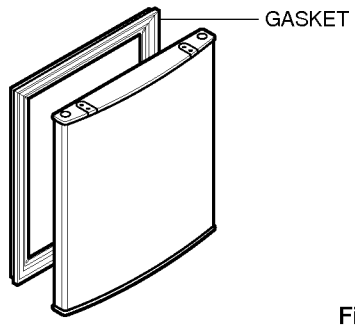


Figure 7

● **Refrigerator Door**

1) Loosen hexagonal bolts fixing the center hinge(Hinge,C) to the body to remove the refrigerator door only.

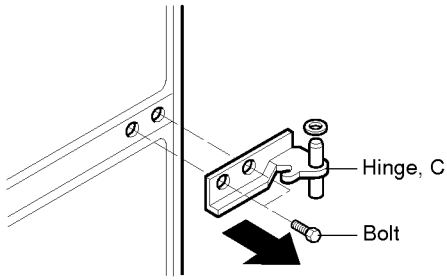


Figure 8

2) Pull out the Door Gasket to remove from the Door Foam Assy, R.

2 DOOR SWITCH

1) Loosen four screws in upper part and disconnect top cover.
2) Disconnect Lead Wire from switch.
3) Disengage hook behind the switch by pressing it with hands.

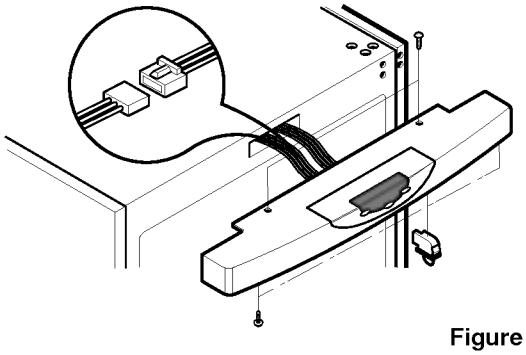


Figure 9

3 REFRIGERATOR ROOM LAMP

1) Remove the Cover Lamp, R by pulling with a '–' type driver.
2) Remove the Lamp by turning.

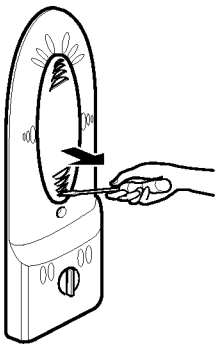


Figure 10

3) After removing the lamp, you must check the O-RING, which is made by rubber and prevent electric spark, in the socket.

4 FAN AND FAN MOTOR

1) Remove freezer drawers.
2) Remove two cap, screws and loosen two screws in Grille Fan.
3) Pull out the Grille Fan and Shroud, F.
4) Disconnect the housing of lead wire.
5) Separate the Fan Assy.
6) Losse 2 screw fixed to the Bracket.
7) Pull out Shroud, F remove the Fan Motor Assy.
8) Separate the Motor Bracket and Rubber.

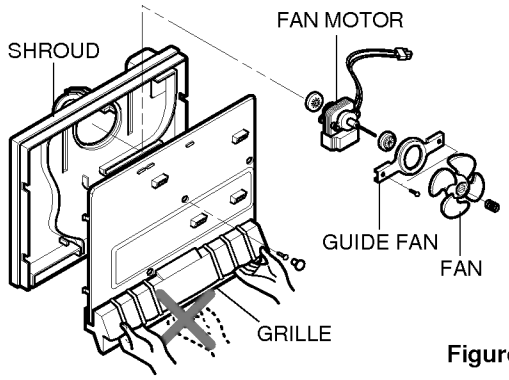


Figure 11

5 DEFROST CONTROL ASSY

Defrost Control Assy consists of Thermistor and Fuse, Melting. Thermistor functions to defrost automatically and it is attached to metal side of the Evaporator and senses temperature.

Fuse, Melting is a kind of safety device for preventing overheating of the Heater when defrosting.

At the temperature of 72℃, it stops the emission of heat from the Heater.

1) Pull out the Shroud, F after removing the Grille.
2) Separate the connector connected with the Defrost Control Assy and replace new one.

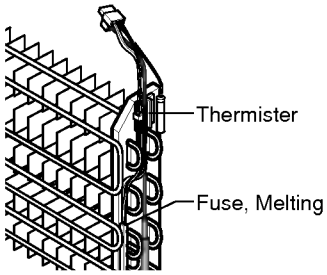


Figure 12

6 DAMPER CONTROL

1) Remove the Cover Lamp, R and loosen 2 screw.
2) Pull the Control Box, R and separate the lead wire housing.
3) Remove the Cover Lamp, R.
4) Separate the Insulation Multi Duct and Control Box, R.
5) Disassemble the Knob.
6) Separate the Damper Control and Control Box, R.
7) Separate the Damper Control and Resistor.
8) Disconnect the lead wire.

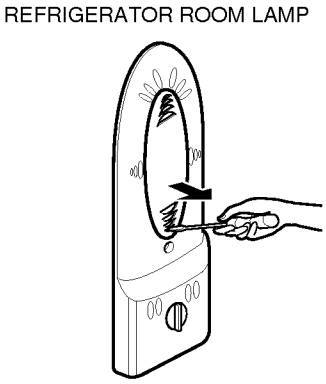


Figure 13

7 HEATER, SHEATH & HEATER, CORD-L

In this refrigerator, Heater, Sheath & Heater, Cord-L are used for defrosting heater. During heating, the temperature of heater rises about 300~350℃. Therefore, be careful not to burn while servicing.

1) After removing the Grille and Shroud, separate the Heater, Sheath by disconnecting the connectors.
2) Exchanged Heater, Sheath and connected the housing.

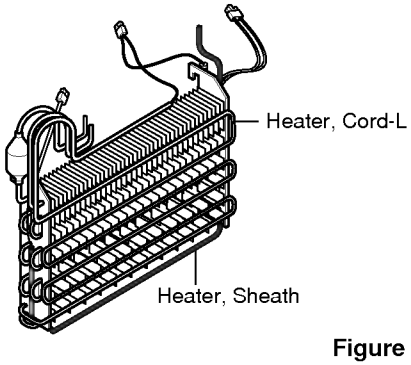


Figure 14

3) If the Heater, Cord-L is defected, disconnect the connectors, and separate the Heater, Cord-L with Long Nose.
4) Replace and assembly the Heater, Cord-L and connect the connectors.

ADJUSTMENT

1 COMPRESSOR

1) Role

The compressor intakes low temperature and low pressure gas evaporated from Evaporator of the Refrigerator, and condenses this gas to high temperature and high pressure gas, and then plays delivering role to Condenser.

2) Composition

The Compressor is Composed of Compressor Apparatus compressing gas, Compressor Motor moving Compressor Apparatus and Case protecting Compressor Apparatus and Motor. There is Relay Assy (one set of PTC-Starter and Over Load Protector (OLP)) in Compressor. On the other hand, because the Compressor consists of 1/1000mm processing precision components and is sealed after production in absence of dust or humidity, deal and repair with care.

3) Note for Usage

(1) Be careful not to allow over-voltage and over-current.

(2) No Strike
If applying forcible power or strike (dropping or careless dealing), poor operation and noise may occur.

(3) Use proper electric components appropriate to the Compressor.

(4) Note to Keep Compressor.
If Compressor gets wet in the rain and rust in the pin of Hermetic Terminal, the result may be poor operation and poor contact may cause.

(5) Be careful that dust, humidity, and flux welding don't inflow in the Compressor inside in replacing the Compressor. Dust, humidity, and flux due to welding which inflows to Cylinder may cause lockage and noise.

2 PTC-STARTER

1) Composition of PTC-Starter

(1) PTC (Positive Temperature Coefficient) is a no-contact semiconductor starting device which uses ceramic material and this material consists of $BaTiO_3$.

(2) The higher the temperature is, the higher becomes the resistance value. These features are used as starting device for the Motor.

2) Role of PTC-Starter

(1) PTC is attached to Hermetic Compressor used for Refrigerator, Show Case and starts Motor.

(2) Compressor for household refrigerator applies to single-phase induction Motor.
For normal operation of the single-phase induction motor, in the starting operation flows in both main coil and sub-coil. After the starting is over, the current in subcoil is cut off. The proper features of PTC play all the above roles. So, PTC is used as a motor starting device.

3) PTC-Applied Circuit Diagram

● **According to Starting Method for the Motor**

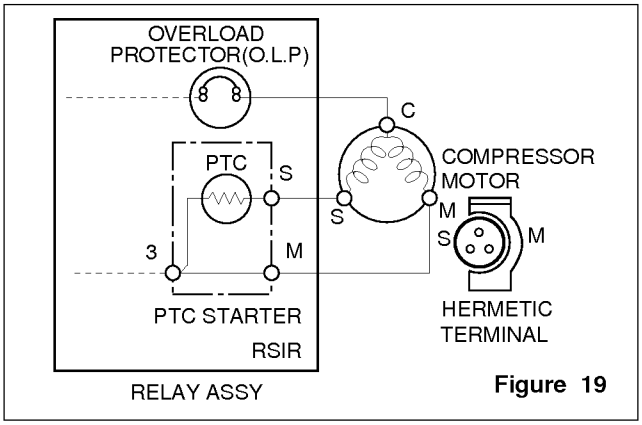


Figure 19

4) Motor Restarting and PTC Cooling

(1) For restarting after power off during normal Compressor Motor operation, plug the power cord after 5 min. for pressure balance of Refrigerating Cycle and PTC cooling.

(2) During normal operation of the Compressor Motor, PTC elements generate heat continuously. Therefore, if PTC isn't cooled for a while after the power has been shut off, Motor can't operate again.

5) Relation of PTC-Starter and OLP

(1) If the power is off during operation of Compressor and the power is on before the PTC is cooled, (instant shut-off within 2 min. or reconnect a power plug due to misconnecting), the PTC isn't cooled and a resistance value grows. As a result, current can't flow to the sub-coil and the Motor can't operate and the OLP operates by flowing over current in only in the main-coil.

(2) While the OLP repeats on and off operation about 3-5 times, PTC is cooled and Compressor Motor performs normal operation.
If OLP doesn't operate when PTC is not cooled, Compressor Motor is worn away and causes circuit-short and fire. Therefore, use a properly fixed OLP without fail.

6) Note to Use PTC-Starter

(1) Be careful not to allow over-voltage and over-current.

(2) No Strike
Don't apply a forcible power or strike.

(3) Keep apart from any liquid.
If liquid such as oil or water away enter the PTC, PTC materials it may break due to insulation breakdown of the material itself.

(4) Don't change PTC at your convenience.
Don't disassemble PTC and mold. If the exterior to the PTC-starter is damaged, resistance value is altered and it may cause poor starting of the compressor motor may cause.

(5) Use a properly fixed PTC.

3 OLP (OVER LOAD PROTECTOR)

1) Definition of OLP

(1) OLP (OVER LOAD PROTECTOR) is attached to the Hermetic Compressor and protects the Motor by cutting off current in Compressor Motor in case of over-rising temperature by Bimetal in the OLP.

(2) When over-voltage flows to Compressor motor, the Bimetal works by heating the heater inside the OLP, and the OLP protects Motor by cutting off current which flows to the Compressor Motor.

2) Role of the OLP

(1) The OLP is attached to the Hermetic Compressor used for the Refrigerator and Show Case and prevents the Motor Coil from being started in the Compressor.

