HITACHI
Inspire the Next

PM | NO. 0322E

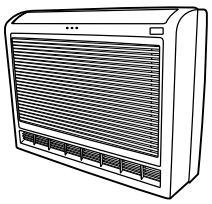
RAK-18NH5, RAK-25NH5,
RAK-35NH5, RAK-50NH5,
RAK-65NH5,
RAI-25NH5, RAI-35NH5,
RAI-50NH5
RAF-25NH5, RAF-35NH5,
RAF-50NH5,
RAD-25NH5, RAD-35NH5

RAM-72QH5

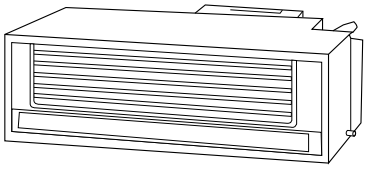
SERVICE MANUAL

TECHNICAL INFORMATION

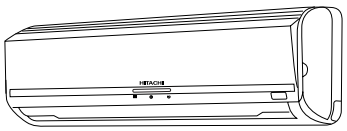
FOR SERVICE PERSONNEL ONLY



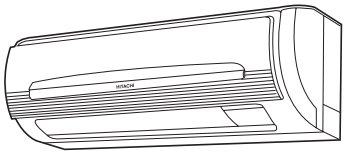
RAF-25NH5
RAF-35NH5
RAF-50NH5



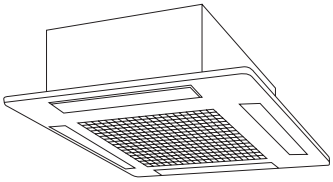
RAD-25NH5
RAD-35NH5



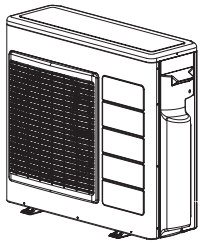
RAK-65NH5



RAK-18NH5, RAK-25NH5
RAK-35NH5, RAK-50NH5



RAI-25NH5
RAI-35NH5
RAI-50NH5



RAM-72QH5

REFER TO THE FOUNDATION MANUAL

CONTENTS

SPECIFICATIONS

TYPE		DC INVERTER DUAL SYSTEM MULTI					
		INDOOR UNIT					OUTDOOR UNIT
MODEL		RAK-18NH5 RAK-25NH5 RAK-35NH5 RAK-50NH5	RAK-65NH5	RAI-25NH5 RAI-35NH5 RAI-50NH5	RAF-25NH5 RAF-35NH5 RAF-50NH5	RAD-25NH5 RAD-35NH5	RAM-72QH5
POWER SOURCE		1ø, 220 - 240V, 50Hz					
TOTAL INPUT	(W)	REFER TO THE SPECIFICATIONS PAGE					
TOTAL AMPERES	(A)						
COOLING CAPACITY	(kW)						
HEATING CAPACITY	(B.T.U.)						
DIMENSIONS (mm)	W	780	1030	580	750	750	850
	H	280	295	285	600	235	800
	D	210	191	580	215	400	298
NET WEIGHT	(kg)	9.5	12.0	20.0	15.0	14.0	52

※ After installation

SPECIFICATIONS AND PARTS ARE SUBJECT TO CHANGE FOR IMPROVEMENT

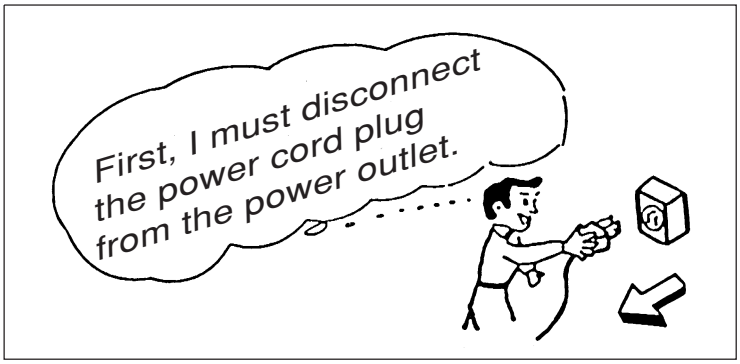
M AIR CONDITIONER

JANUARY

Division

SAFETY DURING REPAIR WORK

1. In order to disassemble and repair the unit in question, be sure to disconnect the power cord plug from the power outlet before starting the work.



2. If it is necessary to replace any parts, they should be replaced with respective genuine parts for the unit, and the replacement must be effected in correct manner according to the instructions in the Service Manual of the unit.

> If the contacts of electrical parts are defective, replace the electrical parts without trying to repair them.

3. After completion of repairs, the initial state should be restored.
4. Lead wires should be connected and laid as in the initial state.
5. Modification of the unit by user himself should absolutely be prohibited.
6. Tools and measuring instruments for use in repairs or inspection should be accurately calibrated in advance.
7. In installing the unit having been repaired, be careful to prevent the occurence of any accident such as electrical shock, leak of current, or bodily injury due to the drop of any part.
8. To check the insulation of the unit, measure the insulation resistance between the power cord plug and grounding terminal of the unit. The insulation resistance should be 1MΩ or more as measured by a 500V DC megger.
9. The initial location of installation such as window, floor or the other should be checked for being and safe enough to support the repaired unit again.
   If it is found not so strong and safe, the unit should be installed at the initial location reinforced or at a new location.
10. Any inflammable thing should never be placed about the location of installation.
11. Check the grounding to see whether it is proper or not, and if it is found improper, connect the grounding terminal to the earth.

WORKING STANDARDS FOR PREVENTING BREAKAGE OF SEMICONDUCTORS

1. Scope
   The standards provide for items to be generally observed in carrying and handling semiconductors in relative manufacturers during maintenance and handling thereof. (They apply the same to handling of abnormal goods such as rejected goods being returned).

2. Object parts

   (1) Micro computer
   (2) Integrated circuits (IC)
   (3) Field-effect transistors (FET)
   (4) P.C. boards or the like on which the parts mentioned in (1) and (2) of this paragraph are equipped.

3. Items to be observed in handling

   (1) Use a conductive container for carrying and storing of parts. (Even rejected goods should be handled in the same way).

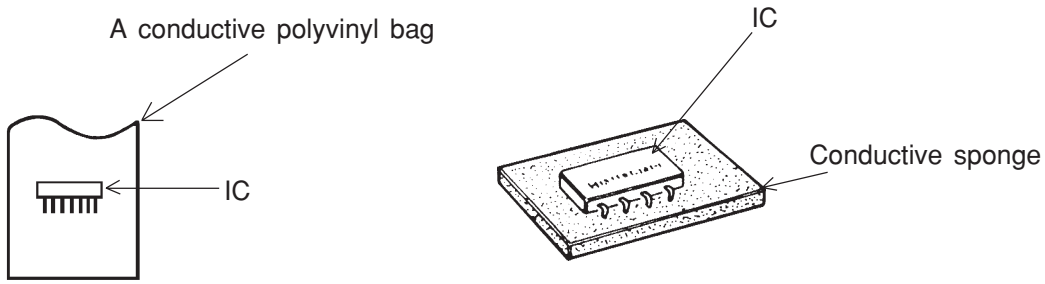


Fig. 1. Conductive Container

   (2) When any part is handled uncovered (in counting, packing and the like), the handling person must always use himself as a body earth. (Make yourself a body earth by passing one M ohm earth resistance through a ring or bracelet).

   (3) Be careful not to touch the parts with your clothing when you hold a part even if a body earth is being taken.

   (4) Be sure to place a part on a metal plate with grounding.

   (5) Be careful not to fail to turn off power when you repair the printed circuit board. At the same time, try to repair the printed circuit board on a grounded metal plate.

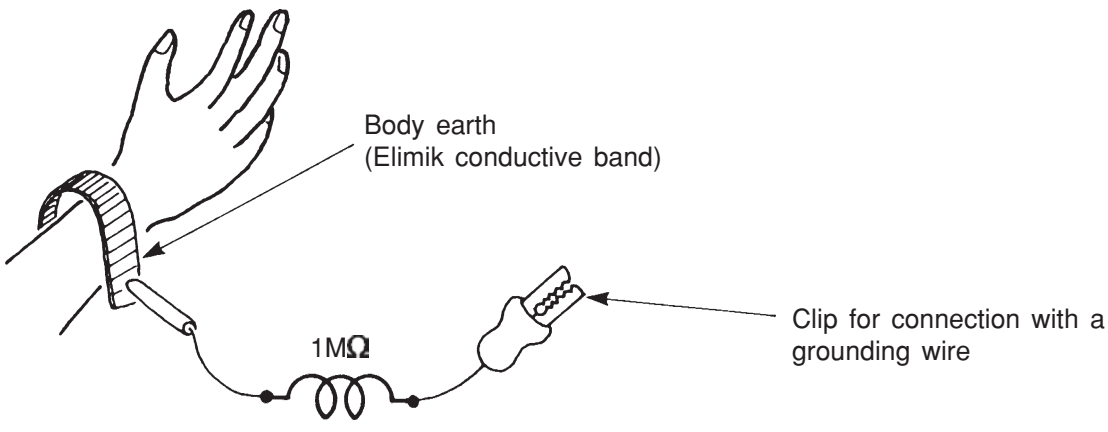


Fig. 2. Body Earth

(6) Use a three wire type soldering iron including a grounding wire.

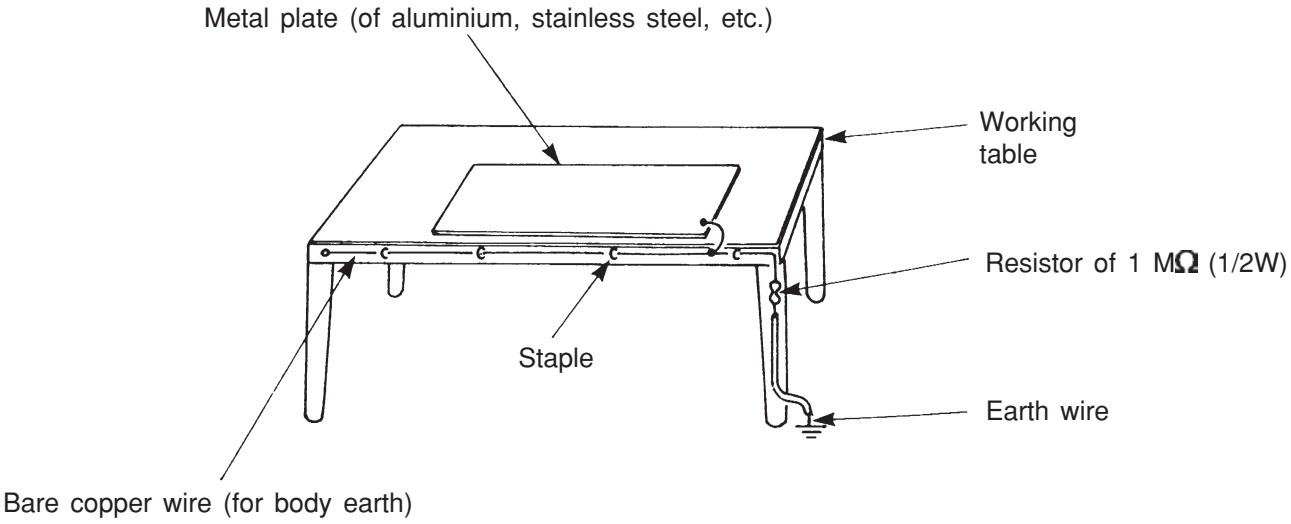


Fig. 3. Grounding of the working table

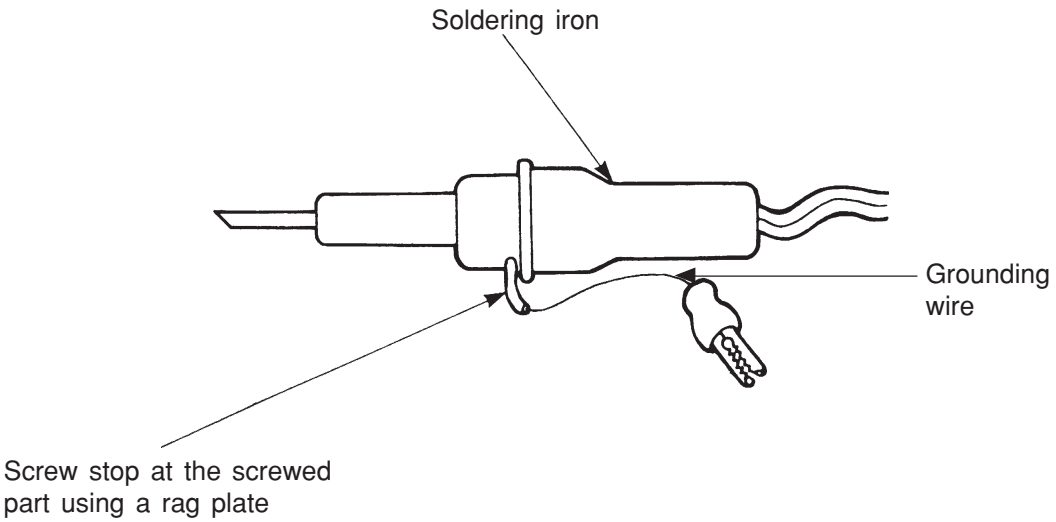


Fig. 4. Grounding a soldering iron

Use a high insulation mode (100V, 10MΩ or higher) when ordinary iron is to be used.

(7) In checking circuits for maintenance, inspection or some others, be careful not to have the test probes of the measuring instrument shortcircuit a load circuit or the like.

⚠ CAUTION

1. In quiet operation or stopping the operation, slight flowing noise of refrigerant in the refrigerating cycle is heard occasionally, but this noise is not abnormal for the operation.

2. When it thunders near by, it is recommend to stop the operation and to disconnect the power cord plug from the power outlet for safety.

3. The room air conditioner does not start automatically after recovery of the electric power failure for preventing fuse blowing. Re-press START/STOP button after 3 minutes from when unit stopped.

4. If the room air conditioner is stopped by setting the temperature, or missoperation, and re-start in a moment, there is occasion that the cooling and heating operation does not start for 3 minutes, it is not abnormal and this is the result of the operation of IC delay circuit. This IC delay circuit ensures that there is no danger of blowing fuse or damaging parts even if operation is restarted accidentally.

5. This room air conditioner should not be used at the cooling operation when the outside temperature is below –10°C (14°F).

6. This room air conditioner (the reverse cycle) should not be used when the outside temperature is below –15°C (5°F).
   If the reverse cycle is used under this condition, the outside heat exchanger will be frosted and its efficiency falls.

7. When the outside heat exchanger is frosted, the frost is melted by operating the hot gas system, it is not trouble that at this time fan stops and the vapour may rise from the outside heat exchanger.

SPECIFICATIONS

MODEL		RAM-72QH5
FAN MOTOR		80 W
FAN MOTOR CAPACITOR		NO
FAN MOTOR PROTECTOR		NO
COMPRESSOR		JU1015D2
COMPRESSOR MOTOR CAPACITOR		NO
OVERLOAD PROTECTOR		YES
OVERHEAT PROTECTOR		YES
FUSE (for MICROPROCESSOR)		5.0A
POWER RELAY		G4A
POWER SWITCH		NO
TEMPORARY SWITCH		NO
SERVICE SWITCH		YES
TRANSFORMER		NO
VARISTOR		450NR
NOISE SUPPRESSOR		YES
THERMOSTAT		YES(IC)
REMOTE CONTROL SWITCH (LIQUID CRYSTAL)		NO
REFRIGERANT CHARGING VOLUME (Refrigerant 410A)	UNIT	2300g
		WITHOUT REFRIGERANT BECAUSE COUPLING IS FLARE TYPE.
	PIPES	MAX. 60m

In case the pipe length is more than 30m, add refrigerant R410 at 20gram per every meter exceeds.

SPECIFICATIONS

MODEL		RAK-18NH5	RAK-25NH5	RAK-35NH5	RAK-50NH5
FAN MOTOR		35W			
FAN MOTOR CAPACITOR		NO			
FAN MOTOR PROTECTOR		NO			
COMPRESSOR		–			
COMPRESSOR MOTOR CAPACITOR		NO			
OVERLOAD PROTECTOR		NO			
OVERHEAT PROTECTOR		NO			
FUSE (for MICROPROCESSOR)		NO			
POWER RELAY		NO			
POWER SWITCH		NO			
TEMPORARY SWITCH		YES			
SERVICE SWITCH		NO			
TRANSFORMER		NO			
VARISTOR		NO			
NOISE SUPPRESSOR		NO			
THERMOSTAT		YES(IC)			
REMOTE CONTROL SWITCH (LIQUID CRYSTAL)		YES			
REFRIGERANT CHARGING VOLUME (Refrigerant 410A)	UNIT	----------			
	PIPES	WITHOUT REFRIGERANT BECAUSE COUPLING IS FLARE TYPE.			

SPECIFICATIONS

MODEL		RAK-65NH5
FAN MOTOR		PWM DC35V
FAN MOTOR CAPACITOR		NO
FAN MOTOR PROTECTOR		NO
COMPRESSOR		–
COMPRESSOR MOTOR CAPACITOR		NO
OVERLOAD PROTECTOR		NO
OVERHEAT PROTECTOR		NO
FUSE (for MICROPROCESSOR)		NO
POWER RELAY		NO
POWER SWITCH		NO
TEMPORARY SWITCH		YES
SERVICE SWITCH		NO
TRANSFORMER		NO
VARISTOR		NO
NOISE SUPPRESSOR		NO
THERMOSTAT		YES(IC)
REMOTE CONTROL SWITCH (LIQUID CRYSTAL)		YES
REFRIGERANT CHARGING VOLUME (Refrigerant R410A)	UNIT	----------
	PIPES	WITHOUT REFRIGERANT BECAUSE COUPLING IS FLARE TYPE.

SPECIFICATIONS

MODEL		RAI-25NH5	RAI-35NH5	RAI-50NH5
FAN MOTOR		25W		
FAN MOTOR CAPACITOR		NO		
FAN MOTOR PROTECTOR		NO		
COMPRESSOR		–		
OVERHEAT PROTECTOR		NO		
OVERLOAD RELAY		NO		
FUSE (for MICRO COMPUTER)		NO		
POWER RELAY, STICK RELAY		NO		
POWER SWITCH		NO		
TEMPORARY SWITCH		YES		
SERVICE SWITCH		NO		
TRANSFORMER		NO		
VARISTOR		NO		
NOISE SUPPRESSOR		NO		
THERMOSTAT		YES (IC)		
REMOTE CONTROL SWITCH (LIQUID CRYSTAL)		YES		
REFRIGERANT CHARGING VOLUME (Refrigerant 410A)	UNIT	----------		
	PIPES	WITHOUT REFRIGERANT BECAUSE COUPLING IS FLARE TYPE.		

SPECIFICATIONS

MODEL		RAF-25NH5	RAF-35NH5	RAF-50NH5	RAD-25NH5	RAD-35NH5
FAN MOTOR		20W (DC35V)				
FAN MOTOR CAPACITOR		NO				
FAN MOTOR PROTECTOR		NO				
COMPRESSOR		NO				
OVER HEAT PROTECTOR		NO				
OVERLOAD RELAY		NO				
FUSE (for MICRO COMPUTER)		NO				
POWER RELAY, STICK RELAY		NO				
POWER SWITCH		NO				
TEMPORARY SWITCH		YES				
SERVICE SWITCH		NO				
TRANSFORMER		NO				
VARISTOR		NO				
NOISE SUPPRESSOR		NO				
THERMOSTAT		YES (IC)				
REMOTE CONTROL SWITCH (LIQUID CRYSTAL)		YES				
REFRIGERANT CHARGING VOLUME (Refrigerant 410A)	UNIT	----------				
	PIPES	WITHOUT REFRIGERANT BECAUSE COUPLING IS FLARE TYPE.				

SPECIFICATIONS FOR INDOOR UNITS COMBINATION

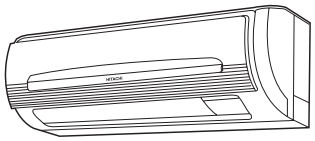
TYPE		DC INVERTER QUADRUPLE SYSTEM MULTI COOLING AND HEATING
MODEL	OUTDOOR UNIT	RAM-72QH5
PHESE/VOLTAGE/FREQUENCY		1ø, 220 - 240V, 50Hz
CIRCUIT AMPERES TO CONNECT (A)		30
COOLING (FOUR UNITS)	CAPACITY (kW) (B.T.U./h)	7.10 (2.40 - 8.80)
		24,240 (8,190 - 30,030)
	TOTAL INPUT (W)	2,140 (460 - 3,200)
	EER (B.T.U./hW)	11.33
	TOTAL AMPERES (A)	9.8 - 9.0
	POWER FACTOR (%)	99
HEATING (FOUR UNITS)	CAPACITY (kW) (B.T.U./h)	8.60 (2.80 - 9.50)
		29,350 (9,560 - 32,420)
	TOTAL INPUT (W)	2,180 (480 - 3,120)
	EER (B.T.U./hW)	13.46
	TOTAL AMPERES (A)	10.0 - 9.2
	POWER FACTOR (%)	99
MAXIMUM LENGTH OF PIPING		MAX. 60m (FOUR UNIT TOTAL)
STANDARD		CE (EMC&LVD)

MODEL		RAM-72QH5
PACKING (mm)	W	1,008
	H	848
	D	394
	cu.ft.	11.89
GROSS WEIGHT (kg)		60
FLARENUTSIZE (SMALL/LARGE)		6.35DX4/9.52DX3/12.70X1

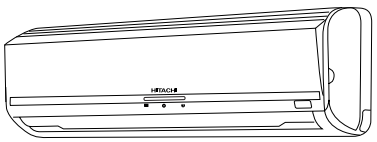
OPERATION SCOPE

	INDOOR SUCTION TEMPERATURE (˚C)	OUTDOOR SUCTION TEMPERATURE (˚C)	INDOOR SUCTION HUMIDITY (%)
COOLING OPERATION SCOPE	16 - 32	22 - 41	BELOW 80
DEHUMIDIFYING OPERATION	16 - 32	22 - 42	BELOW 80
HEATING OPERATION SCOPE	BELOW 27	–15 - 23	—

SPECIFICATION OF ROOM AIR CONDITIONER

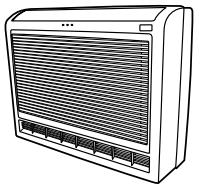



RAK-18NH5, RAK-25NH5, RAK-35NH5, RAK-50NH5

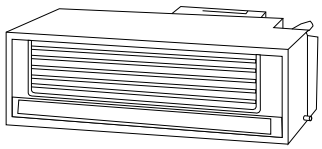


RAK-65NH5

TYPE		COOLING/HEATING				
		WALL TYPE				
MODEL	INDOOR UNIT	RAK-18NH5	RAK-25NH5	RAK-35NH5	RAK-50NH5	RAK-65NH5
PHASE/VOLTAGE/FREQUENCY		1ø / 220V~240V / 50Hz				
COOLING (ONE UNIT)	SOUND LEVEL (INDOOR)	35	38	41	47	47
	AIR FLOW VOLUME (Hi)	7 m³/min	8 m³/min	10 m³/min	13.5 m³/min	13.5 m³/min
HEATING (ONE UNIT)	SOUND LEVEL (INDOOR)	36	39	41	47	47
	AIR FLOW VOLUME (Hi)	7.5 m³/min	8.5 m³/min	10 m³/min	13.5 m³/min	13.5 m³/min
AUTOMATIC AIR DEFLECTORS		YES	YES	YES	YES	YES
FAN SPEED		4	4	4	4	4
LINE CORD		NOT PROVIDED (POWER CORD SHOULD BE PREPARED AND CONNECTED TO OUTDOOR UNIT WHEN INSTALLED)				
REMOTE CONTROL SWITCH		YES (WIRELESS)	YES (WIRELESS)	YES (WIRELESS)	YES (WIRELESS)	YES (WIRELESS)
DIMENSIONS inches (mm)	W	30-23/32 (780)	30-23/32 (780)	30-23/32 (780)	30-23/32 (780)	40-9/16 (1030)
	H	11-1/32 (280)	11-1/32 (280)	11-1/32 (280)	11-1/32 (280)	11-5/8 (295)
	D (INSTALLED)	8-9/32 (210) –	8-9/32 (210) –	8-9/32 (210) –	8-9/32 (210) –	7-1/2 (191) –
NET WEIGHT (kg)		9	9.5	9.5	9.5	11
PACKING inches (mm)	W	32-1/2 (826)	32-1/2 (826)	32-1/2 (826)	32-1/2 (826)	43-5/16 (1100)
	H	10 (254)	10 (254)	10 (254)	10 (254)	10-5/8 (271)
	D	12-13/16 (325)	12-13/16 (325)	12-13/16 (325)	12-13/16 (325)	14-1/2 (368)
	cu.ft	2.42	2.42	2.42	2.42	2.42
GROSS WEIGHT (kg)		11.5	12	12	12	13
FLARE NUT SIZE (SMALL/LARGE)		6.35/9.52	6.35/9.52	6.35/9.52	6.35/12.7	6.35/12.7



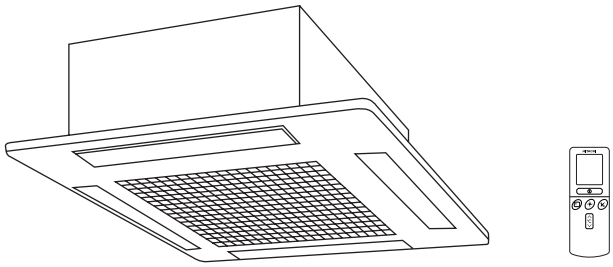

RAF-25NH5, RAF-35NH5, RAF-50NH5



RAD-25NH5, RAD-35NH5

TYPE		COOLING/HEATING				
		CONSOLE			FREE DUCT	
MODEL	INDOOR UNIT	RAF-25NH5	RAF-35NH5	RAF-50NH5	RAD-25NH5	RAD-35NH5
PHASE/VOLTAGE/FREQUENCY		1ø / 220-240V / 50Hz				
COOLING (ONE UNIT)	SOUND LEVEL (INDOOR)	35	40	44	40	42
	AIR FLOW VOLUME (Hi)	7.4 m³/min	8.0 m³/min	10.3 m³/min	8.7 m³/min	9.0 m³/min
HEATING (ONE UNIT)	SOUND LEVEL (INDOOR)	35	40	44	41	42
	AIR FLOW VOLUME (Hi)	8.5 m³/min	9.3 m³/min	12.3 m³/min	9.0 m³/min	9.2 m³/min
AUTOMATIC AIR DEFLECTORS		YES	YES	YES	YES	YES
FAN SPEED		4	4	4	4	4
LINE CORD		NOT PROVIDED (POWER CORD SHOULD BE PREPARED AND CONNECTED TO OUTDOOR UNIT WHEN INSTALLED)				
REMOTE CONTROL SWITCH		YES (WIRELESS)	YES (WIRELESS)	YES (WIRELESS)	YES (WIRELESS)	YES (WIRELESS)
DIMENSIONS inches (mm)	W	29-17/32 (750)			29-17/32 (750)	
	H	35-5/8 (600)			9-1/4 (235)	
	D (INSTALLED)	8-15/32 (215) –			15-3/4 (400) –	
NET WEIGHT (kg)		15			14	
PACKING inches (mm)	W	31-3/8 (797)			31-23/32 (806)	
	H	25-13/16 (656)			23-3/8 (594)	
	D	10-15/16 (278)			12-1/16 (306)	
	cu.ft	5.13			5.17	
GROSS WEIGHT (kg)		17			16	
FLARE NUT SIZE (SMALL/LARGE)		6.35/9.52		6.35/12.7	6.35/9.52	

SPECIFICATION OF ROOM AIR CONDITIONER



RAI-25NH5, RAI-35NH5, RAI-50NH5

TYPE		COOLING/HEATING		
		CEILING CASSETTE		
MODEL	INDOOR UNIT	RAI-25NH5	RAI-35NH5	RAI-50NH5
PHASE/VOLTAGE/FREQUENCY		1ø 220-240V 50Hz		
COOLING (ONE UNIT)	SOUND LEVEL (INDOOR)	35	39	42
	AIR FLOW VOLUME (Hi)	8.5 m^3/min.	10.8 m^3/min.	11.6 m^3/min.
HEATING (ONE UNIT)	SOUND LEVEL (INDOOR)	36	40	44
	AIR FLOW VOLUME (Hi)	8.5 m^3/min.	10.8 m^3/min.	11.9 m^3/min.
AUTOMATIC AIR DEFLECTORS		YES	YES	YES
FAN SPEED		4	4	4
LINE CORD		NOT PROVIDED (POWER CORD SHOULD BE PREPARED AND CONNECTED TO OUTDOOR UNIT WHEN INSTALLED)		
REMOTE CONTROL SWITCH		YES (WIRELESS)	YES (WIRELESS)	YES (WIRELESS)
DIMENSIONS inches (mm)	W	22-27/32 (580)		
	H	11-7/32 (285)		
	D	22-27/32 (580)		
	(INSTALLED)	–		
NET WEIGHT (kg)		20		
PACKING inches (mm)	W	29-29/32 (760)		
	H	15-9/16 (395)		
	D	29-29/32 (760)		
	cu.ft	8.06		
GROSS WEIGHT (kg)		25		
FLARE NUT SIZE (SMALL/LARGE)		6.35/9.52		6.35/12.7

QUADRUPLE SYSTEM MULTI R.A.C. *RAM-72QH5*
COOL / HEAT CAPACITY SPEC. FOR INDOOR UNITS COMBINATIONS TO BE ABLE TO OPERATE SIMULTANEOUSLY

Whichever indoor units are installed, cooling and heating capacity depends on how many and which indoor units are operating at that time.

