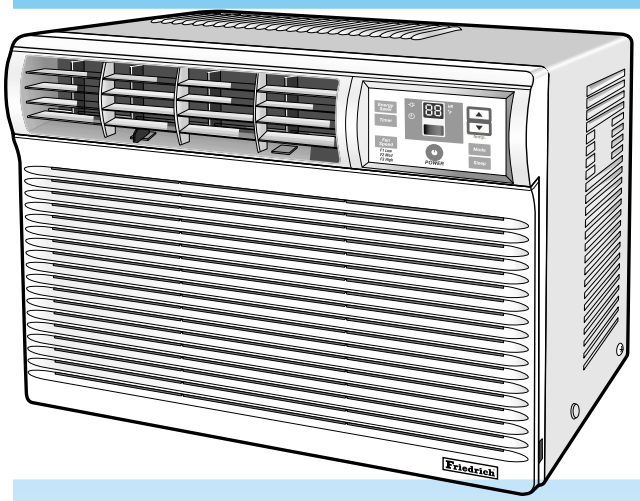
Friedrich®

ROOM AIR CONDITIONER

SP05A10

SERVICE Manual

AIR CONDITIONER



CONTENTS

1. Precautions

1. Warning: Prior to repair, disconnect the power cord from the circuit breaker.

2. Use proper parts: Use only exact replacement parts. (Also, we recommend replacing parts rather than repairing them.)

3. Use the proper tools: Use the proper tools and test equipment, and know how to use equipment may cause problems later-intermittent contact, for example.

4. Power Cord: Prior to repair, check the power cord and replace it if necessary.

5. Avoid using an extension cord, and avoid tapping into a power cord. This practice may result in malfunction or fire.

6. After completing repairs and reassembly, check the insulation resistance.
   Procedure: Prior to applying power, measure the resistance between the power cord and the ground terminal. The resistance must be greater than 30 megaohms.

7. Make sure that the grounds are adequate.

8. Make sure that the installation conditions are satisfactory.
   Relocate the unit if necessary.

9. Keep children away from the unit while it is being repaired.

10. Be sure to clean the unit and its surrounding area.

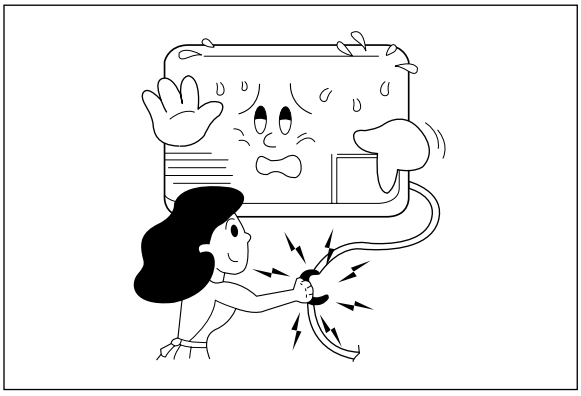


Fig. 1-1 Avoid Dangerous Contact

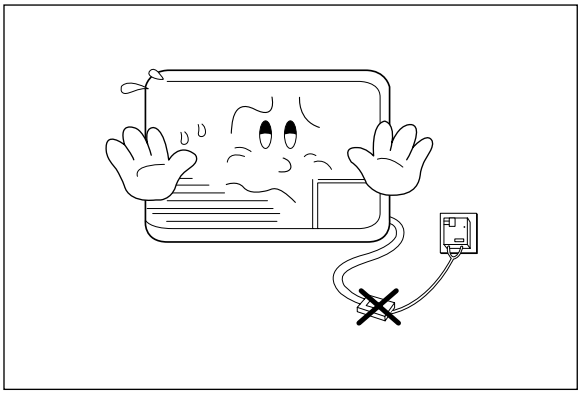


Fig. 1-2 No Tapping and No Extension Cords

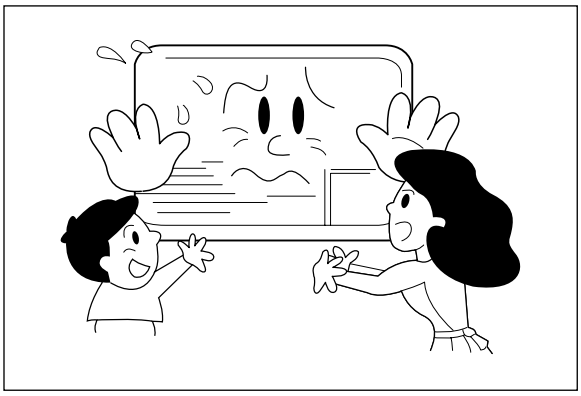


Fig. 1-3 No Kids Nearby!

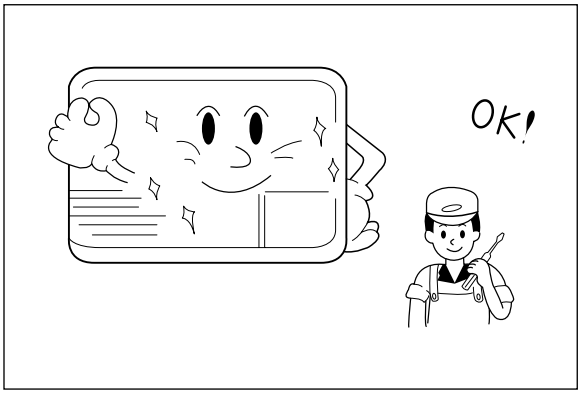


Fig. 1-4 Clean the Unit

2.Product Specifications

2-1 Table

Item	Unit of Measure	SP05A10	REMARK
Type		WINDOW	
Dimension: (Width×Height×Depth)	mm	424×310×326	
Voltage	Volt	115	
Phase	-	SINGLE	
Frequency	Hz	60	
Operation Current	A	4.6	
Power Consumption	W	500	
Refrigerant Type	FREON	R22	
Refrigerant Change	g	300	
Capacity	BTU/h	5400	
EER	BTU/h.W	10.8	
Net Weight	Kg	18.5	
Condenser	Row	2×15	
Condenser Fan	Type	Propeller Fan	
Evaporator	Row	2×10	
Evaporator Fan	Type	Blower	
Fan Motor	MODEL	YGN50-6K(E)	
Compressor(Rotary)	MODEL	39A050HS1KA	
Overload Protect	-	MRA12145-12008	
Compressor Capacitor	μF/VAC	35/270	Two Capacitor combined to be the one with below spec: 35/3.5μF 270VAC
Fan Motor Capacitor	μF/VAC	3.5/270	
Fan Speed	RPM	1060/1010/960	
Thermo Control	-	THERMISTOR	

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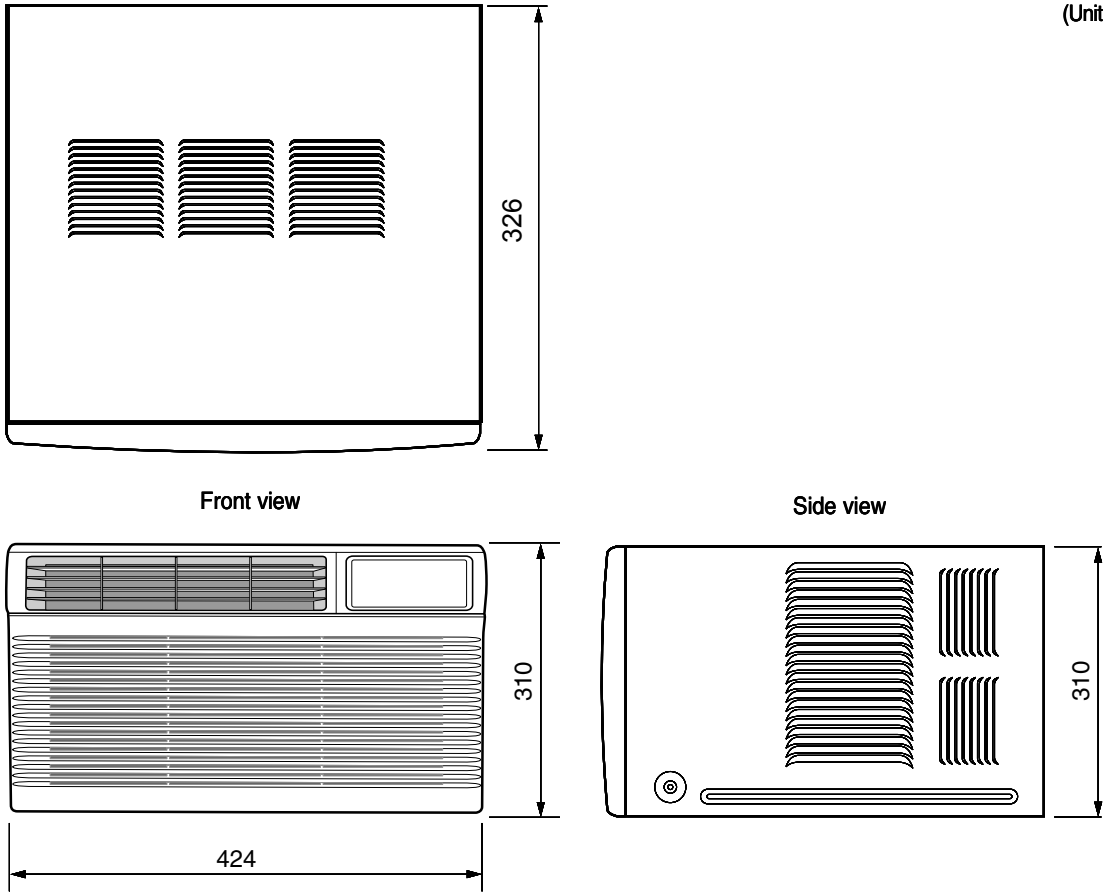
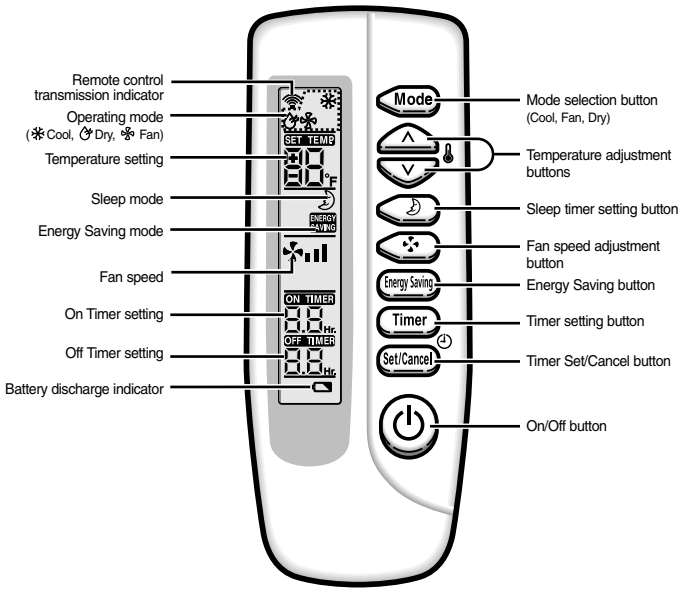
2-2 Dimensions