(2) Do not turn the Adjust Screw of the OLP in any way for normal operation of the OLP.
(Composition and connection Diagram of OLP)

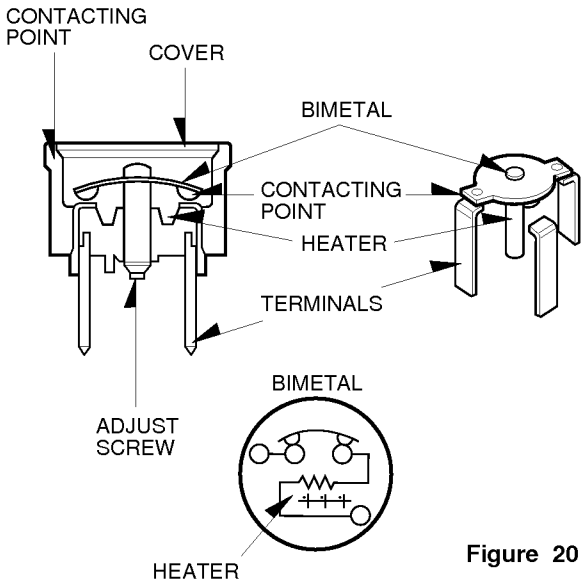
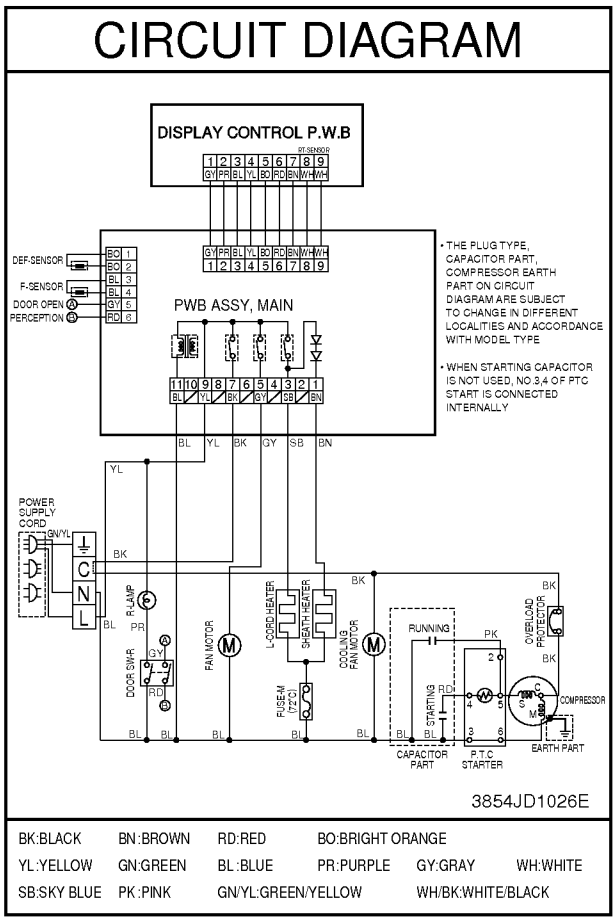


Figure 20

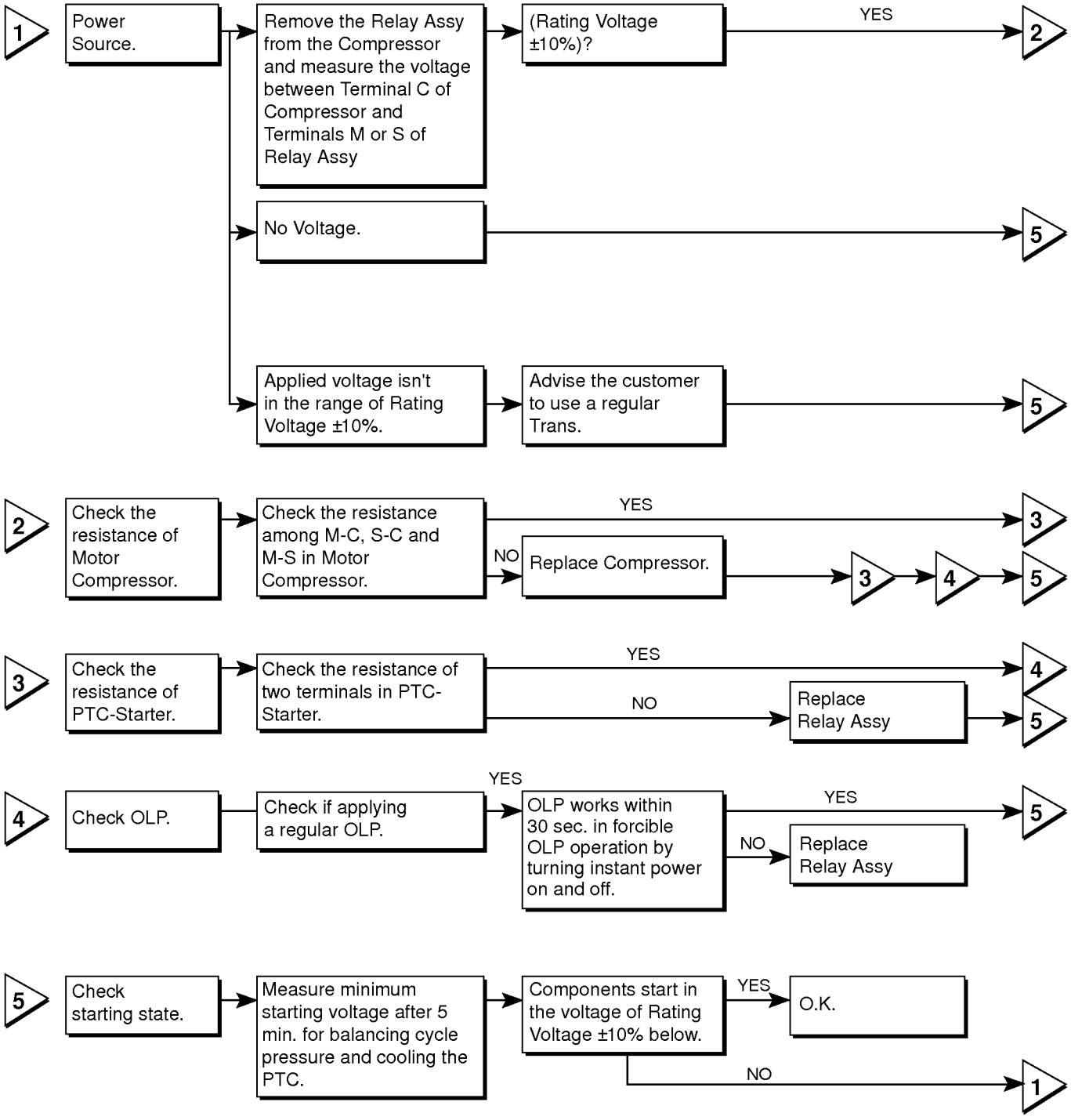
CIRCUIT DIAGRAM



NOTE : 1. This is a basic diagram and specifications vary in different localities.

TROUBLESHOOTING (Mechanical Part)

1 COMPRESSOR AND ELECTRIC COMPONENTS



2 RELAY ASSY (PTC AND OLP)

Normal operation of Compressor is impossible or poor.

Separate the Relay Assy from Compressor and measure the resistance between M and S with a Tester or Whistone Bridge. (Figure 21)

Observation value is
220V/50Hz : 22Ω±30%
115V/60Hz : 6.8Ω±30%
240V/50Hz : 33Ω±30%
127, 220V/60Hz :
22Ω±30%

Check another electric components.

The resistance value is 0 or serveral hundreds Ω.

Replace Relay Assy.

The value is ∞.

Separate the Relay Assy from the Compressor and check the resistance value between two terminals of OLP with a Tester.

YES → Check another electric components.

NO → Replace Relay Assy.

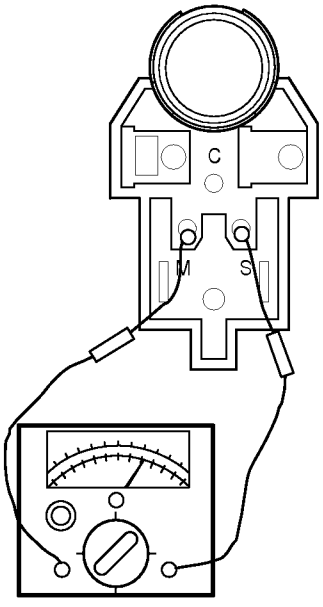


Figure 21

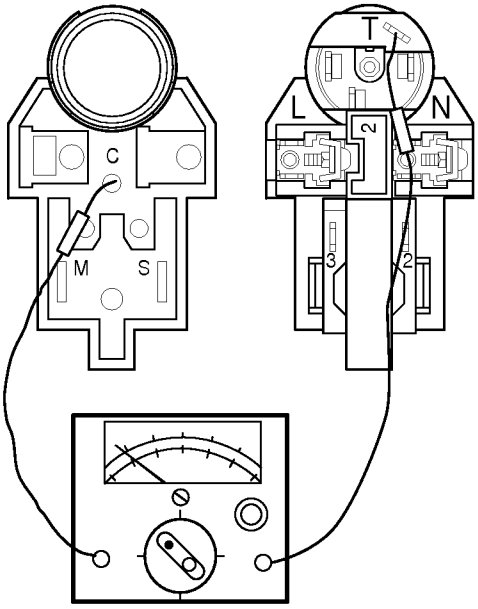
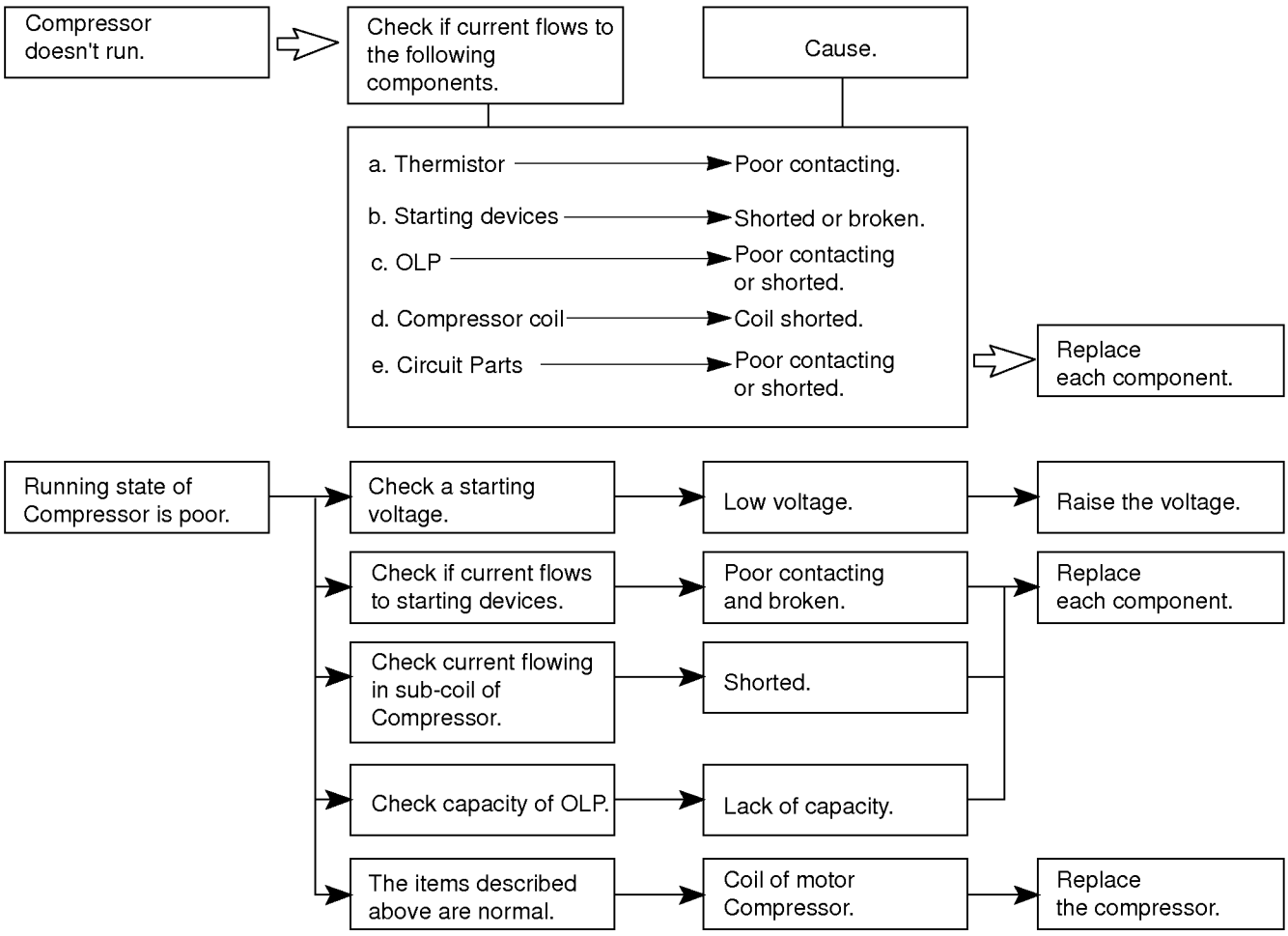