4 ROOM MULTI-SPLIT INVERTER TYPE ROOM AIR CONDITIONER
POSSIBLE COMBINATION TO OPERATE (SAME TIME OPERATION)

(Reference value)

	POSSIBLE COMBINATIONS TO OPERATE	COOLING					HEATING				
		CAPACITY RATING (kW) (RANGE)	TOTAL	OUTDOOR UNIT POWER CONSUMPTION (W)	OUTDOOR UNIT AMPERE (A) at 220-240V	COP	CAPACITY RATING (kW) (RANGE)	TOTAL	OUTDOOR UNIT POWER CONSUMPTION (W)	OUTDOOR UNIT AMPERE (A) at 220-240V	COP
ONE UNIT	1.8	1.80	1.80	450	2.1 – 1.9	4.00	2.50	2.50	850	3.9 – 3.6	2.94
	2.5	2.50	2.50	650	3.0 - 2.7	3.85	3.40	3.40	1130	5.2 – 4.8	3.01
	3.5	3.50	3.50	1030	4.7 – 4.3	3.40	4.30	4.30	1520	7.0 – 6.4	2.83
	5.0	5.00	5.00	1640	7.5 – 6.9	3.05	6.50	6.50	2400	11.0 – 10.1	2.71
	6.0	6.00	6.00	2080	9.6 – 8.8	2.88	7.30	7.30	2590	11.9 – 10.9	2.82
TWO UNITS	1.8 + 1.8	1.80 + 1.80	3.60	830	3.8 – 3.5	4.34	3.20 + 3.20	6.40	1770	8.1 – 7.4	3.62
	1.8 + 2.5	1.80 + 2.50	4.30	1120	5.1 – 4.7	3.84	3.20 + 3.60	6.80	1940	8.9 – 8.2	3.51
	1.8 + 3.5	1.80 + 3.50	5.30	1600	7.3 – 6.7	3.31	3.20 + 4.30	7.50	2240	10.3 – 9.4	3.35
	1.8 + 5.0	1.80 + 5.00	6.80	2420	11.1 – 10.2	2.81	2.30 + 6.30	8.60	2470	11.3 – 10.4	3.48
	1.8 + 6.0	1.70 + 5.40	7.10	2450	11.2 – 10.3	2.90	2.00 + 6.60	8.60	2450	11.2 – 10.3	3.51
	2.5 + 2.5	2.50 + 2.50	5.00	1410	6.5 – 5.9	3.55	3.60 + 3.60	7.20	2070	9.5 – 8.7	3.48
	2.5 + 3.5	2.50 + 3.50	6.00	1950	9.0 – 8.2	3.08	3.60 + 4.30	7.90	2420	11.1 – 10.2	3.26
	2.5 + 5.0	2.40 + 4.70	7.10	2530	11.6 – 10.6	2.81	2.90 + 5.70	8.60	2470	11.3 – 10.4	3.48
	2.5 + 6.0	2.10 + 5.00	7.10	2450	11.2 – 10.3	2.90	2.55 + 6.05	8.60	2450	11.2 – 10.3	3.51
	3.5 + 3.5	3.50 + 3.50	7.00	2630	12.1 – 11.1	2.66	4.30 + 4.30	8.60	2670	12.3 – 11.2	3.22
	3.5 + 5.0	2.90 + 4.20	7.10	2530	11.6 – 10.6	2.81	3.55 + 5.05	8.60	2470	11.3 – 10.4	3.48
	3.5 + 6.0	2.60 + 4.50	7.10	2450	11.2 – 10.3	2.90	3.15 + 5.45	8.60	2450	11.2 – 10.3	3.51
	5.0 + 5.0	3.55 + 3.55	7.10	2530	11.6 – 10.6	2.81	4.30 + 4.30	8.60	2470	11.3 – 10.4	3.48
	5.0 + 6.0	3.20 + 3.90	7.10	2360	10.8 – 9.9	3.01	3.90 + 4.70	8.60	2450	11.2 – 10.3	3.51

THREE UNITS	1.8 + 1.8 + 1.8	1.80 + 1.80 + 1.80	5.40	1250	5.7 – 5.3	4.32	2.86 + 2.86 + 2.86	8.60	2290	10.5 – 9.6	3.76
	1.8 + 1.8 + 2.5	1.80 + 1.80 + 2.50	6.10	1590	7.3 – 6.7	3.84	2.55 + 2.55 + 3.50	8.60	2290	10.5 – 9.6	3.76
	1.8 + 1.8 + 3.5	1.80 + 1.80 + 3.50	7.10	2210	10.1 – 9.3	3.21	2.20 + 2.20 + 4.20	8.60	2290	10.5 – 9.6	3.76
	1.8 + 1.8 + 5.0	1.50 + 1.50 + 4.10	7.10	2180	10.0 – 9.2	3.26	1.80 + 1.80 + 5.00	8.60	2280	10.5 – 9.6	3.77
	1.8 + 1.8 + 6.0	1.35 + 1.35 + 4.40	7.10	2160	9.9 – 9.1	3.29	1.60 + 1.60 + 5.40	8.60	2280	10.5 – 9.6	3.77
	1.8 + 2.5 + 2.5	1.80 + 2.50 + 2.50	6.80	2040	9.4 – 8.6	3.33	2.30 + 3.15 + 3.15	8.60	2290	10.5 – 9.6	3.76
	1.8 + 2.5 + 3.5	1.65 + 2.25 + 3.20	7.10	2210	10.1 – 9.3	3.21	2.00 + 2.75 + 3.85	8.60	2290	10.5 – 9.6	3.76
	1.8 + 2.5 + 5.0	1.40 + 1.90 + 3.80	7.10	2180	10.0 – 9.2	3.26	1.70 + 2.30 + 4.60	8.60	2280	10.5 – 9.6	3.77
	1.8 + 2.5 + 6.0	1.25 + 1.70 + 4.15	7.10	2160	9.9 – 9.1	3.29	1.50 + 2.10 + 5.00	8.60	2260	10.4 – 9.5	3.81
	1.8 + 3.5 + 3.5	1.40 + 2.85 + 2.85	7.10	2210	10.1 – 9.3	3.21	1.80 + 3.40 + 3.40	8.60	2290	10.5 – 9.6	3.76
	1.8 + 3.5 + 5.0	1.25 + 2.40 + 3.45	7.10	2180	10.0 – 9.2	3.26	1.50 + 2.90 + 4.20	8.60	2280	10.5 – 9.6	3.77
	2.5 + 2.5 + 2.5	2.36 + 2.36 + 2.36	7.10	2210	10.1 – 9.3	3.21	2.86 + 2.86 + 2.86	8.60	2290	10.5 – 9.6	3.76
	2.5 + 2.5 + 3.5	2.10 + 2.10 + 2.90	7.10	2210	10.1 – 9.3	3.21	2.55 + 2.55 + 3.50	8.60	2290	10.5 – 9.6	3.76
	2.5 + 2.5 + 5.0	1.80 + 1.80 + 3.50	7.10	2180	10.0 – 9.2	3.26	2.15 + 2.15 + 4.30	8.60	2280	10.5 – 9.6	3.77
	2.5 + 2.5 + 6.0	1.60 + 1.60 + 3.90	7.10	2160	9.9 – 9.1	3.29	1.95 + 1.95 + 4.70	8.60	2260	10.4 – 9.5	3.81
	2.5 + 3.5 + 3.5	1.90 + 2.60 + 2.60	7.10	2210	10.1 – 9.3	3.21	2.20 + 3.20 + 3.20	8.60	2290	10.5 – 9.6	3.76
	2.5 + 3.5 + 5.0	1.60 + 2.25 + 3.25	7.10	2180	10.0 – 9.2	3.26	1.95 + 2.75 + 3.90	8.60	2280	10.5 – 9.6	3.77
	3.5 + 3.5 + 3.5	2.36 + 2.36 + 2.36	7.10	2140	9.8 – 9.0	3.32	2.86 + 2.86 + 2.86	8.60	2280	10.5 – 9.6	3.77
FOUR UNITS	1.8 + 1.8 + 1.8 + 1.8	1.77 + 1.77 + 1.77 + 1.77	7.10	2140	9.8 – 9.0	3.32	2.15 + 2.15 + 2.15 + 2.15	8.60	2200	10.1 – 9.3	3.91
	1.8 + 1.8 + 1.8 + 2.5	1.60 + 1.60 + 1.60 + 2.30	7.10	2140	9.8 – 9.0	3.32	2.00 + 2.00 + 2.00 + 2.60	8.60	2200	10.1 – 9.3	3.91
	1.8 + 1.8 + 1.8 + 3.5	1.45 + 1.45 + 1.45 + 2.75	7.10	2140	9.8 – 9.0	3.32	1.80 + 1.80 + 1.80 + 3.20	8.60	2200	10.1 – 9.3	3.91
	1.8 + 1.8 + 1.8 + 5.0	1.25 + 1.25 + 1.25 + 3.35	7.10	2140	9.8 – 9.0	3.32	1.50 + 1.50 + 1.50 + 4.10	8.60	2180	10.0 – 9.2	3.94
	1.8 + 1.8 + 2.5 + 2.5	1.50 + 1.50 + 2.05 + 2.05	7.10	2140	9.8 – 9.0	3.32	1.80 + 1.80 + 2.50 + 2.50	8.60	2200	10.1 – 9.3	3.91
	1.8 + 1.8 + 2.5 + 3.5	1.35 + 1.35 + 1.80 + 2.60	7.10	2140	9.8 – 9.0	3.32	1.60 + 1.60 + 2.25 + 3.15	8.60	2200	10.1 – 9.3	3.91
	1.8 + 1.8 + 3.5 + 3.5	1.20 + 1.20 + 2.35 + 2.35	7.10	2140	9.8 – 9.0	3.32	1.50 + 1.50 + 2.80 + 2.80	8.60	2180	10.0 – 9.2	3.94
	1.8 + 2.5 + 2.5 + 2.5	1.40 + 1.90 + 1.90 + 1.90	7.10	2140	9.8 – 9.0	3.32	1.70 + 2.30 + 2.30 + 2.30	8.60	2200	10.1 – 9.3	3.91
	1.8 + 2.5 + 2.5 + 3.5	1.25 + 1.75 + 1.75 + 2.35	7.10	2140	9.8 – 9.0	3.32	1.50 + 2.10 + 2.10 + 2.90	8.60	2180	10.0 – 9.2	3.94
	2.5 + 2.5 + 2.5 + 2.5	1.77 + 1.77 + 1.77 + 1.77	7.10	2140	9.8 – 9.0	3.32	2.15 + 2.15 + 2.15 + 2.15	8.60	2180	10.0 – 9.2	3.94
	2.5 + 2.5 + 2.5 + 3.5	1.60 + 1.60 + 1.60 + 2.30	7.10	2140	9.8 – 9.0	3.32	1.95 + 1.95 + 1.95 + 2.75	8.60	2180	10.0 – 9.2	3.94

<REMARKS>

* ONE UNIT INDICATED ARE ONLY FOR ONE UNIT OPERATION WHEN TWO OR THREE OR FOUR INDOOR UNITS ARE CONNECTED.
* TWO UNITS INDICATED ARE ONLY FOR TWO UNITS OPERATION WHEN TWO OR THREE OR FOUR INDOOR UNITS ARE CONNECTED.
• THREE UNITS INDICATED ARE ONLY FOR THREE UNITS OPERATION WHEN THREE OR FOUR INDOOR UNITS ARE CONNECTED.

RATING CONDITON (DRY BLUB / WET BULB)

	INDOOR	OUTDOOR
COOLING	27 / 19 ˚C	35 / –˚C
HEATING	20 / –˚C	7 / 6˚C

QUADRUPLE SYSTEM MULTI R.A.C. *RAM-72QH5*
INDOOR UNITS COMBINATIONS TO BE ABLE TO INSTALL

Two, three or four indoor units can be installed with one outdoor unit.
And total nominal cooling capacity should not be more than 11.0kW

INDOOR UNIT MODEL	NOMINAL COOLING CAPACITY (kW)	CAPACITY (kW) at one unit operation		SUITABLE ROOM SIZE (m^2) at one unit operation	
		COOLING	HEATING	COOLING	HEATING
RAK-18NH5	1.8	1.00 - 2.50	1.10 - 3.20	8 - 12	9 - 11
RAK-25NH5	2.5	1.00 - 2.80	1.10 - 4.70	11 - 17	14 - 18
RAF-25NH5	2.5	1.00 - 2.80	1.10 - 4.70	11 - 17	14 - 18
RAD-25NH5	2.5	1.00 - 2.80	1.10 - 4.70	11 - 17	14 - 18
RAI-25NH5	2.5	1.00 - 2.80	1.10 - 4.70	11 - 17	14 - 18
RAK-35NH5	3.5	1.00 - 3.90	1.10 - 5.80	16 - 24	17 - 22
RAF-35NH5	3.5	1.00 - 3.90	1.10 - 5.80	16 - 24	17 - 22
RAD-35NH5	3.5	1.00 - 3.90	1.10 - 5.80	16 - 24	17 - 22
RAI-35NH5	3.5	1.00 - 3.90	1.10 - 5.80	16 - 24	17 - 22
RAK-50NH5	5.0	1.00 - 5.60	1.10 - 7.20	23 - 34	23 - 29
RAF-50NH5	5.0	1.00 - 5.60	1.10 - 7.20	23 - 34	23 - 29
RAI-50NH5	5.0	1.00 - 5.60	1.10 - 7.20	23 - 34	23 - 29
RAK-60NH5	6.0	1.00 - 6.50	1.10 - 9.00	27 - 41	25 - 32

Be sure to connect two or three indoor units to this outdoor unit. If not, condensed water may drop, resulting in trouble.

QUADRUPLE SYSTEM MULTI R.A.C. *RAM-72QH5*
INDOOR UNITS COMBINATIONS TO BE ABLE TO INSTALL

POSSIBLE COMBINATIONS TO INSTALL (kW)		SUITABLE ROOM SIZE TO INSTALL (m^2)	CONNECTING POSITION ON OUTDOOR UNIT (VALVE DIAMETER) (mm)			
			No.1	No.2	No.3	No.4
			6.35/9.52D	6.35/9.52D	6.35/9.52D	6.35/12.7D
TWO UNITS	1.8+1.8	(8 ~ 12) + (8 ~ 12)	1.8	1.8		
	1.8+2.5	(8 ~ 12) + (11 ~ 17)	1.8	2.5		
	1.8+3.5	(8 ~ 12) + (16 ~ 24)	1.8	3.5		
	1.8+5.0	(8 ~ 12) + (23 ~ 34)	1.8			5.0
	1.8+6.0	(8 ~ 12) + (25 ~ 37)	1.8			6.0
	2.5+2.5	(11 ~ 17) + (11 ~ 17)	2.5	2.5		
	2.5+3.5	(11 ~ 17) + (16 ~ 24)	2.5	3.5		
	2.5+5.0	(11 ~ 17) + (21 ~ 32)	2.5			5.0
	2.5+6.0	(10 ~ 14) + (23 ~ 34)	2.5			6.0
	3.5+3.5	(16 ~ 24) + (16 ~ 24)	3.5	3.5		
	3.5+5.0	(13 ~ 20) + (19 ~ 29)	3.5			5.0
	3.5+6.0	(12 ~ 18) + (20 ~ 31)	3.5			6.0
	5.0+5.0	(16 ~ 24) + (16 ~ 24)	5.0			5.0
	5.0+6.0	(15 ~ 22) + (18 ~ 27)	5.0			6.0
THREE UNITS	1.8+1.8+1.8	(8 ~ 12) + (8 ~ 12) + (8 ~ 12)	1.8	1.8	1.8	
	1.8+1.8+2.5	(8 ~ 12) + (8 ~ 12) + (11 ~ 17)	1.8	1.8	2.5	
	1.8+1.8+3.5	(8 ~ 12) + (8 ~ 12) + (16 ~ 24)	1.8	1.8	3.5	
	1.8+1.8+5.0	(7 ~ 10) + (7 ~ 10) + (19 ~ 28)	1.8	1.8		5.0
	1.8+1.8+6.0	(6 ~ 9) + (6 ~ 9) + (20 ~ 30)	1.8	1.8		6.0
	1.8+2.5+2.5	(8 ~ 12) + (11 ~ 17) + (11 ~ 17)	1.8	2.5	2.5	
	1.8+2.5+3.5	(8 ~ 11) + (10 ~ 16) + (15 ~ 22)	1.8	2.5	3.5	
	1.8+2.5+5.0	(6 ~ 10) + (9 ~ 13) + (17 ~ 26)	1.8	2.5		5.0
	1.8+2.5+6.0	(6 ~ 9) + (8 ~ 12) + (19 ~ 29)	1.8	2.5		6.0
	1.8+3.5+3.5	(6 ~ 10) + (13 ~ 20) + (13 ~ 20)	1.8	3.5	3.5	
	1.8+3.5+5.0	(6 ~ 9) + (11 ~ 17) + (16 ~ 24)	1.8	3.5		5.0
	2.5+2.5+2.5	(11 ~ 16) + (11 ~ 16) + (11 ~ 16)	2.5	2.5	2.5	
	2.5+2.5+3.5	(10 ~ 14) + (10 ~ 14) + (13 ~ 20)	2.5	2.5	3.5	
	2.5+2.5+5.0	(8 ~ 12) + (8 ~ 12) + (16 ~ 24)	2.5	2.5		5.0
	2.5+2.5+6.0	(7 ~ 11) + (7 ~ 11) + (18 ~ 27)	2.5	2.5		6.0
	2.5+3.5+3.5	(9 ~ 13) + (12 ~ 18) + (12 ~ 18)	2.5	3.5	3.5	
	2.5+3.5+5.0	(7 ~ 11) + (10 ~ 16) + (15 ~ 22)	2.5	3.5		5.0
	3.5+3.5+3.5	(11 ~ 16) + (11 ~ 16) + (11 ~ 16)	3.5	3.5	3.5	
FOUR UNITS	1.8+1.8+1.8+1.8	(8 ~ 12) + (8 ~ 12) + (8 ~ 12) + (8 ~ 12)	1.8	1.8	1.8	◎ 1.8
	1.8+1.8+1.8+2.5	(7 ~ 11) + (7 ~ 11) + (7 ~ 11) + (10 ~ 16)	1.8	1.8	1.8	◎ 2.5
	1.8+1.8+1.8+3.5	(7 ~ 10) + (7 ~ 10) + (7 ~ 10) + (13 ~ 19)	1.8	1.8	1.8	◎ 3.5
	1.8+1.8+1.8+5.0	(6 ~ 9) + (6 ~ 9) + (6 ~ 9) + (15 ~ 23)	1.8	1.8	1.8	5.0
	1.8+1.8+2.5+2.5	(7 ~ 10) + (7 ~ 10) + (9 ~ 14) + (9 ~ 14)	1.8	1.8	2.5	◎ 2.5
	1.8+1.8+2.5+3.5	(6 ~ 9) + (6 ~ 9) + (8 ~ 12) + (12 ~ 18)	1.8	1.8	2.5	◎ 3.5
	1.8+1.8+3.5+3.5	(5 ~ 8) + (5 ~ 8) + (11 ~ 16) + (11 ~ 16)	1.8	1.8	3.5	◎ 3.5
	1.8+2.5+2.5+2.5	(6 ~ 10) + (9 ~ 13) + (9 ~ 13) + (9 ~ 13)	1.8	2.5	2.5	◎ 2.5
	1.8+2.5+2.5+3.5	(6 ~ 9) + (8 ~ 12) + (8 ~ 12) + (11 ~ 16)	1.8	2.5	2.5	◎ 3.5
	2.5+2.5+2.5+2.5	(8 ~ 12) + (8 ~ 12) + (8 ~ 12) + (8 ~ 12)	2.5	2.5	2.5	◎ 2.5
	2.5+2.5+2.5+3.5	(7 ~ 11) + (7 ~ 11) + (7 ~ 11) + (10 ~ 16)	2.5	2.5	2.5	◎ 3.5

2.5, 3.5, 4.0, 5.0 & 6.0 means indoor units cooling capacity class.

(1) Marking
- ◉: needs flare adapter (9.52 → 12.7D): Part No. TA261D-4 001
- ◎: needs flare adapter (12.7 → 9.52D): Part No. TA261D-6 002

(2) Suitable room size is determined based on the conditions below:
- Climate is in the temperate zone like Tokyo, Japan.
- For usual residential use.
- Smaller figure is for light construction which means light thermally sealed.
- Larger figure is for heavy constructions, which means well thermally sealed.

FEATURES

1. NEW REFRIGERANT

(1) New refrigerant R410A with no harmful effect on the ozone layer

Refrigerant R410A, which does not damage the ozone layer, was adopted instead of HCFC-22 which is planned to be phased out globally by 2020.

(2) New refrigerating oil

The new refrigerant HFC-R410A is not compatible with conventional mineral oils and no lubrication can be expected with those oils. To solve this, the artificial synthetic ester oil is newly adopted.

NEW TECHNOLOGY

Cautions in relation to HFC (R410A)

1. Safety during Servicing

This air conditioner uses the new refrigerant HFC (R410A) for protecting the ozone layer. R410A has several different characteristic features from HCFC-22. Therefore keep the following care items during servicing for safety.

(1) Since the working pressure of R410A model is about 1.6 times higher than that of HCFC-22 models, it becomes necessary to use part of piping materials and servicing tools exclusive for R410A model.

(2) It is necessary to exercise more care to prevent the foreign matters (oil, moisture, etc.) from mixing into the piping than in the case of HCFC-22 model. Also, when storing the piping, securely seal its openings with pinching and taping, etc..

(3) Be sure to charge the refrigerant from the liquid-phase side, as the liquid-phase/gas-phase-composition changes a little in the case of R410A model.

(4) Never use refrigerant other than R410A in an air conditioner which is designed to operate with R410A.

(5) If a refrigeration gas leakage occurs during servicing, be sure to ventilate fully.
If the refrigerant gas comes into contact with fire, a poisonous gas may occur.

(6) When installing or removing an air conditioner, do not allow air or moisture to remain in the refrigeration cycle. Otherwise, pressure in the refrigeration cycle may become abnormally high so that a rupture or personal injury may be caused.

(7) After completion of service work, check to make sure that there is no refrigeration gas leakage.
If the refrigerant gas leaks into the room, coming into contact with fire in the fandriven heater, space heater, etc., a poisonous gas may occur.

2. Refrigerant Piping Materials

(1) Thickness of Refrigerant Piping
Although the thickness is same as that for HCFC-22 model, as R410A model features higher pressure, be sure to confirm the thickness prior to use.

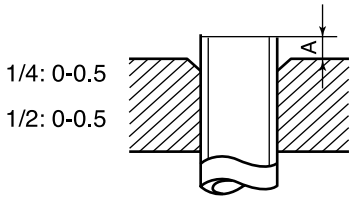
※Do not use thin pipes (thinner than 0.7 mm).

Nominal diameter	Outside diameter (mm)	Thickness (mm)
1/4	6.35	0.8
1/2	12.70	0.8

(2) Flare's Expansion Pipe
The projection when the new flare tool is used, is as follows. When using the conventional flare tool, be sure to secure the following projection by using a gauge for projection adjustment.

※When using the conventional flare tool, use a gauge for projection adjustment.

Projection "A"(mm) for Flare Tool for R410A (Clutch Type)



(3) Flare Nut Dimensions
Along with changes in the expansion pipe dimensions, the opposite side dimensions of flare nuts whose nominal diameter is 1/2 change so that different torque wrenches must be used.

※Figures in ( ) denote those for HCFC-22.

Nominal diameter	Opposite Side Dimensions (mm) of Flare Nuts for R410A
1/4	17 (17)
3/8	22 (22)
1/2	26 (24)

3. Servicing Tools

(Changes in the Product and Components)

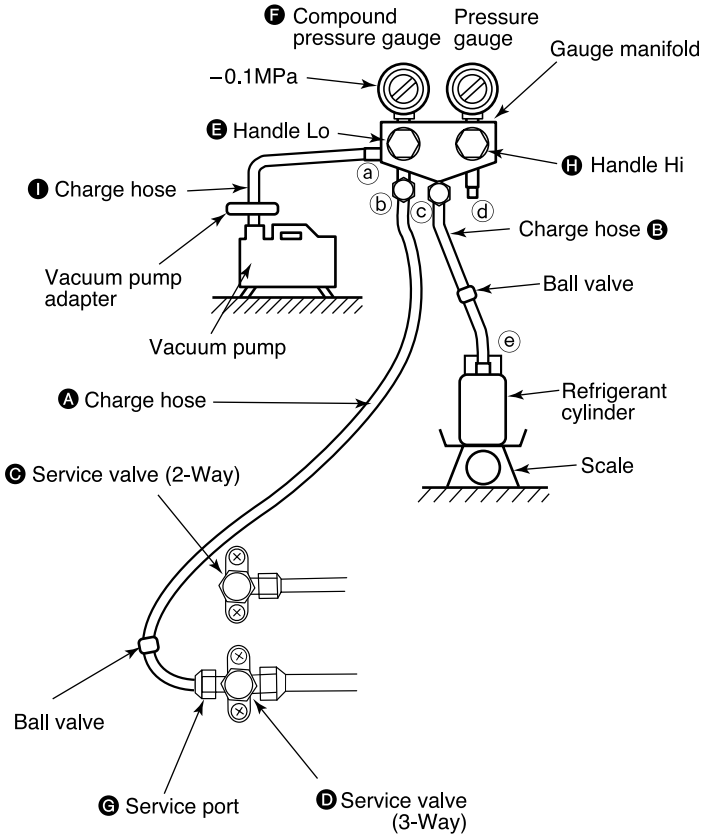
- In order to prevent any other refirigerant from being charged, R410A model is provided with the outdoor unit whose control valve has a different service port diameter (port size: 7/16 UNF 20 threads per inch → 1/2 UNF 20 threads per inch).
- In order to secure larger pressure resisting strength, flare expansion pipe dimensions and flare nut dimensions have been changed.

(New Tools for R410A)

New tools for R410A	Applicable to HCFC-22 Model	Changes
Gauge manifold	×	As pressure is high, it is impossible to measure by means of conventional gauge. In order to prevent any other refrigerant from being charged, each port diameter has been changed.
Charge hose	×	In order to increase pressure resistance, hose materials and port size have been changed (to 1/2 UNF 20 threads per inch). When purchasing a charge hose, be sure to confirm the port size.
Electronic balance for refrigerant charging	○	As pressure is high and gasification speed is fast, it is difficult to read the indicated value by means of charging cylinder, as air bubbles occur.
Torque wrench	× (nominal diam. 1/2, 5/8)	The opposite side dimensions of flare nuts increase. Incidentally, a common wrench is used for nominal diameters 1/4 and 3/8.
Flare tool (clutch type)	○	By increasing the clamp bar's receiving hole, strengh of spring in the tool has been improved.
Gauge for projection adjustment	–	Used when performing flare processing by means of conventional flare tool.
Vacuum pump adapter	○	Connected to conventional vacuum pump.
Gas leakage detector	×	Exclusive for HFC refrigerant.

- Incidentally, the "refrigerant cylinder" comes with the refrigerant designation (R410A) and protector coating in the U.S.'s ARI specified rose color (ARI color code: PMS 507).
- Also, the "charge port and packing for refrigerant cylinder" require 1/2 UNF 20 threads per inch corresponding to the charge hose's port size.

4. Servicing work (Rerfigerant recharging)



⚠ CAUTION

1. Be sure to use the vacuum pump, vacuum pump adapter and gauge manifold to refer to their instruction manuals beforehand.

2. Ascertain that the vacuum pump is filled with oil to the level designated on the oil gauge.

3. After closed the ball valve of charge hose, it should be disconnected at service port side and refrigerant cylinder side at first.
   Next, after discharging the remained gas in the charge hose by opening the ball valve a little, disconnect it at gauge manifold side. You can prevent from being released the refrigerant suddenly by connecting the ball valve to service port. And you can work with more safety.

Working steps

1. Connect the charge hose Ⓐ to outdoor unit.
2. Connect the vacuum pump adapter to the vacuum pump. Connect the 1/2" conversion adapter to the vacuum pump adapter. Connect the charge hose Ⓘ to the conversion adapter.
   Then, service valve Ⓒ & Ⓓ is closed.
3. Connect the charge hose Ⓑ to the refrigerant cylinder.
4. Open the handle Lo Ⓔ.
   Turn ON the power switch of the vacuum pump & adapter.
   ↕ Run the vacuum pump in specified time.
5. When the compound pressure gauge's pointer has indicated -0.1MPa, place the handle Lo Ⓔ in the fully closed position.
   Turn OFF the power switch of the vacuum pump & adapter.
6. Remove the charge hose Ⓘ of vacuum pump at portion ⓐ.
7. Air purge of gauge manifold.
   - Open the refrigerant cylinder's valve and push the valve core at portion ⓐ of gauge manifold. Then the refrigerant is discharge in a moment.
8. Calculation of charged refrigerant amount.
9. Charging of refrigeration.
   - Open the handle Lo Ⓔ in a turn and charge the designated amount.
10. Completion of charging.
11. Be closed the valve of charge hose Ⓐ.
12. Run the compressor at cooling operation.
13. Remove the charge hose Ⓐ & Ⓑ.
    - Remove the charge hose Ⓐ rom portion Ⓖ.
    - Remove the charge hose Ⓑ from portion ⓔ.
14. Attach the caps.
15. Gas leakage check.