2-2-1 Main Unit

(Unit : mm)



2-2-2 Remote Control



3. Installation and Operating Instructions

3-1 Installation

3-1-1 Selecting Area for Installation

1. Make sure that you install the unit in an area providing good ventilation. The air conditioner must not be blocked by any obstacle affecting the air flow near the air inlet and air outlet.

2. Make sure that you install the unit in an area that allow good air handling. The installation area must be able to endure vibration from the unit.

3. Make sure that you install the unit away from heat or vapor.

4. Make sure that you install the unit in an area which is cool and has adequate space.

5. Make sure that you install the unit in an area away from TVs, audio units, cordless phones, fluorescent lighting fixtures and other electrical appliances (obtain a clearance of at least one meter).

6. Make sure that you install the unit in an area which provides easy drainage for condensed water.

7. Make sure that you install the unit in an area not exposed to rain or direct sunlight.
   (Install a separate sunblind if exposed to direct sunlight.)

8. Make sure that you install the unit in an area allowing good air movement. Do not install it in a space that would cause noise amplification of noise.

9. Fix the unit firmly if mounted in a high place.

Caution:

Do not use the air conditioner in the following environments : greasy areas (including areas near machines), or marine areas. Contact your local dealer for advice.

3-2-1 Cooling operation mode

The compressor is turned on and off according to the ambient temperature and set temperature.

1) Compressor on and off control
   - Compressor on and off control according to the ambient temperature
     * The compressor is turned off when "ambient temperature = set temperature
     * The compressor is turned on when "ambient temperature = set temperature +1˚C"
2) Default value after power reset → set temperature = 75˚F
   Fan speed = High
3) Set temperature indicating (setting) range : 1˚F interval from 64˚F to 86˚F.

3-2-2 Fan operation mode

1) If "Fan operation mode" signal is received from remocon or panel.
   → the compressor is immediately turned off and only fan motor is operated at set blowing speed.
   → it changes such as "High → Med → Low → High"(if Fan speed is selected).
2) The initial Fan motor speed is set to "High".
3) The set temperature can not be indicated and set.

3-2-3 Energy saver operation mode

* If the compressor turn off at the cooling operation, the fan motor turn off after operation during the fixation time only, and operation that energy saver by turn off the fixation time only, and operation that energy saver by turn off the motor continuously before the condition of the compressor on.
* The fan motor is not operated at flow wind operation.
* Energy saver operation specification at the cooling operation.
  1) Fan motor control in compressor on : operate with setting wind speed
  2) Fan motor control in compressor off : After compressor off, the fan motor is operated breeze for 2 minutes and then it turn off.
  3) After the fan motor off, the compressor and fan motor is operated normally when the compressor on.

3-2-4 Sleep operation mode

1) Enable to sleep operation only when cooling operation.
2) First, 7-SEG LED DISPLAY "SLEEP" while 15 second, Second, 7-SEG LED DISPLAY "8Hr"
   And, automatically SET OFF after operated while 8 Hour
3) If sleep operation, setting Temperature rise 1˚C after 1 Hour
4) ON TIMER operation, not operation, ENERGY SAVER operation, not sleep operation.

3-2-5 Dry operation mode

If the atmosphere in the room is very humid or damp,use this operation mode. It can remove excess humidity without lowering the room temperature too much.
1) The quantity of air is adjusted automatically.

3-2-6 LED display indication in case of error detection

ERROR OPERATION	7-SEG LED DISPLAY
ROOM THERMISTOR (OPEN or SHORT)	E1 displayed

1) Set operation in case of error occurrence.
   • Malfunction of each temperature sensor (open, short)
     - Error mode display, warning sound.
     - The operation status is off.

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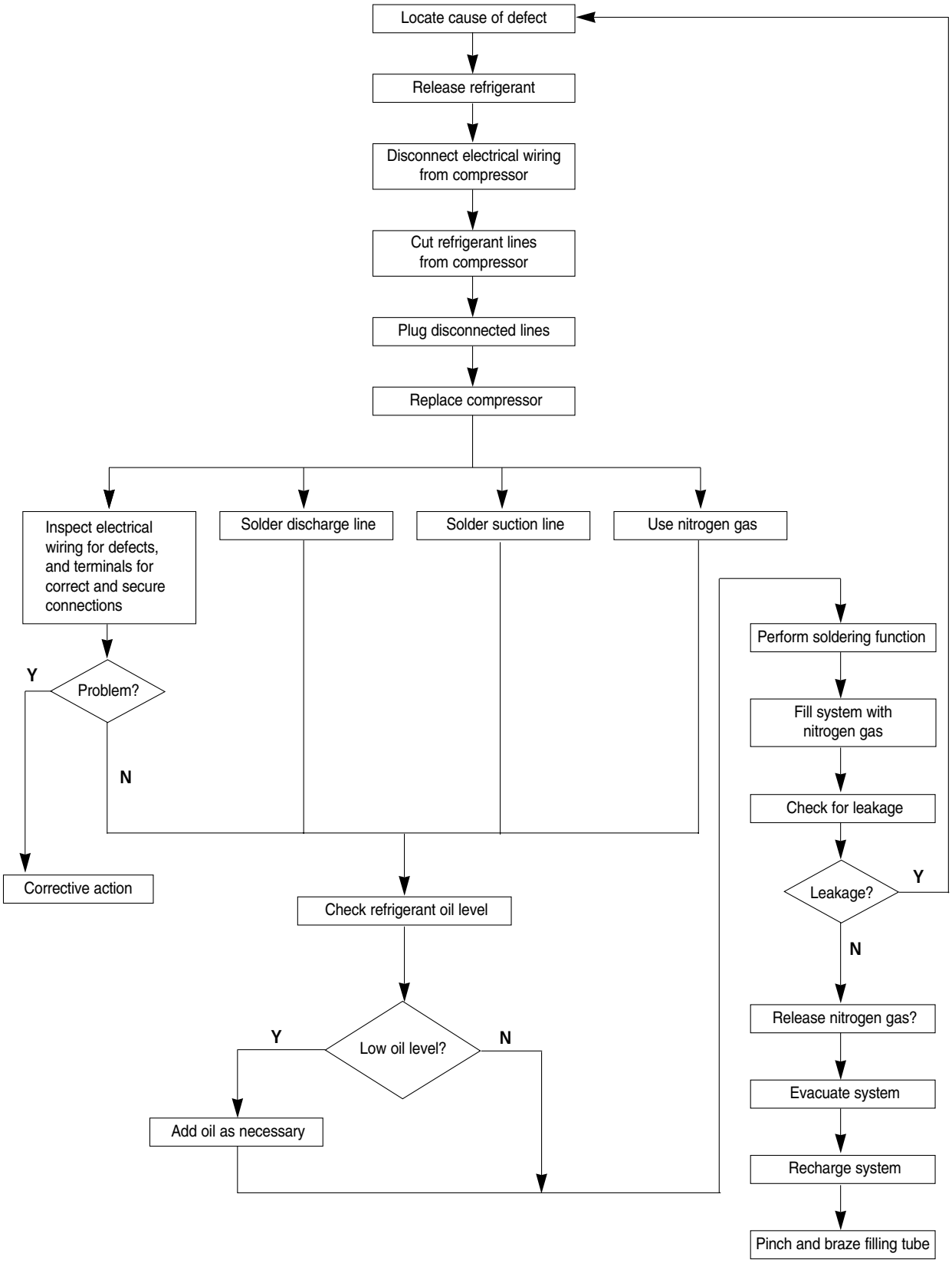
4. Disassembly and Reassembly

4-1 Compressor Replacement Flow Chart



4-2 Checking the oil

Fill the transparent container with 10cc of oil, and then conduct the test.