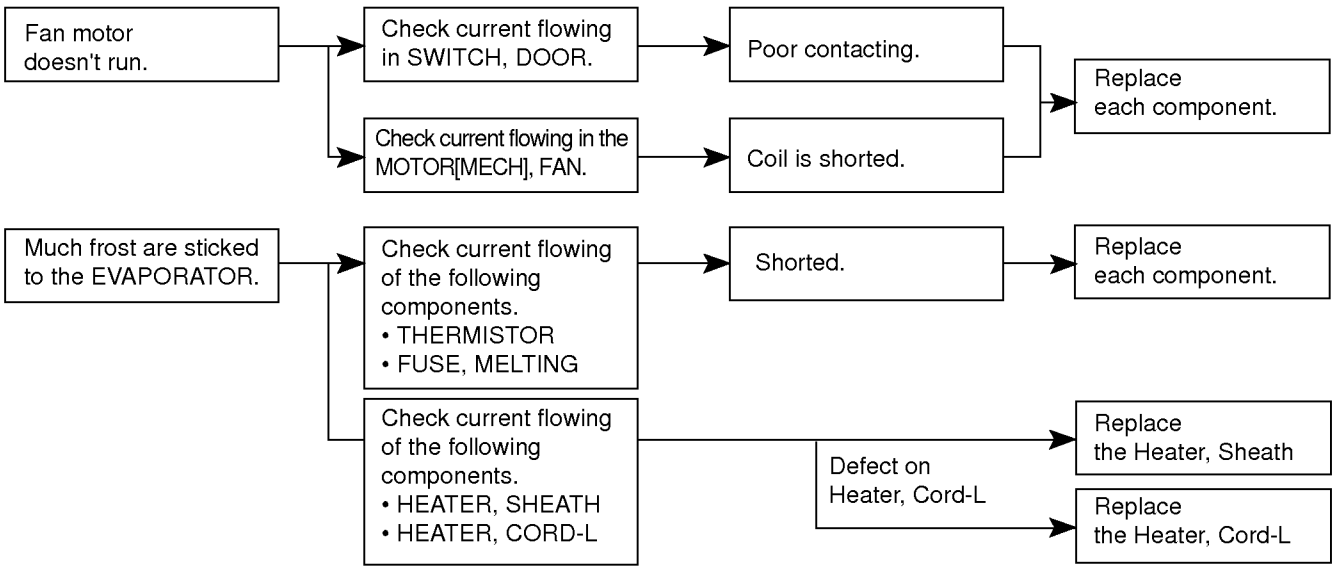
Figure 22

3 ANOTHER ELECTRIC COMPONENTS

▼ Cooling is impossible



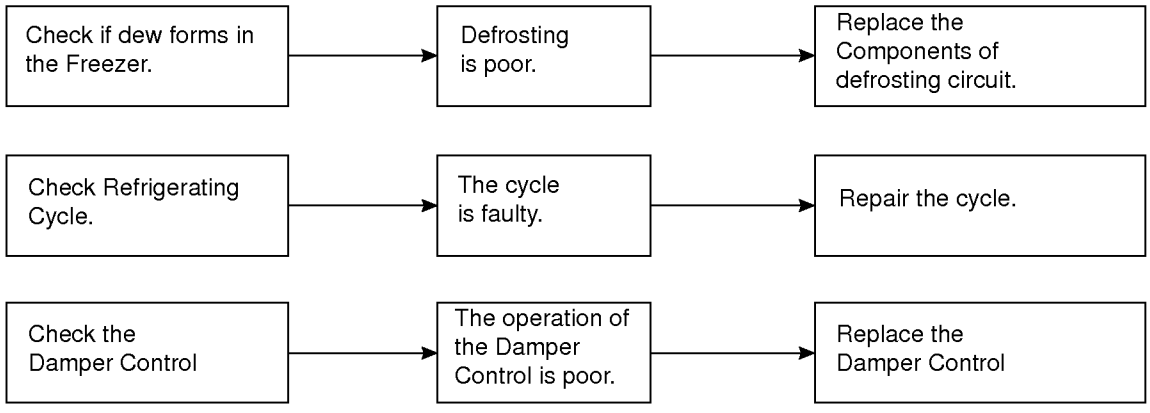
▼ Cooling ability is poor



4 SERVICE DIAGNOSIS CHART

COMPLAINT	POINTS TO BE CHECKED	REMEDY
Cooling is impossible.	• Is the power cord unplugged from the outlet? • Check if the power switch is set to OFF. • Check if the fuse of power switch is shorted. • Measure the voltage of power outlet.	• Plug to the outlet. • Set the switch to ON. • Replace a regular fuse. • If voltage is low, wire newly.
Cooling ability is poor.	• Check if the set is placed close to wall. • Check if the set is placed close to stove, gas cooker and direct rays. • Is the ambient temperature high or the room door closed? • Check if put in is hot. • Did you open the door of the set too often or check if the door is closed up? • Check if the Damper Control is set to "cold-position".	• Place the set with the space of about 10cm. • Place the set apart from these heat appliances. • Make the ambient temperature below. • Put in foods after cooled down. • Don't open the door too often and close it firmly. • Set the control to mid-position.
Foods in the Refrigerator are frozen.	• Is foods placed in cooling air outlet? • Check if the control is set to "cold-position". • Is the ambient temperature below 5°C?	• Place foods in high temperature section. (Front Part) • Set the control to "mid-position". • Set the control to "warm-position".
Dew or ice forms in the chamber of the set.	• Is liquid food stored? • Check if put in is hot. • Did you open the door of the set too often or check if the door is closed up.	• Seal up liquid foods with wrap. • Put in foods after cooled down. • Don't open the door too often and close it firmly.
Dew forms in the Exterior Case.	• Check if ambient temperature and humidity of surroumcling air are high. • Is there gap in the door packed?	• Wipe dew with a dry cloth. This occurrence is solved naturally in low temperature and humidity. • Fill up the gap.
Abnormal noise generates.	• Are the set positioned in a firm and even place? • Are any unnecessary objects set in the back side of the set? • Check if the Tray Drip is not firmly fixed. • Check if the cover of mechanical room in below and front side is taken out.	• Adjust the Adjust Screw, and position in the firm place. • Remove the objects. • Fix it firmly on the original position. • Place the cover at the original position.
To close the door is not handy.	• Check if the door packing is dirty with filth such as juice. • Is the set positioned in a firm and even place? • Is too much food putted in the set?	• Clean the door packing. • Position in the firm place and adjust the Adjust Screw. • Keep foods not to reach the door.
Ice and foods smell unpleasant.	• Check if the inside of the set is dirty. • Did you keep smelly foods without wrapping? • It smells of plastic.	• Clean the inside of the set. • Wrap smelly foods. • The new products smells of plastic, but it is eliminated after 1-2 weeks.

● In addition to the items described left, refer to the followings to solve the complaint.



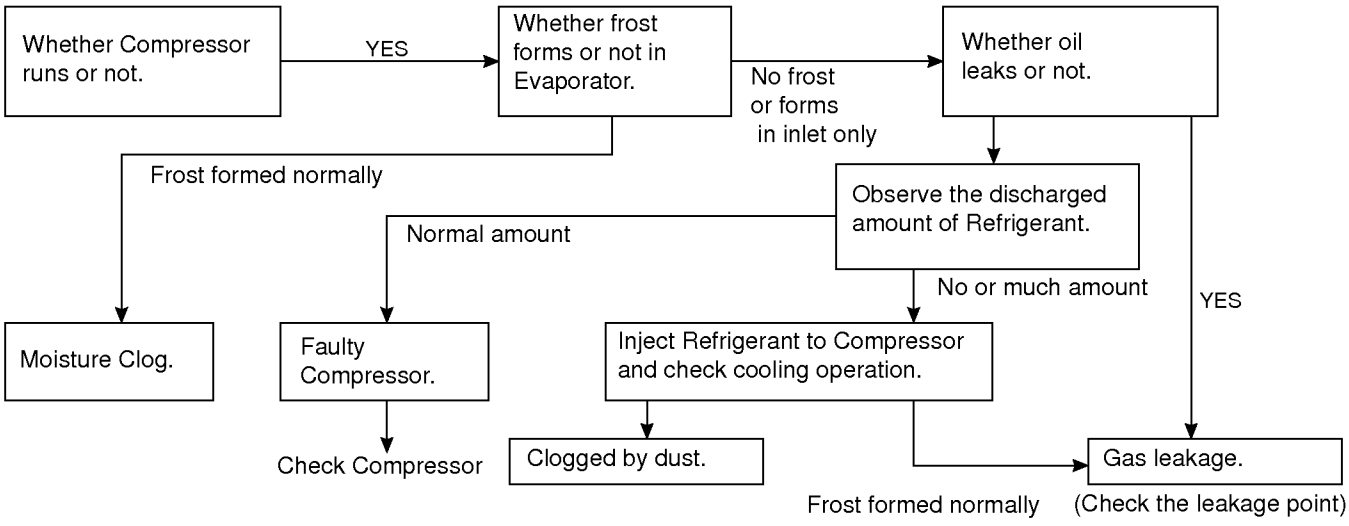
5 REFRIGERATING CYCLE

▼ **Troubleshooting Chart**

CAUSE		STATE OF THE SET	STATE OF THE EVAPORATOR	TEMPERATURE OF THE COMPRESSOR	REMARKS
LEAKAGE	PARTIAL LEAKAGE	Freezer room and Refrigerator don't cool normally.	Low flowing sound of Refrigerant is heard and frost forms in inlet only	A little high more than ambient temperature.	• A little Refrigerant discharges. • Normal cooling is possible when injecting of Refrigerant the regular amount.
	WHOLE LEAKAGE	Freezer room and Refrigerator don't cool normally.	Flowing sound of Refrigerant is not heard and frost isn't formed.	Equal to ambient temperature.	• No discharging of Refrigerant. • Normal cooling is possible when injecting of Refrigerant the regular amount.
CLOGGED BY DUST	PARTIAL CLOG	Freeze room and Refrigerator don't cool normally.	Flowing sound of Refrigerant is heard and frost forms in inlet only.	A little high more than ambient temperature.	• Normal discharging of refrigerant. • The capillary tube is faulty.
	WHOLE CLOG	Freezer room and Refrigerator don't cool.	Flowing sound of Refrigerant is not heard and frost isn't formed.	Equal to ambient temperature.	• Normal discharging of Refrigerant.
MOISTURE CLOG		Cooling operation stops periodically.	Flowing sound of Refrigerant is not heard and frost melts.	Low than ambient temperature	• Cooling operation restarts when heating the inlet of capillary tube.
DEFECTIVE COMPRESSION	COMP-RESSION	Freezer and Refrigerator don't cool.	Low flowing sound of Refrigerant is heard and frost forms in inlet only.	A little high than ambient temperature.	• The pressure of high pressure part in compressor is low.
	NO COMP-RESSION	No compressing operation.	Flowing sound of Refrigerant is not heard and no frost.	Equal to ambient temperature.	• No pressure of high pressure part in the compressor.

