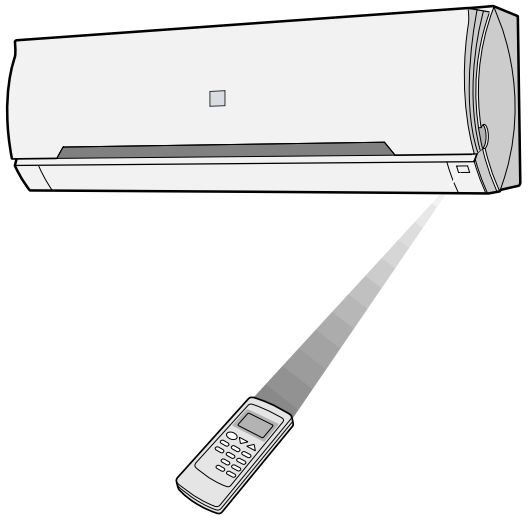
SHARP SERVICE MANUAL



SPLIT SYSTEM
ROOM AIR CONDITIONER

INDOOR UNIT
AH-MP20

OUTDOOR UNIT
AU-MP20

CONTENTS

SHARP CORPORATION

CHAPTER 1. PRODUCT SPECIFICATION
[1] SPECIFICATION

1. AH-MP20 / AU-MP20

ITEMS			INDOOR UNIT	OUTDOOR UNIT
			AH-MP20	AU-MP20
Cooling capacity		kW	5.30	
Moisture removal		Liters/h	–	

Electrical data

Phase			Single	
Rated frequency		Hz	50	
Rated voltage		V	220	
Rated current		A	7.9	
Rated input *		W	1720	
Power factor		%	92 - 98	
Compressor	Type		Hermetically sealed rotary type	
	Model		PH31VNET	
	Oil charge		670cc ,DIAMOND MS32(N-1)	
Refrigerant system	Evaporator		Louver fin and Grooved tube type	
	Condenser		Louver fin and Grooved tube type	
	Control		Capillary tube	
	Refrigerant volume		R22 1300g	
Noise level (at cooling)	High	dB(A)	44	53
	Mid.	dB(A)	37	–
	Low	dB(A)	35	–

Fan system

Drive			Direct drive	
Air flow quantity (at cooling)	High	m3/min.	17.5	44
	Med.	m3/min.	13.4	
	Low	m3/min.	11.9	
Fan			Cross flow fan	Propeller fan

Connections

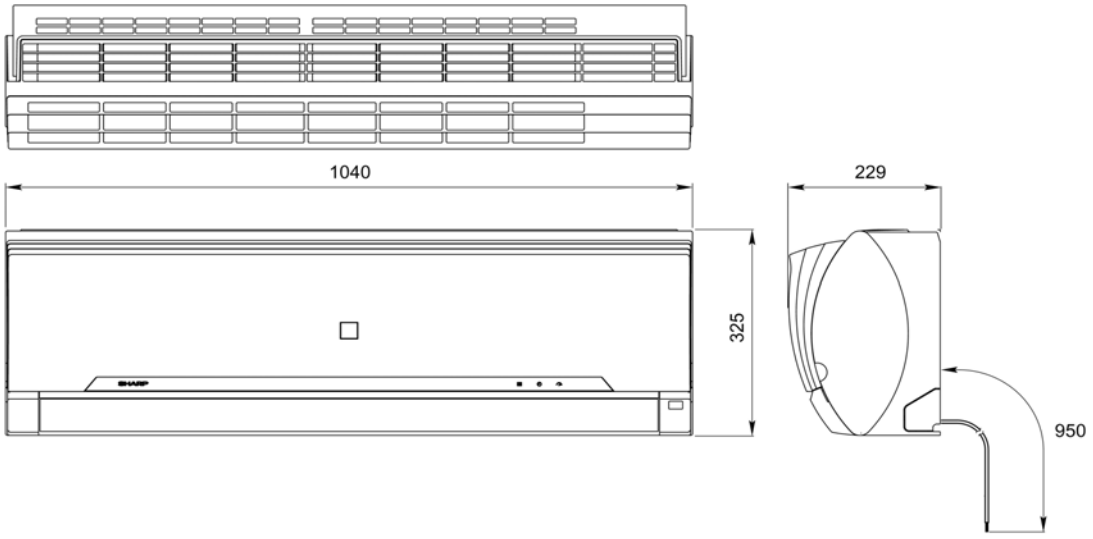
Refrigerant coupling		Flare type	
Refrigerant tube size Gas, Liquid		1/2" , 1/4"	
Drain piping	mm	O.D Φ 20	

Others

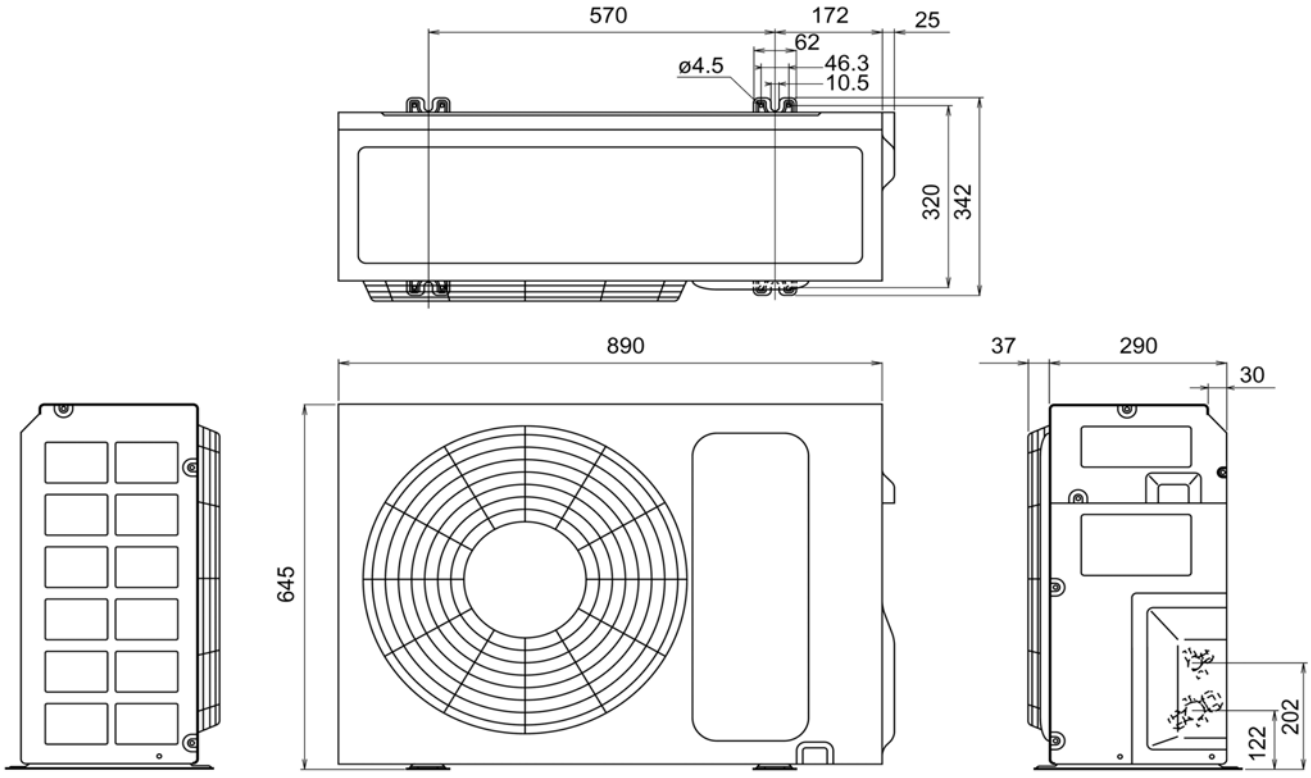
Safety device			Compressor : Internal protector	
			Fan motor : Thermal protector(Internal)	
			Fuse, Micro computer control	
Air filters			Polypropylene net (Washable)	
Net dimensions	Width	mm	1040 (1155)	890 (1020)
	Height	mm	325 (300)	645 (735)
	Depth	mm	220 (385)	327 (398)
Net weight		kg	19 (21)	55 (59)