4-2-1 Oil quality

Condition of Refrigerant Cycle	Oil Condition		Remarks
	Color	Odor	
Normal	Straw Yellow	No Odor	Return with the system
Over-heated	Brown Color	-	Change the oil
Compressor Damage	Dark Brown	Pungent oil	Change the oil

4-2-2 Replacing and refilling the refrigerant oil

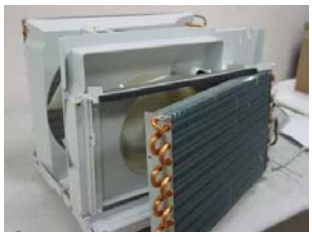
1. Change the compressor - DO NOT recharge the oil as the compressor itself is already charged.
2. Change the condenser .... add 50cc
3. Change the evaporator .... add 50cc
4. When the refrigerant is replaced .... add 30cc oil.
5. After vacuum is completed, the oil is filled through the high pressure side.
6. In the event of a refrigerant leak, generally it is not necessary to add oil. (Unless the oil has leaked significantly.)

4-3.Disassembly and Reassembly Procedure(SP05A10)

Stop operating the air conditioner, and pull out the power cord before repair.

No.	Part Name	Procedures	Remarks
1	Ass'y Grille	1.Pull the Grille air inlet and Guard air filter out. 2.Remove the screw on the panel front. 3.Hold the lower part of panel with two hands while pressing down on both sides of the lower part of the cabinet, pull it forward by about 30mm,and then lift it up carefully for removal.	
2	Ass'y Cabinet	1.Remove all screws on the both side of the cabinet . 2.Take the cabinet upward.	
3	Ass'y Control	1.Remove the earth screw fixed on the base. 2.Remove 3 screws fixed on the partition. 3.Remove the screw fixed for the power cord. 4.Un-connect the motor wire and comp lead wire, then take out the control box upward.	 (The picture maybe have a little different from actual product)

Disassembly and Reassembly Procedure(SP05A10)

No.	Part Name	Procedures	Remarks
4	CASE EVAP UP & ASSY EVAP	1.Take the case evap up forward carefully. (tear all the seal on it before) 2.Pull the frame up upward.	 
5	Blower	1.Remove all screws on the evaporator. 2.Pull the evaporator from frame low carefully. 3.Remove the nut and remove the Blower.	 
6	Case Cond & Fan Propeller & Motor Fan	1.Remove 2 screws on the rear side of the base pan, and all screws fixed on case cond. 2.Pull up the condenser from the base pan. 3.Remove the nut and remove the Propeller fan. 4.Remove the screw fixed on the partition and earth screw fixed on the base pan, then take out the motor backward.	 

5. Troubleshooting

Check the basic checkpoints first to determine whether it is machine trouble or a problem in the operation method. When it is not related to the basic checkpoints, perform checking in accordance with the procedures of troubleshooting by symptom.

5-1 Basic Checkpoints for Troubleshooting

1) Is the voltage of the power source appropriate ?
   (1) It should be within the rating voltage ±10% range.
   (2) The air conditioner may not operate properly when the voltage is out of this range.
2) Is the connection with the fan motor, compressor wire, and starting condenser appropriately made ?
3) The symptoms listed in the table below are not indicative of machine trouble.

Symptom	Cause and check
No operation	• Check whether there is power failure or the power plug is pulled out. • Check whether the unit is stopped as a result of completion of the sleep time. • Pull out the power plug for ten seconds, and then insert it again.
Air flows, but no cooling	• Check whether the Air filter is clogged with dust or is dirty. • Check whether the desired temperature is too high. Set the desired temperature to a lower level than the current temperature. • Check whether it is in "FAN" mode.
The remocon does not operate	• Check whether battery is completely depleted. • Check whether the battery is properly inserted. • Check whether the receiving window of the remocon for the assembly main PCB is blinded. • Check whether the remocon is affected by jamming due to a neon sign.
No temperature setting	• Check whether the unit is in "FAN" mode. (In "FAN" mode, only the current temperature is displayed, and the desired temperature is not set.)