▼ **Leakage Detection**

● Observe discharging point of refrigerant which may be in the oil discharging part in the compressor and hole of evaporator.



▼ **General Control of Refrigerating Cycle**

NO.	ITEMS	CONTENTS AND SPECIFICATIONS	REMARKS
1	WELDING ROD	(1) H 30 • Chemical Ingredients Ag: 30%, Cu: 27%, Zn: 23%, Cd: 20% • Brazing Temperature: 710~840℃ (2) Bcup-2 • Chemical Ingredients Cu: About 93% P: 6.8~7.5% The rest: within 0.2% • Brazing Temperature: 735~840℃	• Recommend H34 containing 34% Ag in the Service Center.
2	FLUX	• Ingredients and how to make Borax 30% Borax 35% Fluoridation kalium: 35% Water: 4% Mix the above ingredients and boil until they are transformed into liquid.	• Make amount for only day. Holding period: 1 day • Close the cover of container to prevent dust putting in the FLUX. • Keep it in a stainless steel container.
3	LOKRING (Figure 23,24)	(1) Both of the tube is inserted up to the stop. (2) Both of the LOKRING is pushed up to the stop (3) The bending point is not too close to the joint ending. (4) During the assembly it is important that both ends remain completely within the joint.	• For a hermetically sealed metal/metal connection, the tube ends have to be clean. • LOKPREP is distributed all of out-surface of the tube ends.
4	DRIER ASM	(1) Assemble the drier within 30min. after unpacking. (2) Keep the unpacked drier at the temperature of 80~100℃.	• Don't keep the drier in a outdoors because humidity damages to it.
5	VACUUM	(1) When measuring with pirant Vacuum gauge the charging M/C, vacuum degree is within 1 Torr. (2) If the vacuum degree of the cycle inside is 10 Torr. below for low pressure and 20 Torr. for high pressure, it says no vacuum leakage state. (3) Vacuum degree of vacuum pump must be 0.05 Torr. below after 5 min. (4) Vacuum degree must be same to the value described item (2) above for more than 20 min.	• Apply M/C Vacuum Gauge without fail. • Perform vacuum operation until a proper vacuum degree is built up. • If a proper vacuum degree isn't built up, check the leakage from the Cycle Pipe line part and Quick Coupler Connecting part.
6	DRY AND AIR NITROGEN GAS	(1) The pressure of dry air must be more han 12~16kg/cm^2 (2) Temperature must be more than -20~-70℃. (3) Keep the pressure at 12~6kg/cm^2 also when substituting dry air for Nitrogen Gas.	
7	NIPPLE AND COUPLER	(1) Check if gas leaks with soapy water. (2) Replace Quick Coupler in case of leakage.	• Check if gas leaks from joint of the Coupler.
8	PIPE	• Put all Joint Pipes in a clean box and cover tightly with the lid so that dust or humidity is not inserted.	

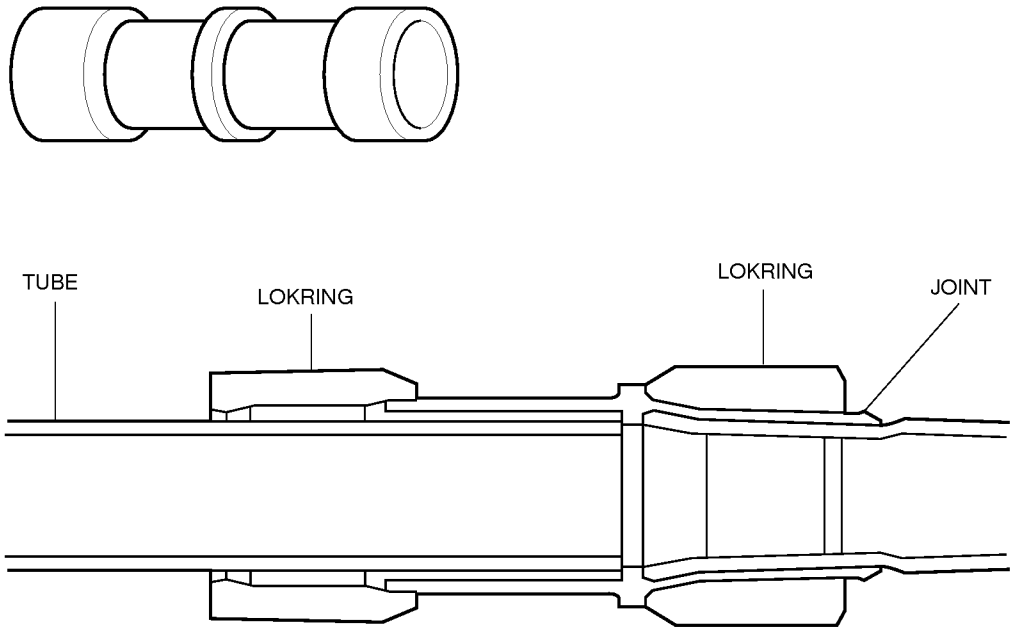


Figure 23. LOKRING

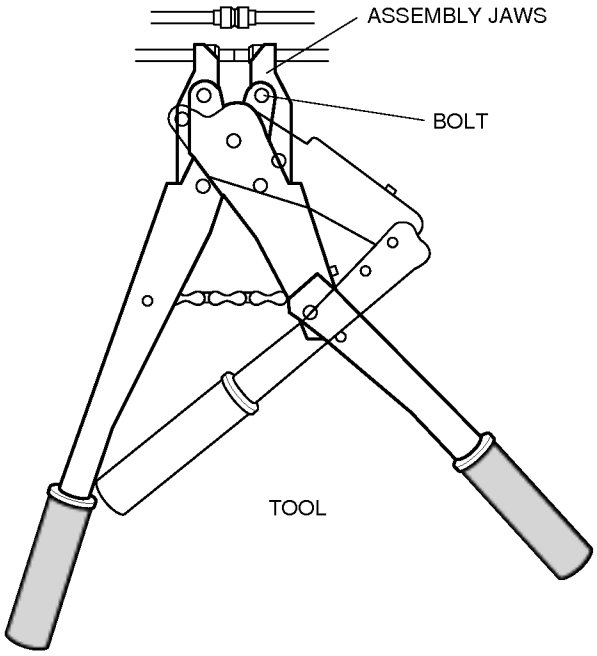


Figure 24. LOKRING TOOL

MICOM FUNCTION & PCB CIRCUIT EXPLANATION

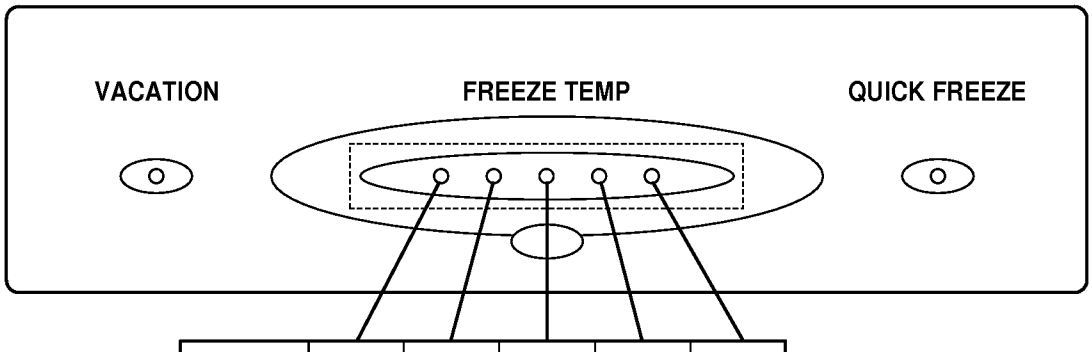
This description is made for GR-349, 389SQ. Please refer to overall PCB circuits for other models.

1 FUNCTION EXPOSITION

1) FUNCTION

(1) The refrigerator starts from optimum condition when electric power is first on. But the operation condition changes "Mid" → "Mid/Max" → "Max" → "Min" → "Min/Mid" → "Mid" whenever pressing the FREEZE TEMP button.

(2) It returns to "Mid" conditions if power off and on again.



NOTCH	Min	Min/ Mid	Mid	Mid/ Max	Max
TEMP(˚C)	-15	-16.5	-18	-19.5	-22
ROOM	FREEZER				

2) QUICK FREEZER

(1) Function to raise the freezing speed by operating the COMP successively. As pressing the QUICK FREEZE button, the QUICK FREEZE LED is displayed. Then after 3 hours' successive operation of COMP, the QUICK FREEZING function will be released.

(2) Defrosting During the QUICK FREEZING operates as follow.
When the QUICK FREEZING time is below 90 minutes, defrost and then operate the QUICK FREEZING for the remaining time. When the QUICK FREEZING time is over 90 minutes, defrost and then operate the QUICK FREEZING for 2 hours

(3) If QUICK FREEZE button is pressed during defrosting, the QUICK FREEZE LED is lit up. But the QUICK FREEZING operates for 3 hours after 7 minutes from the end of defrosting.

(4) If VACATION button is pressed during the QUICK FREEZING, the QUICK FREEZING LED function is released.

(5) If power off during the QUICK FREEZING and power on again, the QUICK FREEZING function is released.

3) VACATION FUNCTION

(1) Function for Energy Saving. As pressing the VACATION button, the VACATION LED is displayed and this function is operated.

(2) Freezer Compartment is not kept by compressor at the notch displayed but at -13°C± differential.

(3) Defrosting and Fan control is same as normal operation.

(4) If QUICK FREEZE button is pressed during the VACATION FUNCTION, VACATION FUNCTION is released.

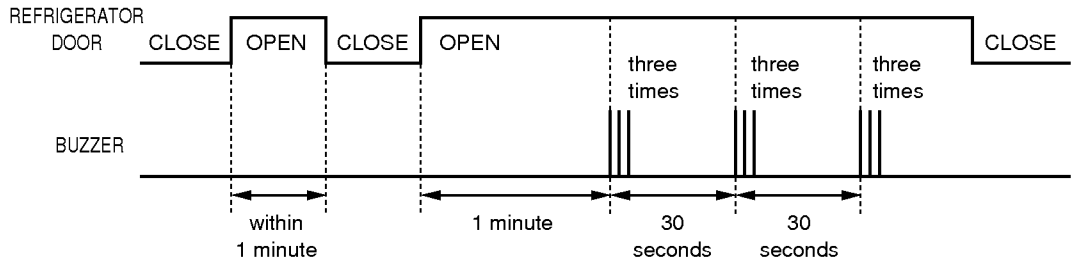
(5) If power off during the VACATION FUNCTION and power on again, the VACATION FUNCTION is released.

4) DOOR OPENING ALARM

(1) When the REFRIGERATOR DOOR is opened and won't be closed after 1 minute from the its opened, BUZZER sounds to notify it.

(2) At frist, BUZZER sounds three times at each intervals of 0.5 second. Then makes a 0.5 second ON/OFF alarm three times at intervals of 30 seconds.

(3) If the REFRIGERATOR door closed during ALARM, it is released.



5) DISPLAY BUTTON RING

(1) If display function button(FREEZE TEMP, QUICK FREEZE, VACATION) of the front of the TOP COVER is pushed, BUZZER rings with "DING~ DONG~"(See the BUZZER OPERATION CHECK)

6) DEFROSTING

(1) If the accumulated time for the operation of the COMPRESSOR is meet with 7 hours, the DEFROSTING HEATER is started.

(2) The first defrosting is performed at 4 hours(compressor ON) later since the power is on.

(3) If DEFROST SENSOR is over 7°C during DEFROSTING, end the operation of DEFROSTING with DEFROSTING HEATER paused, And after 7 minutes, the operation for the freezing is started.
But, if DEFROST SENSOR is not reach to 7°C after 2 hours' operation of the defrosting heater, it represents a defrosting trouble.(See the TROUBLE REPRESENTING FUNCTION)

(4) If DEFROST SENSOR is short or open, defrosting is not performed.