[2] EXTERNAL DIMENSION

1. Indoor unit (AH-MP20)

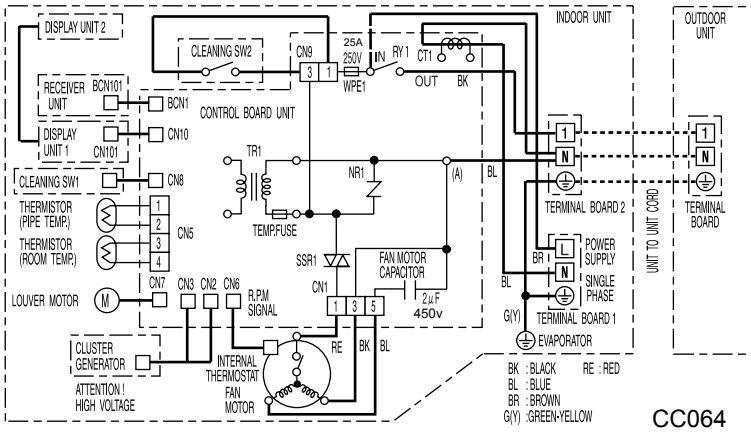


2. Outdoor unit (AU-MP20)

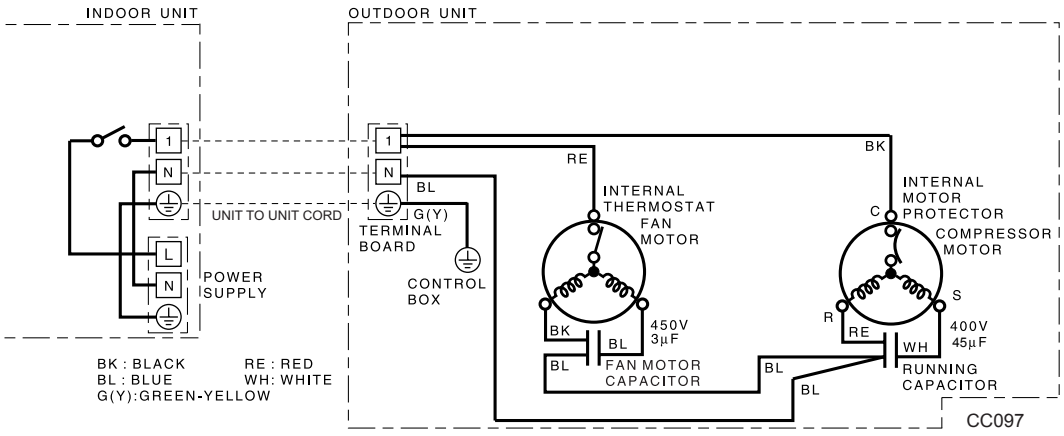


[3] WIRING DIAGRAM

Indoor Unit (AH-MP20)



Outdoor Unit (AU-MP20)



CHAPTER 2. ELECTRIC CIRCUIT

[1] ELECTRIC PARTS

1. INDOOR UNIT (AH-MP20)

PART NO.	PART NAME	ITEM	SPECIFICATION
1	Terminal Board	Rating	300V,25A
2	Fan motor Capacitor	Rating	450V, 2μF
3	Relay-1 (RY1)	Rating	AC250V,20A Coil Volt: 12V
4	Printed Wiring Board	Material	Paper Base Phenolic Resin (UL 94V-0)
5	Transformer	Rating	Pri 220-240VAC
6	Fan motor	Rating	220 - 240VAC 50Hz 41W 4-Pole
		Type	MLA999
		Thermal Protector (Internal)	Cut off 135 $\pm$10 °C
7	Power Supply Cord	Rating	3 x 1.5 mm2
		Type	H05VV-F
8	Louver Motor	Rating	DC12V
		Type	24BYJ48

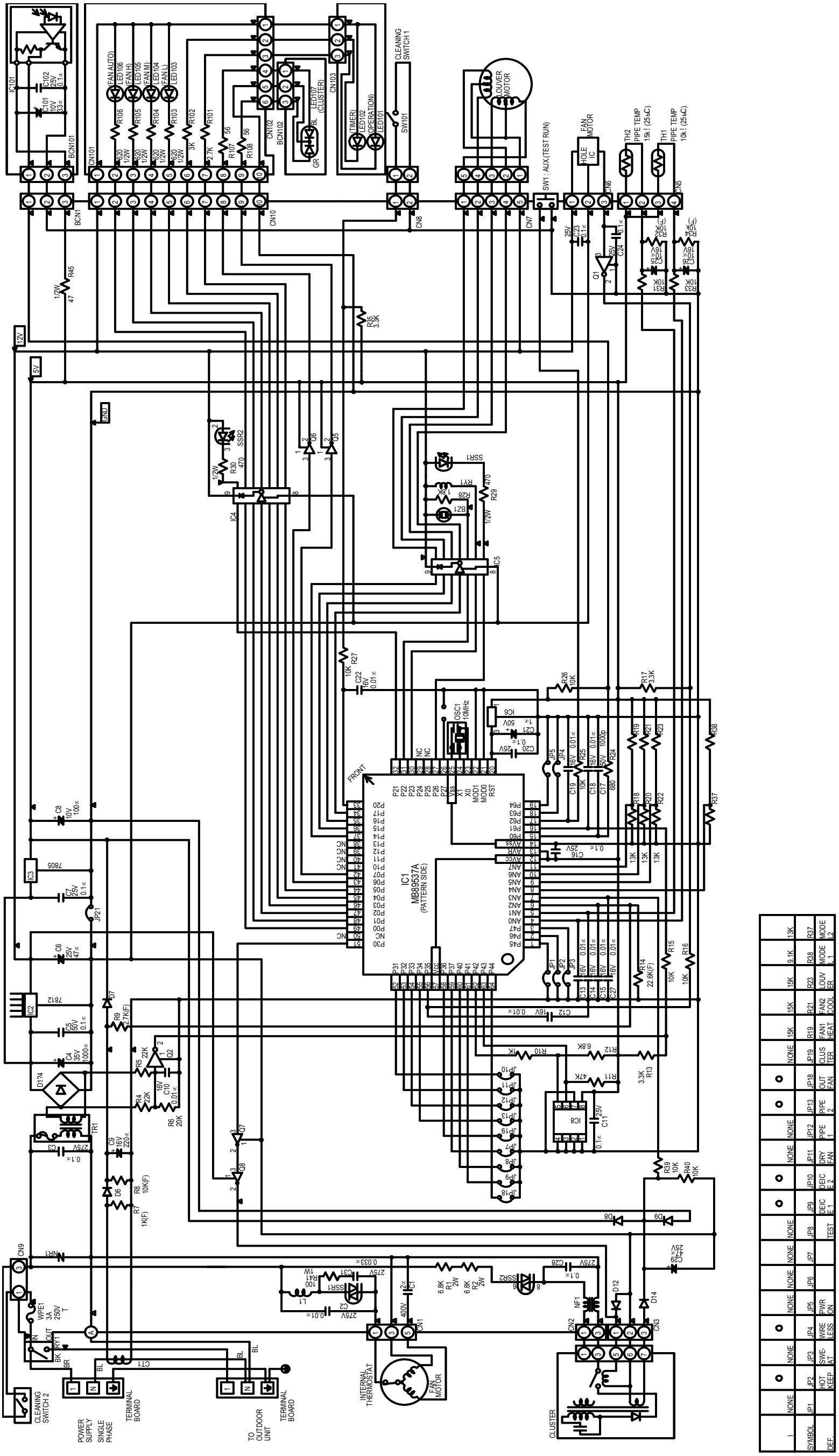
1. OUTDOOR UNIT (AU-MP20)

PART NO.	PART NAME	ITEM	SPECIFICATION
1	Terminal Board	Rating	300V,25A
2	Fan motor Capacitor	Rating	450V, 3μF
3	Running Capacitor	Rating	400V, 45μF
4	Compressor	Rating	AC220V 50Hz 1730W
		Type	PH31VNET
5	Protector	Rating	-
		Type	(INTERNAL)
6	Fan motor	Rating	220 - 240VAC 50Hz 71W 6-Pole
		Type	MLA002
		Thermal Protector (Internal)	Cut off 135 $\pm$5 °C

[2] MICRO-COMPUTER CONTROL SYSTEM

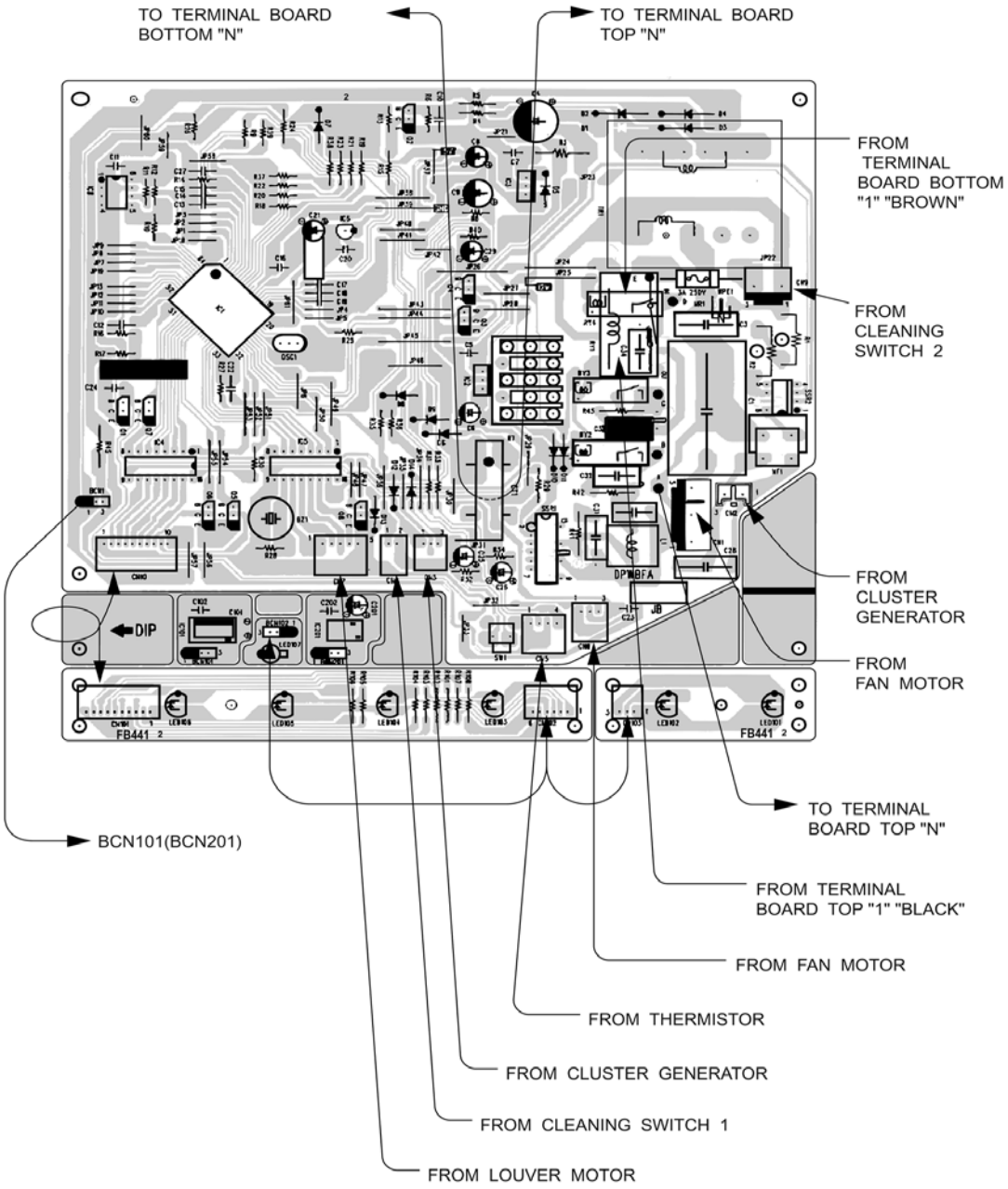
1. Electronic Control Diagram

Indoor unit (AH-MP20)