SAFETY PRECAUTION

- Please read the “Safety Precaution” carefully before operating the unit to ensure correct usage of the unit.
- Pay special attention to signs of “ ⚠ **Warning**” and “ ⚠ **Caution**”. The “Warning” section contains matters which, if not observed strictly, may cause death or serious injury. The “Caution” section contains matters which may result in serious consequences if not observed properly. Please observe all instructions strictly to ensure safety.
- The sign indicate the following meanings.

Make sure to connect earth line.	⃠ The sign in the figure indicates prohibition.
Indicates the instructions that must be followed.	

- Please keep this manual after reading.

PRECAUTIONS DURING INSTALLATION

⚠ WARNING

- Do not reconstruct the unit.
  Water leakage, fault, short circuit or fire may occur if you reconstruct the unit by yourself.

- Please ask your sales agent or qualified technician for the installation of your unit. Water leakage, short circuit or fire may occur if you install the unit by yourself.
- Please use earth line.
  Do not place the earth line near water or gas pipes, lightning-conductor, or the earth line of telephone. Improper installation of earth line may cause electric shock.

⚠ CAUTION

- A circuit breaker should be installed depending on the mounting site of the unit. Without a circuit breaker, the danger of electric shock exists.
- Do not install near location where there is flammable gas. The outdoor unit may catch fire if flammable gas leaks around it.

- Please ensure smooth flow of water when installing the drain hose.

PRECAUTIONS DURING SHIFTING OR MAINTENANCE

⚠ WARNING

- Should abnormal situation arises (like burning smell), please stop operating the unit and turn off the circuit breaker. Contact your agent. Fault, short circuit or fire may occur if you continue to operate the unit under abnormal situation.

- Please contact your agent for maintenance. Improper self maintenance may cause electric shock and fire.
- Please contact your agent if you need to remove and reinstall the unit. Electric shock or fire may occur if you remove and reinstall the unit yourself improperly.
- If the supply cord is damaged, it must be replaced by the special cord obtainable at authorized service/parts centers.

PRECAUTIONS DURING OPERATION

⚠ WARNING

- Avoid an extended period of direct air flow for your health.

- Do not insert a finger, a rod or other objects into the air outlet or inlet. As the fan is rotating at a high speed, it will cause injury. Before cleaning, be sure to stop the operation and turn the breaker OFF.
- Do not use any conductor as fuse wire, this could cause fatal accident.

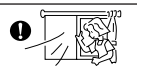
- During thunder storm, disconnect and turn off the circuit breaker.

PRECAUTIONS DURING OPERATION

⚠ CAUTION

- The product shall be operated under the manufacturer specification and not for any other intended use.

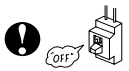
- Do not attempt to operate the unit with wet hands, this could cause fatal accident.
- When operating the unit with burning equipments, regularly ventilate the room to avoid oxygen insufficiency.



- Do not direct the cool air coming out from the air-conditioner panel to face household heating apparatus as this may affect the working of apparatus such as the electric kettle, oven etc.
- Please ensure that outdoor mounting frame is always stable, firm and without defect. If not, the outdoor unit may collapse and cause danger.

- Do not splash or direct water to the body of the unit when cleaning it as this may cause short circuit.
- Do not use any aerosol or hair sprays near the indoor unit. This chemical can adhere on heat exchanger fin and blocked the evaporation water flow to drain pan. The water will drop on tangential fan and cause water splashing out from indoor unit.

- Please switch off the unit and turn off the circuit breaker during cleaning, the high-speed fan inside the unit may cause danger.
- Turn off the circuit breaker if the unit is not to be operated for a long period.

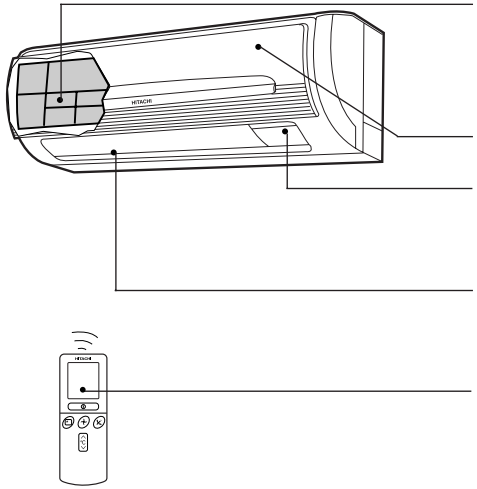


- Do not climb on the outdoor unit or put objects on it.
- Do not put water container (like vase) on the indoor unit to avoid water dripping into the unit. Dripping water will damage the insulator inside the unit and causes short-circuit.

- Do not place plants directly under the air flow as it is bad for the plants.
- When operating the unit with the door and windows opened, (the room humidity is always above 80%) and with the air deflector facing down or moving automatically for a long period of time, water will condense on the air deflector and drips down occasionally. This will wet your furniture. Therefore, do not operate under such condition for a long time.
- If the amount of heat in the room is above the cooling or heating capability of the unit (for example: more people entering the room, using heating equipments and etc.), the preset room temperature cannot be achieved.
- This appliance is not intended for use by young children or infirm persons unless they have been adequately supervised by a responsible person to ensure that they can use the appliance safely.
- Young children should be supervised to ensure that they do not play with the appliance.

NAMES AND FUNCTIONS OF EACH PART

INDOOR UNIT



Air filter
To prevent dust from coming into the indoor unit.
(Refer page 40)

Front panel

Indoor unit indicators
Light indicator showing the operating condition.
(Refer page 24)

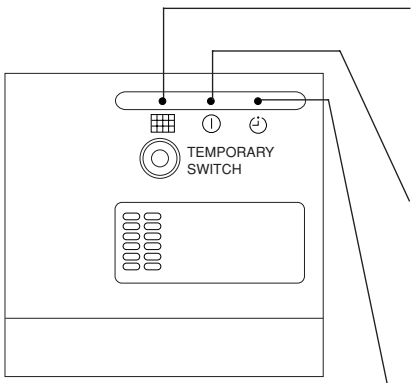
Horizontal deflector ● Vertical deflector (Air Outlet)
(Refer page 35)

Remote controller
Send out operation signal to the indoor unit. So as to operate the whole unit.
(Refer page 25)

MODEL NAME AND DIMENSIONS

MODEL	WIDTH (mm)	HEIGHT (mm)	DEPTH (mm)
RAK-18NH5/RAK-25NH5/RAK-35NH5/RAK-50NH5	780	280	210

INDOOR UNIT INDICATORS



FILTER LAMP
When the device is operated for a total of about 200 hours, the FILTER lamp lights to indicate that it is time to clean the filter. The lamp goes out when the "(AUTO SWING)" button is pressed while the device is on "STANDBY MODE".

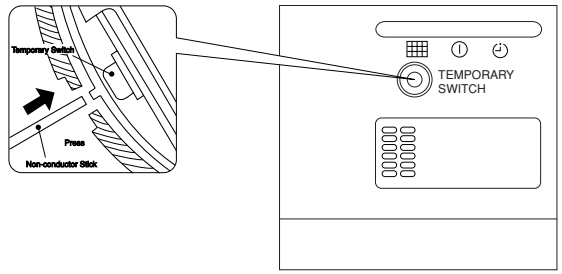
OPERATION LAMP
This lamp lights during operation.
The OPERATION LAMP flashes in the following cases during heating.

(1) During preheating
For about 2–3 minutes after starting up.

(2) During defrosting
Defrosting will be performed about once every one hour when frost forms on the heat exchanger of the outdoor unit, for 5–10 minutes each time.

TIMER LAMP
This lamp lights when the timer is working.

OPERATION INDICATOR



TEMPORARY SWITCH

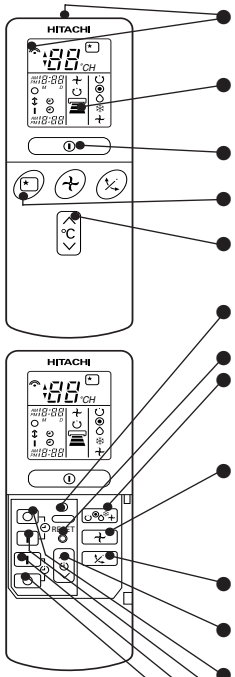
Use this switch to start and stop when the remote controller does not work. [Use non-conductor stick (example toothpick)]

- By pressing the temporary switch, the operation is done in previously set operation mode.
- When the operation is done using the temporary switch after the power source is turned off and turn on again, the operation is done in automatic mode.

NAMES AND FUNCTIONS OF REMOTE CONTROL UNIT

REMOTE CONTROLLER

- This controls the operation of the indoor unit. The range of control is about 7 meters. If indoor lighting is controlled electronically, the range of control may be shorter.
  This unit can be fixed on a wall using the fixture provided. Before fixing it, make sure the indoor unit can be controlled from the remote controller.



⟳	AUTO
◉	HEAT
○	DEHUMIDIFY
❄	COOL
✢	FAN
	FAN SPEED — LOW, MED, HI
	SLEEPING
○	STOP (CANCEL)
I	START (RESERVE)
⏻	START/STOP
	TIME
	TIMER SET
	TIMER SELECTOR — ON TIMER, OFF TIMER
	AUTO SWING

- **Signal emitting window/transmission sign**
  Point this window toward the indoor unit when controlling it.
  The transmission sign blinks when a signal is sent.
- **Display**
  This indicates the room temperature selected, current time, timer status, function and intensity of circulation selected.
- **START/STOP button**
  Press this button to start operation. Press it again to stop operation.
- **SLEEP button**
  Use this button to set the sleep timer.
- **TEMPERATURE buttons**
  Use these buttons to raise or lower the temperature setting. (Keep pressed, and the value will change more quickly.)
- **TIME button**
  Use this button to set and check the time and date.
- **RESET buttons**
- **FUNCTION selector**
  Use this button to select the operating mode. Every time you press it, the mode will change from ⟳ (AUTO) to ◉ (HEAT) to ○ (DEHUMIDIFY) to ❄ (COOL) and to ✢ (FAN) cyclically.
- **FAN SPEED selector**
  This determines the fan speed. Every time you press this button, the intensity of circulation will change from ⟳ (AUTO) to (HI) to (MED) to (LOW) (This button allows selecting the optimal or preferred fan speed for each operation mode).
- **AUTO SWING button**
  Controls the angle of the horizontal air deflector.
- **TIMER control**
  Use this button to set the timer.
- **OFF-TIMER button** Select the turn OFF time.
- **ON-TIMER button** Select the turn ON time.
- **RESERVE button** Time setting reservation.
- **CANCEL button** Cancel time reservation.

Precautions for Use

- Do not put the remote controller in the following places.
  - Under direct sunlight.
  - In the vicinity of a heater.
- Handle the remote controller carefully. Do not drop it on the floor, and protect it from water.
- Once the outdoor unit stops, it will not restart for about 3 minutes (unless you turn the power switch off and on or unplug the power cord and plug it in again).
  This is to protect the device and does not indicate a failure.
- If you press the FUNCTION selector button during operation, the device may stop for about 3 minutes for protection.

VARIOUS FUNCTIONS

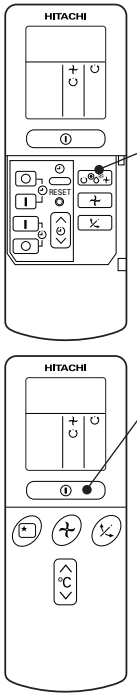
■ Auto Restart Control

- If there is a power failure, operation will be automatically restarted when the power is resumed with previous operation mode and airflow direction.
  (As the operation is not stopped by remote controller.)
- If you intend not to continue the operation when the power is resumed, switch off the power supply.
  When you switch on the circuit breaker, the operation will be automatically restarted with previous operation mode and airflow direction.

Note: 1. If you do not require Auto Restart Control, please consult your sales agent or OFF by remote control.
2. Auto Restart Control is not available when Timer or Sleep Timer mode is set.

AUTOMATIC OPERATION

The device will automatically determine the mode of operation, HEAT, COOL or DEHUMIDIFY depending on the current room temperature. The selected mode of operation will change when the room temperature varies. However the mode of operation will not change when indoor unit connected to multi type outdoor unit.



1 Press the FUNCTION selector so that the display indicates the ⟳ (AUTO) mode of operation.

- When AUTO has been selected, the device will automatically determine the mode of operation, HEAT, COOL or DEHUMIDIFY depending on the current room temperature. However the mode of operation will not change when indoor unit connected to multi type outdoor unit.
- If the mode automatically selected by the unit is not satisfactory, manually change the mode setting (heat, dehumidify, cool or fan).

START / STOP Press the ⏻ (START/STOP) button.
Operation starts with a beep.
Press the button again to stop operation.

■ As the settings are stored in memory in the remote controller, you only have to press the ⏻ (START/STOP) button next time.

You can raise or lower the temperature setting as necessary by maximum of 3°C.

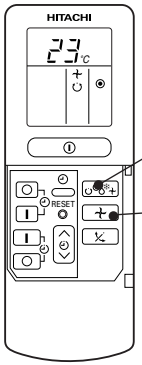
Press the temperature button and the temperature setting will change by 1°C each time.

- The preset temperature and the actual room temperature may vary somewhat depending on conditions.
- The display does not indicate the preset temperature in the AUTO mode. If you change the setting, the indoor unit will produce a beep.

Press the ✢ (FAN SPEED) button, AUTO and LOW is available.

HEATING OPERATION

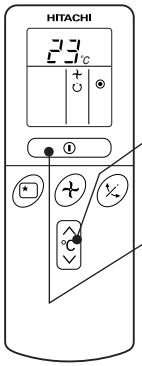
- Use the device for heating when the outdoor temperature is under 21°C.
  When it is too warm (over 21°C), the heating function may not work in order to protect the device.
- In order to keep reliability of the device, please use this device above -15°C of the outdoor temperature.



1 Press the FUNCTION selector so that the display indicates ◉ (HEAT).

2 Set the desired FAN SPEED with the ✢ (FAN SPEED) button (the display indicates the setting).

- (AUTO) : The fan speed is HI at first and varies to MED or LOW automatically when the preset temperature has been reached.
- (HI) : Economical as the room will become warm quickly.
  But you may feel a chill at the beginning.
- (MED) : Fan speed slow.
- (LOW) : Fan speed slower.



3 Set the desired room temperature with the TEMPERATURE buttons (the display indicates the setting).

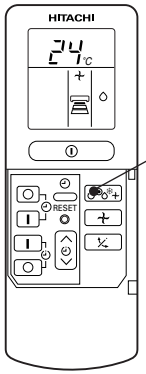
The temperature setting and the actual room temperature may vary somewhat depending on conditions.

START / STOP Press the ⏻ (START/STOP) button. Heating operation starts with a beep. Press the button again to stop operation.

■ As the settings are stored in memory in the remote controller, you only have to press the ⏻ (START/STOP) button next time.

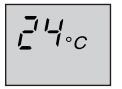
DEHUMIDIFYING OPERATION

Use the device for dehumidifying when the room temperature is over 16°C.
When it is under 15°C, the dehumidifying function will not work.

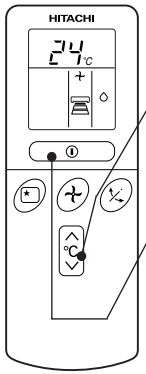


1 Press the FUNCTION selector so that the display indicates ◇ (DEHUMIDIFY).
The FAN SPEED is set at LOW automatically.
The FAN SPEED button does not work.

2 Set the desired room temperature with the TEMPERATURE button (the display indicates the setting).



The range of 20-26˚C is recommended as the room temperature for dehumidifying.



START / STOP Press the ⏻ (START/STOP) button. Dehumidifying operation starts with a beep. Press the button again to stop operation.

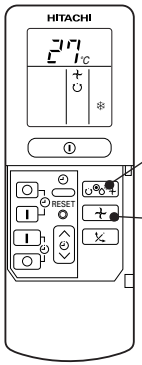
■ As the settings are stored in memory in the remote controller, you only have to press the ⏻ (START/STOP) button next time.

■ Dehumidifying Function

When the room temperature is higher than the temperature setting: The device will dehumidify the room, reducing the room temperature to the preset level.
When the room temperature is lower than the temperature setting: Dehumidifying will be performed at the temperature setting slightly lower than the current room temperature, regardless of the temperature setting. The function will stop (the indoor unit will stop emitting air) as soon as the room temperature becomes lower than the setting temperature.

COOLING OPERATION

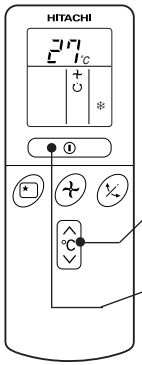
Use the device for cooling when the outdoor temperature is –10 ~ 43°C.
If in doors humidity is very high (80%), some dew may form on the air outlet grille of the indoor



1 Press the FUNCTION selector so that the display indicates ❄ (COOL).

2 Set the desired FAN SPEED with the ✢ (FAN SPEED) button (the display indicates the setting).

- (AUTO) : The FAN SPEED is HI at first and varies to MED or LOW automatically when the preset temperature has been reached.
- (HI) : Economical as the room will become cool quickly.
- (MED) : Fan speed slow.
- (LOW) : Fan speed slower.



3 Set the desired room temperature with the TEMPERATURE button (the display indicates the setting).

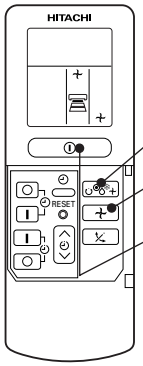
The temperature setting and the actual room temperature may vary some how depending on conditions.

START / STOP Press the ⏻ (START/STOP) button. Cooling operation starts with a beep. Press the button again to stop operation. The cooling function does not start if the temperature setting is higher than the current room temperature (even though the ⏻ (OPERATION) lamp lights). The cooling function will start as soon as you set the temperature below the current room temperature.

■ As the settings are stored in memory in the remote controller, you only have to press the ⏻ (START/STOP) button next time.

FAN OPERATION

You can use the device simply as an air circulator. Use this function to dry the interior of the indoor unit at the end of summer.



1 Press the FUNCTION selector so that the display indicates ✢ (FAN).

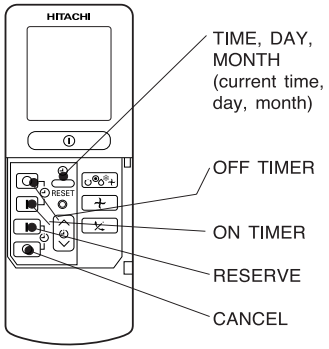
2 Press the ✢ (FAN SPEED) button.

START / STOP Press the ⏻ (START/STOP) button. Fan operation starts with a beep. Press the button again to stop operation.

FAN SPEED (AUTO) ····· When the AUTO fan speed mode is set in the cooling/heating operation:

For the heating operation	● The fan speed will automatically change according to the temperature of discharged air. ● When the difference of room temperature and setting temperature is large, fan starts to run at HI speed. ● When the room temperature reaches setting temperature, fan speed changes to LOW automatically.
For the cooling operation	● When the difference of room temperature and setting temperature is large, fan starts to run at HI speed. ● After room temperature reaches the preset temperature, the cooling operation, which changes the fan speed and room temperature to obtain optimum conditions for natural healthful cooling will be performed.

HOW TO SET THE TIMER



TIME, DAY, MONTH (current time, day, month)

OFF TIMER

ON TIMER

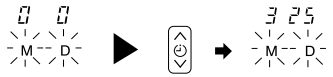
RESERVE

CANCEL

Time, Day, Month

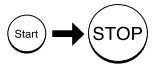
After you change the batteries;

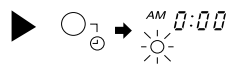
1 Set the current month and day with the TIMER control button.



OFF-Timer

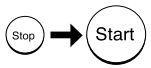
1 Press the (OFF-TIMER) button. The (OFF) mark blinks on the display.





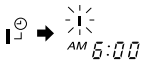
You can set the device to turn off at the present time.

ON-Timer

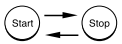


The device will turn on at the designated times.

1 Press the (ON-TIMER) button the (ON) mark blinks on the display.

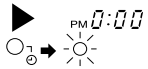


ON/OFF-Timer

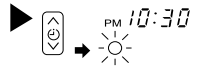


The device will turn on (off) and off (on) at the designated times.
The switching occurs first at the preset time that comes earlier.
The arrow mark appearing on the display indicates the sequence of switching operations.

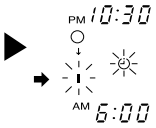
1 Press the (ON-OFF) button so that the (OFF) mark blinks.



2 Set the turn-off time with the TIMER control button.
Press the (RESERVE) button.



3 Press the (ON-TIMER) button so that the (OFF) mark lights and the (ON) mark blinks.



How to Cancel Reservation

Point the signal window of the remote controller toward the indoor unit, and press the (CANCEL) button.
The (RESERVED) sign goes out with a beep and the (TIMER) lamp turns off on the indoor unit.

NOTE

You can set only one of the OFF-timer, ON-timer and ON/OFF-timer.

2 Press the (TIME) button.

3 Set the current time with the TIMER control button.

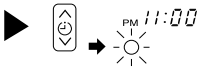
4 Press the (TIME) button again.
The time indication starts lighting instead of flashing.

Example: The current time is 1:30 p.m.

The time indication will disappear automatically in 10 second.
To check the current time setting, press the (TIME) button twice.

The setting of the current time is now complete.

2 Set the turn-off time with the TIMER control button.



3 Point the signal window of the remote controller toward the indoor unit, and press the (RESERVE) button.
The (OFF) mark starts lighting instead of flashing and the sign (RESERVED) lights. A beep occurs and the (TIMER) lamp lights on the indoor unit.

Example: The device will turn off at 11:00p.m.

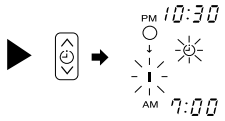
The setting of turn-off time is now complete.

2 Set the turn-on time with the TIMER control button.

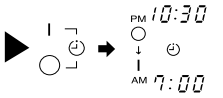
3 Point the signal window of the remote controller toward the indoor unit, and press the (RESERVE) button.
The (ON) mark starts lighting instead of flashing and the (RESERVED) sign lights. A beep occurs and the (TIMER) lamp lights on the indoor unit.

Example:
The device will turn on at 7:00 a.m.
The setting of the turn-on time is now complete.

4 Set the turn-on time with the TIMER control button.



5 Point the signal window of the remote controller toward the indoor unit, and press the (RESERVE) button.
The (ON) mark starts lighting instead of flashing and the (RESERVED) sign lights. A beep occurs and the (TIMER) lamp lights on the indoor unit.



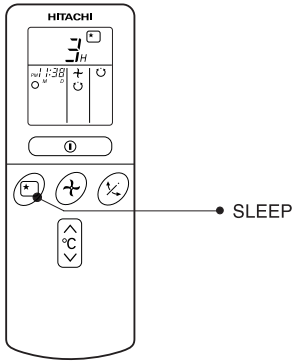
Example:
The device will turn off at 10:30 p.m. and it will be turned on at 7:00 a.m.
The settings of the turn-on/off times are now complete.

The timer may be used in three ways: off-timer, on-timer, and ON/OFF (OFF/ON)-timer. Set the current time at first because it serves as a reference.

As the time settings are stored in memory in the remote controller, you only have to press the (RESERVE) button in order to use the same settings next time.

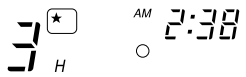
HOW TO SET THE SLEEP TIMER

Set the current time at first if it is not set before (see the pages for setting the current time). Press the ⊡ (SLEEP) button, and the display changes as shown below.



Mode	Indication
Sleep timer	1 hour → 2 hours → 3 hours → 7 hours → Sleep timer off

Sleep Timer: The device will continue working for the designated number of hours and then turn off.
Point the signal window of the remote controller toward the indoor unit, and press the SLEEP button.
The timer information will be displayed on the remote controller. The TIMER lamp lights with a beep from the indoor unit. When the sleep timer has been set, the display indicates the turn-off time.



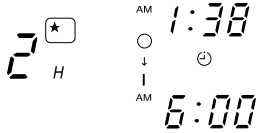
Example: If you set 3 hours sleep time at 11:38 p.m., the turn-off time is 2:38 a.m.

Sleep timer → Start

The device will be turned off by the sleep timer and turned on by on-timer.

1 Set the ON-timer.

2 Press the ⊡ (SLEEP) button and set the sleep timer.



For heating:

In this case, the device will turn off in 2 hours (at 1:38 a.m.) and turn on early so that the preset temperature will be almost reached at 6:00 next morning.

How to Cancel Reservation

Point the signal window of the remote controller toward the indoor unit, and press the ○ (CANCEL) button.
The ◴ (RESERVED) sign goes out with a beep and the ◴ (TIMER) lamp turns off on the indoor unit.

Explanation of the sleep timer

The device will control the FAN SPEED and room temperature automatically so as to be quiet and good for people's health.

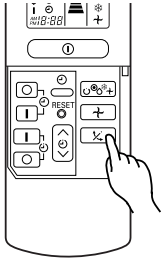
NOTE

- If date or current time is not set, sleep timer can not be set.
- If you set the sleep timer after the off-, on/off- or off/on-timer has been set, the sleep timer becomes effective instead of the off-, on/off- or off/on-timer set earlier.
- You can not set other timer during sleep timer operation.
- After sleep timer time is up and when press sleep button again, the sleep timer will be set as last setting.
- Sleep timer effective only once.

ADJUSTING THE AIR DEFLECTOR

1 Adjustment of the conditioned air in the upward and downward directions.

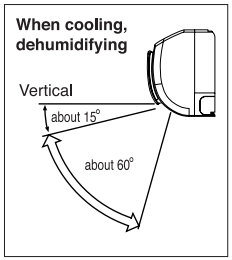
The horizontal air deflector is automatically set to the proper angle suitable for each operation. The deflector can be swung up and down continuously and also set to the desired angle using the " (AUTO SWING)" button.



If the " (AUTO SWING)" button is pressed once, the horizontal air deflector swings up and down. If the button is pressed again, the deflector stops in its current position. Several seconds (about 6 seconds) may be required before the deflector starts to move.

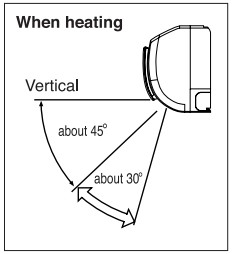
Use the horizontal air deflector within the adjusting range shown on the right.

When the operation is stopped, the horizontal air deflector moves and stops at the position where the air outlet closes.



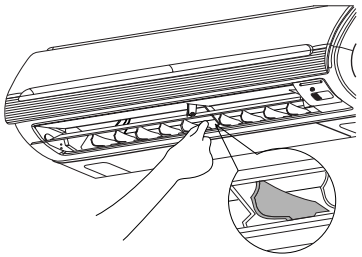
⚠ CAUTION

In "Cooling" operation, do not keep the horizontal air deflector swinging for a long time. Some dew may form on the horizontal air deflector and dew may drop.



2 Adjustment of the conditioned air to the left and right.

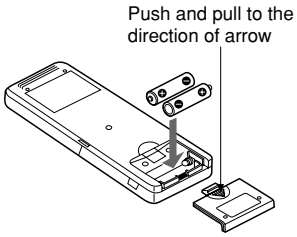
Hold the vertical air deflector as shown in the figure and adjust the conditioned air to the left and right.



HOW TO EXCHANGE THE BATTERIES IN THE REMOTE CONTROLLER

1 Remove the cover as shown in the figure and take out the old batteries.

2 Install the new batteries.
The direction of the batteries should match the marks in the case.

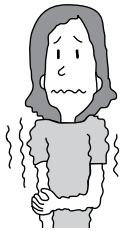


⚠ CAUTION

1. Do not use new and old batteries, or different kinds of batteries together.
2. Take out the batteries when you do not use the remote controller for 2 or 3 months.

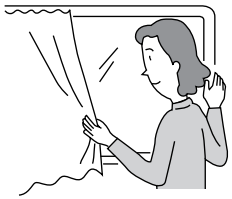
THE IDEAL WAYS OF OPERATION

Suitable Room Temperature



⚠ Warning
Freezing temperature is bad for health and a waste of electric power.

Install curtain or blinds



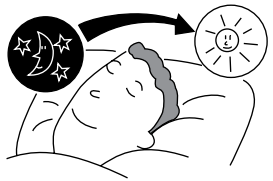
It is possible to reduce heat entering the room through windows.

Ventilation

⚠ Caution
Do not close the room for a long period of time. Occasionally open the door and windows to allow the entrance of fresh air.

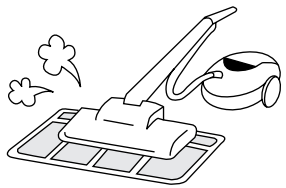
Effective Usage Of Timer

At night, please use the “OFF or ON timer operation mode”, together with your wake up time in the morning. This will enable you to enjoy a comfortable room temperature. Please use the timer effectively.



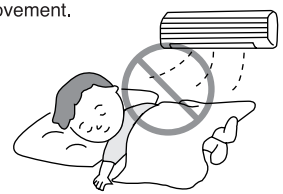
Do Not Forget To Clean The Air Filter

Dusty air filter will reduce the air volume and the cooling efficiency. To prevent from wasting electric energy, please clean the filter every 2 weeks.