7) ORDERLY OPERATION OF ELECTRIC PARTS

To avoid NOISE and DAMAGE, the items containing an electric parts such as COMP, DEFROSTING HEATER and FAN MOTOR operate in order as follows.

	OPERATION STATE	OPERATION ORDER
WHEN PLUGGED AT FIRST	WHEN DEFROST SENSOR TEMPERATURE IS OVER 7℃. (WHEN PURCHASING OR MOVING)	**POWER ON** → after 0.5 sec. → **COMP ON** → after 0.5 sec. → **FAN ON**
	WHEN DEFROST SENSOR TEMPERATURE IS BELOW 7℃. (WHEN POWER FAILURE OR SERVICING)	**POWER ON** → after 0.5 sec. → **DEFROSTING HEATER ON** → after 10 sec. → **DEFROSTING HEATER ON** after 0.5 sec. → **COMP ON** → after 0.5 sec. → **FAN ON**
WHEN RETURNING TO NORMAL STATE FROM TEST MODE		**All Elec. Parts OFF** → after 7 min . → **COMP ON** → after 0.5 sec. → **FAN ON**

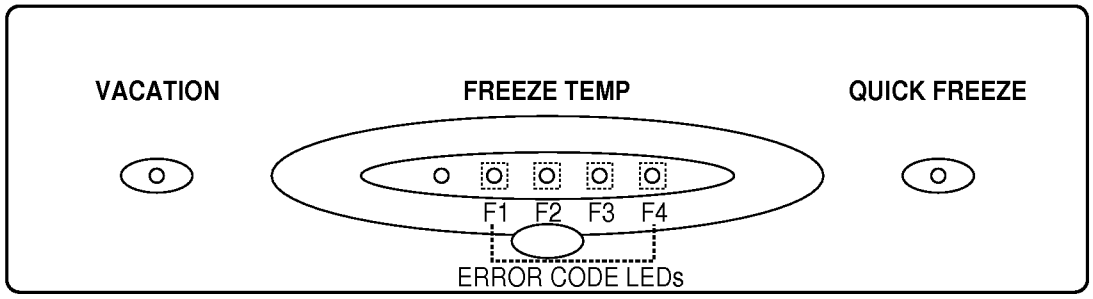
8) SELF-TEST

(1) Function to make service easy in case of occuring a trouble in the product.

(2) When occurring a trouble, if the button is pushed, but the function could not operate.

(3) If a toruble release during the representation of trouble, a refrigerator performs the normal function(RESET).

(4) To represent a ERROR CODE, it use FREEZE TEMP LEDs on TOP COVER. If ERROR occurs, the other LEDs except ERROR CODE LEDs are all off.



O : OPERATE NORMAL

☼ :ON

● :OFF

NO.	ITEMS	ERROR CODE LEDs F1 F2 F3 F4	DESCRIPTION	OPERATION IN TROUBLE'S OCCURRING		
				COMP	FAN	DEFROST HEATER
1	FREEZER SENSOR abnormal	☼ ● ● ●	FREEZER SENSOR open or short.	15 minutes On/ 15 minutes Off	O	O
2	DEFROST SENSOR abnormal	● ● ☼ ●	DEFROST SENSOR open or short.	O	O	No defrosting
3	DEFROSTING FUNCTION is abnormal	☼ ☼ ☼ ☼	DEFROST HEATER, TEMP. FUSE open or disconnection (Displayed after at least 4 hours from the trouble's occurring.)	O	O	O
4	RT-SENSOR abnormal	NOTE 1)	Room Temperature SENSOR open or short	O	O	O

* NOTE 1) If one second pass after pressing the QUICK FREEZE and FREEZE TEMP buttons togather in normal operation, operates as follow.

RT-SENSOR ┌ If normal, LEDs on the TOP COVER is all on.
└ If abnormal, LEDs are all on except VACATION LED.

9) FUNCTION TEST

(1) Function to check the testing function of PCB and refrigerator and to find where the trouble.

(2) The test switch is on the MAIN PCB of refrigerator.
TEST FUNCTION is released and RESET after MAX. 2hours regardless of TEST MODE.

(3) If the buttons on TOP COVER is pushed during TEST MODE, Function is not operated and only BUZZER ring with "DING~ DONG~"

(4) After the end of TEST MODE, pull out the power cord and plug it in again(RESET).

(5) If a ERROR occurs during the TEST MODE, TEST FUNCTION is released and DISPLAY LEDs represent ERROR CODE.

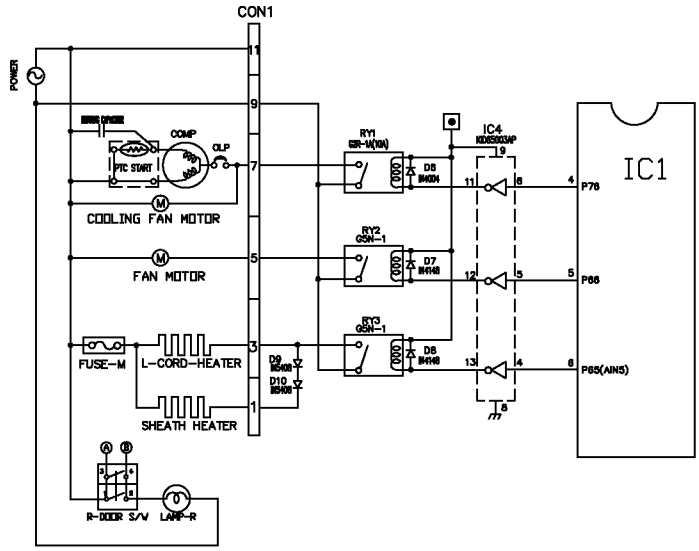
(6) If the TEST swithch is pushed during ERROR CODE, TEST FUNCTION is not operated.

MODE	OPERATION	CONTENTS	REMARKS
TEST 1	Press TEST button once.	1. COMP OPERATES SUCCESSIVELY. 2. FAN OPERATES SUCCESSIVELY. 3. DEFROSTING HEATER OFF 4. ALL DISPLAY LEDS ON.	
TEST 2	Press TEST button once in the state of TEST MODE 1.	1. COMP OFF. 2. FAN OFF. 3. DEFROST HEATER ON. 4. ALL THE DISPLAY LEDS OFF EXCEPT QUICK FREEZE AND VACATION LEDS.	If DEFROST HEATER is over 7℃, it returns to the NORMAL STATE.
NORMAL STATE	Press TEST button once in the state of TEST MODE 2.	Return to the initial condition. (RESET)	Comp starts after 7 minutes.

• **LED Check Function :** Press the QUICK FREEZE and FREEZE TEMP buttons at the same time. After 1 sec., all the LEDs of the DISPLAY are ON simultaneously. If release the BUTTON, return to the previous condition.

4) LOAD/BUZZER OPERATION, DOOR OPENING SENSING CIRCUIT

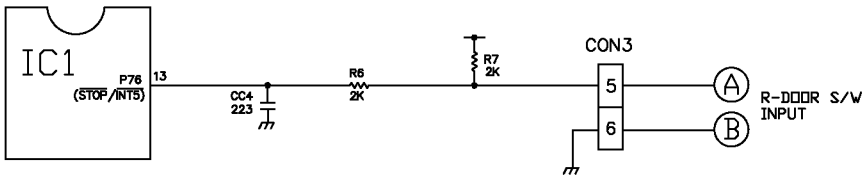
(1) LOAD OPERATION CHECK



KIND OF LOAD		COMP, COMP COOLING FAN	FAN MOTOR	DEFROSTING HEATER
MEASURING POINT (IC4)		No.11	No.12	No.13
STATE	ON	below 1V		
	OFF	12V		

- If the DOOR-R is opened during FAN MOTOR is operated, FAN MOTOR is stopped immediately.
- The Ⓐ , Ⓑ of DOOR S/W-R is connected DOOR OPEN DETECTION CIRCUIT as follow.
- If the DOOR-R is opened or closed, then the DOOR S/W-R is ON/OFF, and the LAMP-R is ON/OFF, and at the same time, S/W of the Ⓐ, Ⓑ of DOOR S/W-R for detection of DOOR-R open is ON/OFF.

(2) DOOR OPENING PERCEPTION CHECK

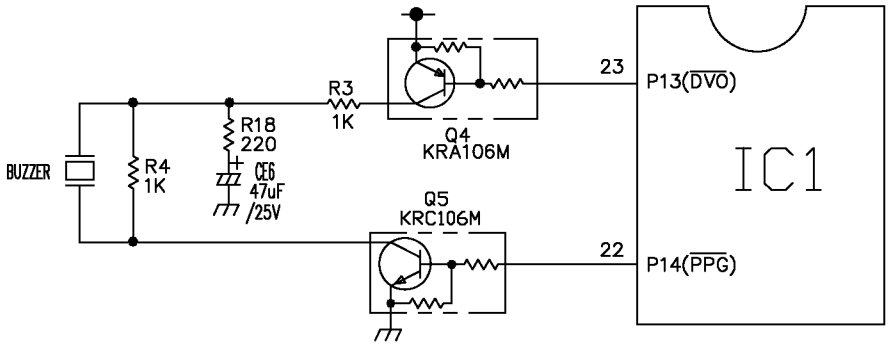


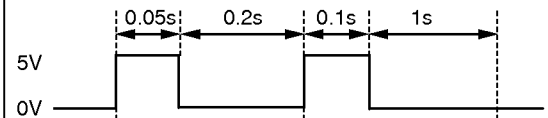
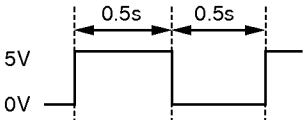
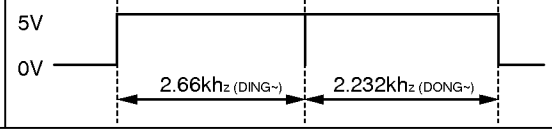
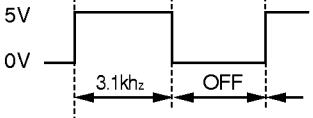
*NOTICE: If you would change DOOR S/W-R, must use the componenot of right PART NUMBER. Because there is a similar type DOOR S/W-R of NOT MICOM MODEL, it's logic of the A , B of DOOR S/W-R is reversed.

MEASURING POINT / REFRIGERATOR DOOR	NO.13 OF IC 1 (MICOM)
CLOSE	5V(S/W of Ⓐ , Ⓑ is OFF state)
OPEN	0V(S/W of Ⓐ , Ⓑ is ON state)

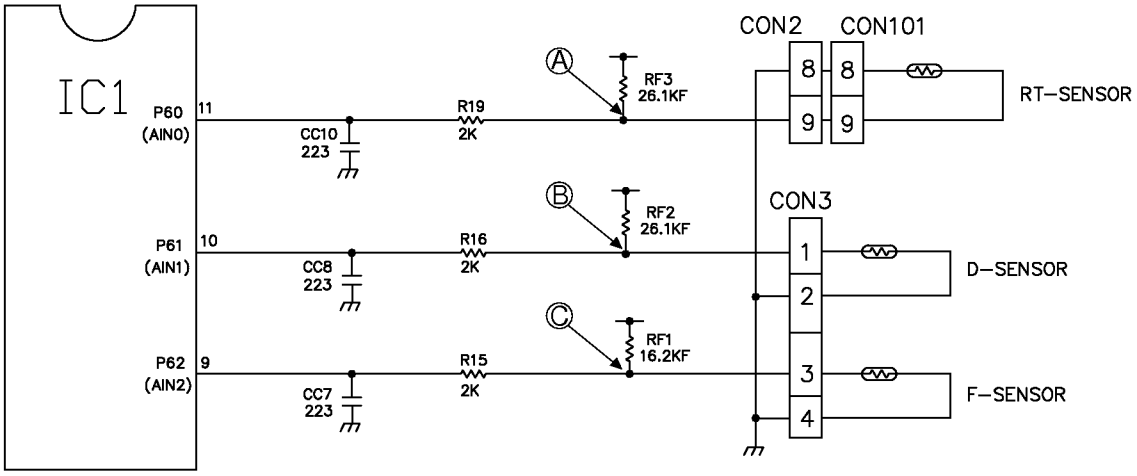
- Even though LAMP-R is operated a normal ON/OFF according to DOOR S/W-R, but the MICOM couldn't detect a DOOR-R opened or closed of lead wire of the Ⓐ , Ⓑ is abnormal or S/W of the Ⓐ , Ⓑ of DOOR S/W-R is abnormal.
- When DOOR-R open isn't detected : Even though DOOR-R is opened, FAN MOTOR couldn't stop.
  When DOOR-R close isn't detected : Even though DOOR-R is closed, BUZZER sounds a DOOR OPEN ALARM.
  check a lead wire of the Ⓐ , Ⓑ and DOOR S/W-R.