2. PRINTED WIRING DIAGRAM

1 Indoor (AH-MP20)



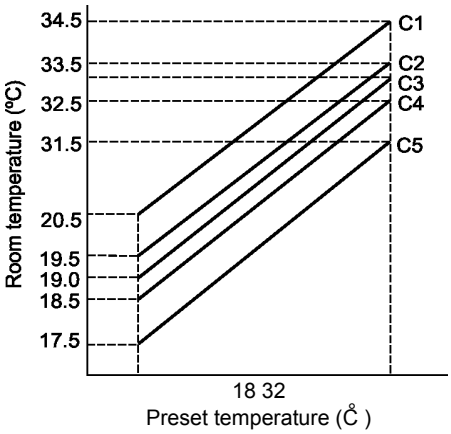
CHAPTER 3. FUNCTIONS

[1] FUNCTION

1. TEMPERATURE CONTROL CHARACTERISTIC

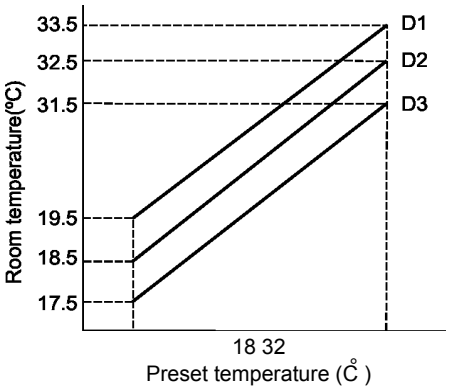
1.1. COOL operation

In the "COOL" mode, the thermostat circuit is controlled by five thermostat lines (C1 thru C5).



1.2. DRY

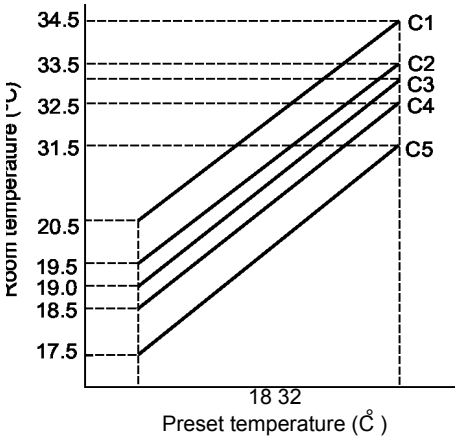
In the "DRY" mode, the thermostat circuit is controlled by three thermostat lines (D1 thru D3).



2. OPERATION MODES

2.1. COOL operation

The compressor turns on or off, at the thermostat lines C3 and C4. The outdoor fan motor is also controlled with the compressor.



2.2. DRY

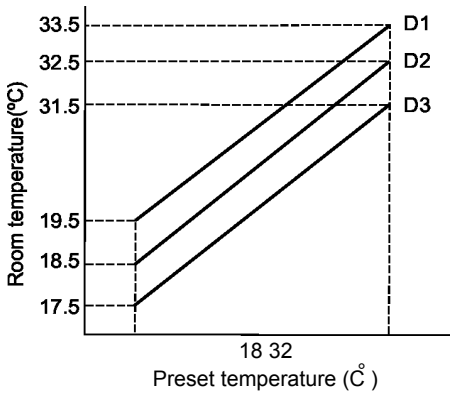
On the switch on, the compressor always starts to operate for 2 minutes with fan speed "DL".

The microcomputer reads the room temperature 2 minutes after this first compressor operation.

This room temperature is set as the preset temperature

The preset temperature ranges from 18°C to 32°C. When the room temperature is below 18°C, the preset temperature is set to 18°C, and when the room temperature is over 32°C, the preset temperature is set to 32°C.

Dry operation is divided into three zones (Cooling zone, Dehumidifying zone and Circulating zone) by thermostat lines (D1 to D3), and the compressor and the fan motor are controlled in each zone as shown in Table.



	Compressor	Fan speed
Cooling zone	ON	"DH"
Dehumidifying zone	ON	"DL"
Circulating zone	OFF	"DL" or OFF

3. FAN SPEED

Fan speeds are given by the indoor fan motor, "DL"~"HH" which are available in the following operation mode.

Fan speed	Fan switch	Fan switch (AUTO)	AH-MP20 (r.p.m)
DL	—	DRY	800
DH	—		890
CL	COOL SOFT	—	800
CAL	—	COOL	840
CM	COOL LOW		980
CAH	—		1020
CH	COOL HIGH	—	1170

4. TEST

If the "AUX" button on the unit is pressed for 5 seconds or more during operation, cool test operation starts. The operation LED (red) flickers during test run.

To put the system in the heating test run mode, start the cooling operation and select the heating mode on the remote control. In cool and heat mode continuous compressor on operation is performed. In dry mode the operation is in dehumidifiying zone. In fan only mode the indoor fan motor runs continusly.

5. TIMER

5.1. ON/OFF Timer

When the unit operates during one hour after the OFF-time is set, ther- mostart setting is automatically shifted (in operation and dry operation). When the ON-timer is set in cool operation, operation starts before 0 to 30 minutes(depends on the room temperature) so that preset temperature is obtaind at set time.

5.2. hour timer

When ONE-HOUR timer is set, the unit turns off automatically after one hour. The one hour timer operation has priority over other time operation, such as the TIMER ON and TIMER OFF. If the ONE-HOUR TIMER button is pressed again during operation, the unit will operate additionally for another one hour.

AUTOMATIC AIR CONDITIONING

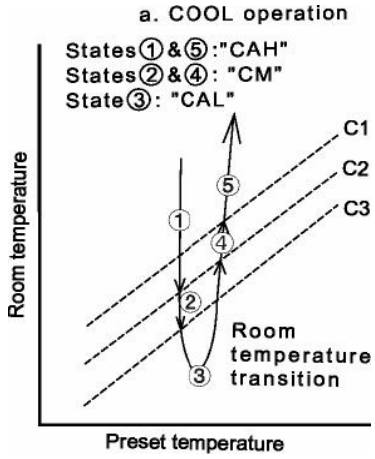
When automatic air conditioning is selected, the operation mode and preset temperature are set automatically according to the room temperature on starting operation.

Room temperature at operation start	Operation Mode	Preset Temperature
Above 28°C	COOL	26°C
26°C > 28°C		25°C
24°C > 26°C		24°C
Below 24°C	DRY	Room temperature at operation start

When DRY mode is selected by the micro computer with AUTO operation, the fan speed lamps on the indoor unit panel will indicate identically with the fan speed symbols on the remote control dispaly, as the FAN speed setting is changed accordingly. Despite,as the FAN speed setting is changed accordingly. Despite, the actual fan speed will not change, as it is determined autometically by the micro computer.

AUTOMATIC FAN SPEED

When the automatic fan speed is selected in cool operation, the fan speed is automatically changed by the thermostat lines C1 to C3 in cool operation.



OUTPUTS IN EACH OPERATION MODE

Mode		Compressor	Outdoor Fan Motor	Indoor Fan Motor	Valve Coil
0	Cooling	ON	ON	ON	OFF
OU	Circulat-ing	OFF	OFF	ON	OFF
	Cooling	ON	ON	L/UL	OFF
} 0	Dehu-midiflying	ON	ON	UL/D	OFF
	Circulat-ing	OFF	OFF	D/OFF	OFF

POWER ON START

If the connecting wire "POWER ON" (JP99) is cut on the PWB ass'y, when the power is supplied by turning on a circuit breaker, the air conditioner automatically starts of operation in "AUTO".

(Refer to Printed Wiring Board.)

AUTO RESTART 11.1.

When JP5 is ON

Power failuer occurs during operation, the unit will restart in the same operation mode as before recovery.

11.2. When JP5 is OFF

Auto restart function is not available.

[2] TEST MODE

Keep pushing the "AUX." buttons and supply the power, the system will go to the test mode. In this mode, the output of operation is switched by pushing the ""AUX." button in the unit or the "OI" button in the remote controller. Normal outputs are shown in Table.