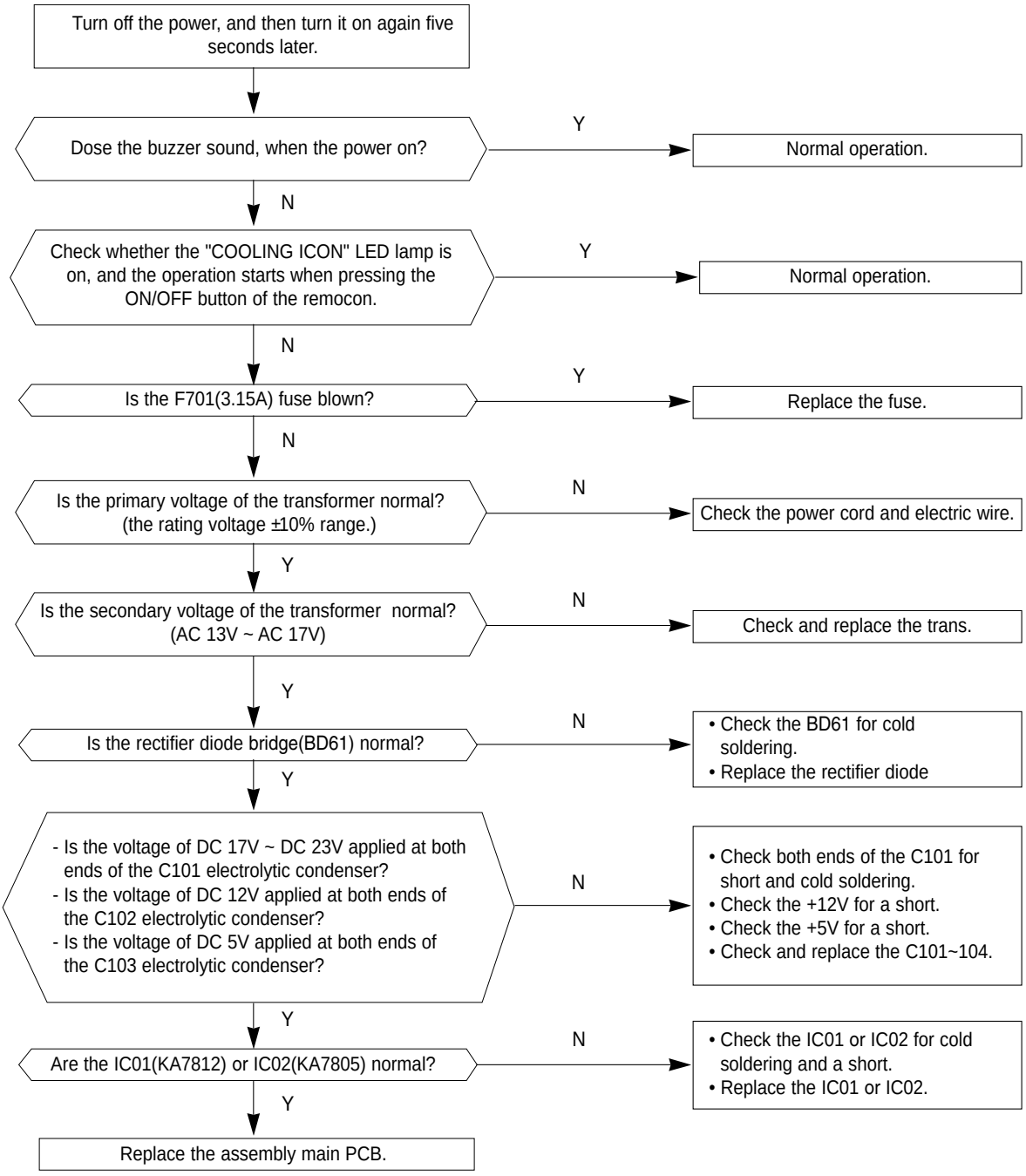
❋ Checking and Display of Fault Area

ERROR OPERATION	ERROR OPERATION
ROOM THERMISTOR (OPEN OR SHORT)	E1 displayed

5-2-1 No power

1) Check points

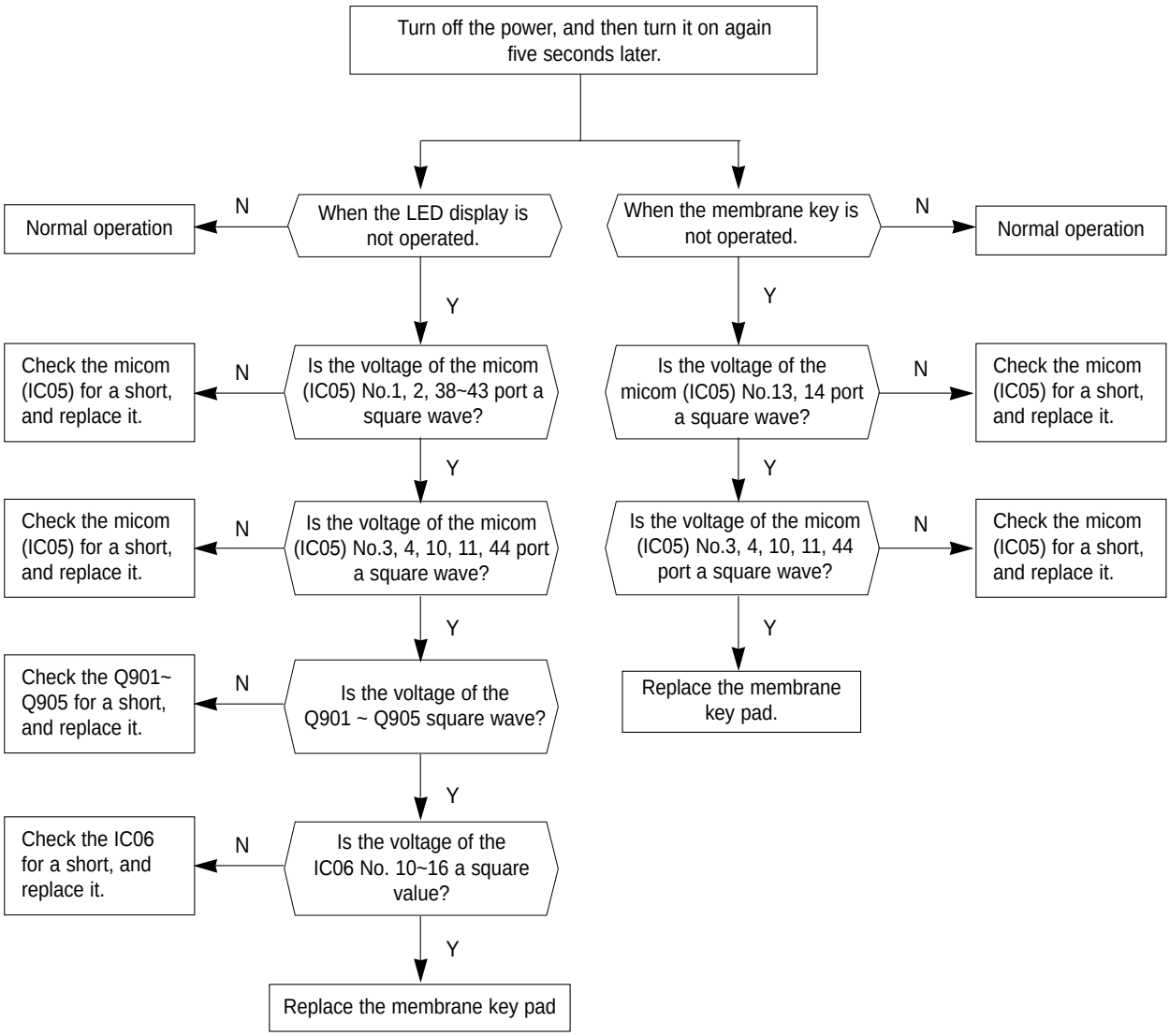
(1) Is the voltage of the power source normal ? (the rating voltage ±10% range.)
(2) Is the electric wire in good contact ?(CN 71, RY 71)
(3) Is the output voltage of the IC01(KA 7812) normal ?(DC 11.5V ~ DC 12.5V)
(4) Is the output voltage of the IC02(KA 7805) normal ?(DC 4.5V ~ DC 5.5V)



5-2-2 When the Touch Key pad and Led Display

1) Check points

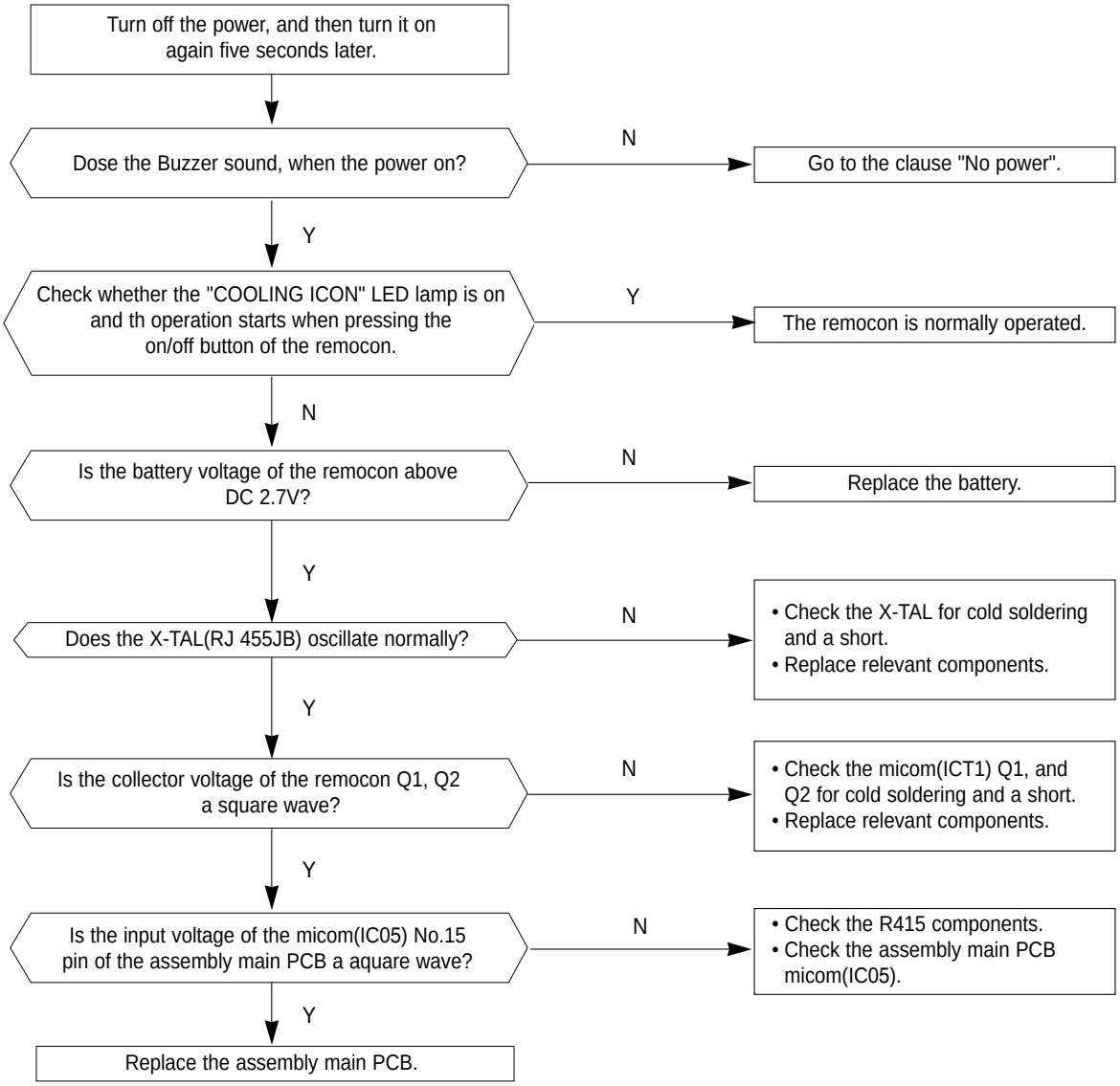
(1) Is the voltage of the power source normal ? (the rating voltage ±10% range.)
(2) Is the electric wire in good contact ?(CN71, RY71)
(3) Is the connection of the assembly main PCB, and TOUCH KEY PAD in good contact? (SW01-SW05)