(3)BUZZER OPERATION CHECK



CONDITIONS / MEASURING POINT	DISPLAY FUNCTION BUTTON RING (DING~ DONG~)	DOOR OPEN ALARM (SCREECHING)	OFF
IC1 (No.23 Pin)			0V
IC1 (No.22 Pin)			0V

5) TEMP SENSOR CIRCUITS

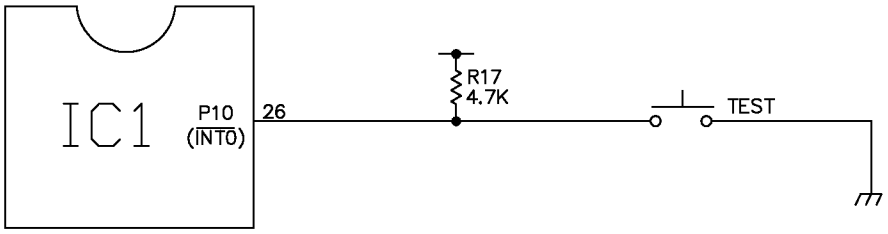


The above circuit reads the surrounding temperature, DEFROSTING temperature and FREEZER ROOM temperature into MICOM(IC1). OPEN or SHORT state of each SENSOR is as follows.

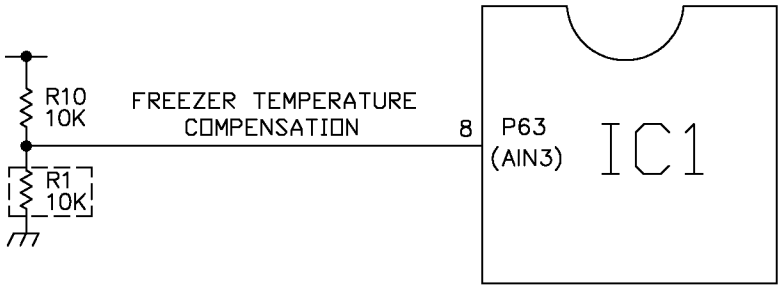
SENSOR	CHECK POINT	NORMAL (-30℃~50℃)	SHORT	OPEN
ROOM TEMPERATURE SENSOR	POINT Ⓐ Voltage	0.5V ~ 4.5V	0V	5V
DEFROST SENSOR	POINT Ⓑ Voltage			
FREEZER SENSOR	POINT Ⓒ Voltage			

6) SWITCH INPUT CIRCUIT

The following circuit is a test switch input circuit for checking the refrigerator.



7) TEMPERATURE COMPENSATION



FREEZER ROOM		REMARKS
RESISTANCE VALUES(R1)	TEMPERATURE COMPENSATION	
180 kΩ	+ 5.0°C	COMPENSATE WARMLY
56 kΩ	+4.0°C	
33 kΩ	+3.0°C	
18 kΩ	+2.0°C	
12 kΩ	+1.0°C	
10 kΩ	0°C	STANDARD
8.2 kΩ	-1.0°C	
5.6 kΩ	-2.0°C	
3.3 kΩ	-3.0°C	
2 kΩ	-4.0°C	
470 Ω	-5.0°C	COMPENSATE COOLLY

• TEMPERATURE COMPENSATION TABLE by adjusting resistance values. (the temp difference compared to the present temp.)

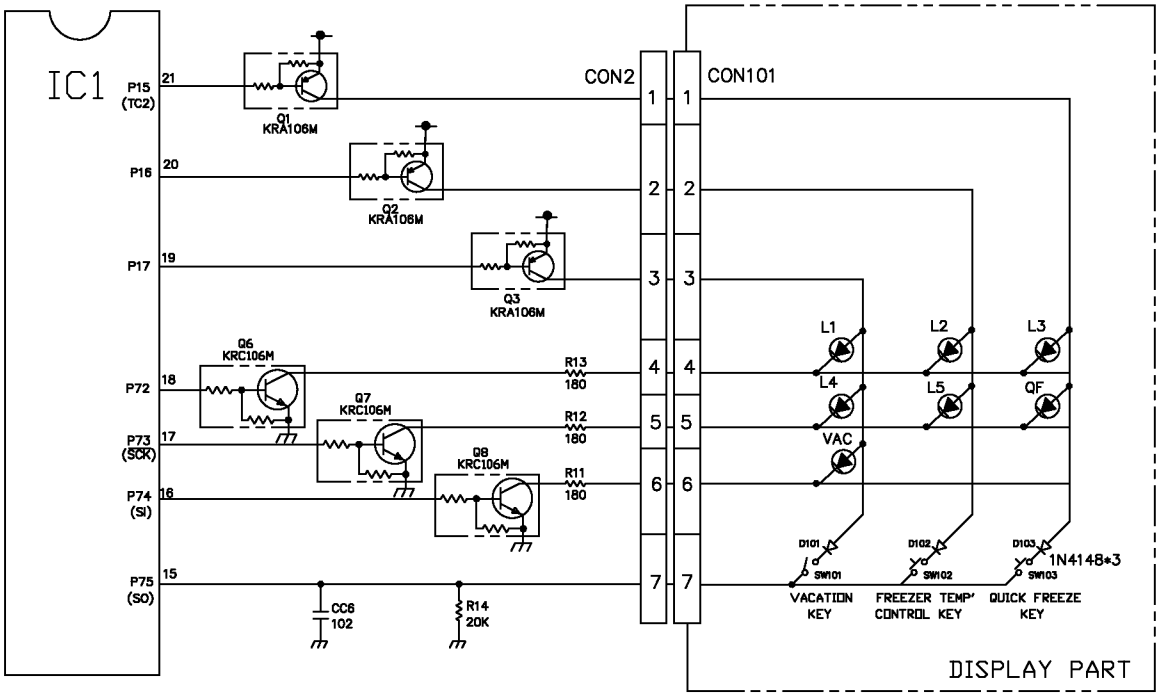
eg) If the compensation resistance of freezer compartment is changed from 10K (present resistance) to 18K (revised resistance), the temp of freezer compartment goes up by +2°C.

• TEMPERATURE COMPENSATION OF FREEZER ROOM

	Revised resistance / Present resistance	470Ω	2kΩ	3.3kΩ	5.6kΩ	8.2kΩ	10kΩ	12kΩ	18kΩ	33kΩ	56kΩ	180kΩ
FREEZER ROOM (R1)	470Ω	NOT COMPENSATE	1°C↑	2°C↑	3°C↑	4°C↑	5°C↑	6°C↑	7°C↑	8°C↑	9°C↑	10°C↑
	2kΩ	1°C↓	NOT COMPENSATE	1°C↑	2°C↑	3°C↑	4°C↑	5°C↑	6°C↑	7°C↑	8°C↑	9°C↑
	3.3kΩ	2°C↓	1°C↓	NOT COMPENSATE	1°C↑	2°C↑	3°C↑	4°C↑	5°C↑	6°C↑	7°C↑	8°C↑
	5.6kΩ	3°C↓	2°C↓	1°C↓	NOT COMPENSATE	1°C↑	2°C↑	3°C↑	4°C↑	5°C↑	6°C↑	7°C↑
	8.2kΩ	4°C↓	3°C↓	2°C↓	1°C↓	NOT COMPENSATE	1°C↑	2°C↑	3°C↑	4°C↑	5°C↑	6°C↑
	10kΩ	5°C↓	4°C↓	3°C↓	2°C↓	1°C↓	NOT COMPENSATE	1°C↑	2°C↑	3°C↑	4°C↑	5°C↑
	12kΩ	6°C↓	5°C↓	4°C↓	3°C↓	2°C↓	1°C↓	NOT COMPENSATE	1°C↑	2°C↑	3°C↑	4°C↑
	18kΩ	7°C↓	6°C↓	5°C↓	4°C↓	3°C↓	2°C↓	1°C↓	NOT COMPENSATE	1°C↑	2°C↑	3°C↑
	33kΩ	8°C↓	7°C↓	6°C↓	5°C↓	4°C↓	3°C↓	2°C↓	1°C↓	NOT COMPENSATE	1°C↑	2°C↑
	56kΩ	9°C↓	8°C↓	7°C↓	6°C↓	5°C↓	4°C↓	3°C↓	2°C↓	1°C↓	NOT COMPENSATE	1°C↑
	180kΩ	10C↓	9°C↓	8°C↓	7°C↓	6°C↓	5°C↓	4°C↓	3°C↓	2°C↓	1°C↓	NOT COMPENSATE

• This circuit is aimed to input the necessary temperature compensation values into the MICOM in order to adjust the freezer temperature which is different in each model.