AH-MP20

STEP No	Buzzer	Lamps: RED LED 101	Lamps: ORANGE LED 102	Lamps: GREEN LED 103	Lamps: GREEN LED 104	Lamps: GREEN LED 105	Lamps: GREEN LED 106	Cluster: CLUSTER LED 107	Cluster: Power	Outdoor	Indoor Fan	Louver
0	2	Room temp. 7~42'C: ON / ~7'C, 42'C~: OFF	Pipe temp. -2~45'C: ON / ~-2'C, 45'C~: OFF	ON	ON	ON	ON	BLUE	OFF	OFF	OFF	OPEN
1	1	FLICK	FEED BACK CIRCUIT / Cluster(AN3 input voltage) / ON	CT INPUT(AN2 input voltage): 0.3V~4.5V: ON; ~0.3V, 4.5V~: OFF	CT INPUT(AN2 input voltage): ~0.3V, 4.5V~: ON; 0.3V~4.5V: OFF	CT INPUT(AN2 input voltage): 0.3V~4.5V: ON; ~0.3V, 4.5V~: OFF	CT INPUT(AN2 input voltage): ~0.3V, 4.5V~: ON; 0.3V~4.5V: OFF	BLUE	ON	ON	1000 rpm	OPEN
2	1	ON	Power On Start(JP5) / Wireless(JP4) / OFF	ON	MODEL SELECTION(AN4 input voltage) / OFF	OFF	ON	GREEN	ON	OFF		OFF
3	1	ON	Sweat(JP3) / Hot Keep(JP2) / OFF	OFF	Out Fan(JP18) / ON	TEST(JP8) / ON	Cluster(JP19) / ON	OFF	OFF	OFF		OFF
4	1	OFF	DEICE 1 / DEICE 2 / OFF	OFF	Louver Collection(AN5 input voltage) / ON	ON	ON	OFF	OFF	OFF		OFF
5	1	ON	Pipe 1 / Pipe 2 / OFF	OFF	Cooling mode FAN speed Collection(AN6 input voltage) / ON	ON	ON	OFF	OFF	OFF		OFF
6	1	ON	EEPROM / Micro SW: OFF / ON	OFF	Heating mode FAN speed Collection(AN6 input voltage) / ON	ON	ON	OFF	OFF	OFF		OFF
7	1	ON	OFF	OFF	EEPROM VERSION(UPPER 4bit) / OFF	OFF	OFF	OFF	OFF	OFF		OFF
8	1	OFF	OFF	OFF	EEPROM VERSION(LOWER 4bit) / OFF	OFF	OFF	OFF	OFF	OFF		CLOSE

2.1 PLASMA CLUSTER

Plasma cluster ion mode

SSR2 : ON

Relay (Cluster unit inside) : OFF

Minus ion mode

SSR2 : ON

Relay (Cluster unit inside) : ON

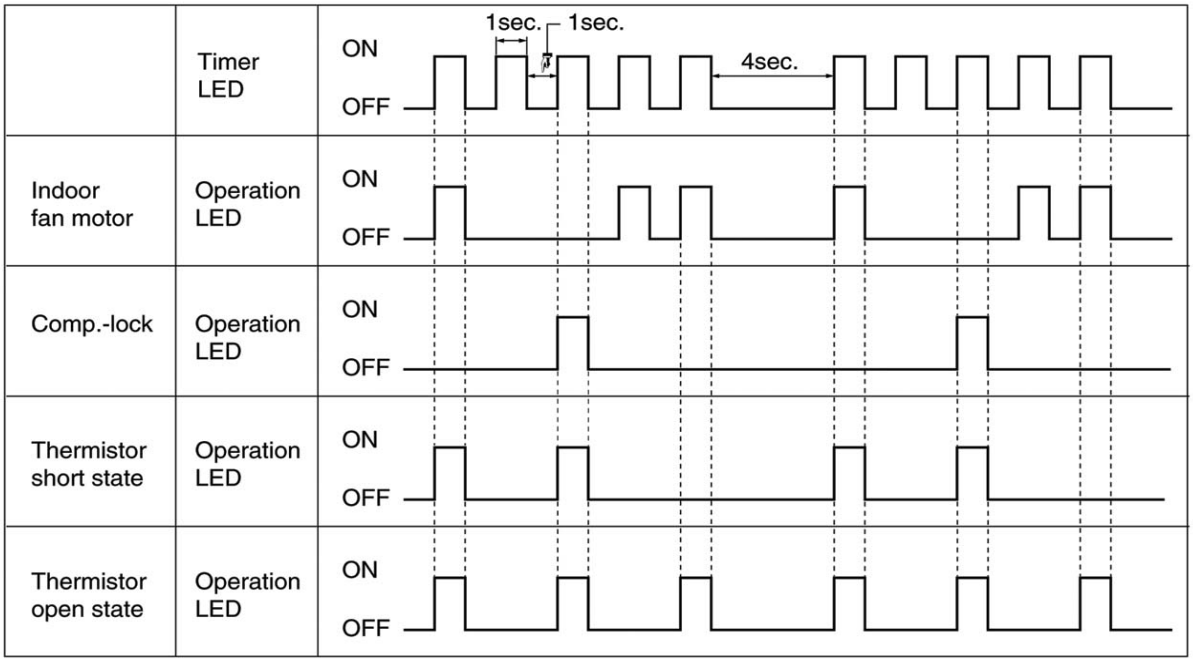
1) Cluster generator checking (STEP 1)

Time LED (Yellow)	ON	OFF
Judgement	Normal (Generator OK)	Failure (Check circuit)

[3] DIAGNOSIS PROCEDURE

When indoor fan motor is out of order or compressor lock occurs, indoor fan motor, outdoor fan motor, and louver are all stopped and the operation LED(red) turns on or off synchronously with the timimg of the timer LED.

When the thermistor for room temperature or pipe temperature is open or short state, the operation LED turns on or off synchrnoously with the timing of the timer LED by pushing continously for more than 5 seconds "AUX." button during suspension of operation.