Please Adjust Suitable Temperature For Baby And Children

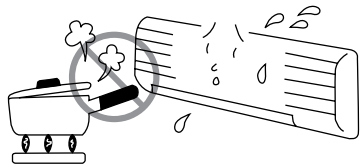
Please pay attention to the room temperature and air flow direction when operating the unit for baby, children and old folks who have difficulty in movement.



FOR USER’S INFORMATION

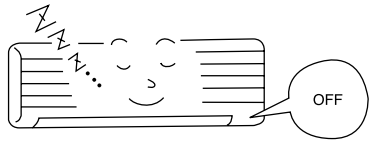
The Air Conditioner And The Heat Source In The Room

⚠ Caution
If the amount of heat in the room is above the cooling capability of the air conditioner (for example: more people entering the room, using heating equipments and etc.), the preset room temperature cannot be achieved.



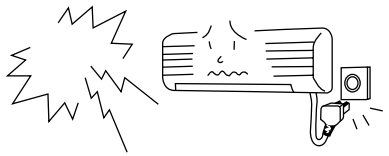
Not Operating For A Long Time

When the indoor unit is not to be used for a long period of time, please switch off the power from the mains. If the power from mains remains “ON”, the indoor unit still consumes about 8W in the operation control circuit even if it is in “OFF” mode.



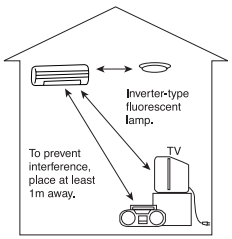
When Lightning Occurs

⚠ Warning
To protect the whole unit during lightning, please stop operating the unit and remove the plug from the socket.



Interference From Electrical Products

⚠ Caution
To avoid noise interference, please place the indoor unit and its remote controller at least 1m away from electrical products.

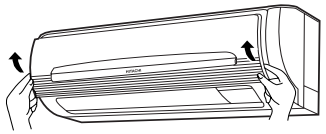


ATTACHING THE AIR CLEANSING AND DEODORIZING FILTERS

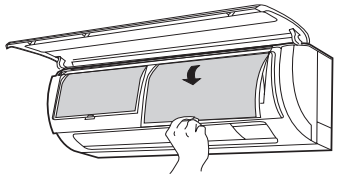
⚠ CAUTION

Cleaning and maintenance must be carried out only by qualified service personal. Before cleaning, stop operation and switch off the power supply.

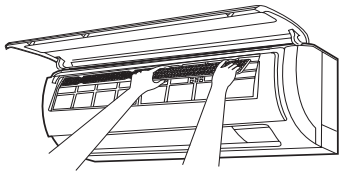
1 **Open the front panel.**
- Pull up the front panel by holding it at both sides with both hands.



2 **Remove the filter.**
- Push upward to release the claws and pull out the filter.

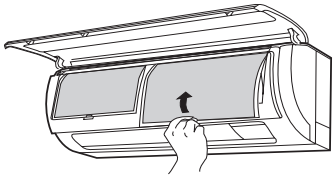


3 **Attaching the air cleansing and deodorizing filters to the filter.**
- Attach the air cleansing and deodorizing filters to the frame by gently compress its both sides and release after insertion into filter frame.

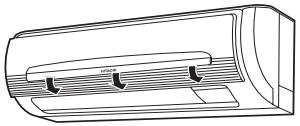


⚠ CAUTION

Do not bend the air cleansing and deodorizing filter as it may cause damage to the structure.



4 **Attach the filters.**
- Attach the filters by ensuring that the surface written “FRONT” is facing front.
- After attaching the filters, push the front panel at three arrow portion as shown in figure and close it.



NOTE

- In case of removing the air cleansing and deodorizing filters, please follow the above procedures.
- The cooling capacity is slightly weakened and the cooling speed becomes slower when the air cleansing and deodorizing filters are used. So, set the fan speed to "HIGH" when using it in this condition.
- Air cleansing and deodorizing filters are washable and reusable up to 20 times by using vacuum cleaner or water rinse under running tap water. Type number for this air cleansing filter is <SPX-CFH11>. Please use this number for ordering when you want to renew it.
- Do not operate the air conditioner without filter. Dust may enter the air conditioner and fault may occur.

MAINTENANCE

⚠ CAUTION

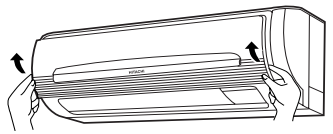
Cleaning and maintenance must be carried out only by qualified service personal. Before cleaning, stop operation and switch off the power supply.

1. AIR FILTER

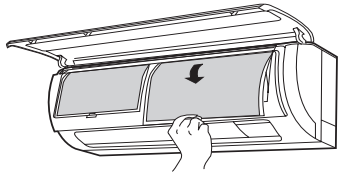
Clean the air filter, as it removes dust inside the room. In case the air filter is full of dust, the air flow will decrease and the cooling capacity will be reduced. Further, noise may occur. Be sure to clean the filter following the procedure below.

PROCEDURE

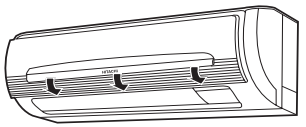
1 Open the front panel and remove the filter
- Gently lift and remove the air cleansing and deodorizing filter from the air filter frame.



2 Vacuum dust from the air filter and air cleansing and deodorizing filter using vacuum cleaner. If there is too much dust, rinse under running tap water and gently brush it with soft bristle brush. Allow filters to dry in shade.



3
- Re-insert the air cleansing and deodorizing filter to the filter frame. Set the filter with “FRONT” mark facing front, and slot them into the original state.
- After attaching the filters, push the front panel at three arrow portions as shown in figure and close it.



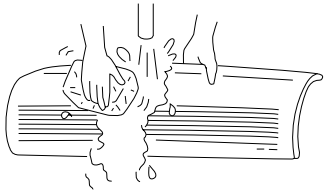
NOTE:
- Air cleansing and deodorizing filter should be cleaned every month or sooner if noticeable loading occurs. When used overtime, it may loose its deodorizing function. For maximum performance, it is recommended to replace it every 3-6 months depending on application requirements.

⚠ CAUTION

- Do not wash with hot water at more than 40°C. The filter may shrink.
- When washing it, shake off moisture completely and dry it in the shade; do not expose it directly to the sun. The filter may shrink.
- Do not use detergent on the air cleansing and deodorizing filter as some detergent may deteriorate the filter electrostatic performance.

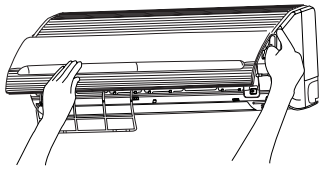
2. Washable Front Panel

- Remove the front panel and wash with clean water.
  Wash it with a soft sponge.
  After using neutral detergent, wash thoroughly with clean water.
- When front panel is not removed, wipe it with a soft dry cloth. Wipe the remote controller thoroughly with a soft dry cloth.
- Wipe the water thoroughly.
  If water remains at indicators or signal receiver of indoor unit, it causes trouble.



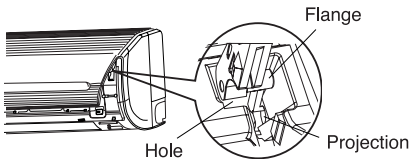
Method of removing the front panel.
Be sure to hold the front panel with both hands to detach and attach it.

Removing the Front Panel



- When the front panel is fully opened with both hands, push the right arm to the inside to release it, and while closing the front panel slightly, put it out forward.

Attaching the Front Panel



- Move the projections of the left and right arms into the **Flanges** in the unit and securely insert them into the holes.

⚠ CAUTION

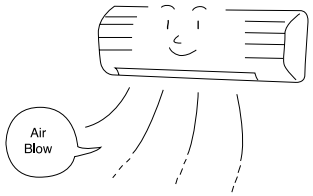
- Do not splash or direct water to the body of the unit when cleaning it as this may cause short circuit.
- Never use hot water (above 40°C), benzine, gasoline, acid, thinner or a brush, because they will damage the plastic surface and the coating.

⚠ CAUTION

Cleaning and maintenance must be carried out only by qualified service personal. Before cleaning, stop operation and switch off the power supply.

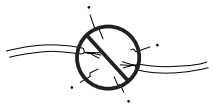
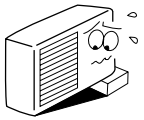
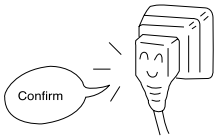
3. MAINTENANCE AT BEGINNING OF LONG OFF PERIOD

- Run the unit by setting the operation mode to ❄ (COOL), the temperature to 32°C and the fan speed to HI for about half a day on a fine day, and dry the whole of the unit.
- Switch off the power plug.



REGULAR INSPECTION

PLEASE CHECK THE FOLLOWING POINTS BY QUALIFIED SERVICE PERSONAL EITHER EVERY HALF YEARLY OR YEARLY. CONTACT YOUR SALES AGENT OR SERVICE SHOP.

1		Is the earth line disconnected or broken?
2		Is the mounting frame seriously affected by rust and is the outdoor unit tilted or unstable?
3		Is the plug of power line firmly plugged into the socket? (Please ensure no loose contact between them).

AFTER SALE SERVICE AND WARRANTY

WHEN ASKING FOR SERVICE, CHECK THE FOLLOWING POINTS.

CONDITION	CHECK THE FOLLOWING POINTS
When it does not operate	● Is the fuse all right? ● Is the voltage extremely high or low? ● Is the circuit breaker “ON”?
When it does not cool well When it does not hot well	● Was the air filter cleaned? ● Does sunlight fall directly on the outdoor unit? ● Is the air flow of the outdoor unit obstructed? ● Are the doors or windows opened, or is there any source of heat in the room? ● Is the set temperature suitable?

Notes

- In quiet operation or stopping the operation, the following phenomena may occassionally occur, but they are not abnormal for the operation.
  (1) Slight flowing noise of refrigerant in the refrigerating cycle.
  (2) Slight rubbing noise from the fan casing which is cooled and then gradually warmed as operation stops.
- The odor will possibly be emitted from the room air conditioner because the various odor, emitted by smoke, foodstuffs, cosmetics and so on, sticks to it. So the air filter and the evaporator regularly must be cleaned to reduce the odor.

- Please contact your sales agent immediately if the air conditioner still fails to operate normally after the above inspections. Inform your agent of the model of your unit, production number, date of installation. Please also inform him regarding the fault.
- Power supply shall be connected at the rated voltage, otherwise the unit will be broken or could not reach the specified capacity.

Please note:
On switching on the equipment, particularly when the room light is dimmed, a slight brightness fluctuation may occur. This is of no consequence.
The conditions of the local Power Supply Companies are to be observed.

Note

- Avoid to use the room air conditioner for cooling operation when the outside temperature is below -10°C (14°F).
  The recommended maximum and minimum operating temperatures of the hot and cold sides should be as below:

		Cooling		Heating	
		Minimum	Maximum	Minimum	Maximum
Indoor	Dry bulb °C	21	32	20	27
	Wet bulb °C	15	23	12	19
Outdoor	Dry bulb °C	21	43	2	21
	Wet bulb °C	15	26	1	15

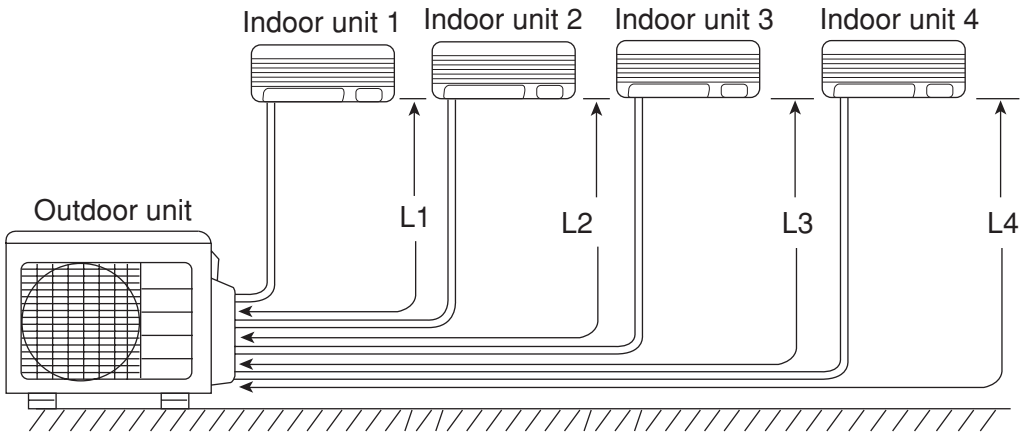
MEMO

INSTALLATION

PIPE LENGTH

(1) Total 60m maximum pipe length.

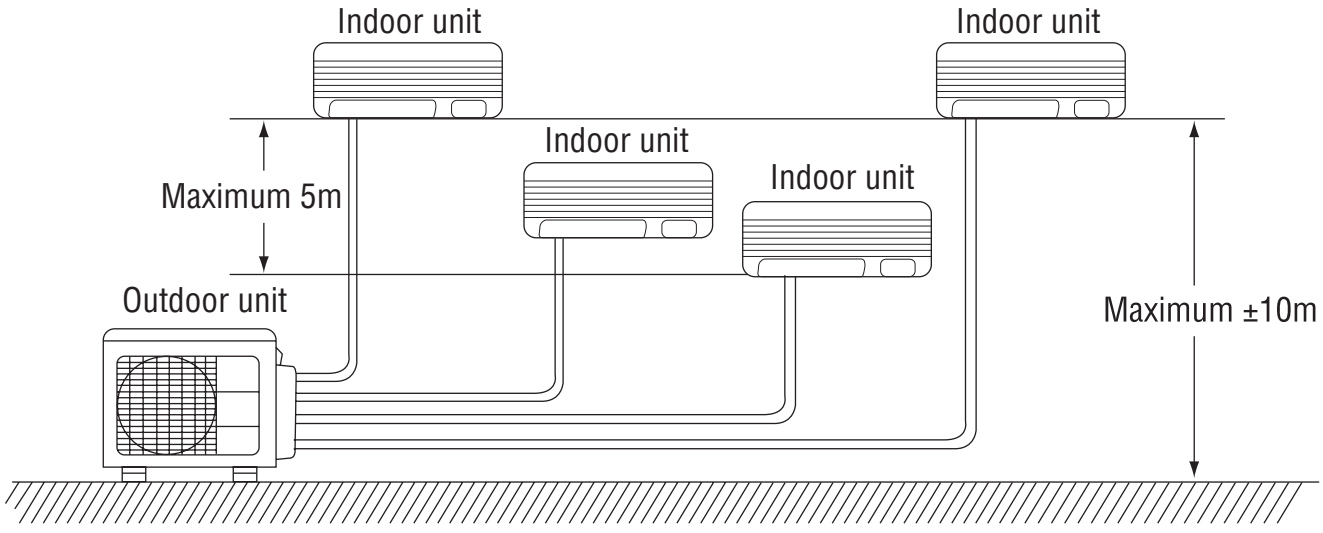
(2) Pipe length for one indoor unit : maximum 25m.



HIGHT DIFFERENCE

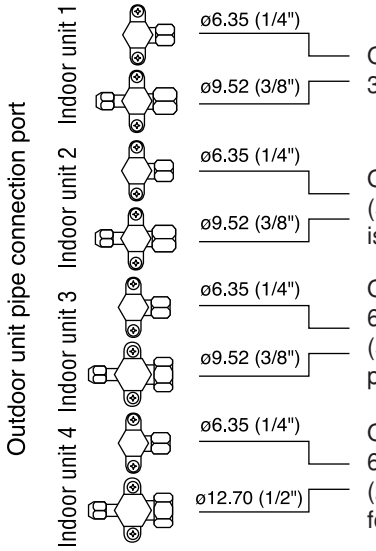
(1) Hight : maximum ± 10m

(2) Hight difference between each indoor unit ≤ 5m.



- To the outdoor unit, up to four indoor units can be connected until the total value of capacity to 11.0kW.
- Make sure to connect to two or more indoor units.

MODEL: RAM-72QH5



One unit of 1.8kW, 2.5kW, 3.5kW or 5.0kW

One unit of 1.8kW, 2.5kW, 3.5kW or 5.0kW
(5kW unit: Optional flare adaptor for piping is necessary.)

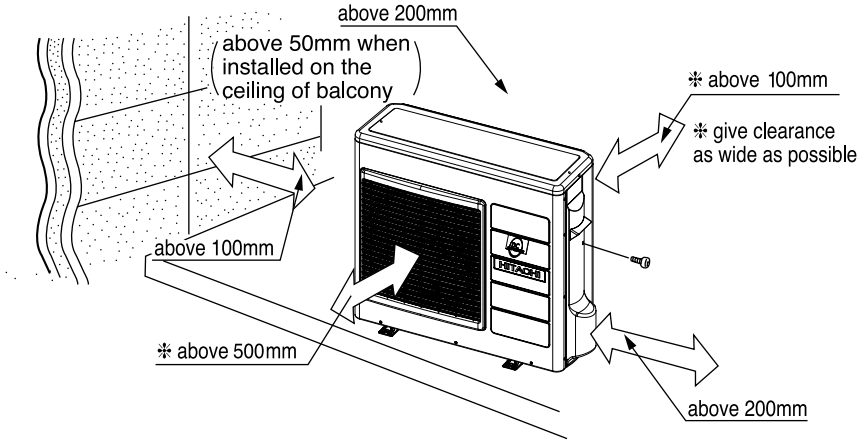
One unit of 1.8kW, 2.5kW, 3.5kW, 5.0kW or 6.0kW
(5kW, 6kW unit: Optional flare adaptor for piping is necessary.)

One unit of 1.8kW, 2.5kW, 3.5kW, 5.0kW or 6.0kW
(2.5kW, 3.5kW unit: Optional flare adaptor for piping is necessary.)

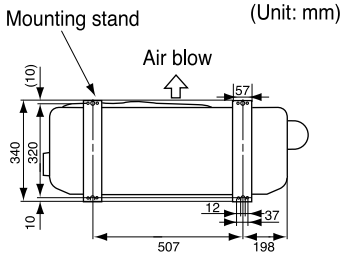
Flare adaptor for piping

The flare adaptor for piping is required depending on combination of indoor units.
- ø9.52 (3/8") → ø 12.7 (1/2")
  Parts number TA261D-4 001
- ø12.7(1/2") → ø 9.52 (3/8")
  Parts number TA261D-6 002

- Remove the side cover.
- For installation, refer as shown below.
- The space indicated with a ⇔ mark is required to guarantee the air conditioner's performance. Install the airconditioner in a place big enough to provide ample space for servicing and repairs later on.

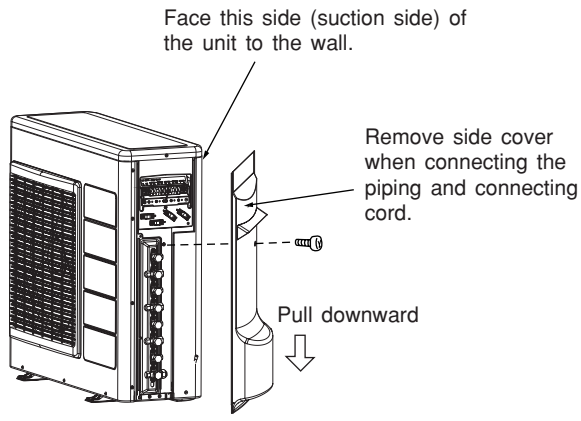


Dimension of Mounting Stand of the Outdoor Unit



Connecting the pipe

- Install the unit in a stable place to minimize vibrationor noise.
- After arranging the cord and pipes, secure them inplace.



- Hold the handle of the side cover. Slide down and takeoff the corner hook, then pull. Reverse these stepswhen installing.

1. Remove flare nut from service valve.
2. Apply refrigerant oil to flare nut sections of servicevalve and pipings.
3. Match center of piping to large diameter side service valve and tank assembly, and tighten flarenut first by hand, then securely tighten using torque wrench.
4. Perform air purge and gas leak inspection.
5. Wrap the provided insulating material around sidepiping using vinyl tape.

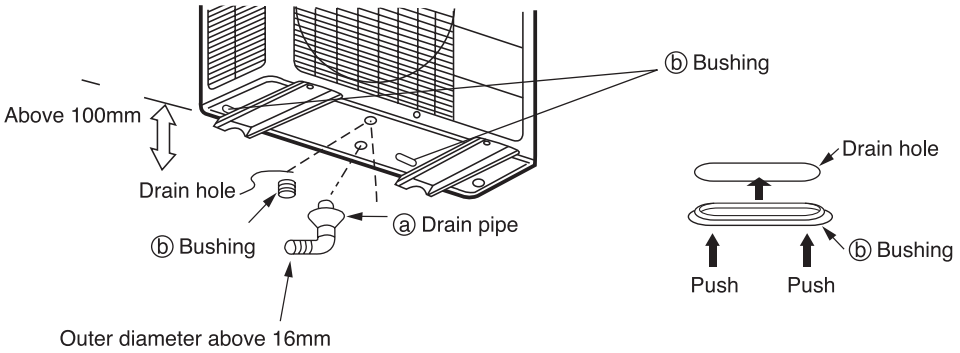
Condensed water disposal of outdoor unit

- There is holes on the base of outdoor unit for condensed water to exhaust.
- To lead condensed water to the drain hole, place the outdoor unit on the mounting stand (optional) or on blocks to raise its level more than 100mm from the ground surface. Connect the drain pipe as shown in the figure. Cover two other water drain holes with the bushings included. (To insall a bushing, push in both ends of the bushing so that it aligns with the drain hole.)
- When connecting the drain pipe, make sure that the bushing does not lift off or deviate from the base.
- Install the outdoor unit on a stable, flat surface and check to see that the condensed water drains.

When Using and Installing in Cold Areas

When the air conditioner is used in low temperature and in snowy conditions, water from the heat exchanger may freeze on the base surface to cause poor drainage. When using the air conditioner in such areas, do not install the bushings. Keep a minimum of 250mm between the drain hole and the ground. When using the drain pipe, consult your sales agent.

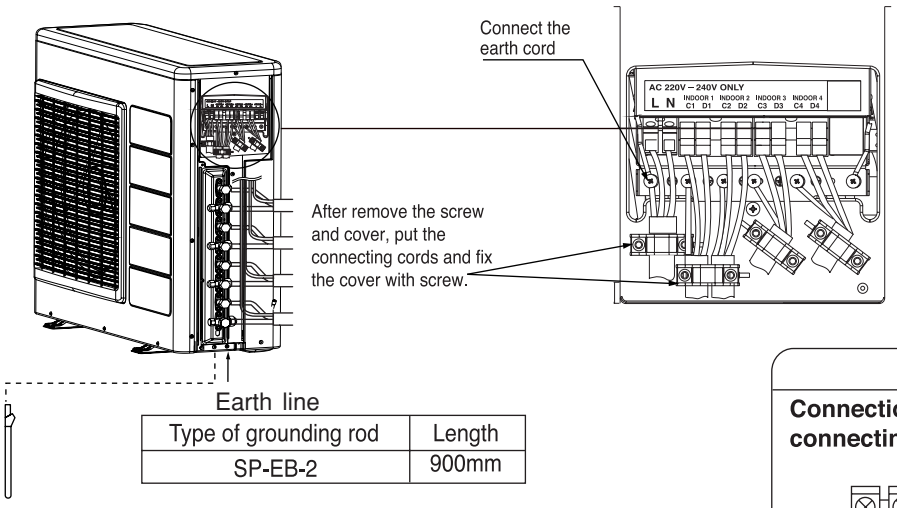
※ For more details, refer to the Installation Manual for Cold Areas.



Connection of the connecting cords and power cord. (Outdoor unit)
RAM-72QH5

⚠ WARNING

- Connecting cord should be connected according to Fig.1, that the Indoor unit No. shall match with terminal board No. of Outdoor unit.
- Be sure to fix the connecting cord with the band as shown below. Otherwise water leakage causes short circuit or faults.



Type of grounding rod	Length
SP-EB-2	900mm

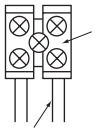
Grounding rod (optional)
(Earth wire and grounding rod are not supplied. Please use optional items below.)

⚠ CAUTION

Arrange power cord so they do not touch service valve.

⚠ WARNING

Connection of the power cord and connecting cord



Securely screw in the power cord and connecting cord so that it will not get loose or disconnect.
Tightening torque reference value: 1.2 to 1.6 N•m (12 to 16 kgf•cm)
Excessive tightening may damage the interior of the cord requiring replacement.

Wiring Pattern

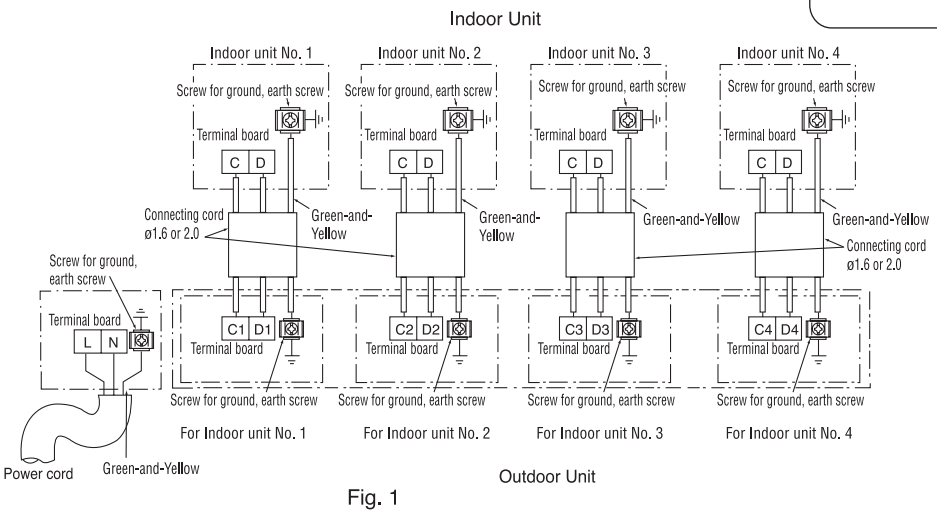
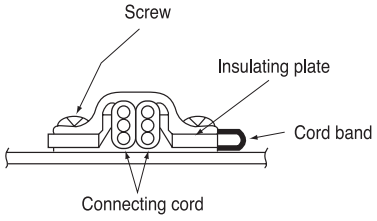


Fig. 1

⚠ CAUTION

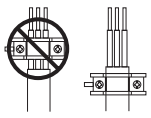
- To prevent a connection error, connecting cords should be bundled and taped to each respective pipe. If connecting cords are mixed with other indoor units, a refrigeration cycle abnormality may occur, causing dripping.

- When putting two connecting cords through the band.



⚠ WARNING

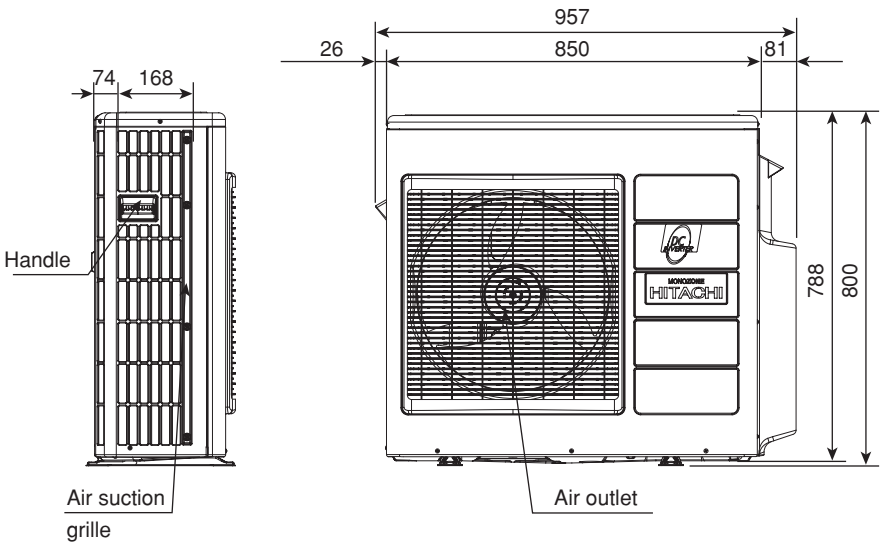
- Leave some space in the connecting cord for maintenance purpose and be sure to secure it with the cord band.
- Secure the connecting cord along the coated part of the wire using the cord band. Do not exert pressure on the wire as this may cause overheating or fire.

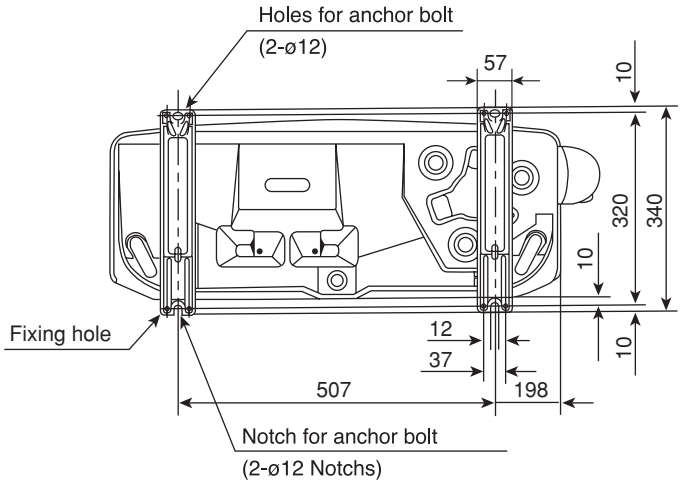


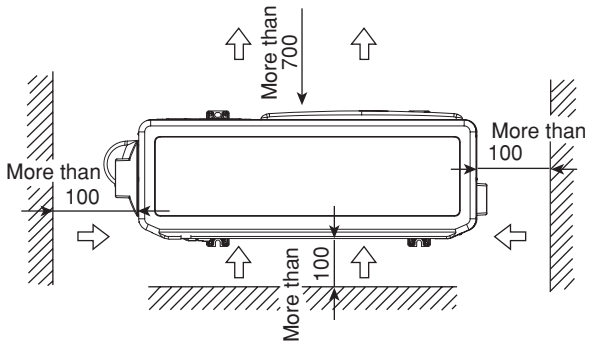
- Hold the handle of the side cover, slide down and take off the corner hook, then pull. Reverse these steps when installing.