8) LIGHTING CIRCUITS OF KEY BUTTON INPUT AND DISPLAY PARTS

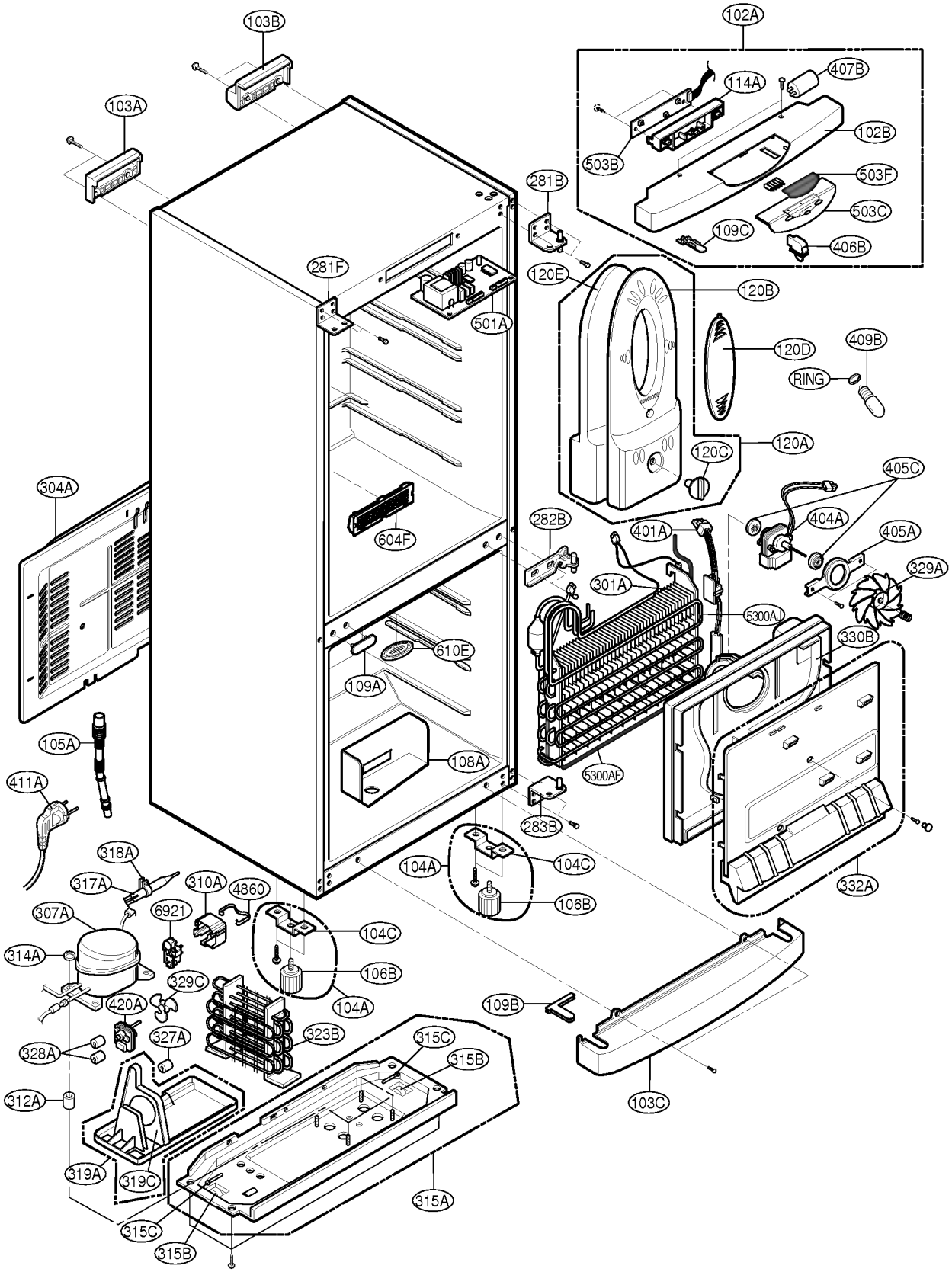


The above circuit is to judge the operation conditions of function key and to light each function indicating LED. It is operated by SCAN method.

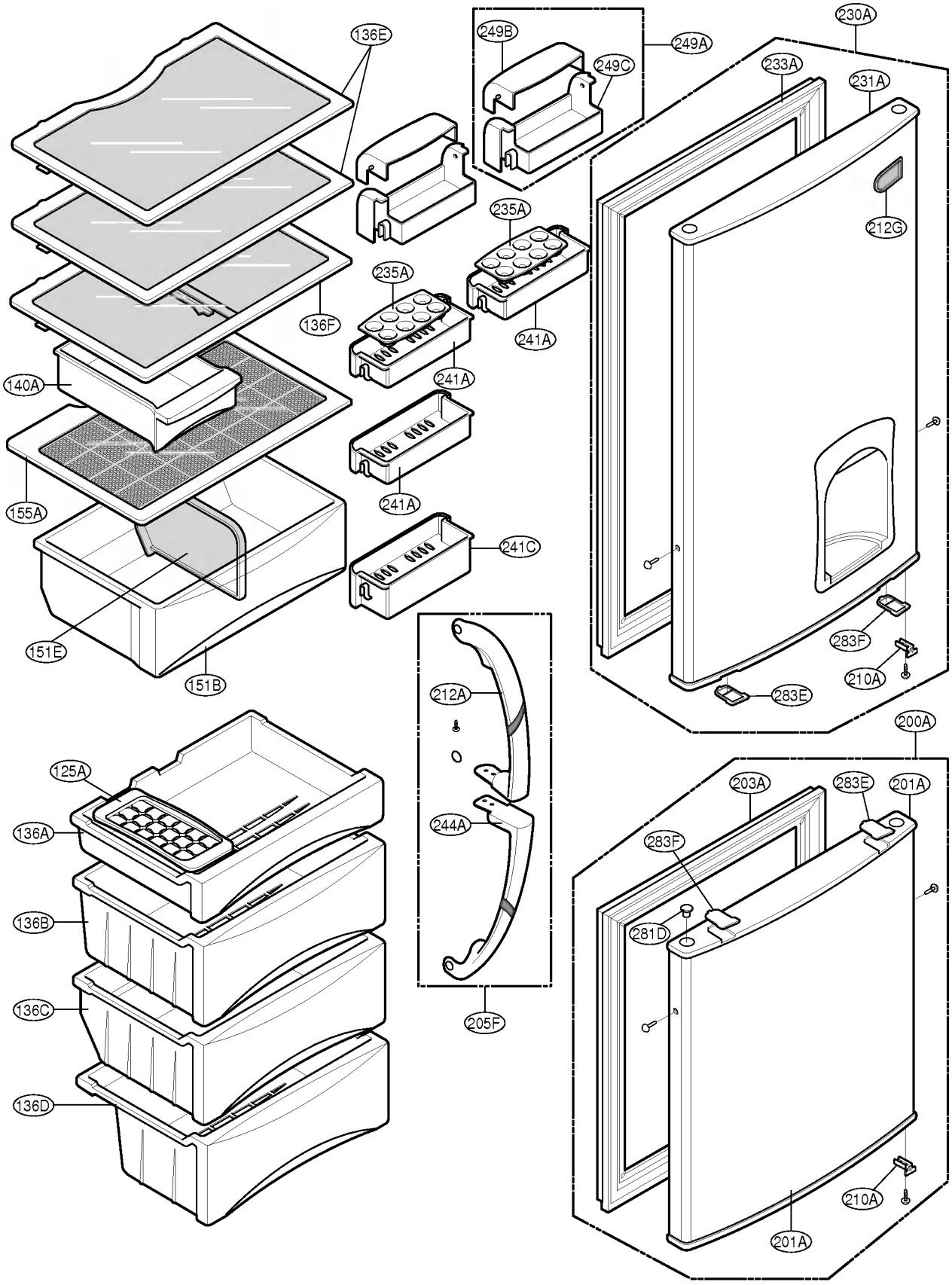
EXPLODED VIEW & REPLACEMENT PARTS LIST

Ref. No : GR-369/409

▼ The parts of refrigerator and the shape of each part are subject to change in different localities.



Ref. No : GR-409 GPA/GTPA/GVPA/GLPA



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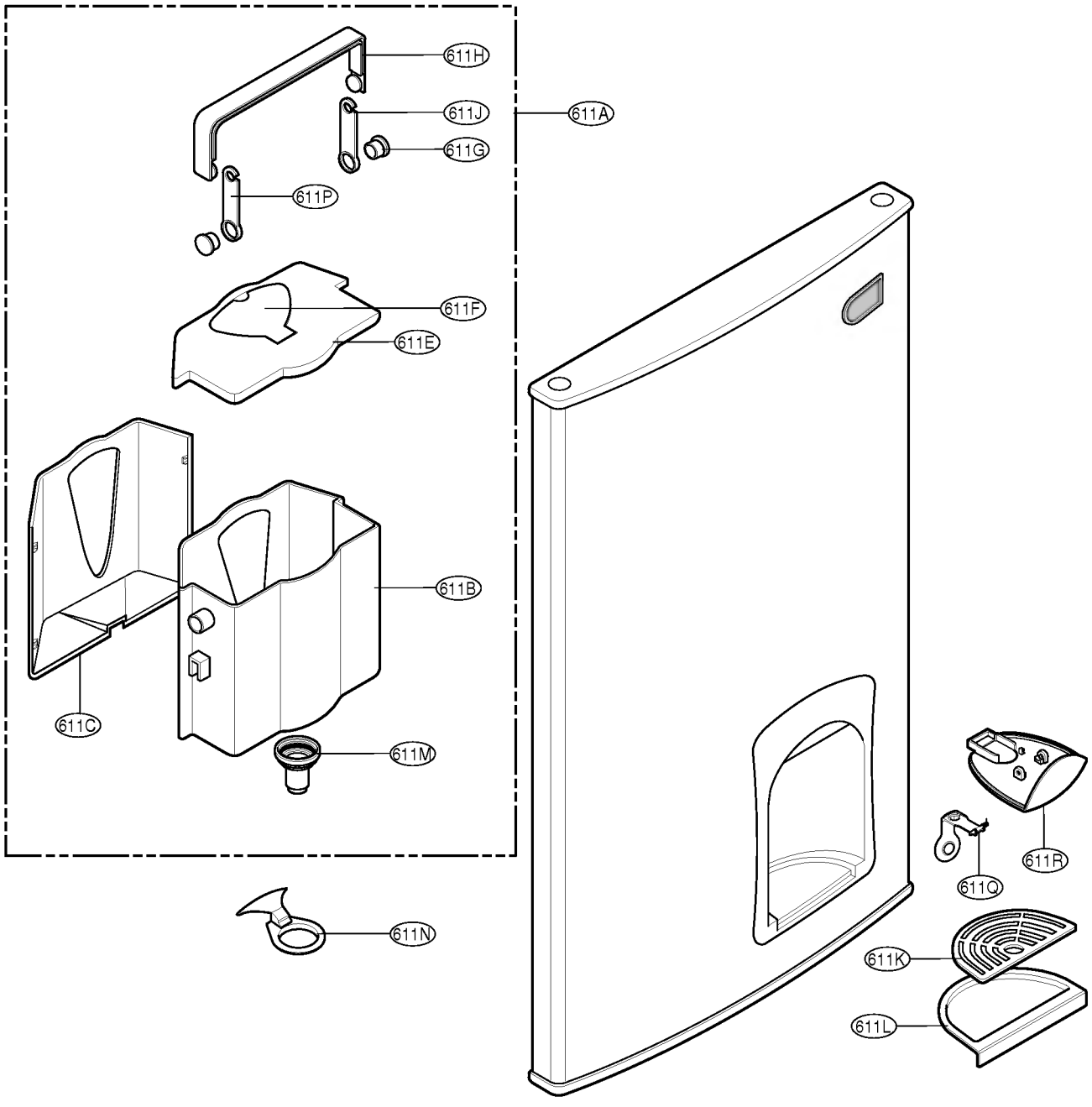

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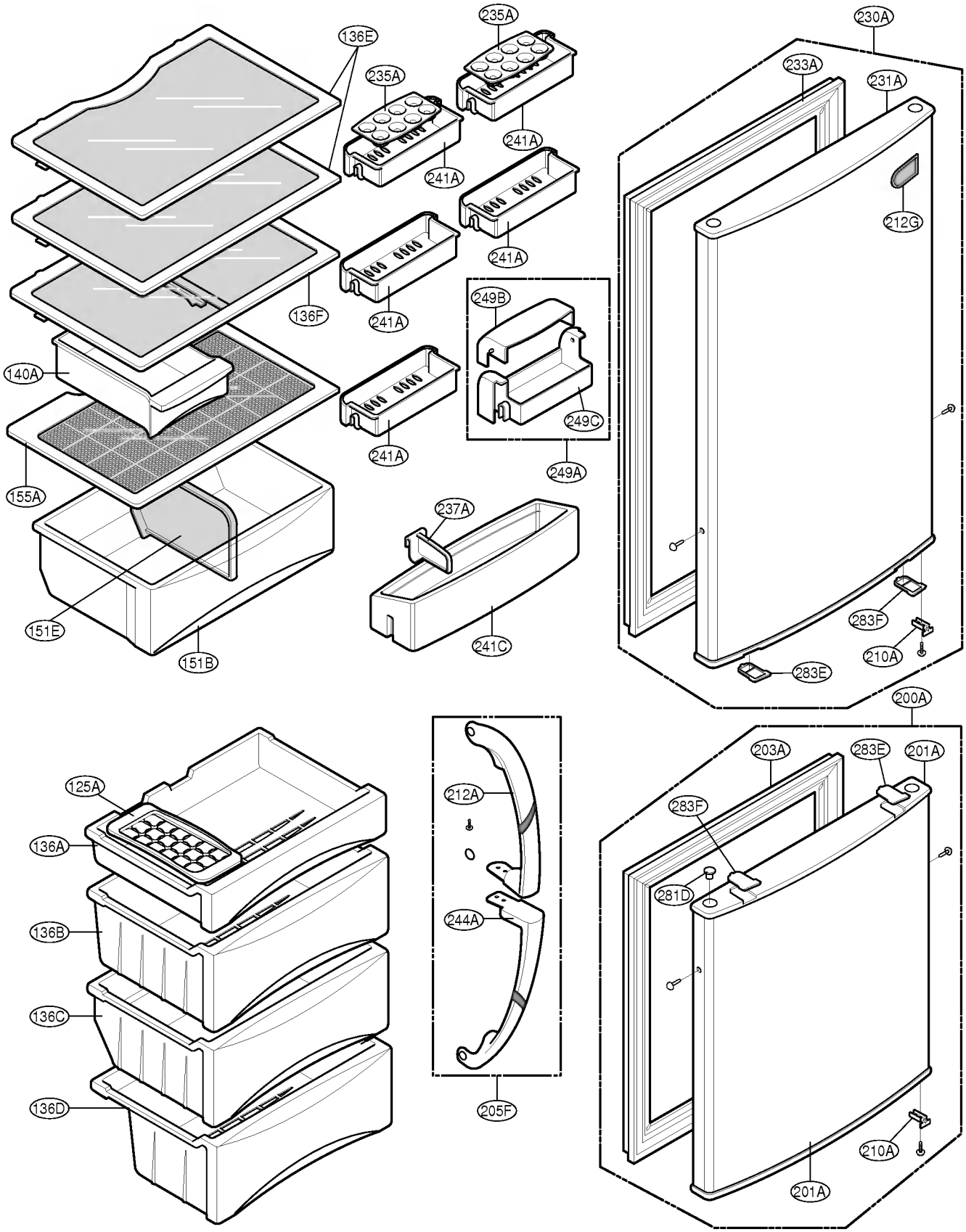