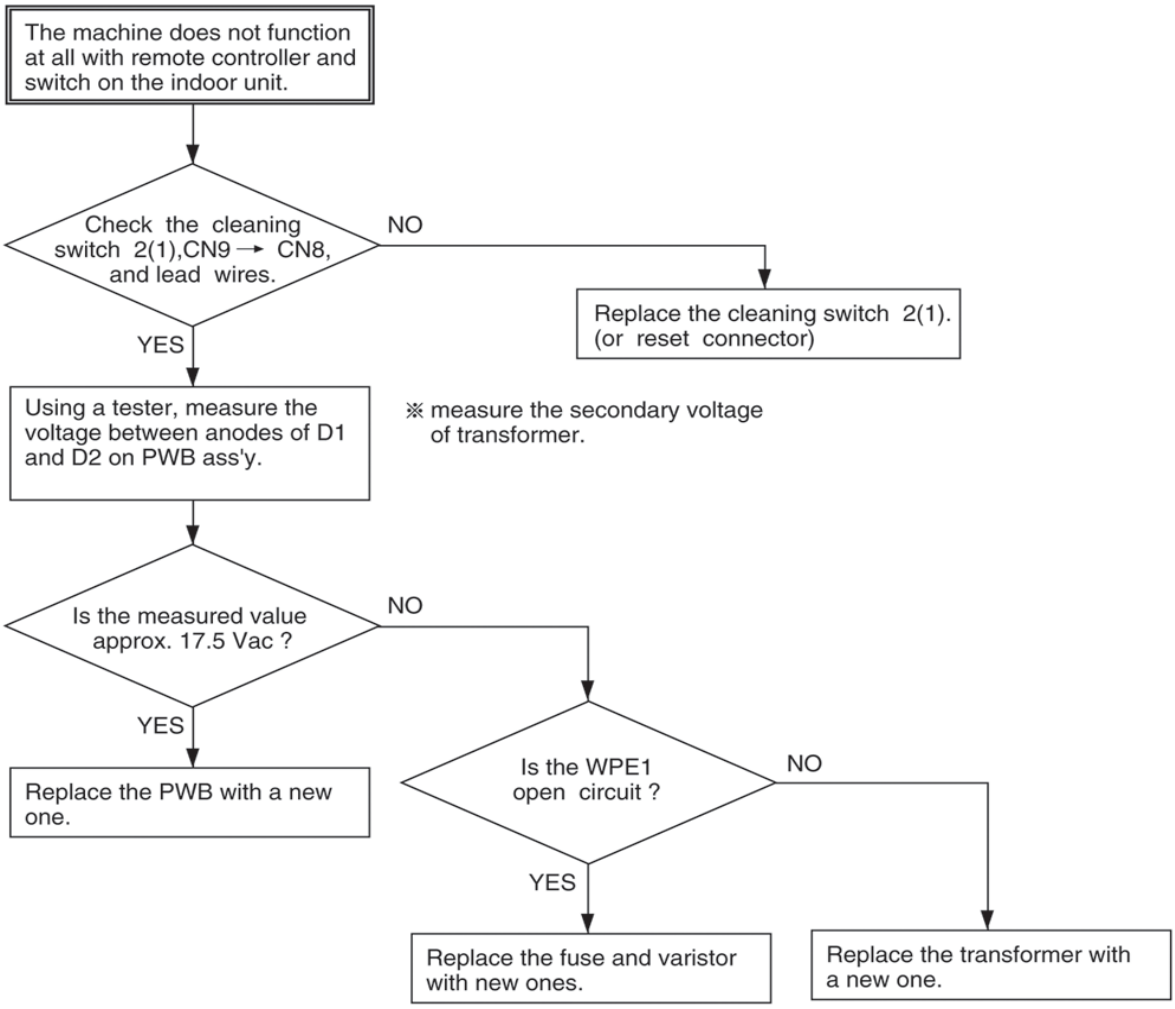


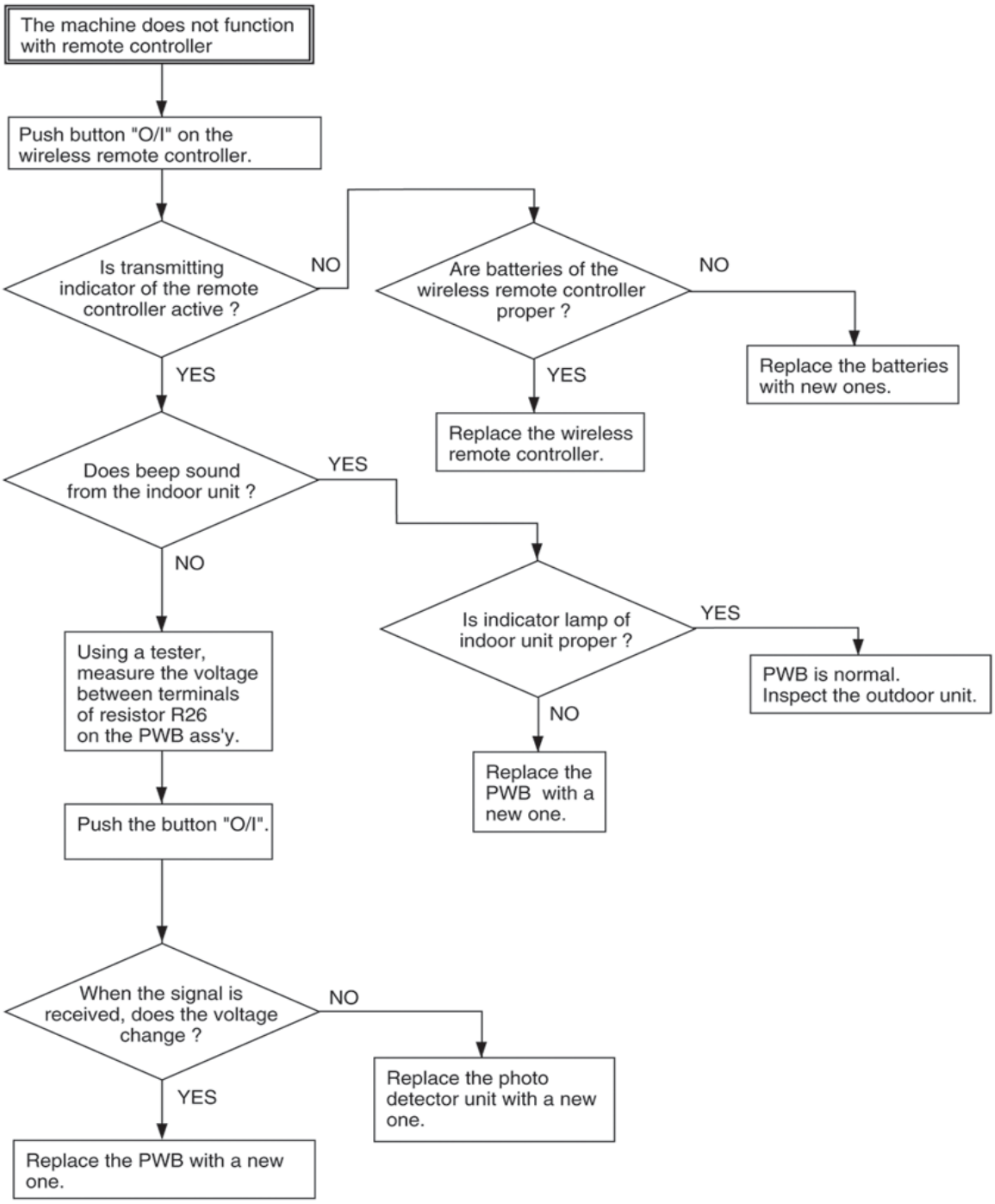
Timing chart of Timer LED and Operation LED of DIAGNOSIS PROCEDURE.

When "OI" button the remote controller or "AUX." button in the unit is pushed, the unit is free from DIAGNOSIS PROCEDURE.

When the louver unit is not properly installed, all lamps on the indicator panel will blink operation are all stop and Remote signal is not accept.

CHAPTER 4. TROUBLESHOOTING




The machine does not function with remote controller
Push button "O/I" on the wireless remote controller.
Is transmitting indicator of the remote controller active ?
NO
YES
Are batteries of the wireless remote controller proper ?
NO
YES
Replace the batteries with new ones.
Replace the wireless remote controller.
Does beep sound from the indoor unit ?
YES
NO
Is indicator lamp of indoor unit proper ?
YES
NO
PWB is normal. Inspect the outdoor unit.
Replace the PWB with a new one.
Using a tester, measure the voltage between terminals of resistor R26 on the PWB ass'y.
Push the button "O/I".
When the signal is received, does the voltage change ?
NO
YES
Replace the photo detector unit with a new one.
Replace the PWB with a new one.

The room is not cooled at all
or not cooled.
The compressor does not operate.

Push the button "AUX." on
the indoor unit, for more than 5 sec.

Using a tester, measure voltage at
the terminals on the terminal board.

Is the voltage
between terminal "N" and
"1" of the terminal board the
power supply voltage ?

NO

YES

Measure resistances of TH1 and TH2.

Are the resistances
conformed Fig. 1 ?

NO

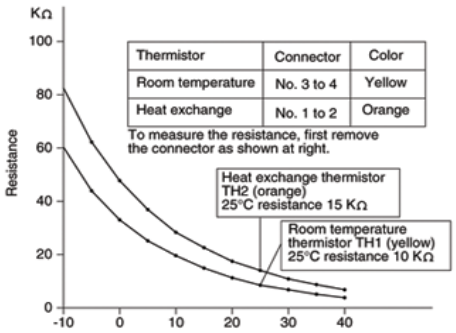
YES

Replace the thermistor ass'y with a new one.

Replace the PWB ass'y with a new one.

The control circuit is normal.
- The compressor may be defective.
- The running capacitor may be defective.
- Refrigerant may be leaked.
- The outdoor fan motor may be defective.
- The outdoor fan motor capacitor may be defective.

Fig. 1 Temperature properties of indoor thermistors



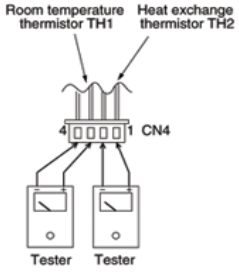
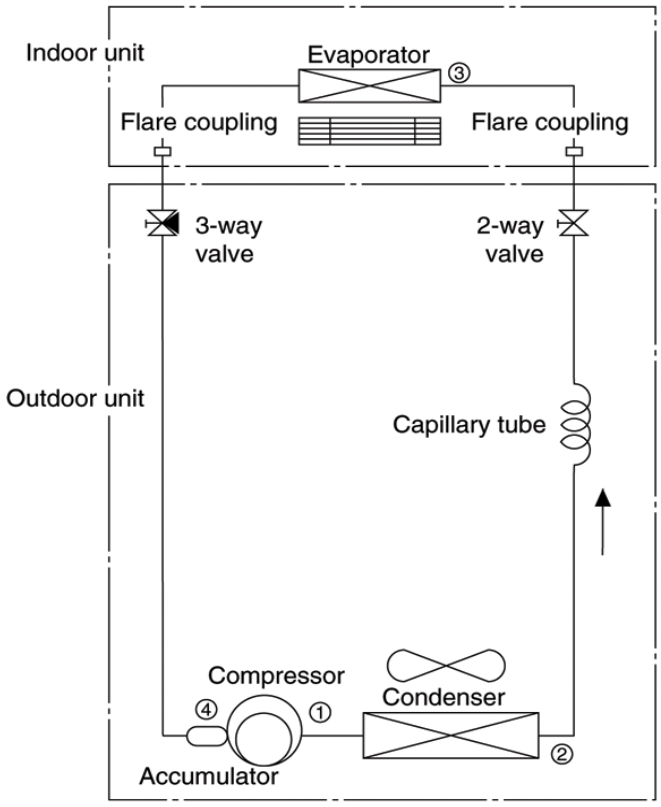