5-2-3 When the remocon is not operated

1) Check points

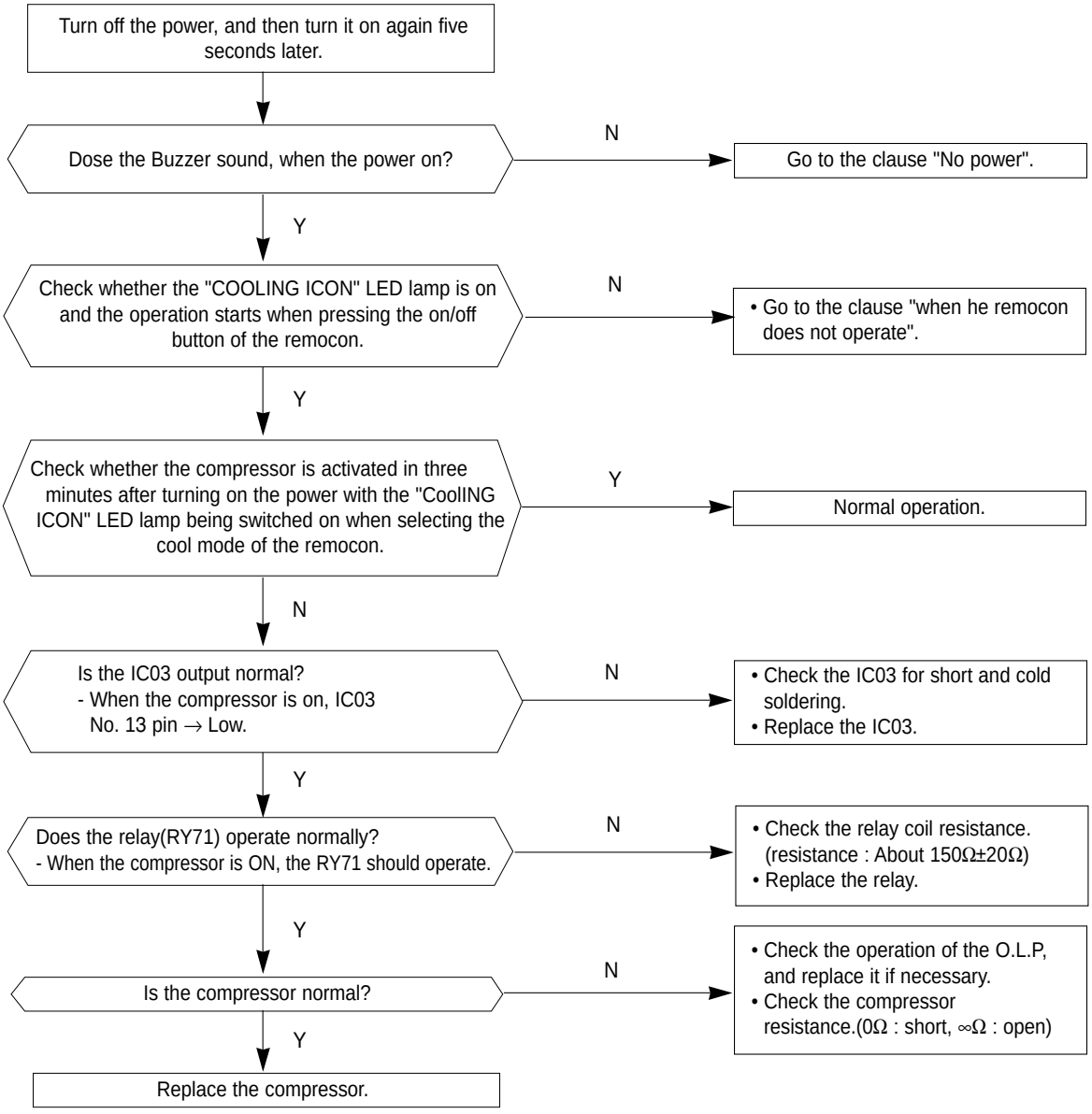
(1) Is the voltage of the power source normal ? (the rating voltage ±10% range.)
(2) Is the electric wire in good contact ? (CN71, RY71)
(3) Is the assembly main PCB in good contact with the TOUCH KEY PAD(SW01-SW05)
(4) Is the battery voltage of the remocon above DC 2.7V?



5-2-4 When the compressor is not operated

1) Check points

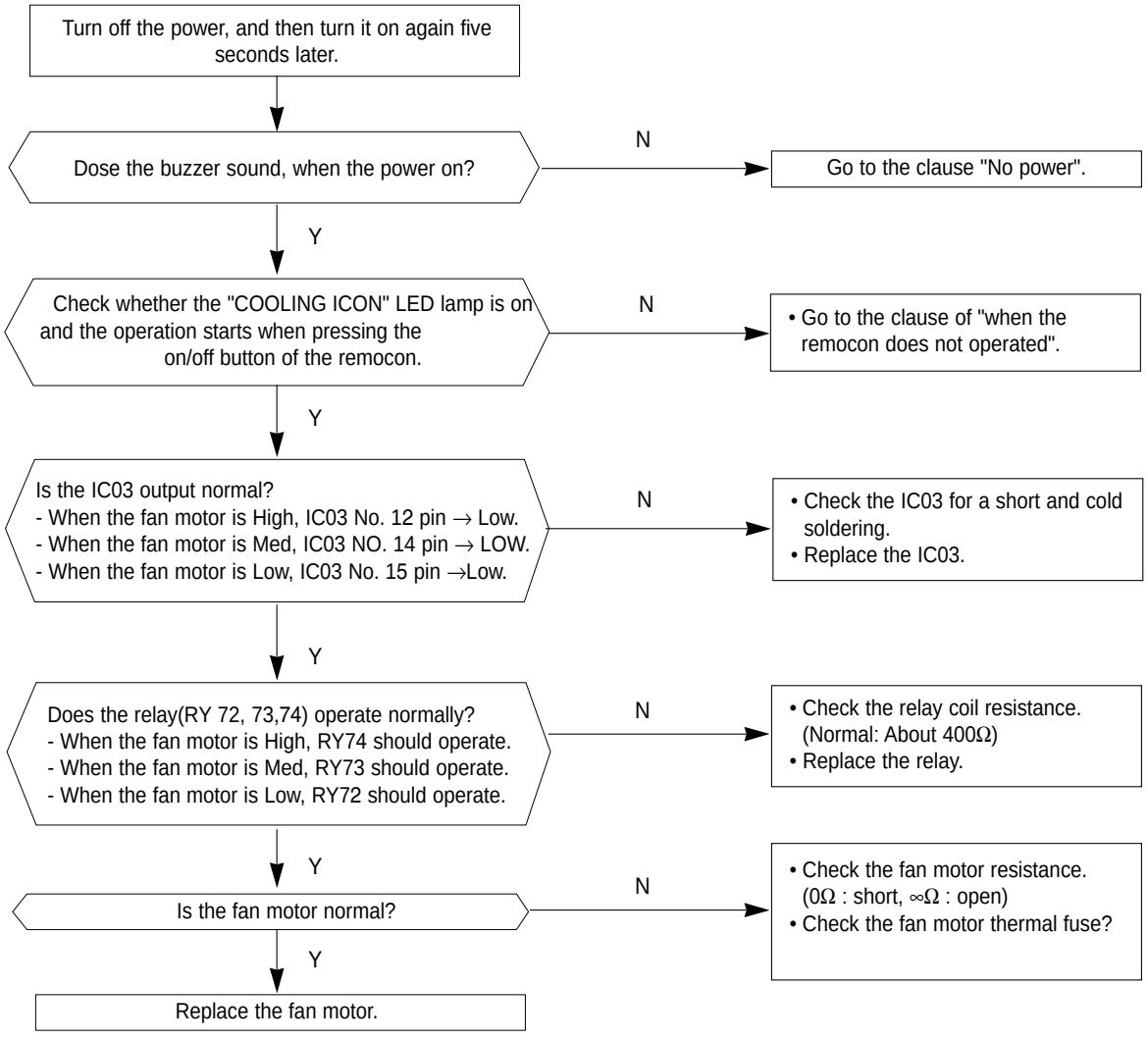
(1) Is the voltage of the power source normal ? (the rating voltage ±10% range.)
(2) Is the desired temperature lower than the indoor temperature in the “COOL” mode? (Compressor stopped)
(3) Is the starting condenser in good contact?
(4) Is the electric wire in good contact ? (CN71, RY71)
(5) Is the output voltage of the IC01(KA7812) and IC02(KA7805) normal ?