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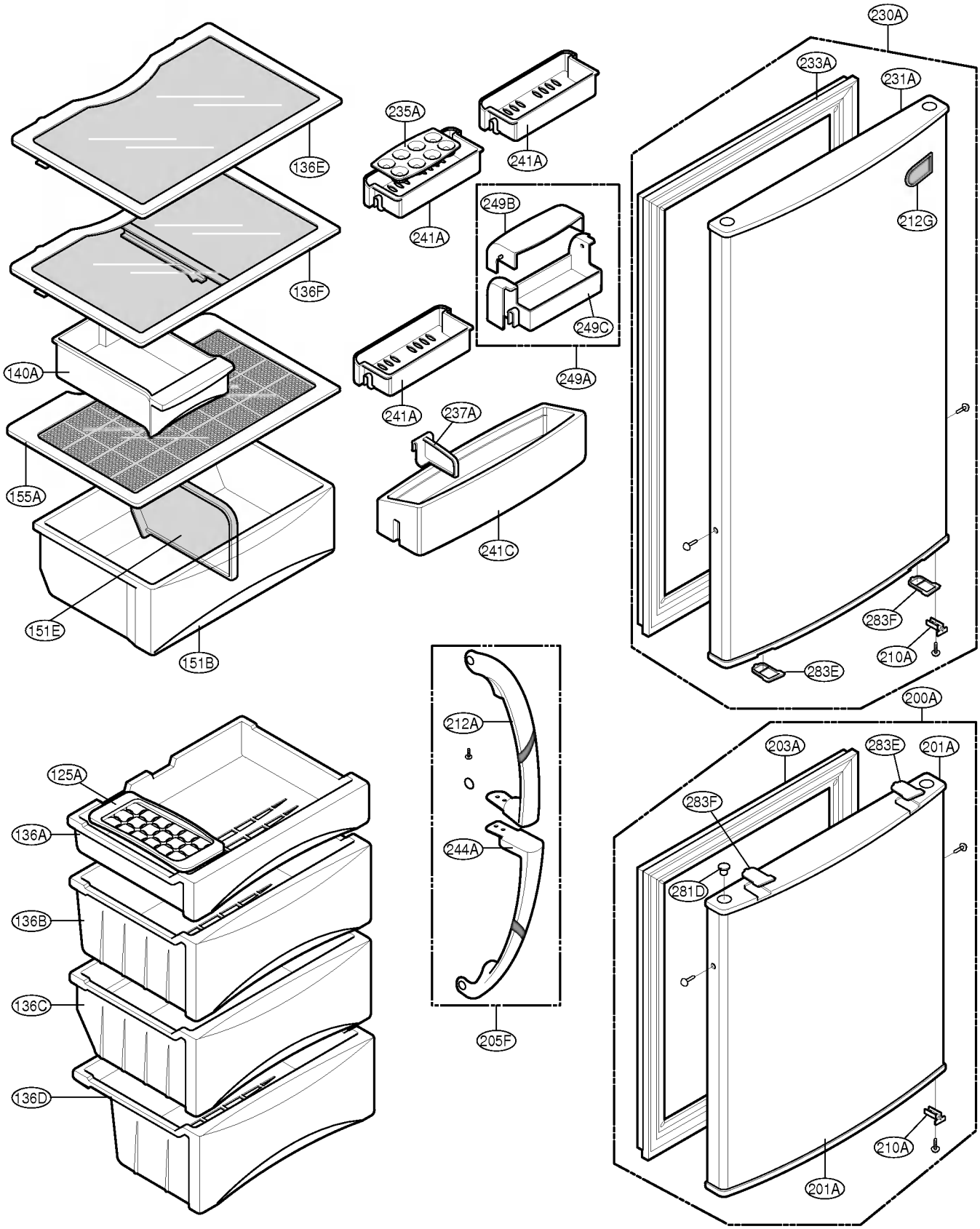

REPLACEMENT PARTS LIST

BUYER NAME:CIS MODEL NAME:GC-409GTPA LG REFERENCE NO:GC-409GTPA.CTIQCIS

COLOR:Titanium

S	AL	LOC No.	PART No.	Description	SPEC	REMARK
R		108A	3391JQ2010A	Tray Assembly,Drain		
R		109A	5006JQ3032A	Cap,Cover		
R		109B	5006JQ3038F	Cap,Cover		
R		109C	5006JA3047F	Cap,Cover		
R		114A	5020JD1003N	Button,Link		
R		120A	4995JQ1005G	Case Assembly,Control Refrigerator		
R		120B	4994JS1003D	Case,Control Refrigerator		
R		120C	4940JQ3003A	Knob,Damper		
R		120D	3550JQ3009B	Cover,Lamp		
R		120E	5209JQ1005A	Duct Assembly,Insulation		
R		125A	3390JQ2001A	Tray,Ice		
R		136A	3391JQ2011A	Tray Assembly,Drawer		
R		136B	AJP30627501	Tray Assembly,Drawer		
R		136C	AJP30627502	Tray Assembly,Drawer		
R		136D	AJP30627503	Tray Assembly,Drawer		
R		136E	5027JQ2006A	Shelf Assembly,Refrigerator		
R		136F	5027JQ2007A	Shelf Assembly,Refrigerator		
R		140A	3390JS1013A	Tray,Meat		
R		145C	4974JA2040A	Guide,Rail		
R		151B	3390JD1053B	Tray,Vegetable		
R		151E	4974JA1068A	Guide,TV		
R		155A	ACQ30624401	Cover Assembly,TV		
R		1SZZJA	1SZZJA3010A	Screw,Customzied		
R		200A	ADC30656604	Door Assembly,Freezer		
R		201A	ADD30652503	Door Foam Assembly,Freezer		
R		203A	4987JQ1017A	Gasket Assembly,Door		
R		210A	4810JQ3019B	Bracket,Door		
R		212A	3651JA2227C	Handle Assembly,Refrigerator		
R		230A	ADC30656505	Door Assembly,Refrigerator		
R		231A	ADD30655503	Door Foam Assembly,Refrigerator		
R		233A	4987JQ1017B	Gasket Assembly,Door		
R		235A	3390JQ2006A	Tray,Egg		
R		241A	5004JA1136A	Basket,Door		
R		241C	5004JA1137A	Basket,Door		
R		244A	3651JA2228C	Handle Assembly,Freezer		
R		281B	4775JQ3002A	Hinge Assembly,Upper		
R		281F	4775JQ3002B	Hinge Assembly,Upper		
R		282B	4775JQ2026A	Hinge Assembly,Center		
R		283B	4775JQ2027A	Hinge Assembly,Lower		
R		301A	5421JQ0023A	Evaporator Assembly		
R		304A	3550JQ0001A	Cover,Machinery(Rear)		
R		307A	2521CRX9802	Compressor,Set Assembly	MB98NBEM BR1EOIL	
R		308A	6748C-0004C	Thermistor,PTC	P330MD 33OHM 20% 355V 6A - LUG BK	
R		309A	6750C-0005W	Overload Protect	4TM174TFBYY-520 5A 140C 61C 10SEC 10SEC	
R		310A	3550CT0008A	Cover,PTC		
R		312A	5040JQ3008B	Damper,Compressor		
R		314A	4J03277A	Stopper,Compressor		
R		315A	3103JQ1006A	Base Assembly,Compressor		
R		315B	4580JQ3001A	Roller		
R		315C	1PZZJQ3017A	Pin,Common		
R		317A	5851JQ2001B	Drier Assembly		
R		318A	4930JQ3020A	Holder,Drier		
R		319A	3390JA0018A	Tray,Drip		
R		319C	4974JQ1006A	Guide,Fan		

REPLACEMENT PARTS LIST

BUYER NAME:CIS MODEL NAME:GC-409GTPA LG REFERENCE NO:GC-409GTPA.CTIQCIS

COLOR:Titanium

S	AL	LOC No.	PART No.	Description	SPEC	REMARK
R		323B	5403JQ1026A	Condenser Assembly,Wire		
R		327A	5040JQ3006A	Damper,Pipe		
R		328A	5040JQ3023A	Damper,Pipe		
R		329A	5901JQ1003A	Fan Assembly		
R		329C	5901JQ1004A	Fan Assembly		
R		330B	4999JQ2001A	Shroud Assembly,Freezer		
R		332A	3531JQ2001A	Grille Assembly,Fan		
R		401A	4781JR2003B	Controller Assembly		
R		404A	4680JR1009F	Motor,Unclassified		
R		405A	4810JQ3021A	Bracket,Motor		
R		405C	5040JQ3003A	Damper,Motor Support		
R		406B	6600JB1004E	Switch,Push Button		
R		407A	5300JR1009B	Heater,Sheath		
R		407B	0CZZJB2005D	Capacitor,Film,Box	4uF -5TO+10% 400V MPP -25TO+80C NON-IND 30X47MM 12MM BK	
R		409B	6912JR2001P	Lamp,Incandescent	20W 240VAC - 100LM - BLUE/GREEN	
R		411A	6411JR1003L	Power Cord Assembly		
R		420A	4680JR1008C	Motor,Unclassified		
R		501A	6871JR1022J	PCB Assembly,Main		
R		503B	6871JB3005A	PCB Assembly,Display		
R		503C	3806JD1073C	Decor,Cover		
R		503F	3806JD1074A	Decor,Cover Display		
R		604F	3550JQ2046A	Cover,Duct		
R		610E	3550JQ2025A	Cover,Sensor		
R		611B	4838JA1005A	Tank,Water		
R		611C	3806JD1075A	Decor,Panel		
R		611E	5006JA1003A	Cap,Tank		
R		611F	5006JA2030A	Cap,Tank		
R		611G	5006JA2032A	Cap,Handle		
R		611H	3650JA2082A	Handle,Tank		
R		611J	3650JA2084B	Handle,Bar		
R		611K	3806JA2037C	Decor,Drain		
R		611L	3806JA2038C	Decor,Case		
R		611M	5221JA2009A	Valve Assembly,Water		
R		611P	3650JA2084A	Handle,Bar		