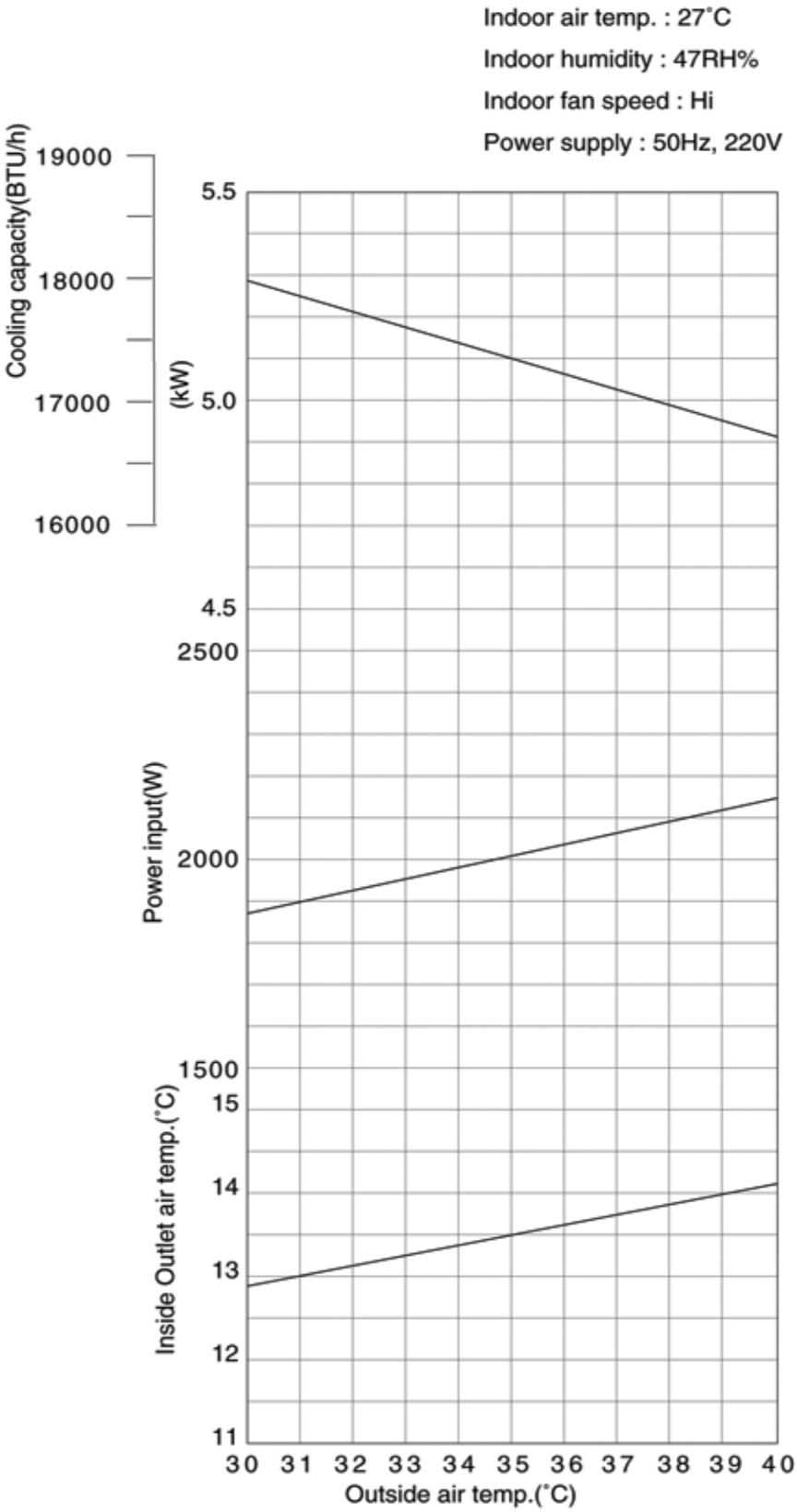
Fig. 1

CHAPTER 5. REFRIGERANTION CYCLE AND PERFORMANCE CURVES
[1] REFRIGERANT CYCLE



	O.D	I.D	L
Capillary tube	3.5	2.0	80

[2] PERFORMANCE CURVES



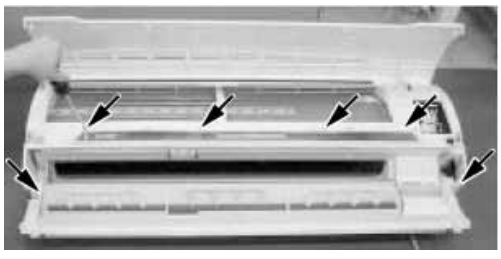
[1] INDOOR UNIT

1. Disassembling procedure of the indoor unit

1) Open the open panel, remove 2 Air Filters.

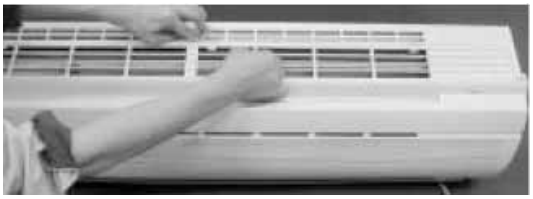
2) Open the Louver frame, unlooks the hooks, pull the unit.

3) Remove 6 screws fixing the Front panel.



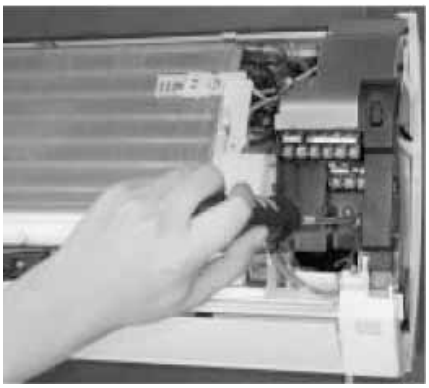
4) Remove the screw fixing the Cord holder.

5) Close the Open panel. pushing the nail of the Front panel, and lift the Front panel up.

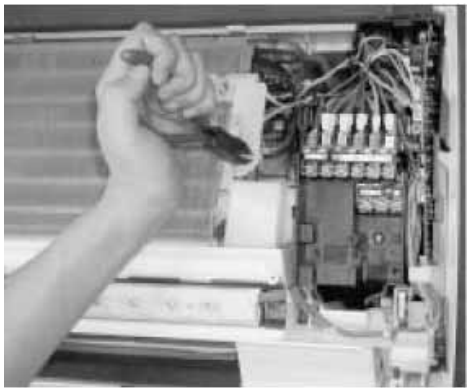


6) Remove the unit-to-unit wiring from the Terminal board.

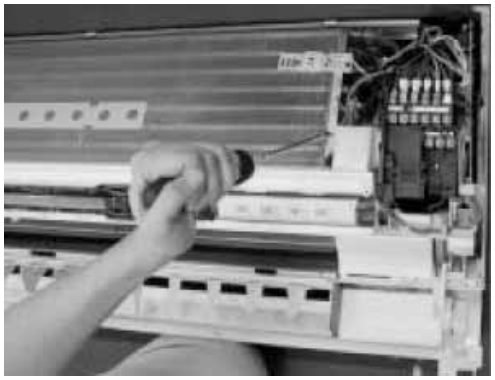
7) Remove a screw fixing the Control box cover.



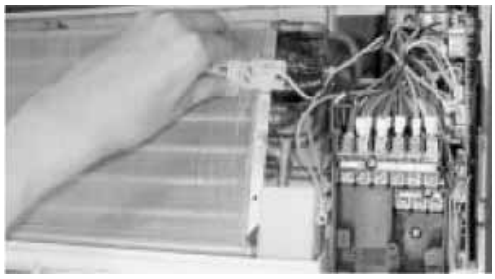
8) Cut the fixing band and remove the Cover B.



9) Remove a screw fixing the ground wire.



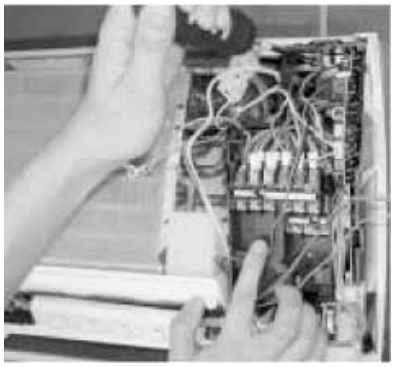
10) Remove the Thermistor of the Evaporator.

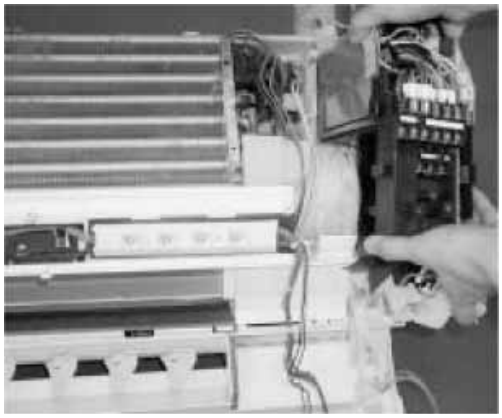


11) Remove Connector.

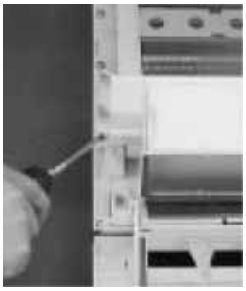
12) Cut the fixing band and remove the Holder.

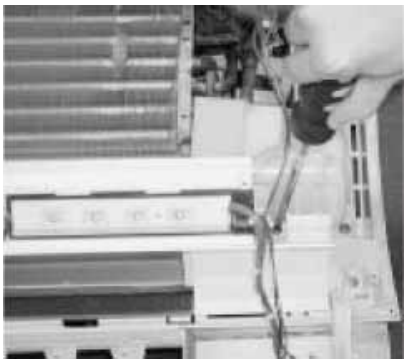
13) Remove 2 screws fixing the Control box and remove it.



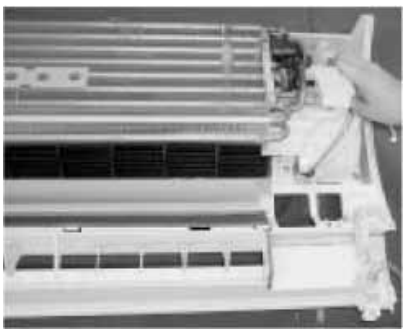


14) Remove a screw fixing the drain pan and pull Drain pan toward you.



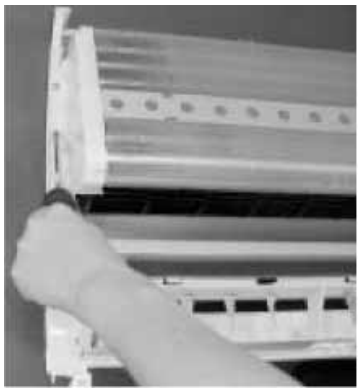


15) Remove the Drain cover from the Evaporator



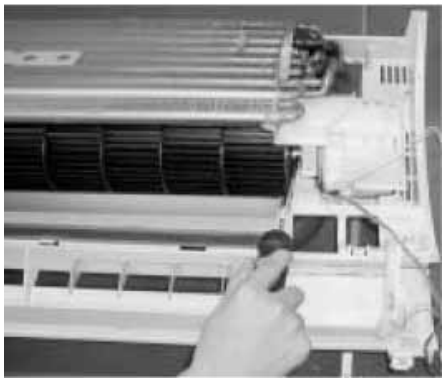
16) Remove 3 screws fixing the Evaporator.