5-2-5 When the fan motor does not operated

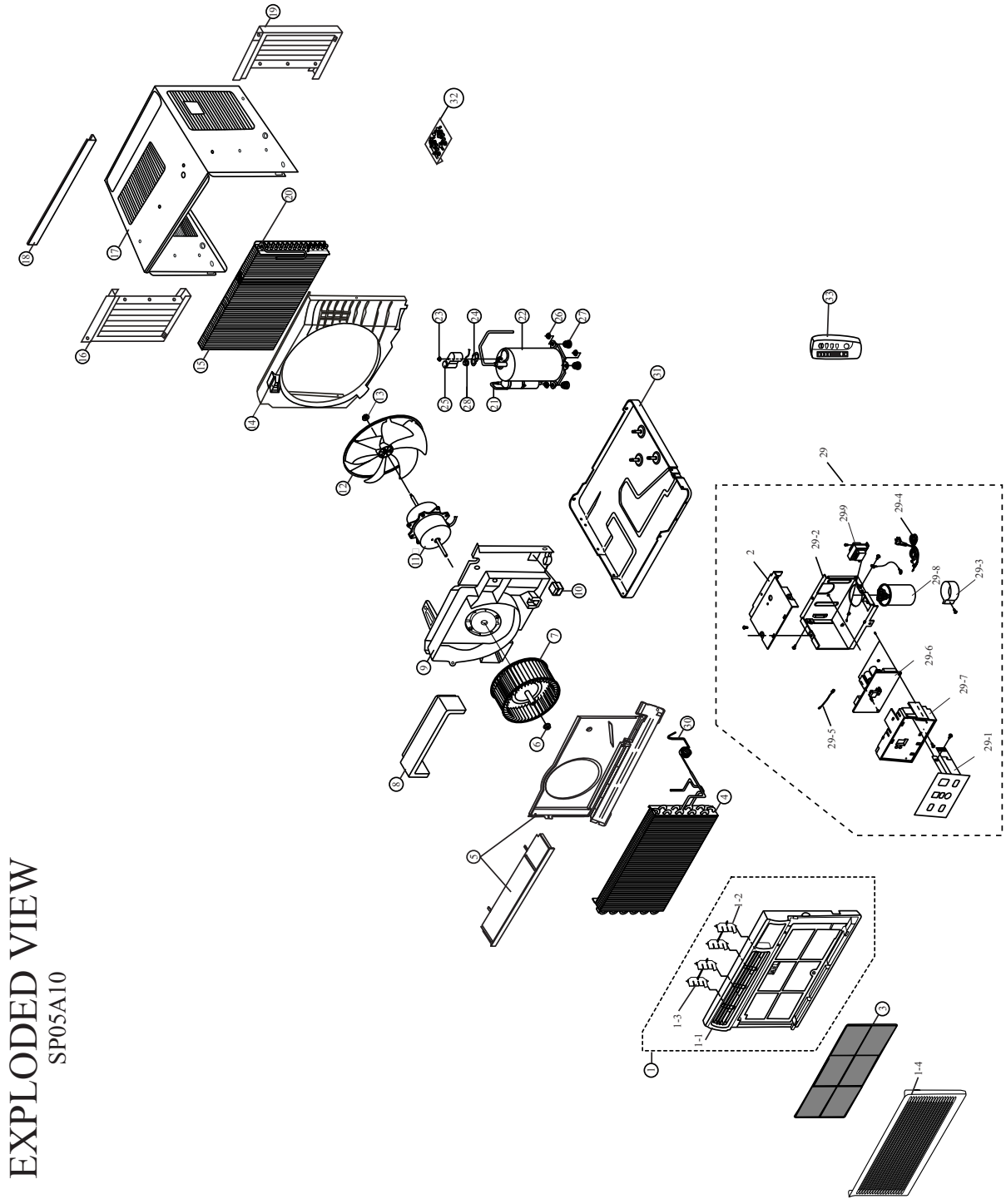
1) Check points

(1) Is the voltage of the power source normal ? (the rating voltage ±10% range.)
(2) Is the electric wire in good contact ?(CN71, RY71)
(3) Is the starting condenser(FAN MOTOR) in good contact?
(4) Is the fan motor connector in good contact?(CN73)
(5) Is the output voltage of the IC01(KA7812) and IC02(KA7805) normal ?



6. Exploded View and Parts List

6-1 Main unit

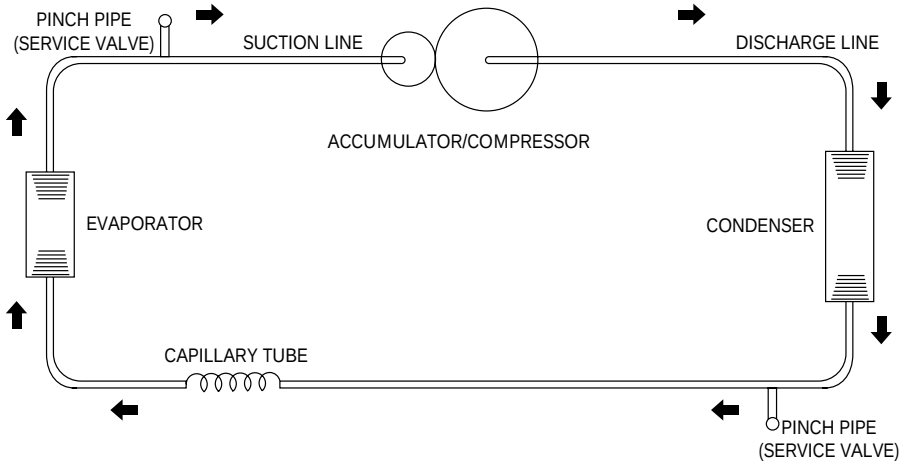


■Part List

No	Description	Code No.	Specification	Q'TY
				SP05A10
1	ASSY PANEL FRONT	DB92-00393B	ASSY,TOP,SEA	1
1-1	PANEL FRONT	DB64-00680A	HIPS,T2	1
1-2	BLADE V	DB66-00367A	HIPS,T2.0	4
1-3	LINK BLADE	DB66-00368A	PP,L82,T1.3	2
1-4	GRILLE AIR INLET	DB64-00681B	HIPS,T2	1
2	CASE CONTROL UP	DB61-00933A	SGCC-M,T0.7	1
3	FILTER	DB63-00600A	HIPS,T2.5	1
4	EVAPORATOR	DB96-01972A	2R×10S,FP1.3	1
5	ASSY-PLATE EVAP CASING	DB90-00898A	ASSY	1
6	NUT-FRANGE	DB60-30004A	2C M6 SM20C NTR	1
7	BLOWER	DB67-00099A	ABS,-,OK_TOP-P/J	1
8	ASSY-EVAP CASE UP	DB90-00944A	25FO-PS	1
9	PLATE-PARTITION	DB70-00219A	ABS,-,T2.5	1
10	INSULATION-TUBE	DB72-50178A	T30,W36,L34,NBR	1
11	MOTOR	DB31-00035K	YGN50-6K	1
12	FAN-PROPELLER	DB67-00014A	ABS,290,OK-PJT	1
13	NUT-FRANGE	DB60-30020A	M6,LEFT	1
14	CASE COND	DB61-00932A	复合PP,T2,W378,L308	1
15	ASSY-COND	DB96-02044A	2R×15S,FP1.5	1
16	ASSY SHUTTER-LF	DB92-00336A	PVC,SC-94445R	1
17	ASSY CABINET	DB90-00912A	Y-PJT,TOP	1
18	SHUTTER-ANGLE UP	DB64-00518A	SECC-P,T1,W8	1
19	ASSY SHUTTER-RH	DB92-00337A	PVC,SC-94445R	1
20	TUBE DISCHARGE	DB62-01349A	C1220T-0	1
21	TUBE SUCTION	DB62-01314A	C1220T-0	1
22	COMPRESSOR	39A050HS1KA	115V 60Hz 1Ph	1
23	NUT-TERMINAL COVER	DB60-30001A	M5,-,SM20C	1
24	GASKET	DB63-20003A	EPDM,T0.8	1
25	COVER-TERMINAL	DB63-10026A	GE,-,NORYL,-,SEI-701	1
26	NUT WASHER	DB60-30028A	M8,ZPC	3
27	GROMMET-ISOLATOR	DB73-00016A	EPDM,-,BLK,OK-PJT	3
28	O.L.P	DB35-00006F		1
29	ASSY CONTROL BOX	DB93-01357G	5K,ELEC,A	1
29-1	SWITCH MEMBRANE	DB34-00019F	76.8*114.5	1
29-2	CASE CONTROL-LOW	DB61-00934A	Y-PJT,SGCC-M,T0.7	1
29-3	CLIP-CAPACITOR	DB65-00031A	SGCC-M,T0.45	1
29-4	POWER CORD	DB39-00343G	125V,15,AWG18	1
29-5	THERMISTOR	DB32-10051D	10K/25,-,3425K	1
29-6	ASSY PCB MAIN	DB93-00874U	SEA 5K TOP,ELECTRONIC	1
29-7	PANEL CONTROL	DB64-00571A	ABS(V5),T2	1
29-8	C-OIL	2501-001290	3.5/35μF,270VAC	1
29-9	TRANSFORMER	DB26-00006G	AC115V,50/60HZ,DC17V	1
30	TUBE CAPILLARY	DB62-01315A	C1220T-H	1
31	ASSY BASE	DB90-00897A	MSWR10,M8,L10	1
32	ASSY-SCREW	DB97-90014K	OK-P/J	1
33	ASSY REMOCON	DB93-01433F	OK-PJT,ARC-724	1