CONSTRUCTION AND DIMENSIONAL DIAGRAM

MODEL RAM-72QH5





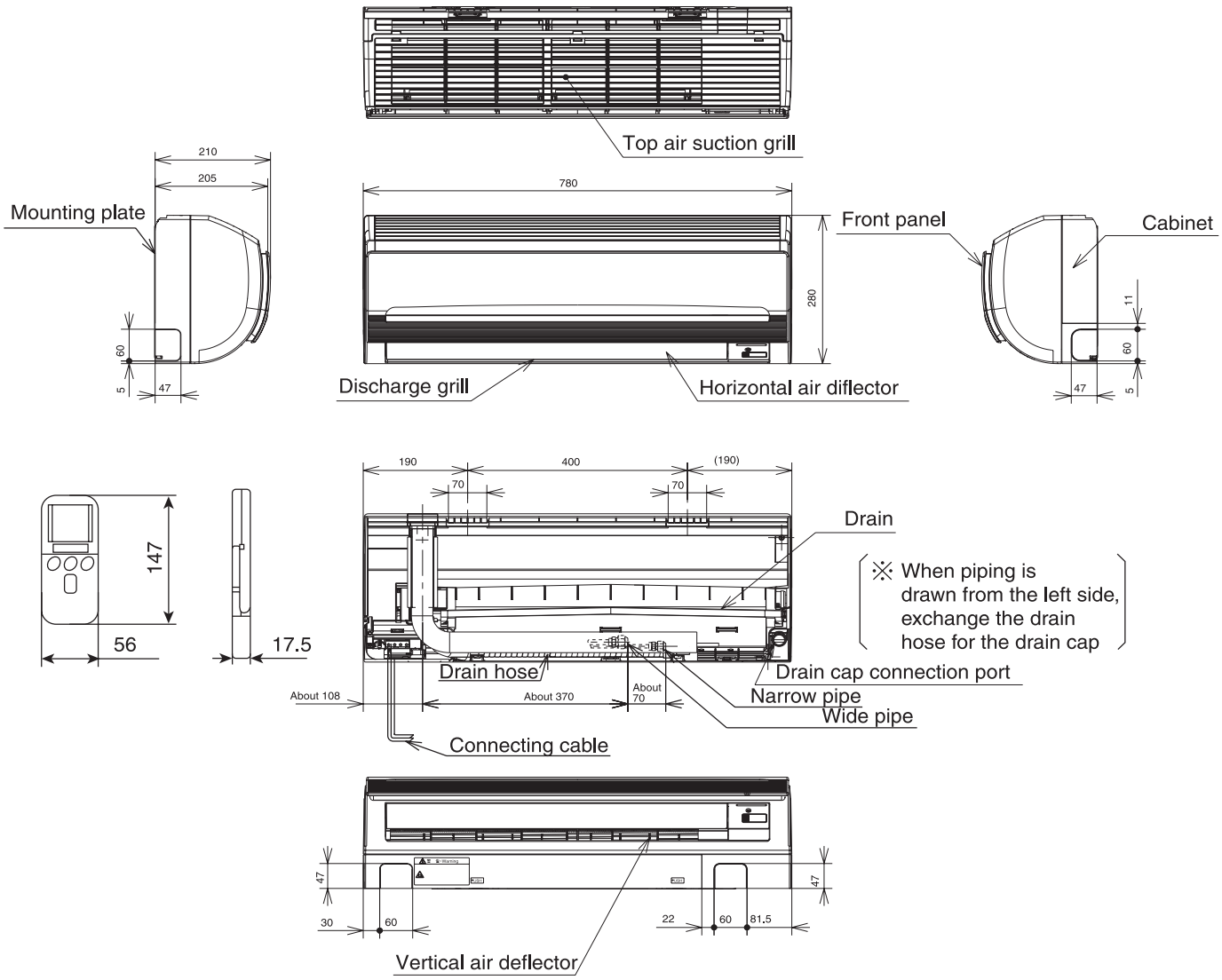


Service space

CONSTRUCTION AND DIMENSIONAL DIAGRAM

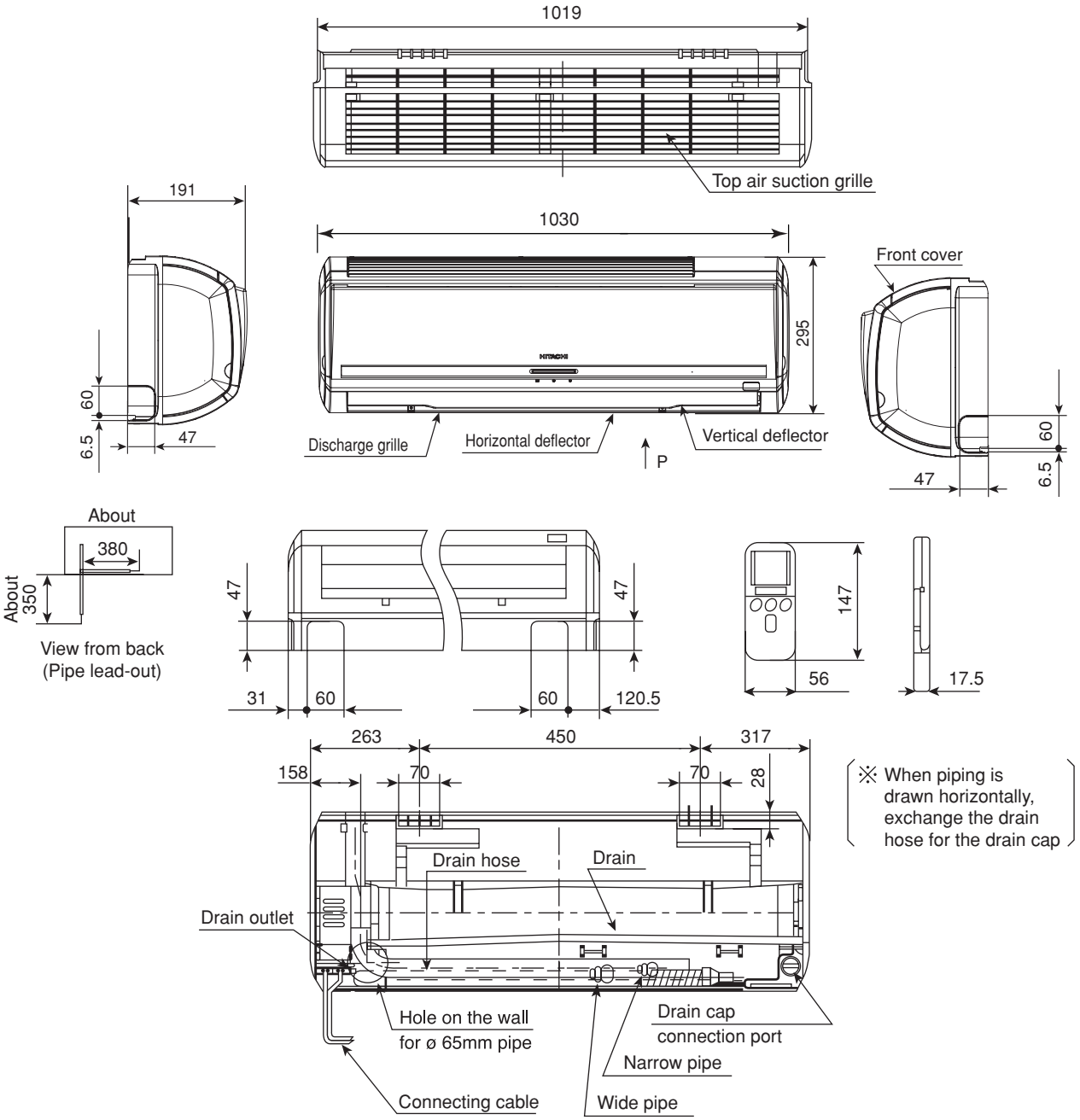
MODEL RAK-18NH5, RAK-25NH5, RAK-35NH5, RAK-50NH5

INDOOR UNIT



CONSTRUCTION AND DIMENSIONAL DIAGRAM

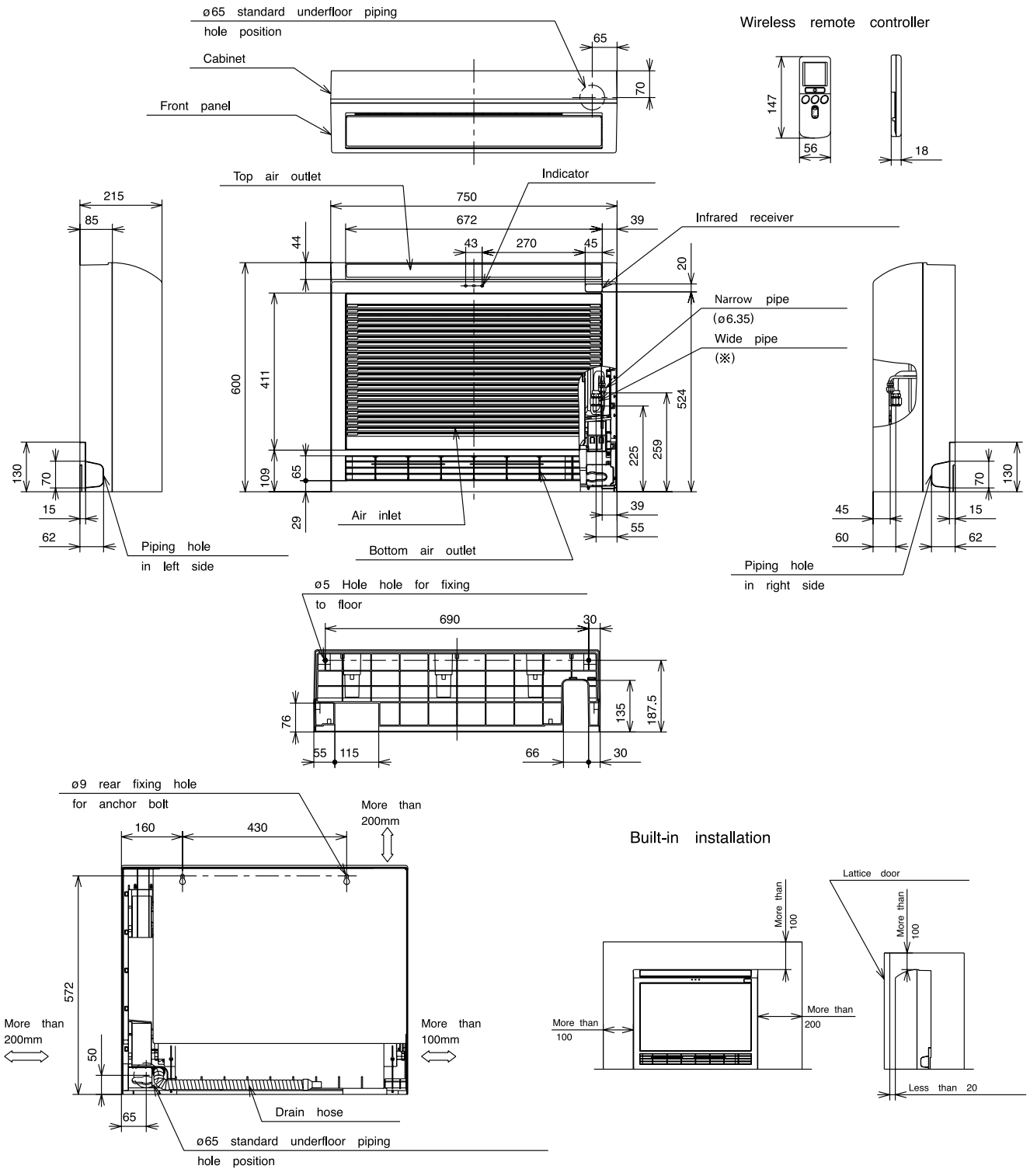
MODEL RAK-65NH5



CONSTRUCTION AND DIMENSIONAL DIAGRAM

MODEL RAF-25NH5, RAF-35NH5, RAF-50NH5

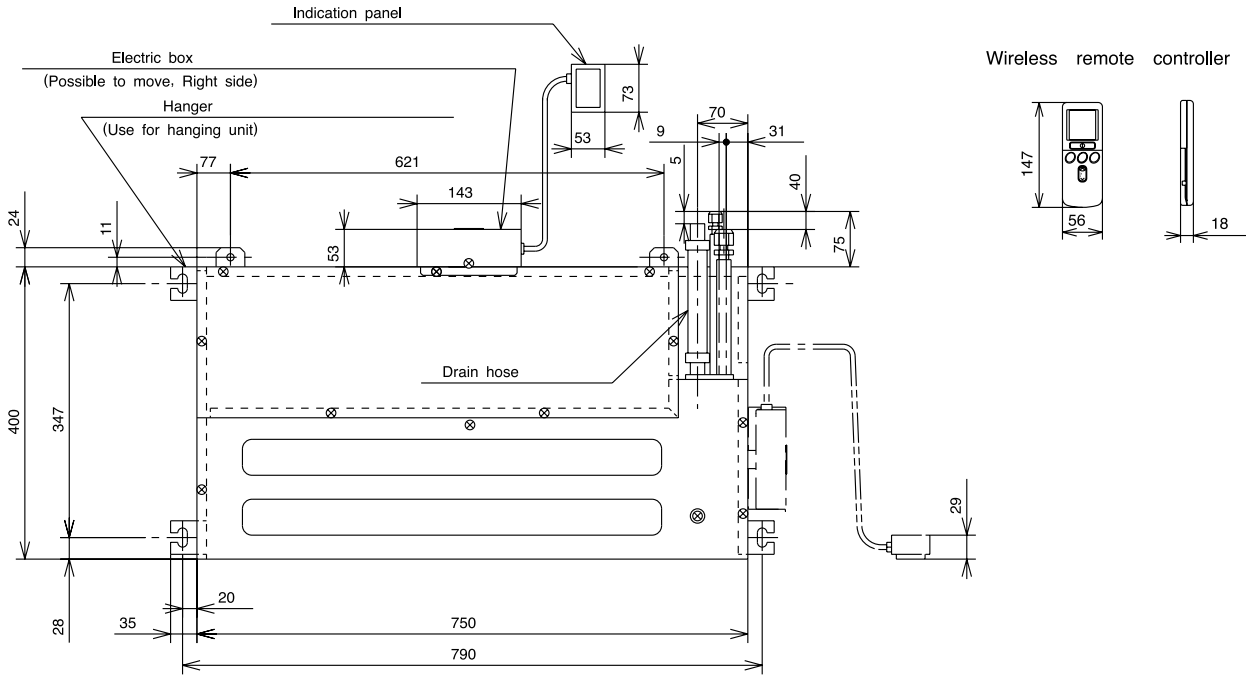
Unit: mm

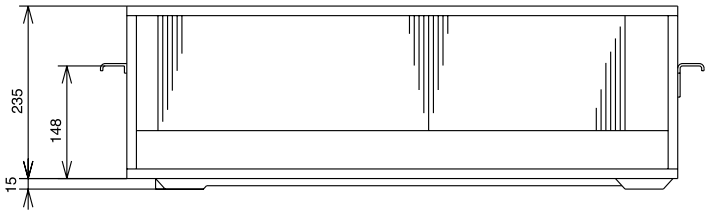


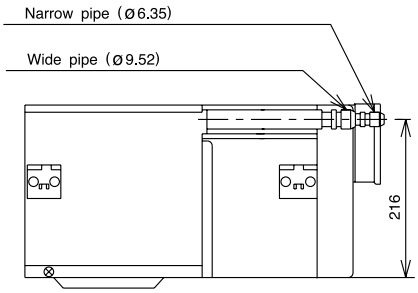
Cautions:

1. Use insulated pipes for both large and small diameters.
2. Make sure the difference in heights between the indoor and outdoor units is 10m.
3. For built-in installation, make sure that the infrared receiver and indicator are not blocked.
4. Pipes can be laid out from the right, bottom or rear, when the unit is viewed from front.
5. Keep the clearance shown by ⟺ for installation.
6. For built-in installation, keep the vertical deflector at the top air outlet as flat as possible.
   If it is inclined too much, heat will be trapped in the unit, which could cause faulty room temperature.
7. An connection cable 1.6mm or 2.0mm dia.X2 (control side) is used for the connection cable.
   RAF-25NH5, RAF-35NH5 → ø9.52, RAF-50NH5 → ø12.7

Unit : mm





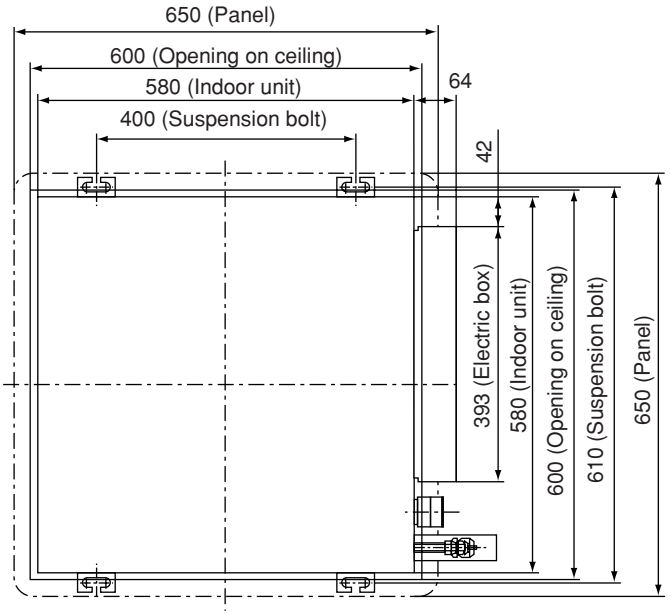


Cautions:

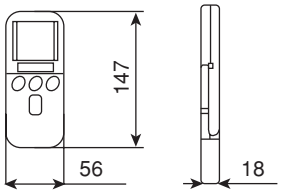
1. Use insulated pipes for both large and small diameters.
2. An connection cable.

CONSTRUCTION AND DIMENSIONAL DIAGRAM

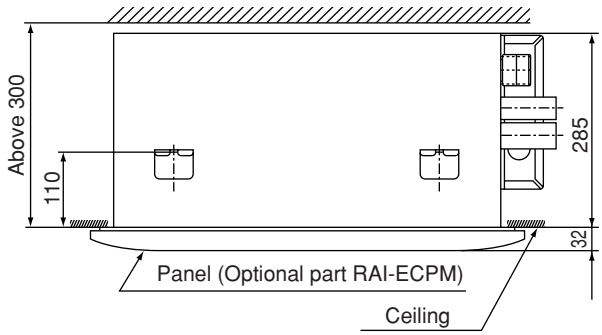
MODEL RAI-25NH5, RAI-35NH5, RAI-50NH5

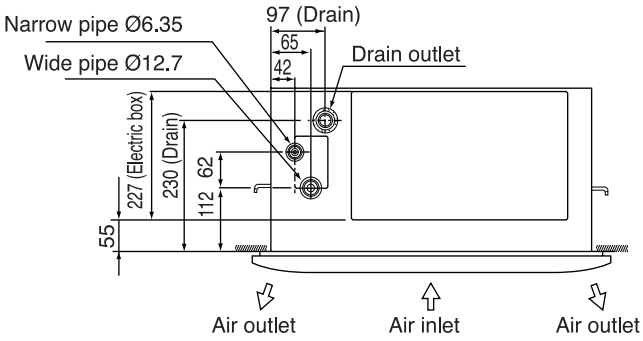


Unit : mm



Wireless remote controller





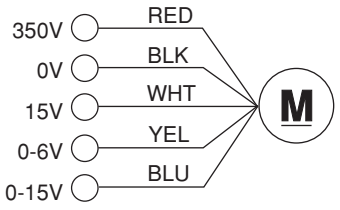
Note:

1. Insulated pipes should be used for both the narrow and wide dia. pipes.
2. Piping length is within 20m.
3. Height difference of the piping between the indoor unit and the outdoor unit should be within 10m.
4. An F-cable 1.6mm or 2.0mm dia. X 3 (control side) is used for the connection cable.

MAIN PARTS COMPONENT

FAN MOTOR

Fan Motor Specifications

MODEL		RAM-72QH5
POWER SOURCE		DC : 350V
OUTPUT		80W
CONNECTION		 (Control circuit built in)
RESISTANCE VALUE (Ω)	20˚C (68˚F)	—
	75˚C (167˚F)	—

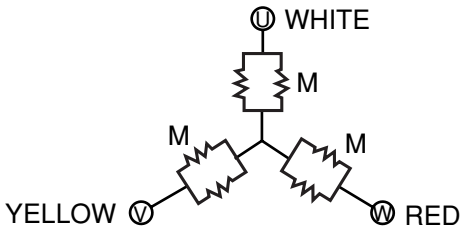
BLU : BLUE　YEL : YELLOW　BRN : BROWN　WHT : WHITE

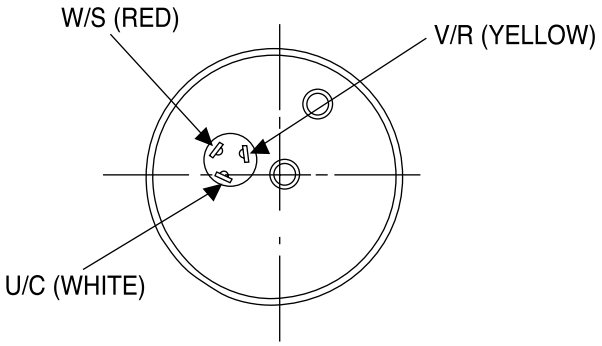
GRY : GRAY　ORN : ORANGE　GRN : GREEN　RED : RED

BLK : BLACK　PNK : PINK　VIO : VIOLET

COMPRESSOR MOTOR

Compressor Motor Specifications

MODEL		RAM-72QH5
COMPRESSOR MODEL		JU1015D2
PHASE		SINGLE
RATED VOLTAGE		AC 220 ~ 240 V
RATED FREQUENCY		50 Hz
POLE NUMBER		4
CONNECTION		
RESISTANCE VALUE (Ω)	20°C (68°F)	2M = 1.05
	75°C (167°F)	2M = 1.268



MAIN PARTS COMPONENT

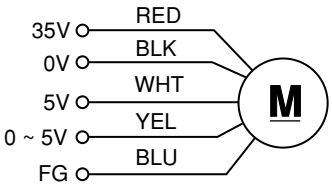
THERMOSTAT

Thermostat Specifications

MODEL			RAK-18NH5, RAK-25NH5, RAK-35NH5, RAK-50NH5	
THERMOSTAT MODEL			IC	
OPERATION MODE			COOL	HEAT
TEMPERATURE °C (°F)	INDICATION 16	ON	16.7 (62.1)	20.0 (68.0)
		OFF	16.0 (60.8)	20.7 (69.3)
	INDICATION 24	ON	24.7 (76.5)	28.0 (82.4)
		OFF	24.0 (75.2)	28.7 (83.7)
	INDICATION 32	ON	32.7 (90.9)	36.0 (96.8)
		OFF	32.0 (89.6)	36.7 (98.1)

FAN MOTOR

Fan Motor Specifications

MODEL	RAK-18NH5, RAK-25NH5, RAK-35NH5, RAK-50NH5
POWER SOURCE	DC: 5V, 35V
OUTPUT	25W
CONNECTION	 (Control circuit built in)

BLU : BLUE YEL : YELLOW BRN : BROWN WHT : WHITE

GRY : GRAY ORN : ORANGE GRN : GREEN RED : RED

BLK : BLACK PNK : PINK VIO : VIOLET

MAIN PARTS COMPONENT

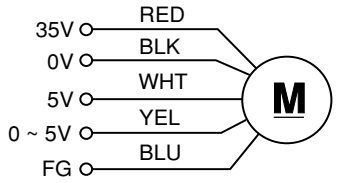
THERMOSTAT

Thermostat Specifications

MODEL			RAK-65NH5	
THERMOSTAT MODEL			IC	
OPERATION MODE			COOL	HEAT
TEMPERATURE °C (°F)	INDICATION 16	ON	15.6 (60.1)	20.0 (68.0)
		OFF	15.3 (59.5)	20.7 (69.3)
	INDICATION 24	ON	23.6 (74.5)	28.0 (82.4)
		OFF	23.3 (73.9)	28.7 83.7)
	INDICATION 32	ON	31.6 (88.9)	36.0 (96.8)
		OFF	31.3 (88.3)	36.7 (98.1)

FAN MOTOR

Fan Motor Specifications

MODEL	RAK-65NH5
POWER SOURCE	DC: 0 ~ 35V
OUTPUT	20W
CONNECTION	 (Control circuit built in)

BLU : BLUE YEL : YELLOW BRN : BROWN WHT : WHITE

GRY : GRAY ORN : ORANGE GRN : GREEN RED : RED

BLK : BLACK PNK : PINK VIO : VIOLET

MAIN PARTS COMPONENT

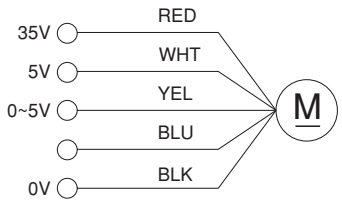
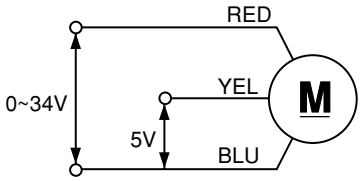
THERMOSTAT

Thermostat Specifications

MODEL			RAF-25NH5, RAF-35NH5, RAF-50NH5		RAD-25NH5, RAD-35NH5	
THERMOSTAT MODEL			IC			
OPERATION MODE			COOL	HEAT	COOL	HEAT
TEMPERATURE °C (°F)	INDICATION 16	ON	15.7 (60.3)	19.0 (66.2)	14.9 (59.3)	20.4 (68.8)
		OFF	15.0 (59.0)	19.7 (67.5)	14.3 (58.3)	21.0 (69.1)
	INDICATION 24	ON	23.7 (74.7)	27.0 (80.6)	22.9 (43.7)	28.4 (83.1)
		OFF	23.0 (73.4)	27.7 (81.9)	22.3 (72.7)	29.0 (84.1)
	INDICATION 32	ON	31.7 (89.1)	35.0 (95.0)	30.9 (88.1)	36.4 (97.7)
		OFF	31.0 (87.8)	35.7 (96.3)	30.3 (87.1)	37.0 (98.8)

FAN MOTOR

Fan Motor Specifications

MODEL	RAF-25NH5, RAF-35NH5, RAF-50NH5	RAD-25NH5, RAD-35NH5
POWER SOURCE	DC: 5V, DC: 0 - 35V	DC : 0 - 300V
OUTPUT	20W (MAX40)	50W
CONNECTION	 (Control circuit built in)	

BLU : BLUE YEL : YELLOW BRN : BROWN WHT : WHITE

GRY : GRAY ORN : ORANGE GRN : GREEN RED : RED

BLK : BLACK PNK : PINK VIO : VIOLET

MAIN PARTS COMPONENT

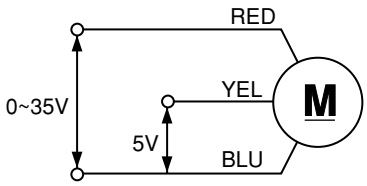
THERMOSTAT

Thermostat Specifications

THERMOSTAT MODEL			IC			
OPERATION MODE			COOL			HEAT
MODEL			RAI-25NH5	RAI-35NH5	RAI-50NH5	RAI-25NH5, RAI-35NH5, RAI-50NH5
TEMPERATURE °C (°F)	INDICATION 16	ON	15.0 (59.0)	13.0 (55.4)	13.0 (55.4)	20.0 (68.0)
		OFF	14.7 (58.5)	12.7 (54.9)	12.7 (54.9)	20.3 (68.5)
	INDICATION 24	ON	23.0 (73.4)	21.0 (69.8)	21.0 (69.8)	28.0 (82.4)
		OFF	22.7 (72.9)	20.7 (69.3)	20.7 (69.3)	28.3 (82.9)
	INDICATION 32	ON	31.0 (87.8)	29.0 (84.2)	29.0 (84.2)	36.0 (96.8)
		OFF	30.7 (87.3)	28.7 (83.7)	28.7 (83.7)	36.3 (97.9)

FAN MOTOR

Fan Motor Specifications

MODEL	RAI-25NH5, RAI-35NH5, RAI-50NH5
POWER SOURCE	DC: 0 ~ 35V
OUTPUT	25W
CONNECTION	 (Control circuit built in)