17) Remove the Evaporator from the Cabinet.



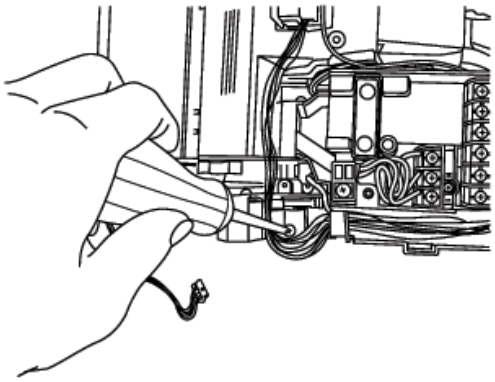
18) Remove 4 screws fixing the Side cover R, and pull the - Cross flow fan

19) Loose a screw fixing Cross flow fan.

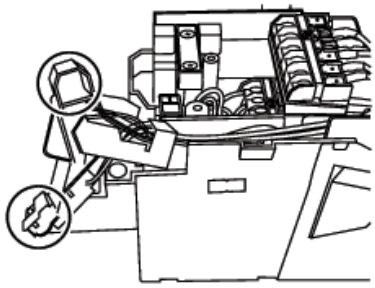


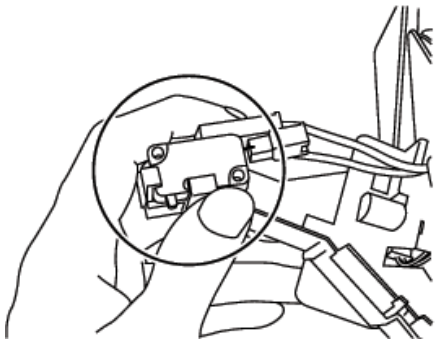
2. The Electric Control box.

1) Remove the screw fixing the Receiving filter.

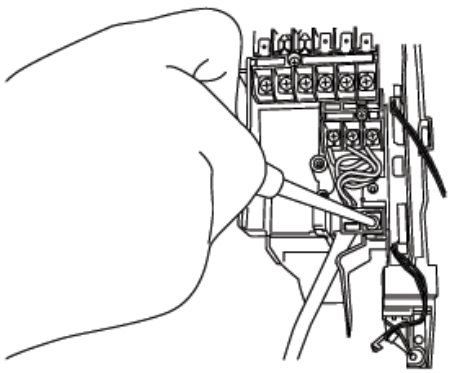


2) Remove the 2 Switch and Photo detector unit.

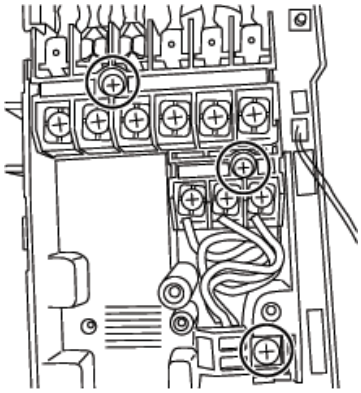




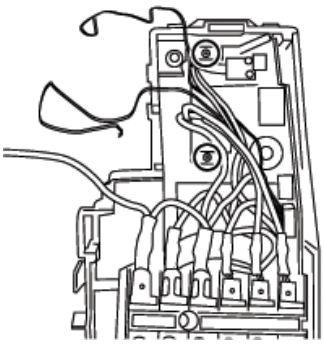
3) Remove a screw fixing the Cord holder.

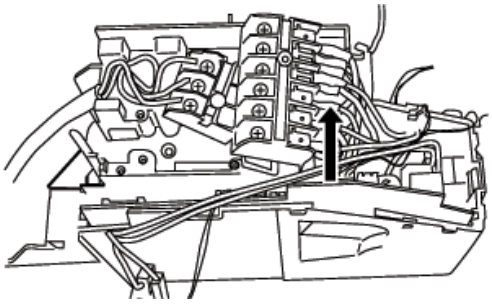


4) Remove a screw fixing the Cord holder and 2 screw fixing the Terminal board.



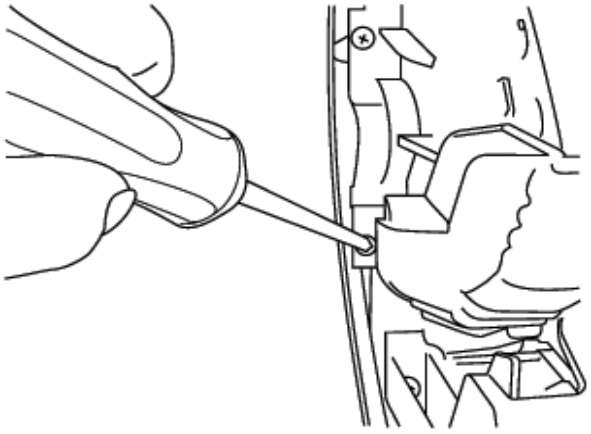
5) Remove 2 screws fixing the Transformer and pull the Control board unit.

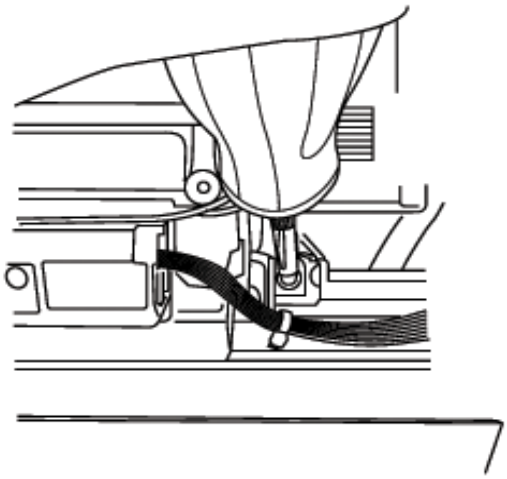




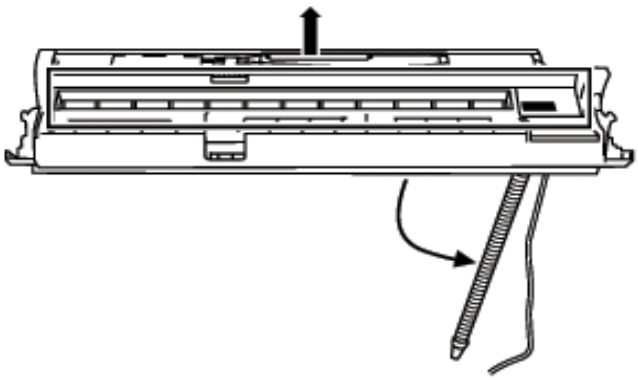
3. The Drain pan and related.

1) Remove the screw fixing the Drain pan on both side.



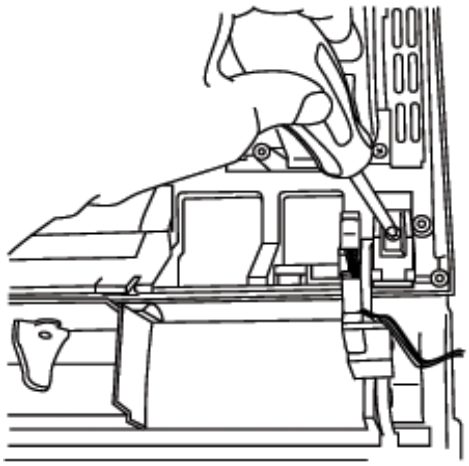


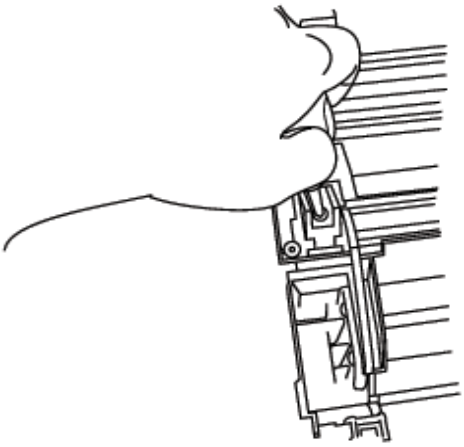
2) Turn left the Drain hose.



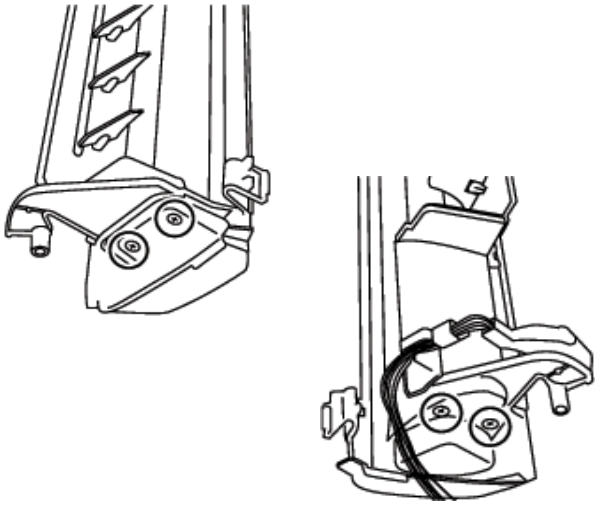
4. The Louver frame unit and related

1) Remove the screw fixing the frame guide on both side and take off the louver unit.