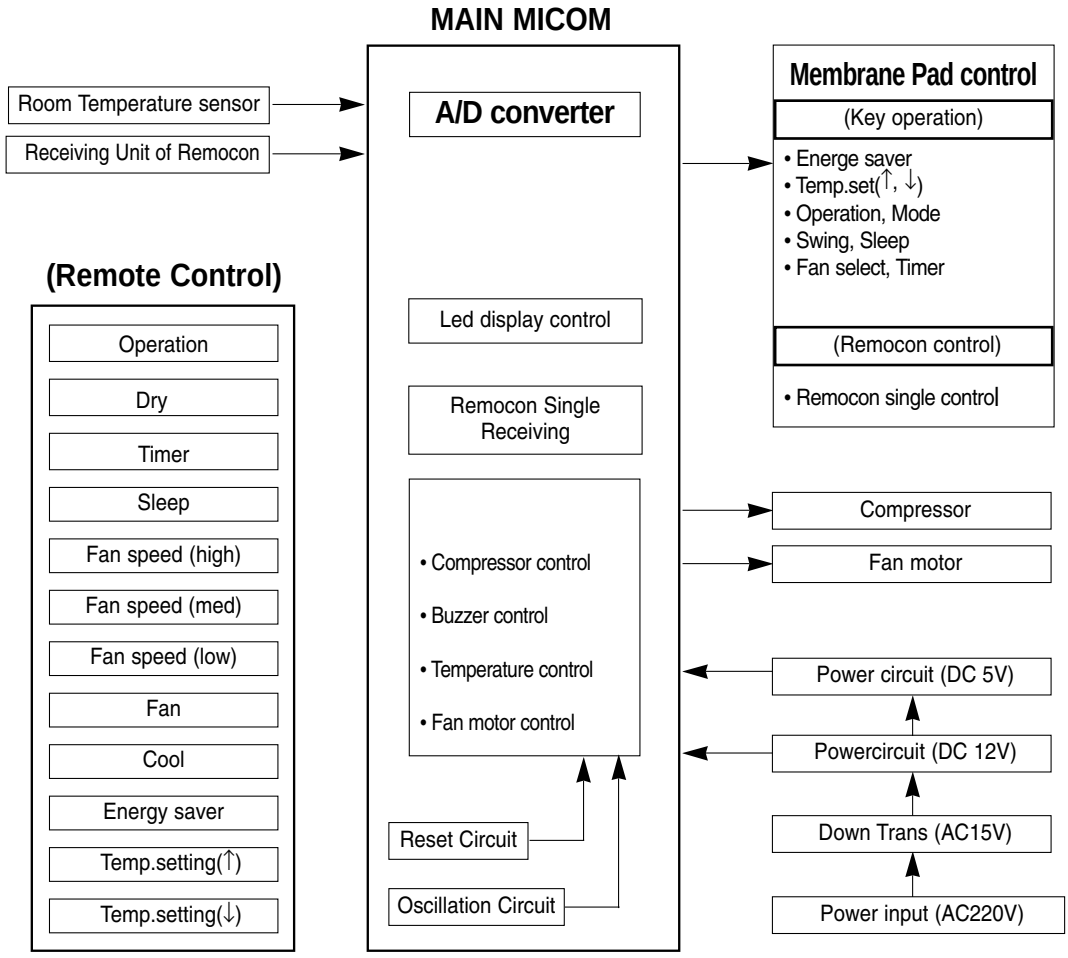
7. Block Diagram

7-1 Refrigerating Cycle Block Diagram

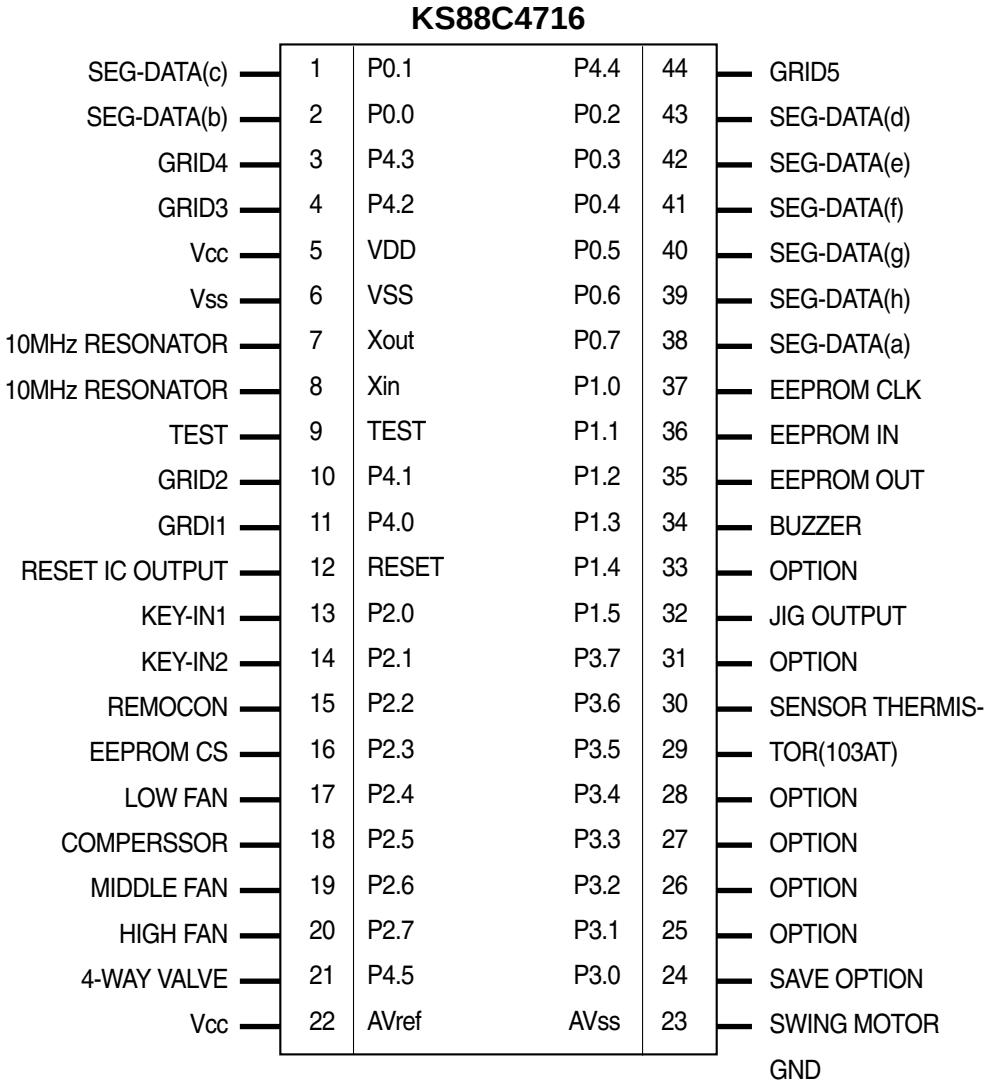


7-2 Basic Structure

7-2-1 Micom Control Diagram



7-2-2 Micom pin assignment

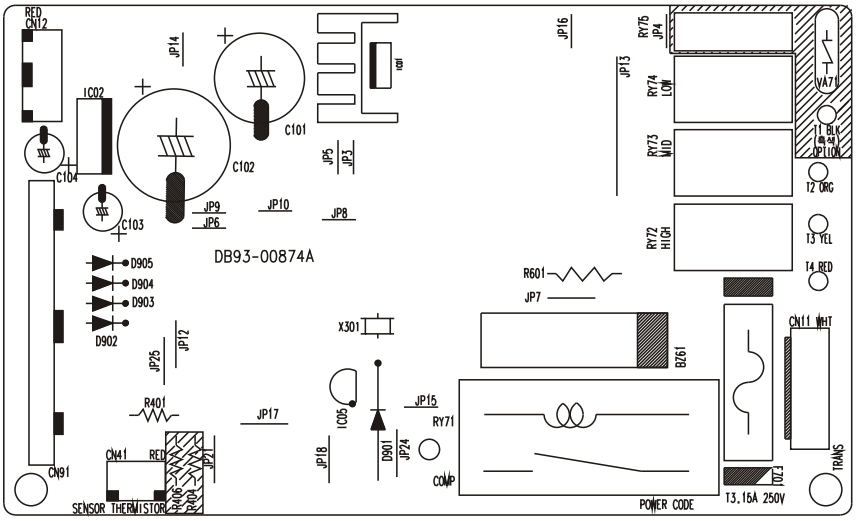


8. PCB DIGRAM

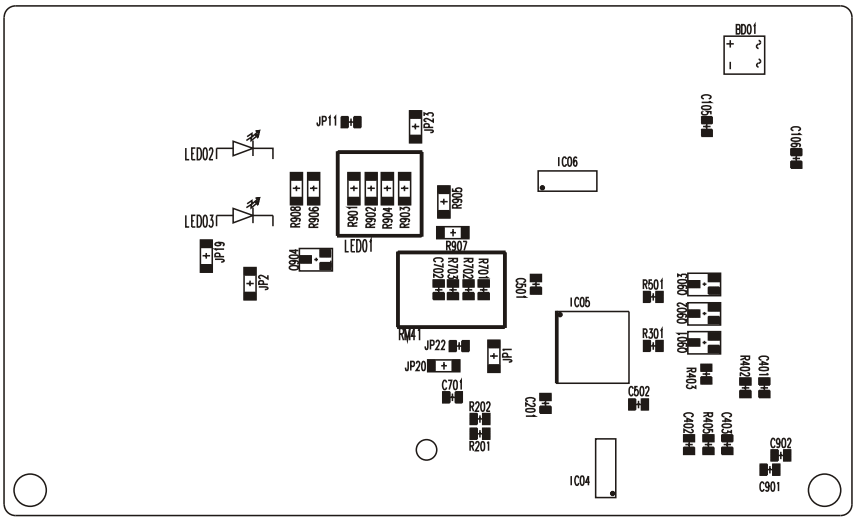
8-1 ASSY MAIN PCB

MAIN PCB:DB93-00874U

Front Side



Back Side



■Part List DB93-00874U

NO.	DESCRIPTION	SPECIFICATION	Q'TY	REMARK
1	DIODE BRIDGE	DE06S	1	BD01
2	VARISTOR	10D 471	1	VA71
3	IC DRIVE	ULN2003AD	2	IC04,IC06
4	IC	KA7533OZ	1	IC03
5	IC-VOLT REGU	KA7805	1	IC02
6	IC-VOLT REGU	KA7812	1	IC01
7	SCREW TAPPING	PH3*8	1	IC01
8	HEAT SINK	L15 W15 H25	1	IC01
9	C-AL	2200uF 25V	1	C102
10	C-AL	1000uF 35V	1	C101
11	C-AL	100uF 10V	1	C103
12	C-AL	22uF 16V	1	C104
13	CONNECTOR WAFER	FCZ254-08SL	1	CN91
14	CONNECTOR WAFER	VH-4A,WHT	1	CN11
15	CONNECTOR WAFER	TJC3-2A,RED	1	CN41
16	CONNECTOR WAFER	TJC3-3A,RED	1	CN12
17	FUSE	250V 3015A	1	F701
18	FUSE HOLDER	HF-004/J	2	F701
19	BUZZER	PZ-227125	1	BZ61
20	R-CARBON	620 OHM 1/2W	1	R601
21	REMOCON MODULE	FRP-4021H6	1	RM41
22	JUMPER WIRE	PH0.6 7.5mm	17	JP3~JP10,JP12,JP14~JP18,JP21,JP24,JP25