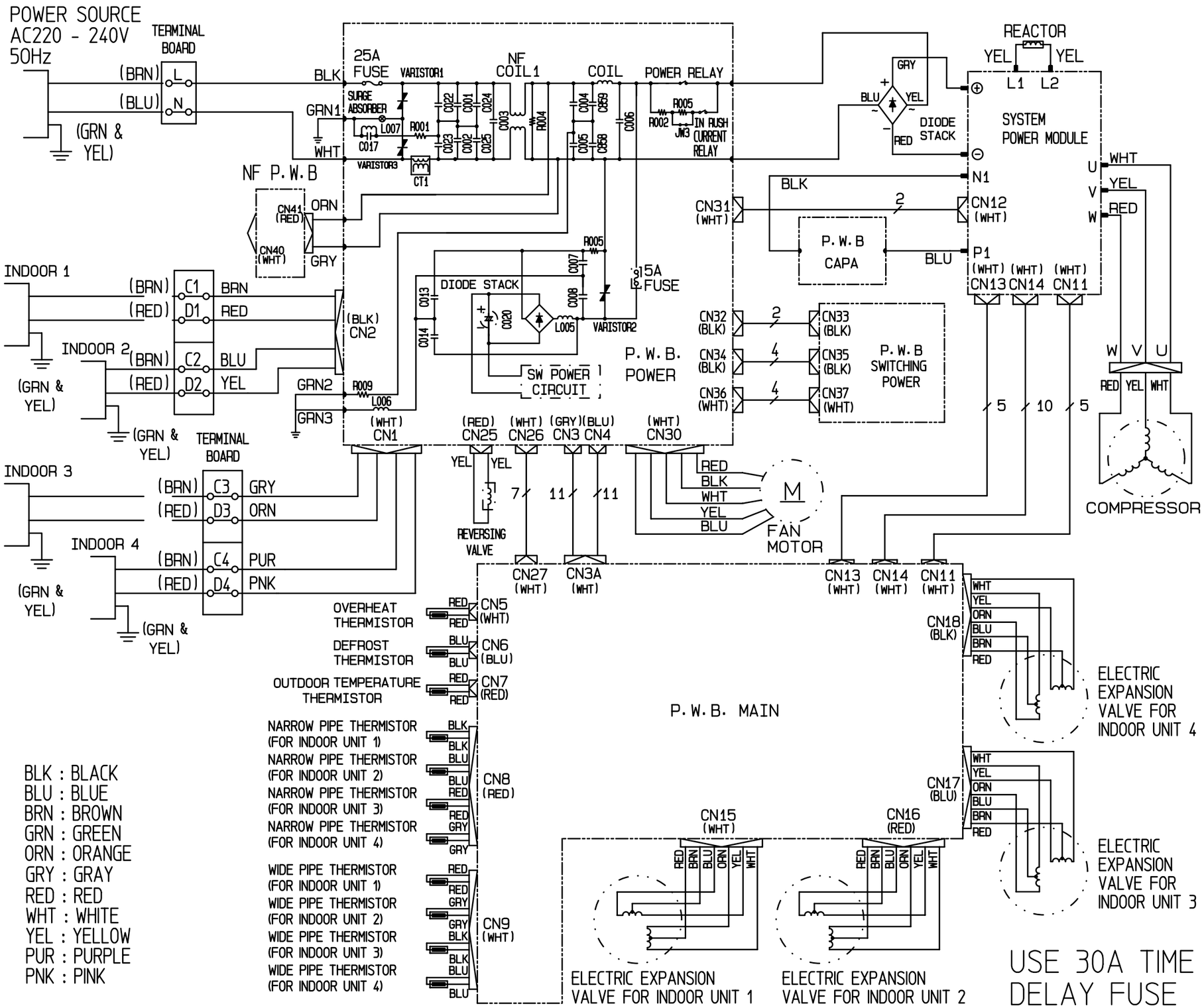
BLU : BLUE YEL : YELLOW BRN : BROWN WHT : WHITE

GRY : GRAY ORN : ORANGE GRN : GREEN RED : RED

BLK : BLACK PNK : PINK VIO : VIOLET

WIRING DIAGRAM

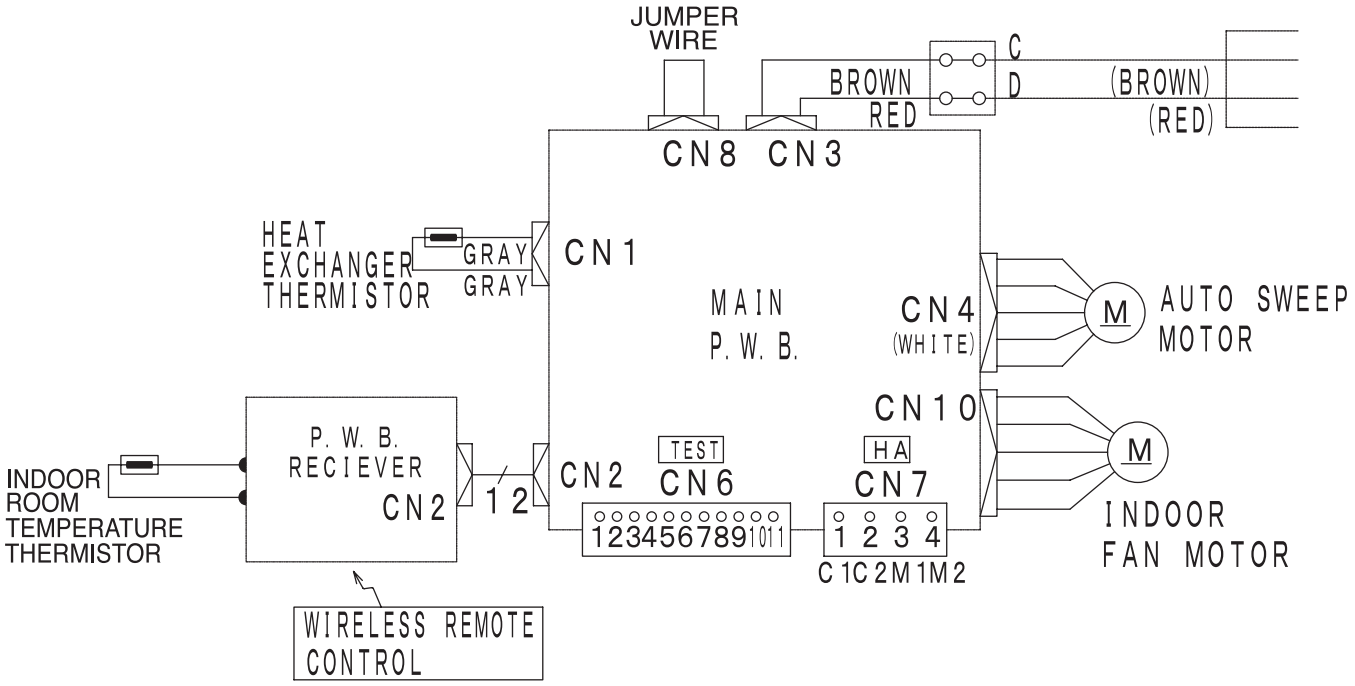
MODEL RAM-72QH5



WIRING DIAGRAM

MODEL RAK-18NH5, RAK-25NH5, RAK-35NH5, RAK-50NH5

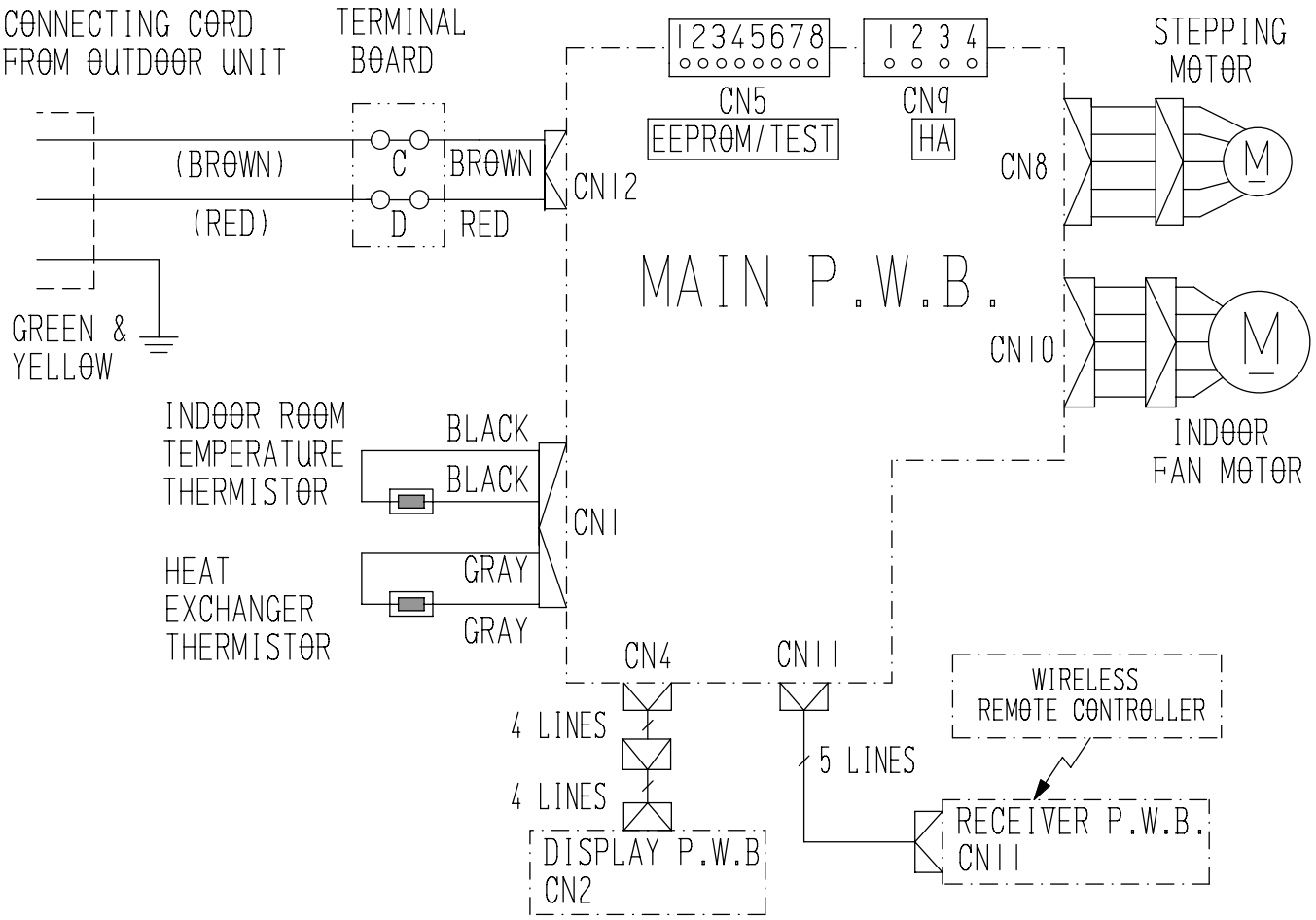
INDOOR UNIT



WIRING DIAGRAM

MODEL RAK-65NH5

INDOOR UNIT

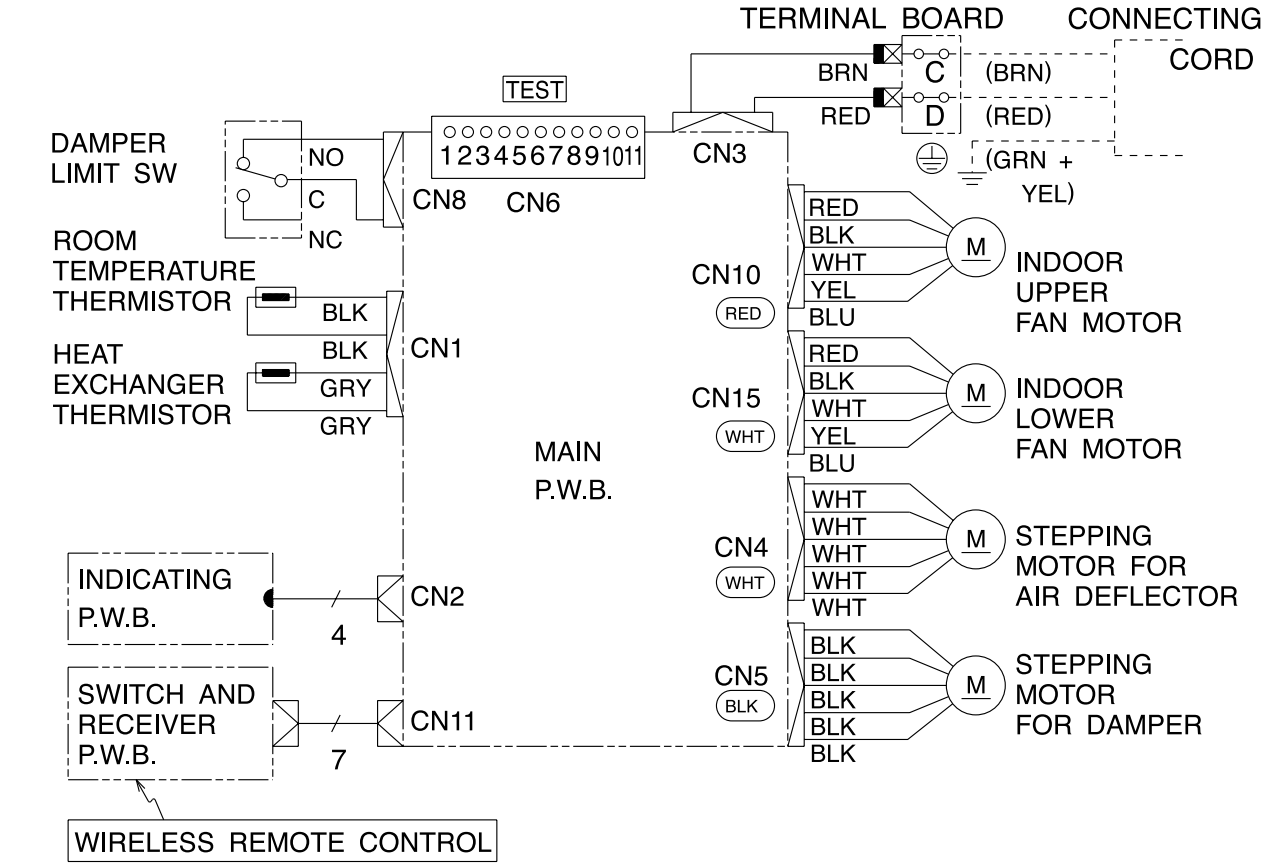


WIRING DIAGRAM

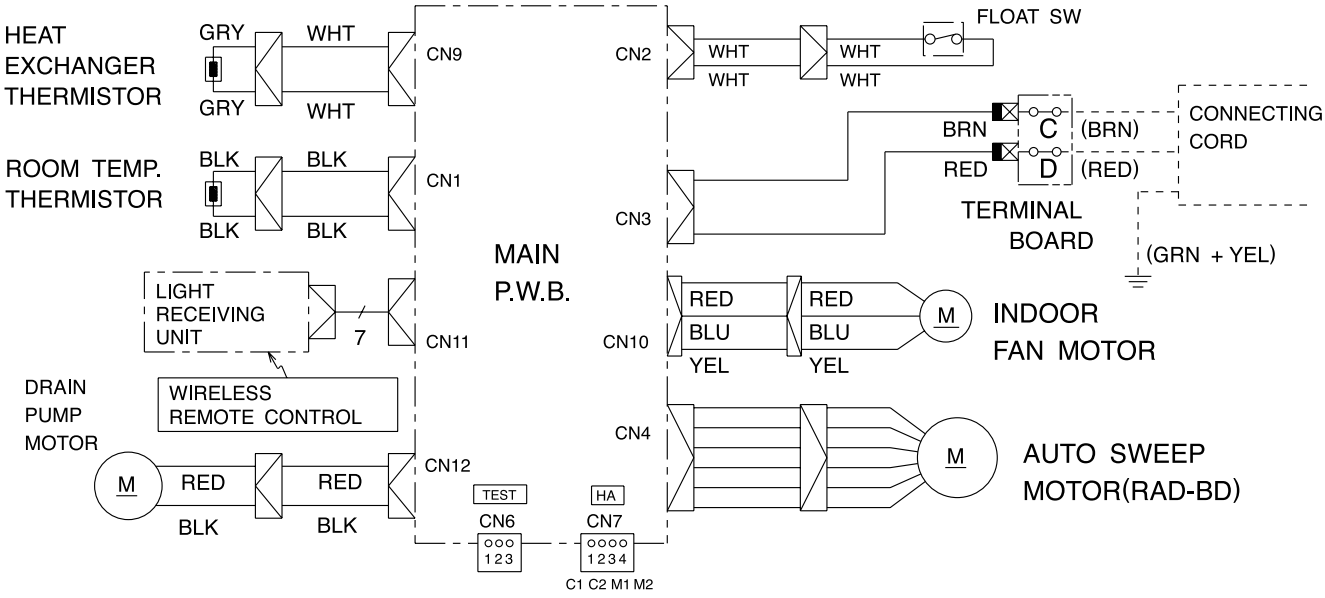
INDOOR UNIT

BLU	: BLUE	YEL	: YELLOW	BRN	: BROWN	WHT	: WHITE
GRY	: GRAY	ORN	: ORANGE	GRN	: GREEN	RED	: RED
BLK	: BLACK	PNK	: PINK	VIO	: VIOLET		

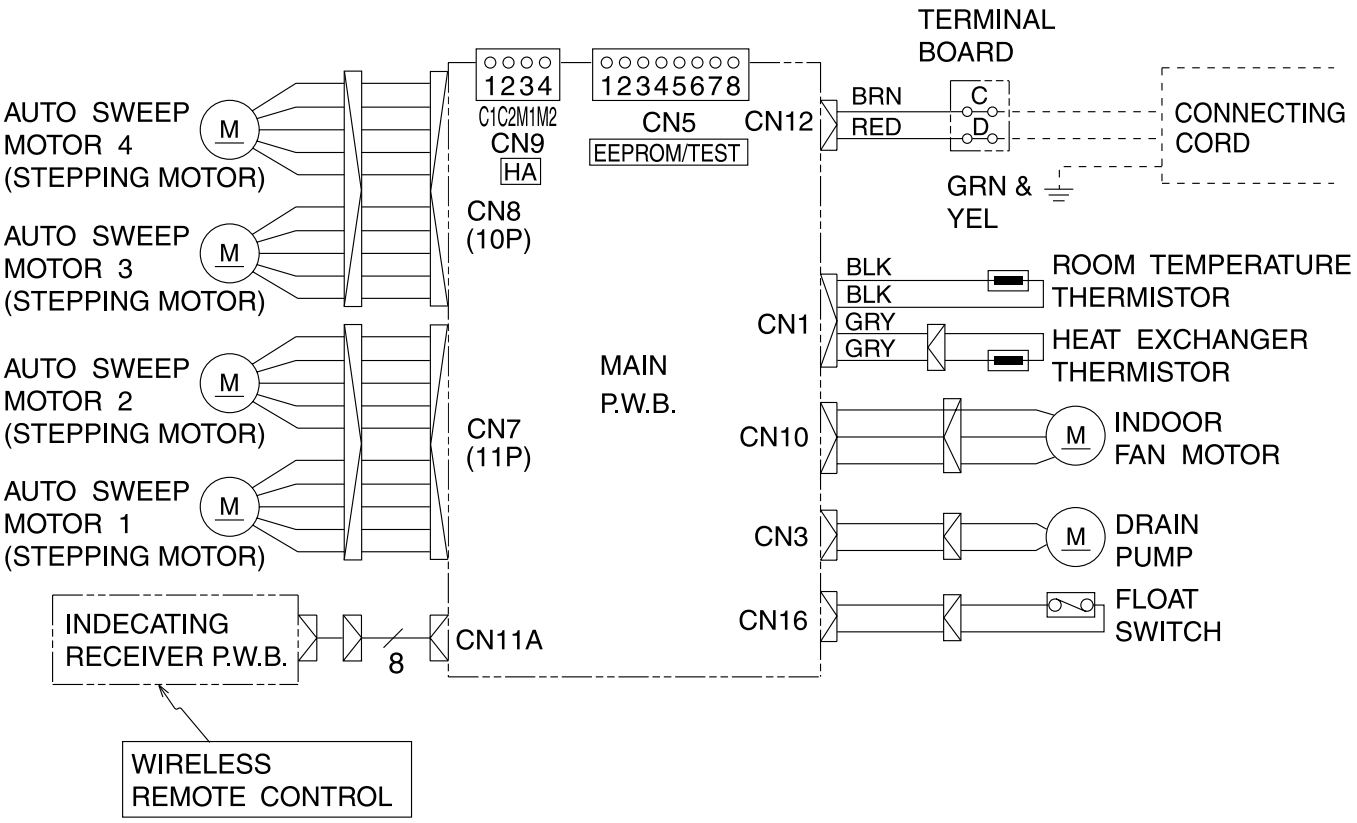
MODEL RAF-25NH5, 35NH5, 50NH5



MODEL RAD-25NH5, 35NH5



INDOOR UNIT

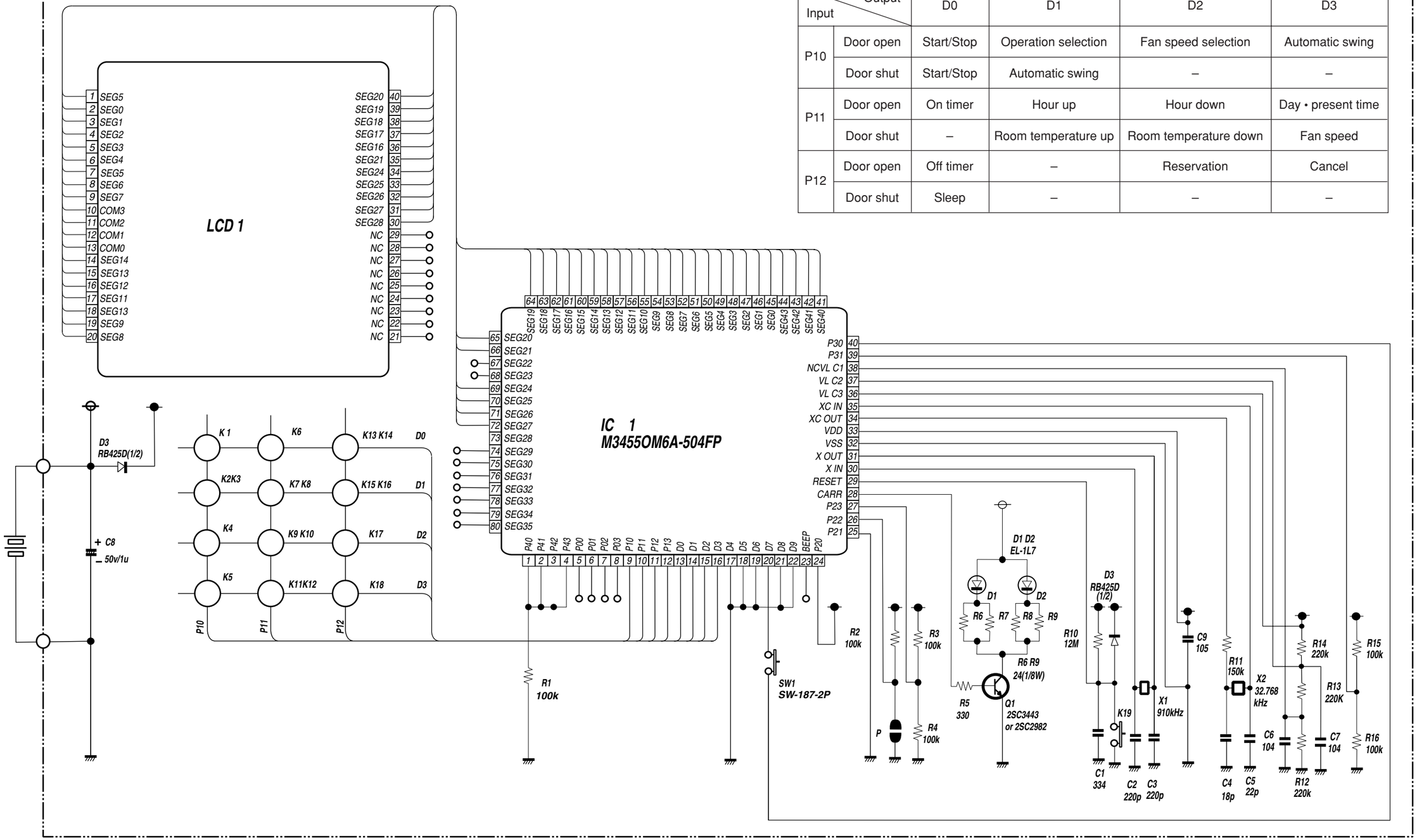


CIRCUIT DIAGRAM

Remote Control

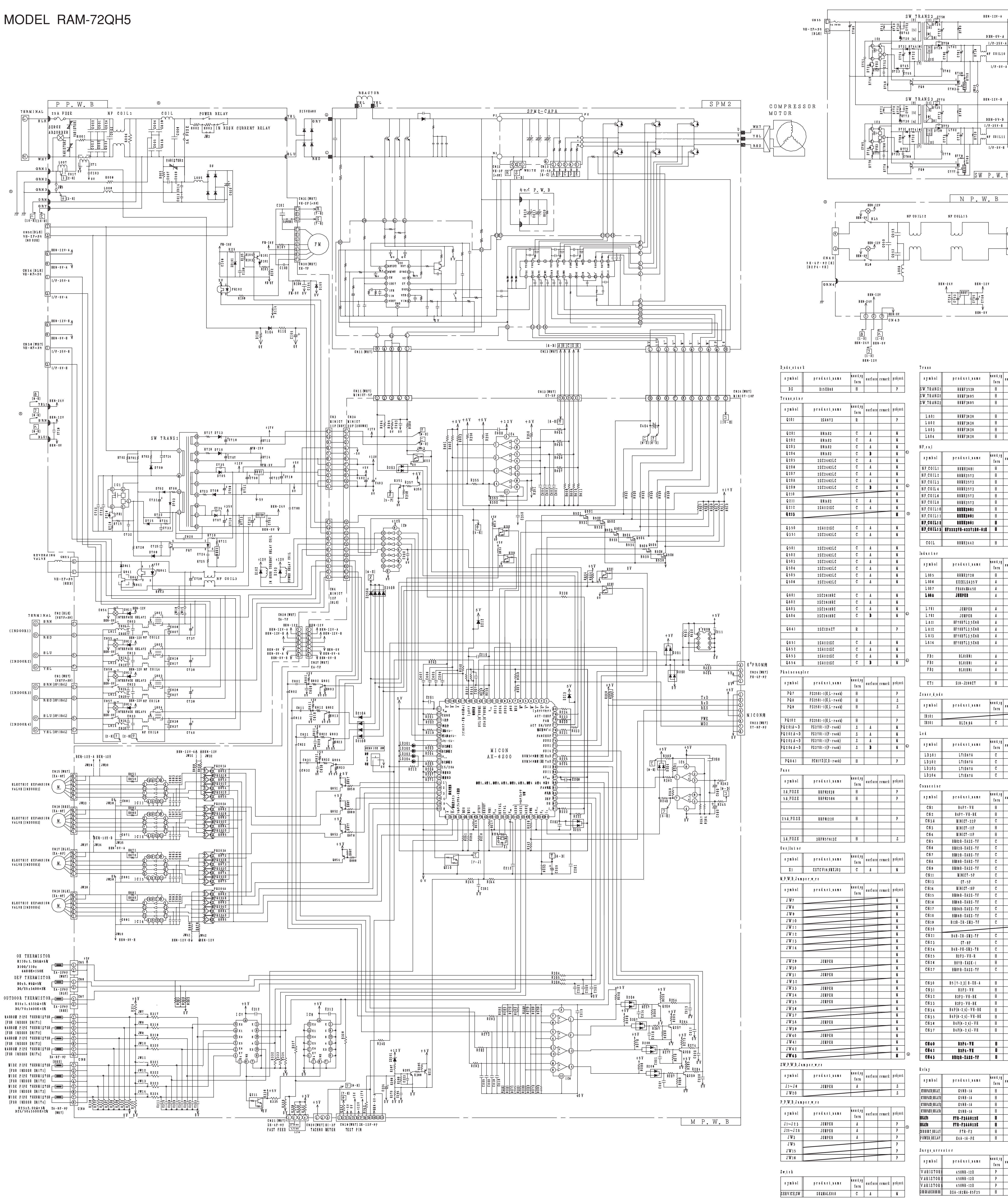
Key matrix table

Input \ Output		D0	D1	D2	D3
P10	Door open	Start/Stop	Operation selection	Fan speed selection	Automatic swing
	Door shut	Start/Stop	Automatic swing	–	–
P11	Door open	On timer	Hour up	Hour down	Day • present time
	Door shut	–	Room temperature up	Room temperature down	Fan speed
P12	Door open	Off timer	–	Reservation	Cancel
	Door shut	Sleep	–	–	–



CIRCUIT DIAGRAM

MODEL RAM-72QH5



PCB_SET
N ..N.P.W.B
P ..P.P.W.B
S ..SW.P.W.B
C ..キャパ.P.W.B
N ..N.P.W.B

Surface
A ..Parts side
B ..Solder side

Mounting form
A ..Axial insertion
R ..Radial insertion
P ..Radial insertion (7.5mm pitch)
H ..Hand insertion
C ..Chip surface mounting
S ..In addition surface mounting