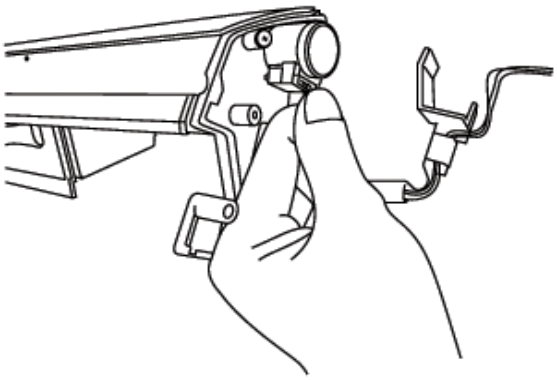




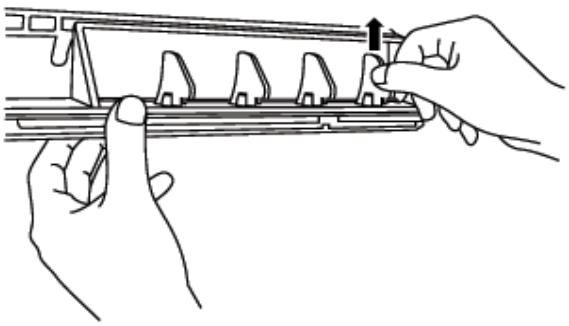
2) Remove 2 screws fixing cover-l and cover-r and take off them.



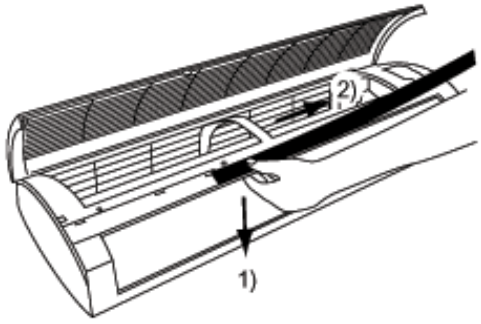
3) Remove the connector of louver motor and take off the wire and holder.



4) Put the one of the vertical louver.



5. How to remove the display cover

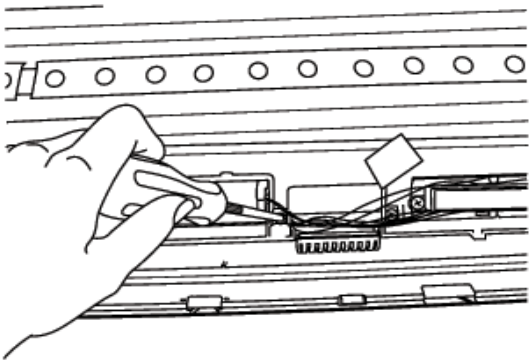


1) Put the center of the front panel under the display cover.

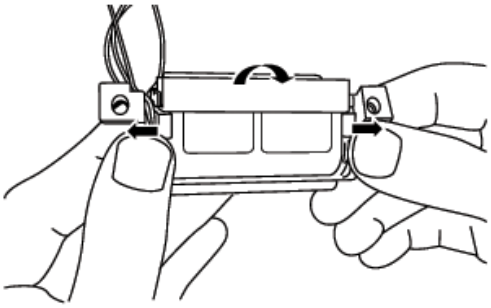
2) Side it to one side.

6. How to remove the hi voltage unit.

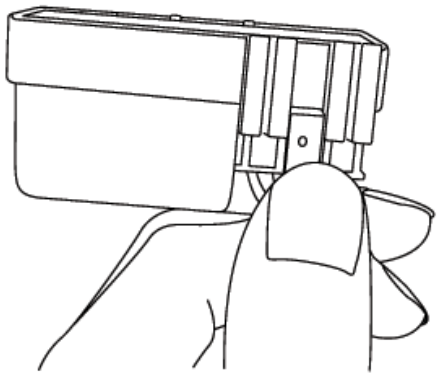
1) Remove 2 screws fixing holder.



2) Take off the high voltage unit ass'y from the holder.



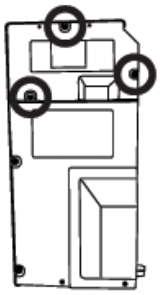
3) Remove the connector of high voltage unit ass'y.



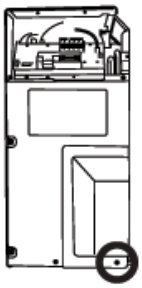
[2] OUTDOOR UNIT

1. Disassembling procedure of the control box

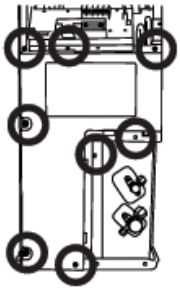
1) Loose 3 screws fixing the control cover.



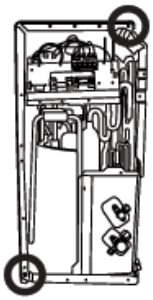
2) Loose 1 screw fixing the side cover.



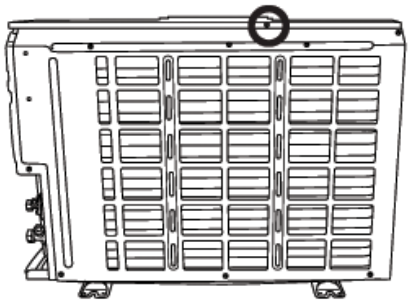
3) Loose 8 screws fixing the side cover R.



4) Loose 2 screws fixing the cabinet.

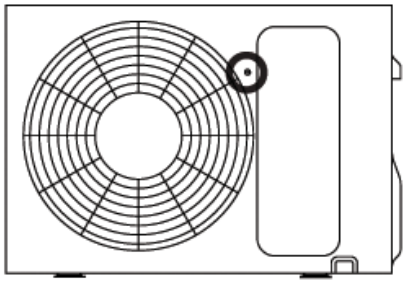


5) Loose 1 screw fixing the cabinet (rear side).

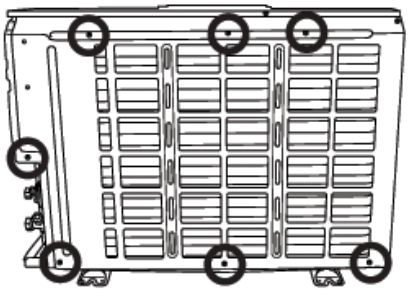


6) Loose 3 screw fixing the cabinet (right side).

7) Loose 1 screw fixing the cabinet (front side).

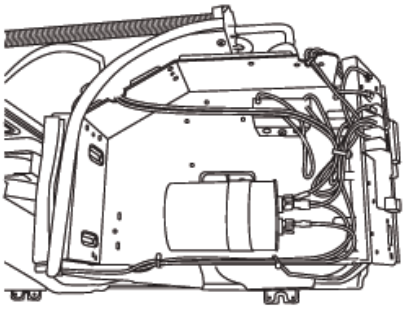


8) Loose 7 screws fixing the rear cabinet.

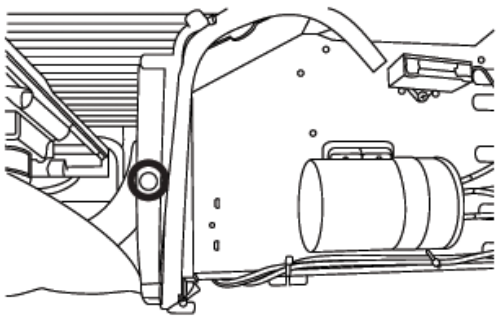


9) Loose 1 screw fixing the rear cabinet (left side).

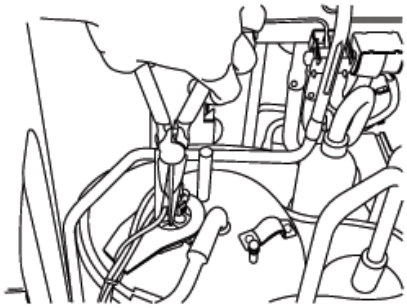
10) Cut nylon band.



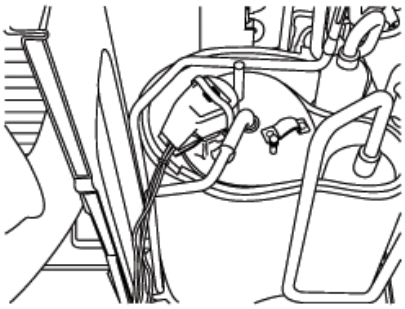
11) Loose 1 screw fixing the control box.



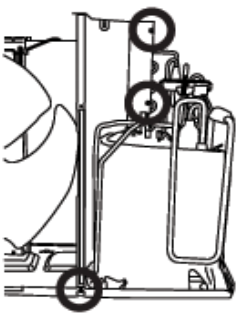
12) Remove the terminal cover.



13) Remove 3 terminal.

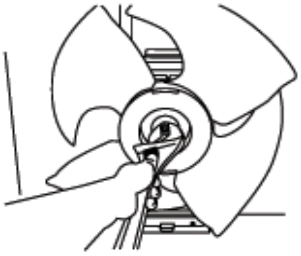


14) Loose 3 screws fixing the bulkhead.

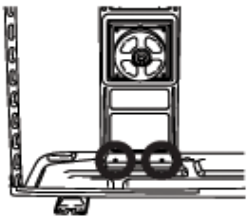


2. Disassembling procedure of the fan

1) Loose the fan nut and fan can take out.



2) Loose 2 screw fixing the fan motor angle.



3) Cut the nylon band and loose 4 screws fixing the fan motor