23	JUMPER WIRE	2012 TYPE	2	JP11,JP22
24	JUMPER WIRE	3216 TYPE	5	JP1,JP2,JP19,JP20,JP23
25	PCB-MAIN	FR-1 112*65*1.6mm	1	-
26	R-CHIP	180,3216,10%	8	R90~R908
27	R-CHIP	330,2012,5%	3	R402,R701,R703
28	R-METAL	10K,1/8W 1%	1	R404
29	R-METAL	6,8K,1/8W 1%	1	R401
30	R-CARBON	10K,2012,5%	4	R301,R403,R501,R502
31	R-CARBON	1K,2012,5%	2	R201,R202
32	R-METAL	5.4K,1/8W,1%	1	R406
33	C-CHIP	104Z,2012,50V	5	C105,C106,C401~C403
34	C-CHIP	223Z,2012,50V	3	C201,C501,C502
35	C-CHIP	101K,2012,50V	1	C701
36	C-CHIP	102K,2012,50V	3	C702,C901,C902
37	CHIP-TRANSISTOR	KRA226S	3	Q901~Q903
38	CHIP-TRANSISTOR	KRC246S	1	Q904
39	DIODE-SWITCHING	1N4148(SMALL)	5	D901~D905
40	IC-MCU	STM0013-BA	1	IC05
41	RELAY-POWER	D11U,12VDC	1	RY71
42	CERAMIC RESONATOR	10MHz	1	X301
43	LED DISPLAY	D306GWA/S29	1	LED01
44	RELAY	JQ1A12V	3	RY72~RY74
45	RELAY	F3A	1	RY75
46	ASSY HARNESS	EL2-06V	1	T1~T4
47	LED LAMP	B5054D3,GREEN	2	LED02,LED03
48	R-CHIP	4,7K,2012,5%	1	R405
49	JUMPER WIRE	PH0.6 15mm	1	JP13

9. Wiring Diagram

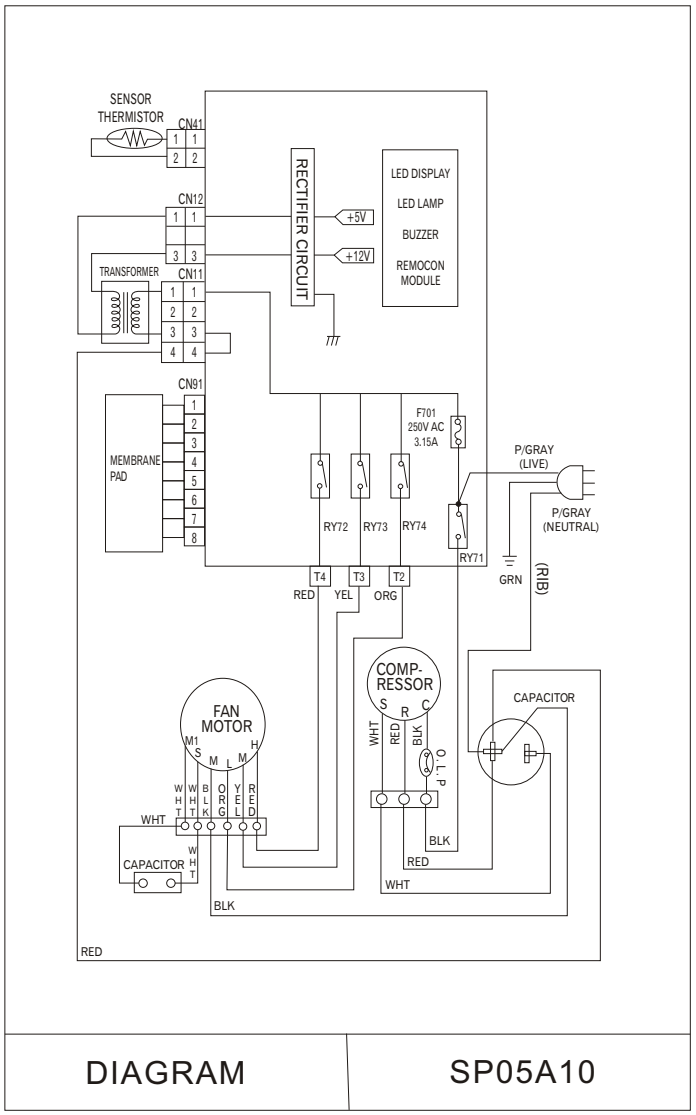
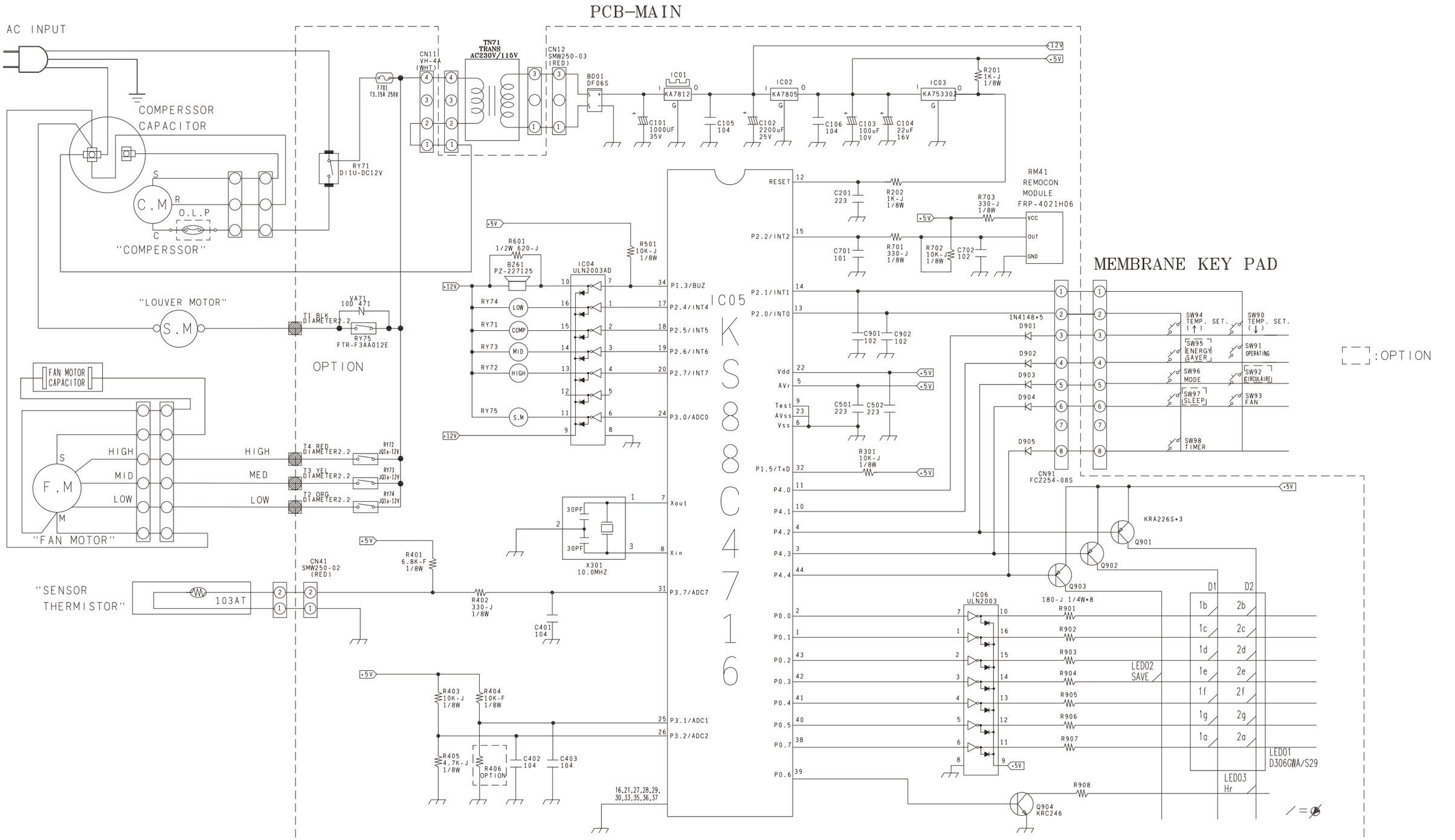


DIAGRAM	SP05A10

10 Schematic Diagrams

10-1 MAIN PCB



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