Diode stack

symbol	product_name	mounting form	surface	remark	pcb_set
DS	D15XB60	H			P

Transistor

symbol	product_name	mounting form	surface	remark	pcb_set
Q101	2SA673	R			P
Q201	RN1402	C	A		M
Q202	RN1402	C	A		M
Q203	RN1402	C	A		M
Q204	RN1402	C	B		M ①
Q205	2SC2462LC	C	A		M
Q206	2SC2462LC	C	A		M
Q207	2SC2462LC	C	A		M
Q208	2SC2462LC	C	A		M
Q209	2SC2462LC	C	B		M ①
Q210					M
Q211	RN1402	C	A		M
Q212	2SA1121SC	C	A		M
Q213					M ①
Q350	2SA1121SC	C	A		M
Q351	2SC2462LC	C	A		M
Q501	2SC2462LC	C	A		M
Q502	2SC2462LC	C	A		M
Q503	2SC2462LC	C	A		M
Q504	2SC2462LC	C	A		M
Q505	2SC2462LC	C	A		M
Q506	2SC2462LC	C	A		M
Q801	2SC2618RC	C	A		M
Q802	2SC2618RC	C	A		M
Q803	2SC2618RC	C	A		M
Q804	2SC2618RC	C	B		M ①
Q841	2SC1214CT	R			P
Q851	2SA1121SC	C	A		M
Q852	2SA1121SC	C	A		M
Q853	2SA1121SC	C	A		M
Q854	2SA1121SC	C	B		M ①

Photocoupler

symbol	product_name	mounting form	surface	remark	pcb_set
PQ7	PS2561-1(K,L-rank)	H			P
PQ8	PS2561-1(K,L-rank)	H			S
PQ9	PS2561-1(K,L-rank)	H			S
PQ102	PS2561-1(K,L-rank)	H			P
PQ201A~D	PS2701-1(P-rank)	S	A		M
PQ202A~D	PS2701-1(P-rank)	S	A		M
PQ203A~D	PS2701-1(P-rank)	S	A		M
PQ204A~D	PS2701-1(P-rank)	S	B		M ①
PQ841	PC817X(C,D-rank)	H			P

Fuse

symbol	product_name	mounting form	surface	remark	pcb_set
2A_FUSE	BRPN2038	H			P
5A_FUSE	BRPN2586	H			P
25A_FUSE	BRPN1221	H			P
3A_FUSE	3BPN57613C	H			S

Oscillator

symbol	product_name	mounting form	surface	remark	pcb_set
X1	CSTCV16.0MXJ03	C	A		M

M.P.W.B Jumper wire

symbol	product_name	mounting form	surface	remark	pcb_set
JW7					M
JW8					M
JW9					M
JW10					M
JW11					M
JW12					M
JW13					M
JW14					M
					M
JW29	JUMPER				M
JW30					M
JW31	JUMPER				M
JW32					M
JW33	JUMPER				M
JW34	JUMPER				M
JW35	JUMPER				M
JW36					M
JW37					M
JW38	JUMPER				M
JW39					M
JW40	JUMPER				M
JW41	JUMPER				M
JW42					M
JW43					M ①

SW.P.W.B Jumper wire

symbol	product_name	mounting form	surface	remark	pcb_set
J1~J4	JUMPER	A			S
JW20					S

P.P.W.B Jumper wire

symbol	product_name	mounting form	surface	remark	pcb_set
J1~J23	JUMPER	A			P ①
J25~J28	JUMPER	A			P
JW3	JUMPER	A			P
JW5					P
JW15					P
JW16					P

Switch

symbol	product_name	mounting form	surface	remark	pcb_set
SERVICE_SW	SKQMALE010	C	A		M

Trans

symbol	product_name	mounting form	surface	remark	pcb_set
SW_TRANS1	RRMF3528	H			P
SW_TRANS2	RRMF3605	H			S
SW_TRANS3	RRMF3605	H			S
L801	RRMF3636	H			P
L802	RRMF3636	H			P
L803	RRMF3636	H			P
L804	RRMF3636	H			P

NF coil

symbol	product_name	mounting form	surface	remark	pcb_set
NF_COIL1	RRMH3681	H			P
NF_COIL2	RRMH3573	H			P
NF_COIL3	RRMH3573	H			P
NF_COIL4	RRMH3573	H			P
NF_COIL6	RRMH3573	H			P
NF_COIL8	RRMH3573	H			P
NF_COIL10	RRMH3001	H			S ①
NF_COIL11	RRMH3001	H			S ①
NF_COIL12	RRMH3001	H			N ①
NF_COIL13	HF2223VB-022Y1R0-01H	H			N ①
COIL	RRMH3442	H			P

Inductor

symbol	product_name	mounting form	surface	remark	pcb_set
L005	RRMH3728	H			P
L006	EXCELSA35V	A			P
L007	FBA04HA450	A			P
L008	JUMPER	A			N ①
L701	JUMPER	A			S
L702	JUMPER	A			S
L811	HF70BTL3.5X6R	A			P
L812	HF70BTL3.5X6R	A			P
L813	HF70BTL3.5X6R	A			P
L814	HF70BTL3.5X6R	A			P
FB1	BL01RN1	A			P
FB2	BL01RN1	A			S
FB3	BL01RN1	A			S
CT1	S10-J209CT	H			P

Zener diode

symbol	product_name	mounting form	surface	remark	pcb_set
ZD101					P
ZD201	RLZ6.8A	C	A		M

Led

symbol	product_name	mounting form	surface	remark	pcb_set
LD301	LT1D67A	C	A	RED	M
LD302	LT1D67A	C	A	RED	M
LD303	LT1D67A	C	A	RED	M
LD304	LT1K67A	C	A	GREEN	M

Connector

symbol	product_name	mounting form	surface	remark	pcb_set
CN1	B4P7-VH	H		WHITE	P
CN2	B4P7-VH-BK	H		BLACK	P
CN3A	MINICT-22P	C	A	2ROWS	M
CN3	MINICT-11P	H		GRAY	P
CN4	MINICT-11P	H		BLUE	P
CN5	BM02B-XASS-TF	C	A	WHITE	M
CN6	BM02B-XARS-TF	C	A	BLUE	M
CN7	BM02B-XARS-TF	C	A	RED	M
CN8	BM08B-XARS-TF	C	A	RED	M
CN9	BM08B-XASS-TF	C	A	WHITE	M
CN11	MINICT-5P	C	A	WHITE	M
CN13	CT-5P	C	A	WHITE	M
CN14	MINICT-10P	C	A	WHITE	M
CN15	BM06B-XASS-TF	C	A	WHITE	M
CN16	BM06B-XARS-TF	C	A	RED	M
CN17	BM06B-XAES-TF	C	A	BLUE	M
CN18	BM06B-XAKS-TF	C	A	BLACK	M
CN19	B12B-ZR-SM3-TF	C	A	WHITE	M
CN20					M
CN21	B4B-ZR-SM3-TF	C	A	WHITE	M
CN23	CT-8P	C	A	WHITE	M
CN24	B4B-PH-SM3-TB	C	A	WHITE	M
CN25	B2P3-VH-R	H		RED	P
CN26	B07B-XASK-1	H		WHITE	P
CN27	BM07B-XASS-TF	C	A	WHITE	M
CN30	B5(7-2,3)B-XH-A	H		WHITE	P
CN31	B2P3-VH	H		WHITE	P
CN32	B2P3-VH-BK	H		BLACK	P
CN33	B2P3-VH-BK	H		BLACK	S
CN34	B4P(6-2,4)-VH-BK	H		BLACK	P
CN35	B4P(6-2,4)-VH-BK	H		BLACK	S
CN36	B4P(6-2,4)-VH	H		WHITE	P
CN37	B4P(6-2,4)-VH	H		WHITE	S
CN40	B2P4-VH	H	A	WHITE	N ①
CN41	B2P4-VH	H	A	RED	N ①
CN43	BM03B-XASS-TF	H	A	WHITE	N ①

Relay

symbol	product_name	mounting form	surface	remark	pcb_set
INTERFACE_RELAY1	G5NB-1A	H			P
INTERFACE_RELAY2	G5NB-1A	H			P
INTERFACE_RELAY3	G5NB-1A	H			P
INTERFACE_RELAY4	G5NB-1A	H			P
RELAY5	FTR-F3AA012E	H			N ①
RELAY6	FTR-F3AA012E	H			N ①
IN RUSH CURRENT_RELAY	FTR-F3	H			P
POWER_RELAY	G4A-1A-PE	H			P

Surge arrester

symbol	product_name	mounting form	surface	remark	pcb_set
VARISTOR1	450NR-12D	P			P
VARISTOR2	450NR-12D	P			P
VARISTOR3	450NR-12D	P			P
SURGE ABSORBER	DSA-102MA-05F25	H			P

Resistor

symbol	resistance (Ω)	tolerance	power rating (W)	mounting form	surface	remark	pcb_set
R001	JUMPER			A			P
R002	100	5%	10	H			P
R003							P
R004	470k	5%	1/2	A		RCR	P
R005	2.2	5%	5	H			P
R009	JUMPER						P
R010	470k	5%	1/2	A		RCR	C
R101	3.6k	1%	1/6	A			P
R102	3k	1%	1/6	A			P
R103	30k	5%	1/6	A			P
R104	3.9k	5%	1/6	A			P
R105	7.5k	5%	1/6	A			P
R106	2.4k	5%	1/6	A			P
R107	6.11	1%	2	P			P ①
R108	1k	1%	1/6	A			P
R109	510	1%	1/6	A			P
R110	1.69k	1%	1/6	A			P
R114	1k	5%	1/6	A			P
R115	JUMPER			A			P
R201	10k	5%	1/16	C	A	1608	M
R202	10k	5%	1/16	C	A	1608	M
R203	2k	5%	1/16	C	A	1608	M
R204	2k	5%	1/16	C	A	1608	M
R205	2k	5%	1/16	C	A	1608	M
R206	10k	5%	1/16	C	A	1608	M
R207	10k	5%	1/16	C	A	1608	M
R212	2k	5%	1/16	C	A	1608	M
R215	10k	5%	1/16	C	A	1608	M
R216	10k	5%	1/16	C	A	1608	M
R217	10k	5%	1/16	C	A	1608	M
R219	10k	5%	1/16	C	A	1608	M
R220	1M	5%	1/16	C	A	1608	M
R221	10k	1%	1/16	C	A	1608	M
R222	510	5%	1/16	C	A	1608	M
R223	100	5%	1/16	C	A	1608	M
R224	100	5%	1/16	C	A	1608	M
R225	100	5%	1/16	C	A	1608	M
R228	100	5%	1/16	C	A	1608	M
R229	10k	5%	1/16	C	A	1608	M
R230	10k	5%	1/16	C	A	1608	M
R231	10k	5%	1/16	C	A	1608	M
R232	10k	5%	1/16	C	A	1608	M
R233	10k	5%	1/16	C	A	1608	M ①
R234	10k	5%	1/16	C	A	1608	M
R237	5.1k	5%	1/16	C	A	1608	M
R238	100	5%	1/16	C	A	1608	M
R239	100	5%	1/16	C	A	1608	M
R240	1k	5%	1/16	C	A	1608	M
R243	100	5%	1/16	C	A	1608	M
R244	2k	5%	1/16	C	A	1608	M
R245	5.1k	5%	1/16	C	A	1608	M
R246	10k	5%	1/16	C	A	1608	M
R247	1.43k	1%	1/16	C	A	1608	M
R248	1k	5%	1/16	C	A	1608	M
R249	20k	1%	1/16	C	A	1608	M
R250	10k	5%	1/16	C	A	1608	M
R251	10k	5%	1/16	C	A	1608	M
R253	3.32k	1%	1/16	C	A	1608	M
R254	100	5%	1/16	C	A	1608	M
R255	2k	5%	1/16	C	A	1608	M
R256	10k	5%	1/16	C	A	1608	M
R257	3k	5%	1/16	C	A	1608	M
R258	1k	5%	1/16	C	A	1608	M
R259	8.25k	1%	1/16	C	A	1608	M
R260	10k	1%	1/16	C	A	1608	M
R261	10k	1%	1/16	C	A	1608	M
R262	10k	1%	1/16	C	A	1608	M
R263	470	5%	1/16	C	A	1608	M ①
R264	100	5%	1/16	C	A	1608	M
R265	2k	5%	1/16	C	A	1608	M
R266	10k	5%	1/16	C	A	1608	M
R267	3k	5%	1/16	C	A	1608	M
R268	1k	5%	1/16	C	A	1608	M
R269	8.25k	1%	1/16	C	A	1608	M
R270	10k	1%	1/16	C	A	1608	M
R271	10k	1%	1/16	C	A	1608	M
R272	10k	1%	1/16	C	A	1608	M
R273	470	5%	1/16	C	A	1608	M ①
R274	100	5%	1/16	C	A	1608	M
R275	2k	5%	1/16	C	A	1608	M
R276	10k	5%	1/16	C	A	1608	M
R277	3k	5%	1/16	C	A	1608	M
R278	1k	5%	1/16	C	A	1608	M
R279	8.25k	1%	1/16	C	A	1608	M
R280	10k	1%	1/16	C	A	1608	M
R281	10k	1%	1/16	C	A	1608	M
R282	10k	1%	1/16	C	A	1608	M
R283	470	5%	1/16	C	A	1608	M ①
R284	100	5%	1/16	C	B	1608	M ①
R285	2k	5%	1/16	C	B	1608	M ①
R286	10k	5%	1/16	C	B	1608	M ①
R287	3k	5%	1/16	C	B	1608	M ①
R288	1k	5%	1/16	C	B	1608	M ①
R289	8.25k	1%	1/16	C	B	1608	M ①
R290	10k	1%	1/16	C	B	1608	M ①
R291	10k	1%	1/16	C	B	1608	M ①
R292	10k	1%	1/16	C	B	1608	M ①
R293	470	5%	1/16	C	B	1608	M ①
R294	18k	5%	1/16	C	A	1608	M
R295	910	1%	1/16	C	A	1608	M
R296							M ①
R301	3.74k	1%	1/16	C	A	1608	M
R302	3.01k	1%	1/16	C	A	1608	M
R303	3.01k	1%	1/16	C	A	1608	M
R304	100	5%	1/16	C	A	1608	M
R305	100	5%	1/16	C	A	1608	M
R306	100	5%	1/16	C	A	1608	M
R307	2k	1%	1/16	C	A	1608	M ①
R308	2k	1%	1/16	C	A	1608	M ①
R309	2k	1%	1/16	C	A	1608	M ①
R310	2k	1%	1/16	C	A	1608	M ①
R311	2k	1%	1/16	C	A	1608	M ①
R312	2k	1%	1/16	C	A	1608	M ①
R313	2k	1%	1/16	C	A	1608	M ①
R314							M
R315							M
R316	2k	1%	1/16	C	A	1608	M ①
R317	1k	5%	1/16	C	A	1608	M
R318	1k	5%	1/16	C	A	1608	M
R319	1k	5%	1/16	C	A	1608	M
R320	1k	5%	1/16	C	A	1608	M
R321	1k	5%	1/16	C	A	1608	M
R322	1k	5%	1/16	C	A	1608	M
R323	1k	5%	1/16	C	A	1608	M
R324	1k	5%	1/16	C	A	1608	M
R326							M
R327	1k	5%	1/16	C	A	1608	M
R328	2.7k	5%	1/16	C	A	1608	M
R329	470	5%	1/16	C	A	1608	M
R330	1.6k	5%	1/16	C	A	1608	M
R331	4.3k	5%	1/16	C	A	1608	M
R332	10k	5%	1/16	C	A	1608	M
R333	10k	5%	1/16	C	A	1608	M
R334	10k	5%	1/16	C	A	1608	M
R335	100	5%	1/16	C	A	1608	M
R336	2k	5%	1/16	C	A	1608	M
R338	0	5%	1/16	C	A	1608	M
R340	100	5%	1/16	C	A	1608	M
R341	100	5%	1/16	C	A	1608	M
R342	100	5%	1/16	C	A	1608	M
R343	10k	5%	1/16	C	A	1608	M
R344	100	5%	1/16	C	A	1608	M
R345	5.1k	5%	1/16	C	A	1608	M
R350	120k	1%	1/16	C	A	1608	M
R351	120k	1%	1/16	C	A	1608	M
R352	120k	1%	1/16	C	A	1608	M
R353	120k	1%	1/16	C	A	1608	M
R354	4.3k	1%	1/16	C	A	1608	M ①
R355	4.3k	5%	1/16	C	A	1608	M
R356	10k	5%	1/16	C	A	1608	M
R357	2k	5%	1/16	C	A	1608	M
R358	3k	5%	1/16	C	A	1608	M
R360							M
R361	4.99k	1%	1/16	C	A	1608	M
R362	2k	5%	1/16	C	A	1608	M
R363	1k	5%	1/16	C	A	1608	M

Resistor

symbol	resistance (Ω)	tolerance	power rating (W)	mounting form	surface	remark	pcb_set
R364	1k	1%	1/16	C	A	1608	M
R365	10k	5%	1/16	C	A	1608	M
R366	4.7k	5%	1/16	C	A	1608	M
R367	3k	5%	1/16	C	A	1608	M
R368	1.6k	5%	1/16	C	A	1608	M
R369	27k	5%	1/16	C	A	1608	M
R370	5.1k	5%	1/16	C	A	1608	M
R371	10k	5%	1/16	C	A	1608	M
R401	5.1k	5%	1/16	C	A	1608	M
R402	5.1k	5%	1/16	C	A	1608	M
R403	390	5%	1/16	C	A	1608	M
R404	390	5%	1/16	C	A	1608	M
R501	1k	5%	1/16	C	A	1608	M
R502	1k	5%	1/16	C	A	1608	M
R503	1k	5%	1/16	C	A	1608	M
R504	1k	5%	1/16	C	A	1608	M
R505	1k	5%	1/16	C	A	1608	M
R506	1k	5%	1/16	C	A	1608	M
R507	5.1k	5%	1/8	C	A	3216	M
R508	5.1k	5%	1/8	C	A	3216	M
R509	5.1k	5%	1/8	C	A	3216	M
R510	5.1k	5%	1/8	C	A	3216	M
R511	5.1k	5%	1/8	C	A	3216	M
R512	5.1k	5%	1/8	C	A	3216	M
R521	10k	5%	1/16	C	A	1608	M
R522	10k	5%	1/16	C	A	1608	M
R523	10k	5%	1/16	C	A	1608	M
R524	10k	5%	1/16	C	A	1608	M
R525	10k	5%	1/16	C	A	1608	M
R526	10k	5%	1/16	C	A	1608	M
R531	5.1k	5%	1/16	C	A	1608	M
R532	5.1k	5%	1/16	C	A	1608	M
R533	5.1k	5%	1/16	C	A	1608	M
R534	5.1k	5%	1/16	C	A	1608	M
R535	5.1k	5%	1/16	C	A	1608	M
R536	5.1k	5%	1/16	C	A	1608	M
R601	2k	5%	1/16	C	A	1608	M
R602	2k	5%	1/16	C	A	1608	M
R603	2k	5%	1/16	C	A	1608	M
R604	100	5%	1/16	C	A	1608	M
R605	100	5%	1/16	C	A	1608	M
R606	100	5%	1/16	C	A	1608	M
R607	100	5%	1/16	C	A	1608	M
R608	4.02k	1%	1/16	C	A	1608	M
R609	4.02k	1%	1/16	C	A	1608	M
R610	4.02k	1%	1/16	C	A	1608	M
R611	4.02k	1%	1/16	C	A	1608	M
R701	1M	5%	1/2	A		RCR	P
R702	1M	5%	1/2	A		RCR	P
R703	100k	5%	2	P		MOS	P
R708	10	5%	1/4	A			P
R710	1.8k	5%	1/4	A			P
R711	75	5%	1/6	A			P
R712	3.3k	5%	1/4	A			P
R713	8.2k	5%	1	P		MOS	P
R714	3.3k	5%	1/4	A			P
R715	680	5%	1/4	A			P
R716	0.56	5%	1	P		MOSX	P
R717	JUMPER			A			P
R718	8.2	5%	1/4	A			P
R719	8.2k	5%	1	P		MOS	S
R720	8.2k	5%	1	P		MOS	S
R721	10k	5%	1/6	A			P
R722	2.7k	5%	1/4	A			P
R723	33	5%	1/6	A			P
R724	2.7k	5%	1/4	A			P
R725	JUMPER			A			P
R726	3.3k	5%	1/4	A			P
R740	820k	5%	1/2	A		RCR	S
R741	820k	5%	1/2	A		RCR	S
R742	820k	5%	1/4	A			S
R743	47	5%	1/2	A			S
R744	10	2%	1/4	A			S
R745	2k	5%	1/6	A			S
R746	0.33	5%	1	P		MOSX	S
R747	680	5%	1/4	A			S
R748	3.3k	5%	1/4	A			S
R749	4.7k	5%	1/4	A			S
R750	150	5%	1/4	A			S
R760	100k	5%	1/4	A			S
R770	820k	5%	1/2	A		RCR	S
R771	820k	5%	1/2	A		RCR	S
R772	820k	5%	1/4	A			S
R773	47	5%	1/2	A			S
R774	10	2%	1/4	A			S
R775	2k	5%	1/6	A			S
R776	0.33	5%	1	P		MOSX	S
R777	680	5%	1/4	A			S
R778	3.3k	5%	1/4	A			S
R779	4.7k	5%	1/4	A			S
R780	150	5%	1/4	A			S
R790	100k	5%	1/4	A			S
R801	39	5%	1/4	C	A	3225	M
R802	39	5%	1/4	C	A	3225	M
R803	3k	5%	1/16	C	A	1608	M
R804	3k	5%	1/16	C	A	1608	M
R811	39	5%	1/4	C	A	3225	M
R812	39	5%	1/4	C	A	3225	M
R813	3k	5%	1/16	C	A	1608	M
R814	3k	5%	1/16	C	A	1608	M ①
R821	39	5%	1/4	C	A	3225	M
R822	39	5%	1/4	C	A	3225	M
R823	3k	5%	1/16	C	A	1608	M
R824	3k	5%	1/16	C	A	1608	M ①
R831	39	5%	1/4	C	A	3225	M
R832	39	5%	1/4	C	A	3225	M
R833	3k	5%	1/16	C	A	1608	M
R834	3k	5%	1/16	C	B	1608	M ①
R841	10k	5%	1/6	A			P
R842	7.5k	5%	1/2	A			P
R843	620	5%	1/6	A			P
R850	200	5%	1/10	C	A	2125	M
R851	200	5%	1/10	C	A	2125	M
R852	510	5%	1/16	C	A	1608	M
R853	510	5%	1/16	C	A	1608	M
R854	510	5%	1/16	C	A	1608	M
R855	510	5%	1/16	C	A	1608	M
R856	1k	5%	1/10	C	A	2125	M
R857	10k	5%	1/16	C	A	1608	M
R858	3k	5%	1/16	C	A	1608	M
R860	200	5%	1/10	C	A	2125	M
R861	200	5%	1/10	C	A	2125	M
R862	510	5%	1/16	C	A	1608	M
R863	510	5%	1/16	C	A	1608	M
R864	510	5%	1/16	C	A	1608	M
R865	510	5%	1/16	C	A	1608	M
R866	1k	5%	1/10	C	A	2125	M
R867	10k	5%	1/16	C	A	1608	M
R868	3k	5%	1/16	C	A	1608	M
R870	200	5%	1/10	C	A	2125	M
R871	200	5%	1/10	C	A	2125	M
R872	510	5%	1/16	C	A	1608	M
R873	510	5%	1/16	C	A	1608	M
R874	510	5%	1/16	C	A	1608	M
R875	510	5%	1/16	C	A	1608	M
R876	1k	5%	1/10	C	A	2125	M
R877	10k	5%	1/16	C	A	1608	M
R878	3k	5%	1/16	C	A	1608	M
R880	200	5%	1/10	C	B	2125	M ①
R881	200	5%	1/10	C	B	2125	M ①
R882	510	5%	1/16	C	B	1608	M ①
R883	510	5%	1/16	C	B	1608	M ①
R884	510	5%	1/16	C	B	1608	M ①
R885	510	5%	1/16	C	B	1608	M ①
R886	1k	5%	1/10	C	B	2125	M ①
R887	10k	5%	1/16	C	B	1608	M ①
R888	3k	5%	1/16	C	B	1608	M ①

Capacitor

symbol	capacitance (μF)	rated voltage (V)	type	mounting form	surface	remark	temperature characteristic	pcb_set
C001	0.01	AC250	C	P		規格品	F	P
C002	0.01	AC250	C	P		規格品	F	P
C003	0.68	630	F	H		ECQU		P
C004	0.001	AC250	C	P		規格品	F	P ①
C005	0.01	AC250	C	P		規格品	F	P ①
C006	3.3	AC300	F	H		VEA		P
C007	0.01	AC250	C	P		規格品	F	P
C008	0.01	AC250	C	P		規格品	F	P
C010	400	450	D	H				C
C011	400	450	D	H				C
C013	0.01	AC250	C	P		規格品	F	P
C014	0.01	AC250	C	P		規格品	F	P
C017	0.0022	AC250	C	P		規格品	F	P ①
C020	270	450	D	H		SMH		P
C022	0.01	AC250	C	P		規格品	F	P
C023	0.01	AC250	C	P		規格品	F	P
C024	0.01	AC250	C	P		規格品	F	P
C025	0.01	AC250	C	P		規格品	F	P
C050	0.47	AC275	F	H		規格品		H ①
C052	0.01	AC250	C	P		規格品	F	H ①
C053	0.01	AC250	C	P		規格品	F	H ①
C101	0.082	630	F	H		QXJ		P
C102								P
C103	0.1	50	C	R			F	P
C104	1000p	50	C	R				P
C105	100	10	D	R				P
C106								P
C109	0.1	50	C	R			F	P
C201	0.1	25	C	C	A	1608	F	M
C202	2200p	25	C	C	A	1608	B	M
C203	2200p	25	C	C	A	1608	B	M
C205	0.1	50	D	C	A	WX		M
C206	0.1	25	C	C	A	1608	F	M
C207	0.047	50	C	C	A	1608	F	M
C208	0.1	25	C	C	A	1608	F	M
C209	0.1	25	C	C	A	1608	F	M
C210	0.047	50	C	C	A	1608	F	M
C211	0.1	25	C	C	A	1608	F	M
C212	0.1	25	C	C	A	1608	F	M
C213	0.047	50	C	C	A	1608	F	M
C214	0.068	16	C	C	A	1608	B	M
C215	0.1	25	C	C	A	1608	F	M
C216	4700p	50	C	C	A	1608	B	M
C217	0.047	50	C	C	A	1608	F	M
C218	0.068	16	C	C	A	1608	B	M
C219	4700p	50	C	C	A	1608	B	M
C220	0.047	50	C	C	A	1608	F	M
C221	0.068	16	C	C	A	1608	B	M
C222	4700p	50	C	C	A	1608	B	M
C223	0.1	25	C	C	A	1608	F	M
C224	10	16	D	C	A	WX		M
C225	4700p	50	C	C	A	1608	B	M
C226	0.047	50	C	C	A	1608	F	M
C227	0.068	16	C	C	A	1608	B	M
C280	2.2	50	D	C	A	WX		M
C281	0.01	50	C	C	A	1608	B	M
C282	22	6.3	D	C	A	WX		M
C283	0.1	25	C	C	A	1608	F	M
C284	0.1	25	C	C	A	1608	F	M
C301	0.1	25	C	C	A	1608	F	M
C302	0.1	25	C	C	A	1608	F	M
C303	0.1	25	C	C	A	1608	F	M
C304	1	16	C	C	A	2125	F	M
C305	1	16	C	C	A	2125	F	M
C306	1	16	C	C	A	2125	F	M
C307	1	16	C	C	A	2125	F	M
C308	1	16	C	C	A	2125	F	M
C309	1	16	C	C	A	2125	F	M
C310	1	16	C	C	A	2125	F	M
C311	1	16	C	C	A	2125	F	M
C312	0.1	25	C	C	A	1608	F	M
C313	0.1	25	C	C	A	1608	F	M
C350	150p	50	C	C	A	1608	CH	M
C351	0.047	50	C	C	A	1608	F	M
C402	100	10	D	C	A	UR		M
C403	100	25	D	C	A			M
C404	33	25	D	C	A	WX		M
C601	680p	50	C	C	A	2125	CH	M
C602	680p	50	C	C	A	2125	CH	M
C603	680p	50	C	C	A	2125	CH	M
C604	680p	50	C	C	A	2125	CH	M
C605	1000p	50	C	C	A	1608	B	M
C606	1000p	50	C	C	A	1608	B	M
C607	1000p	50	C	C	A	1608	B	M
C608	0.1	25	C	C	A	1608	F	M
C701	330	50	D	H		LXV		P ①
C702	0.1	50	C	R			F	P
C703	330	50	D	H		LXV		H ①
C704	0.1	50	C	R			F	H ①
C705	0.1	50	C	R			F	H ①
C706	330	25	D	H		PF		H ①
C707	330	25	D	H		PF		P ①
C708	330	25	D	H		PF		P ①
C709	180	10	D	R		PF		P
C710	330	50	D	H		LXV		P ①
C714	0.01	1k	C	P			E	P
C716	330	10	D	R		PF		P
C718	220	25	D	R		PF		P
C719	0.1	50	C	R			F	P ①
C721	0.1	50	C	R			F	P
C722								P
C723	470p	2k	C	P			R	P
C724	0.1	50	C	R			F	P
C725								P
C731	330	25	D	H		PF		P ①
C732	470p	50	C	R				P
C733	1000p	50	C	R				P
C734	1000p	AC250	C	P			E	P
C735	1000p	50	C	R				P
C736	68	50	D	R		PF		P
C737	68	50	D	R		PF		P
C738	68	50	D	R		PF		P
C739	68	50	D	R		PF		P
C740	68	50	D	R		PF		P
C751	680p	2k	C	P			R	S
C752	470p	50	C	R				S
C753	0.01	AC250	C	P			F	S
C754	330	25	D	R				S
C755	330p	50	C	R				S
C756	1000p	50	C	R				S
C757	330	25	D	R		PF		S
C758	1000p	AC250	C	P			E	S
C760	470	50	D	R		PF		S
C761	470	50	D	R		PF		S
C762	470p	AC250	C	P			B	S
C763	0.1	50	C	R			F	S
C765	680p	2k	C	P			R	S
C766	470p	50	C	R				S
C767	0.01	AC250	C	P			F	S
C768	330	25	D	R				S
C769	330p	50	C	R				S
C770	1000p	50	C	R				S
C771	330	25	D	R		PF		S
C773	1000p	AC250	C	P			E	S
C774	470	50	D	R		PF		S
C775	470	50	D	R		PF		S
C776	470p	AC250	C	P			B	S
C777	0.1	50	C	R			F	S
C780	470p	AC250	C	P			B	P
C790	10	450	D	R		EMX		S
C801	0.15	50	F	C	A	4041		M
C802	0.022	16	F	C	A	3216		M
C803	0.15	50	F	R				P
C804	0.01	AC250	C	P		規格品	F	P

Capacitor

symbol	capacitance (μF)	rated voltage (V)	type	mounting form	surface	remark	temperature characteristic	pcb_set
C805	0.01	AC250	C	P		規格品	F	P
C806	0.01	AC250	C	P			F	P
C807	0.01	AC250	C	P			F	P
C808	0.1	25	C	C	A	1608	F	M
C811	0.15	50	F	C	A	4041		M
C812	0.022	16	F	C	A	3216		M
C813	0.15	50	F	R				P
C814	0.01	AC250	C	P		規格品	F	P
C815	0.01	AC250	C	P		規格品	F	P
C816	0.01	AC250	C	P			F	P
C817	0.01	AC250	C	P			F	P
C818	0.1	25	C	C	A	1608	F	M
C820	470p	AC250	C	P			B	P
C821	0.15	50	F	C	A	4041		M
C822	0.022	16	F	C	A	3216		M
C823	0.15	50	F	R				P
C824	0.01	AC250	C	P		規格品	F	P
C825	0.01	AC250	C	P		規格品	F	P
C826	0.01	AC250	C	P			F	P
C827	0.01	AC250	C	P			F	P
C828	0.1	25	C	C	A	1608	F	M
C831	0.15	50	F	C	A	4041		M
C832	0.022	16	F	C	B	3216		M ①
C833	0.15	50	F	R				P
C834	0.01	AC250	C	P		規格品	F	P
C835	0.01	AC250	C	P		規格品	F	P
C836	0.01	AC250	C	P			F	P
C837	0.01	AC250	C	P			F	P
C838	0.1	25	C	C	A	1608	F	M
C854	100	25	D	R				P
C855	100	25	D	R				P
C856	100	25	D	R				P
C857	100	25	D	R				P
C858	0.001	AC250	C	P		規格品	F	P ①
C859	0.01	AC250	C	P		規格品	F	P ①
C861	0.1	25	C	C	A	1608	F	M
C862	0.01	50	C	C	A	1608	B	M
C863	0.01	50	C	C	A	1608	B	M
C864	0.01	50	C	C	A	1608	B	M
C865	0.01	50	C	C	A	1608	B	M
C871	0.1	25	C	C	A	1608	F	M
C872	0.01	50	C	C	A	1608	B	M
C873	0.01	50	C	C	A	1608	B	M
C874	0.01	50	C	C	A	1608	B	M
C875	0.01	50	C	C	A	1608	B	M
C881	0.1	25	C	C	A	1608	F	M
C882	0.01	50	C	C	A	1608	B	M
C883	0.01	50	C	C	A	1608	B	M
C884	0.01	50	C	C	A	1608	B	M
C885	0.01	50	C	C	A	1608	B	M
C891	0.1	25	C	C	B	1608	F	M ①
C892	0.01	50	C	C	A	1608	B	M
C893	0.01	50	C	C	A	1608	B	M
C894	0.01	50	C	C	A	1608	B	M
C895	0.01	50	C	C	B	1608	B	M ①

Diode

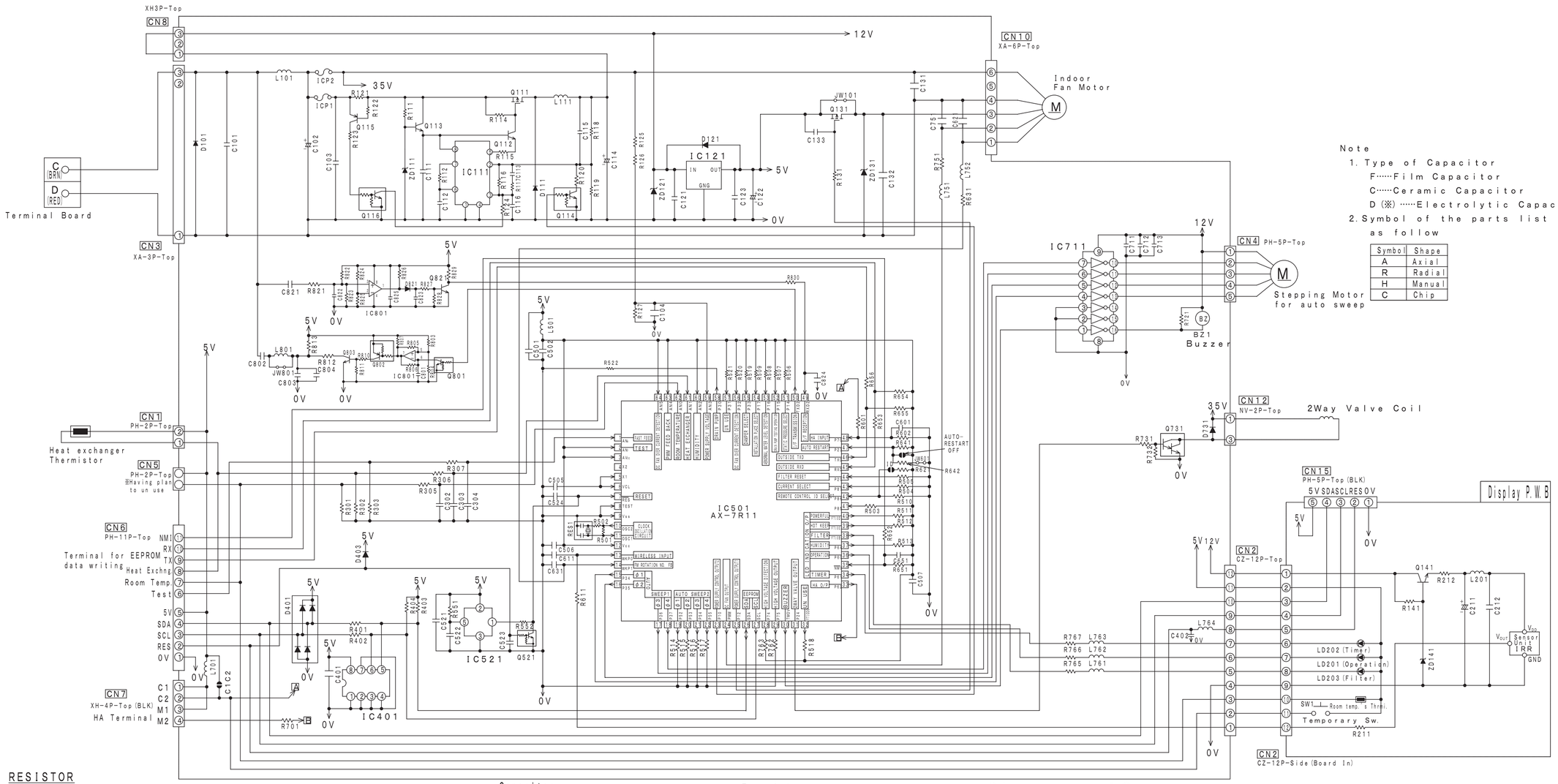
symbol	product_name	mounting form	surface	remark	pcb_set
D101	1GH46	A			P
D102	1S2176A	A			P
D103	1S2176A	A			P
D104	1SS121	A			P
D105	1SS121	A			P
D201	DAN202K	C	A		M
D202	DAP202K	C	A		M
D203	DAP202K	C	A		M
D204	DAN202K	C	A		M
D205	DAN202K	C	A		M
D206	DAN202K	C	A		M
D207	DAN202K	C	A		M
D208	DAN202K	C	B		M ①
D209	DAN202K	C	A		M
D210A	1SS355	C	A		M
D210B	HN2D01FU-TE85L	C	B		M ①
D212	1SS355	C	A		M
D213	1SS355	C	A		M
D350A	1SS355	C	A		M
D350B	HN2D01FU-TE85L	C	B		M ①
D702	1GH46	A			P
D703	1SS121	A			P
D705	RN2Z	H			P
D706	AK14	A			P
D707	RN3Z	H			P
D708	JUMPER	A			P
D709	RU1P	A			P
D710	1GH46	A			P
D713	1GH46	A			P
D715	1SS121	A			P
D716	1S2473	A			P
D720	SARS01	A			S
D721	AG01Z	A			S
D722	AG01Z	A			S
D723	AG01Z	A			S
D724	1S2473	A			S
D725	RN2Z	H			S
D726	FML-G22S	H			S
D730	SARS01	A			S
D731	AG01Z	A			S
D732	AG01Z	A			S
D733	AG01Z	A			S
D734	1S2473	A			S
D735	RN2Z	H			S
D736	FML-G22S	H			S
D811	1SS121	A			P
D812	1SS121	A			P
D813	1SS121	A			P
D814	1SS121	A			P
D841	1SS121	A			P

IC

symbol	product_name	mounting form	surface	remark	pcb_set
MICON	AX-6S00	Q	A		M
EEPROM	S24C04BFJ-TB	S	A		M
IC1	STR-F6523	H			P
IC2	STR-F6667B	H			S
IC3	STR-F6667B	H			S
IC4	NJM2901M-TE1	S	A		M
IC5	NJM2904M-TE3	S	A		M
IC6	NJM2901M-TE1	S	A		M
IC7	HD74HC4051FP	S	A		M
IC8	HD74HC4051FP	S	A		M
IC9	ULN2003ANS	S	A		M
IC11	M54532FP	S	A		M
IC12	M54532FP	S	A		M
IC13	M54532FP	S	A		M
IC14	M54532FP	S	B		M ①
REG1	MC7815CT	H			P
REG2	SE012N	H			P
REG4	SE134N	H			S
REG5	SE134N	H			S
REG6	TA7824S	H			P ①
REG7	MC7812CT	H			H ①

CIRCUIT DIAGRAM

MODEL RAK-18NH5, RAK-25NH5, RAK-35NH5, RAK-50NH5



RESISTOR

Circuit's Symbol	Numerical Value (Ω)	Common use	Power (W)	Drawing's part's No.	Shape
R111	27K	±5%	1/10W	014	C
R112	30K	±5%	1/16W	029	C
R114	750	±5%	1/8W	010	C
R115	560	±5%	1/8W	011	C
R116	–	–	–	–	–
R117	68K	±5%	1/16W	024	C
R118	75K	±2%	1/16W	021	C
R119	6.8k	±2%	1/16W	022	C
R121	0.56	±5%	1/4W	008	C
R122	100	±5%	1/16W	042	C
R123	33K	±5%	1/16W	043	C
R124	100	±5%	1/16W	042	C
R125	30K	±5%	1/16W	029	C
R126	30K	±5%	1/16W	029	C
R127	5.1K	±5%	1/16W	040	C
R131	5.1K	±5%	1/16W	020	C
R141	2.7K	±5%	1/10W	015	C
R211	1K	±5%	1/16W	033	C
R212	47	±5%	1/10W	016	C
R301	12.7K	±1%	1/16W	018	C
R302	12.7K	±1%	1/16W	018	C
R303	10K	±5%	1/16W	030	C

Circuit's Symbol	Numerical Value (Ω)	Common use	Power (W)	Drawing's part's No.	Shape
R305	1K	±5%	1/16W	033	C
R306	1K	±5%	1/16W	033	C
R307	1K	±5%	1/16W	033	C
R401	390	±5%	1/16W	027	C
R402	390	±5%	1/16W	027	C
R403	5.1K	±5%	1/16W	040	C
R404	5.1K	±5%	1/16W	040	C
R501	1M	±5%	1/16W	041	C
R503	10K	±5%	1/16W	030	C
R504	10K	±5%	1/16W	030	C
R505	10K	±5%	1/16W	030	C
R506	10K	±5%	1/16W	030	C
R507	10K	±5%	1/16W	030	C
R508	10K	±5%	1/16W	030	C
R509	10K	±5%	1/16W	030	C
R510	10K	±5%	1/16W	030	C
R511	10K	±5%	1/16W	030	C
R512	10K	±5%	1/16W	030	C
R513	10K	±5%	1/16W	030	C
R514	10K	±5%	1/16W	030	C
R515	10K	±5%	1/16W	030	C
R516	10K	±5%	1/16W	030	C
R517	10K	±5%	1/16W	030	C
R518	10K	±5%	1/16W	030	C
R519	10K	±5%	1/16W	030	C
R520	10K	±5%	1/16W	030	C
R521	10K	±5%	1/16W	030	C

Circuit's Symbol	Numerical Value (Ω)	Common use	Power (W)	Drawing's part's No.	Shape
R522	10K	±5%	1/16W	030	C
R551	10K	±5%	1/16W	041	C
R552	1K	±5%	1/16W	033	C
R602	10K	±5%	1/16W	030	C
R611	1K	±5%	1/8W	006	A
R621	1K	±5%	1/16W	033	C
R631	1K	±5%	1/8W	012	C
R641	10K	±5%	1/16W	030	C
R642	1K	±5%	1/16W	033	C
R651	1K	±5%	1/16W	033	C
R652	100K	±5%	1/16W	042	C
R653	1K	±5%	1/16W	033	C
R654	10K	±5%	1/8W	032	C
R655	10K	±5%	1/16W	030	C
R656	1K	±5%	1/16W	033	C
R701	1K	±5%	1/16W	033	C
R721	3.3K	±5%	1/16W	036	C
R731	2.7K	±5%	1/8W	007	A
R732	10K	±5%	1/16W	030	C

Circuit's Symbol	Numerical Value (Ω)	Common use	Power (W)	Drawing's part's No.	Shape
R751	2.7K	±5%	1/16W	034	C
R762	10K	±5%	1/8W	009	A
R763	10K	±5%	1/8W	009	A
R765	390	±5%	1/16W	027	C
R766	390	±5%	1/16W	026	C
R767	390	±5%	1/16W	027	C
R804	120K	±5%	1/8W	039	C
R805	120K	±5%	1/16W	031	C
R806	120K	±5%	1/16W	031	C
R807	4.3K	±5%	1/16W	028	C
R810	680	±5%	1/16W	028	C
R811	2K	±5%	1/16W	035	C
R812	39	±5%	1/8W	013	C
R813	39	±5%	1/8W	013	C
R821	1K	±5%	1/16W	033	C
R822	10K	±1%	1/16W	017	C
R823	10K	±1%	1/16W	017	C
R824	8.25K	±1%	1/16W	019	C
R825	10K	±1%	1/16W	017	C
R826	1K	±5%	1/16W	033	C
R827	3K	±5%	1/16W	037	C
R828	10K	±1%	1/16W	030	C
R829	5.1K	±5%	1/16W	040	C
R830	1K	±5%	1/8W	006	A

Capacitor

Circuit's Symbol	Numerical Value (F)	Voltage	Type	Drawing's part's No.	Shape
C101	0.22μ	50V	F	062	R
C102	330μ	50V	D (※)	065	R
C103	470p	630V	C	052	C
C104	0.1μ	25V	C	045	C
C111	2.2μ	10V	C	058	C
C112	1000P	50V	C	047	C
C113	0.047μ	25V	C	056	C
C114	220μ	25V	D (※)	066	R
C115	–	–	–	–	–
C116	–	–	–	–	–
C121	0.1μ	25V	C	045	C
C122	100μ	10V	D (※)	068	R
C123	0.1μ	25V	C	045	C
C131	0.22μ	50V	C	046	C
C132	0.1μ	25V	C	045	C
C133	0.1μ	25V	C	045	C
C211	47μ	16V	D (※)	069	R
C212	1μ	16V	C	049	C
C302	0.1μ	25V	C	045	C
C303	0.1μ	25V	C	045	C
C304	0.1μ	25V	C	045	C
C401	0.1μ	25V	C	045	C
C402	–	–	–	–	–

Circuit's Symbol	Numerical Value (F)	Voltage	Type	Drawing's part's No.	Shape
C501	0.1μ	25V	C	045	C
C502	0.1μ	25V	C	045	C
C505	0.1μ	25V	C	045	C
C506	0.1μ	25V	C	045	C
C507	0.1μ	25V	C	045	C
C521	0.1μ	25V	C	045	C
C522	0.22μ	10V	C	057	C
C523	0.1μ	25V	C	045	C
C524	0.1μ	25V	C	045	C
C601	0.1μ	25V	C	045	C
C611	1000P	50V	C	047	C
C621	–	–	–	–	–
C631	1000P	50V	C	047	C
C651	0.1μ	25V	C	045	C
C711	0.1μ	25V	C	045	C
C712	0.1μ	25V	C	045	C
C713	0.1μ	25V	C	045	C
C751	1μ	16V	C	049	C
C801	150P	50V	C	048	C
C802	0.15μ	50V	F	063	R
C803	–	–	–	–	–
C804	–	–	–	–	–
C821	0.01μ	50V	F	061	R
C822	1000P	50V	C	047	C
C823	0.047μ	25V	C	056	C
C824	0.01μ	50V	C	055	C
C825	0.1μ	25V	C	045	C

Transistor

Circuit's Symbol	Model	Drawing's part's No.	Shape
Q111	2SJ518	076	C
Q112	2SC5209H	074	C
Q113	2SC5209H	074	C
Q114	RN1102	078	C
Q115	2SA1162Y	079	C
Q116	RN1102	078	C
Q131	–	–	C
Q141	2SC2462LC	071	C
Q521	RN1102	078	C
Q731	–	–	–

Circuit's Symbol	Model	Drawing's part's No.	Shape
Q801	RN1102	078	C
Q802	RN2102	080	C
Q803	2SC3441E	072	C
Q821	2SC4738GR	073	C

LED

Circuit's Symbol	Model	Color	Drawing's part's No.	Shape
LD201	HLMF-K305	Yellow	133	H
LD202	HLMF-K405	Orange	134	H
LD203	HLMF-K505	Green	135	H

Jumper

Circuit's Symbol	Use/ Don't Use	Size	Drawing's part's No.	Shape
JW101	Use	1608	–	–
JW601	Use	1608	–	–
JW801	–	1608	–	–

Over Current Protecter

Circuit's Symbol	Model	Rating Current	Drawing's part's No.	Shape
ICP1	CCP2E-20	0.8A	103	C
ICP2	CCP2E-50	2.0A	104	C

Diode

Circuit's Symbol	Model	Drawing's part's No.	Shape
D101	DSM3MA2	091	C
D111	D1FS6	092	C
D121	1SS355	095	C
D401	HN1D03FU	093	C
D403	1SS355	095	C
D731	–	–	–
D821	1SS355	095	C

Oscillator

Circuit's Symbol	Model	Drawing's part's No.	Shape
RES1	CSTLS10M0G53	10MHz 107	R

Buzzer

Circuit's Symbol	Model	Drawing's part's No.	Shape
BZ1	PKM13EPY	131	H

Sensor Unit

Circuit's Symbol	Model	Drawing's part's No.	Shape
IRR	RPM6938-V4	130	H

Thermistor

Circuit's Symbol	Model	Drawing's part's No.	Shape
Room Temp. Thermistor	RREL4587	127	H

IC

Circuit's Symbol	Model	Drawing's part's No.	Shape
IC111	NJM2340M	082	C
IC121	LF50CDT	083	C
IC401	S-24C04BFJ	084	C
IC501	HD643985A20H (AX-7R11)	087	C
IC521	RN5VD42C	089	C
IC711	ULN2003ANS	090	C
IC801	NJM2903M	085	C

Switch

Circuit's Symbol	Model	Drawing's part's No.	Shape
SW1	EVQP07K-SW	132	H

Zener Diode

Circuit's Symbol	Model	Drawing's part's No.	Shape
ZD111	RD6.2UJN2	101	C
ZD121	PTZ20A	098	C
ZD131	RLZ6.8A	099	C
ZD141	RD5.6UJN2	100	C

Coil

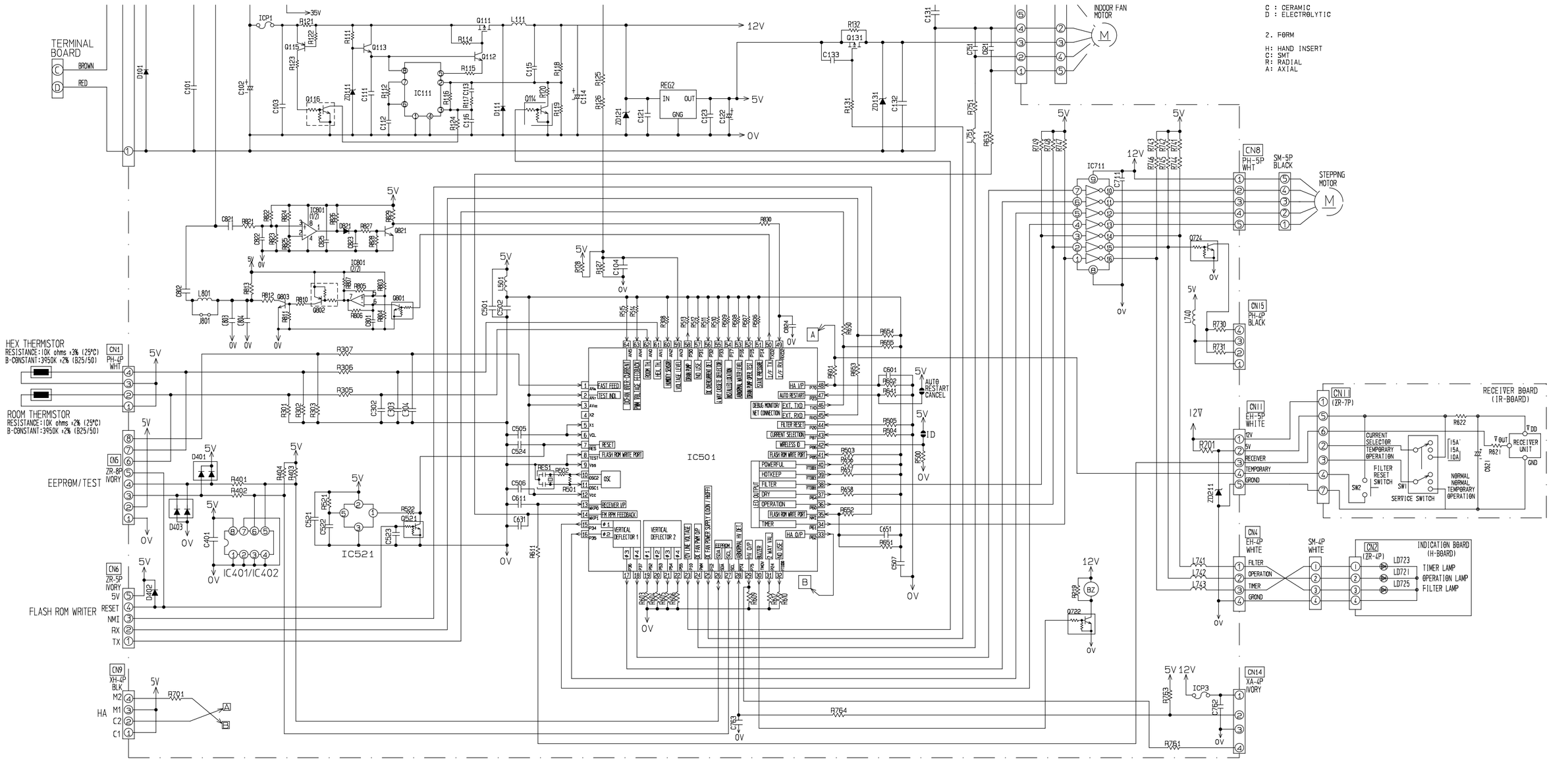
Circuit's Symbol	Numerical Value (H)	Rating Current	Drawing's part's No.	Shape
L101	82μ	1.3A	112	H
L111	560μ	0.6A	113	H
L201	ELM11A01S	0.2A	110	C
L501	1608CJ	–	025	C
L701	ELM11A01S	0.2A	110	C
L751	1608CJ	–	025	C
L752	1608CJ	–	025	C
L761	1608CJ	–	025	C
L762	1608CJ	–	025	C
L763	1608CJ	–	025	C
L764	1608CJ	–	025	C
L801	100μ	55mA	111	C

Connecter

Circuit's Symbol	Model	Drawing's part's No.	Shape
CN1	PH-2P-Top	116	H
CN2	CZ-12-Top	117	H
CN2	CZ-12P-Side (BOARD IN)	123	H
CN3	XA-3P-Top	118	H
CN4	PH-5P-Top	119	H
CN5	PH-2P-Top (In use)	120	H
CN6	PH-11P-Top	121	H
CN7	XH-4P-Top (BLK)	122	H
CN8	XH-3P-Top	125	H
CN10	XA-6P-Top	122	H
CN12	–	–	–
CN15	PH-5P-Top (BLK)	124	H

CIRCUIT DIAGRAM

RAK-65NH5



RESISTOR

SYMBOL	RESISTANCE	TOL.	POWER	FORM
R111	27K	±5%	1/10W	C
R112	30K	±5%	1/16W	C
R114	750	±5%	1/8W	C
R115	560	±5%	1/8W	C
R116				
R117	68K	±5%	1/16W	C
R118	75K	±2%	1/16W	C
R119	6.98K	±2%	1/16W	C
R120				
R121	0.56	±5%	1/4W	C
R122	100	±5%	1/16W	C
R123	33K	±5%	1/16W	C
R124	100	±5%	1/16W	C
R125				
R126				
R127				
R128	10K	±5%	1/16W	C
R131				
R132	JUMPER	–	1/16W	C
R201	1K	±5%	1/10W	C
				C
R219	3.3K	±5%	1/10W	C
				C
R301	12.7K	±1%	1/16W	C
R302	12.7K	±1%	1/16W	C
R303	10K	±5%	1/16W	C
R305	1K	±5%	1/16W	C
R306	1K	±5%	1/16W	C

SYMBOL	RESISTANCE	TOL.	POWER	FORM
R307	1K	±5%	1/16W	C
R308	10K	±5%	1/16W	C
R401	390	±5%	1/16W	C
R402	390	±5%	1/16W	C
R403	5.1K	±5%	1/16W	C
R404	5.1K	±5%	1/16W	C
R500	10K	±5%	1/16W	C
R501	1M	±5%	1/16W	C
R502	0	±5%	1/16W	C
R503	10K	±5%	1/16W	C
R504	10K	±5%	1/16W	C
R505	10K	±5%	1/16W	C
R506	10K	±5%	1/16W	C
R507	10K	±5%	1/16W	C
R508	10K	±5%	1/16W	C
R509	10K	±5%	1/16W	C
R510	10K	±5%	1/16W	C
R511	10K	±5%	1/16W	C
R512	10K	±5%	1/16W	C
R513	10K	±5%	1/16W	C
R514	10K	±5%	1/16W	C
R515	10K	±5%	1/16W	C
R521	1M	±5%	1/16W	C
R522	1K	±5%	1/16W	C
R601	1K	±5%	1/16W	C
R602	10K	±5%	1/16W	C
R603	10K	±5%	1/16W	C

SYMBOL	RESISTANCE	TOL.	POWER	FORM
R604	10K	±5%	1/16W	C
R605	10K	±5%	1/16W	C
R606	10K	±5%	1/16W	C
R609				
R610	10K	±5%	1/16W	C
R611	1K	±5%	1/16W	C
R612	10K	±5%	1/16W	C
IR BOARD R621	10K	±5%	1/6W	A
IR BOARD R622	10K	±5%	1/6W	A
R631	1K	±5%	1/16W	C
R641	10K	±5%	1/16W	C
R650	1K	±5%	1/16W	C
R651	1K	±5%	1/16W	C
R652	100	±5%	1/16W	C
R653	1K	±5%	1/16W	C
R654	10K	±5%	1/16W	C
R655	10K	±5%	1/16W	C
R656	10K	±5%	1/16W	C
R657	10K	±5%	1/16W	C
R658	10K	±5%	1/16W	C
R701	1K	±5%	1/16W	C
R730	390	±5%	1/4W	C
R731	390	±5%	1/4W	C
R741	110	±5%	1/10W	C
R742	110	±5%	1/10W	C
R743	110	±5%	1/10W	C

SYMBOL	RESISTANCE	TOL.	POWER	FORM
R744	130	±5%	1/10W	C
R745	130	±5%	1/10W	C
R746	130	±5%	1/10W	C
R747	5.1K	±5%	1/16W	C
R748				
R749	5.1K	±5%	1/16W	C
R751	2.7K	±5%	1/16W	C
R761	100	±5%	1/16W	C
R763	10K	±5%	1/16W	C
R764	1K	±5%	1/16W	C
RB03	120K	±5%	1/16W	C
RB04	120K	±5%	1/16W	C
RB05	120K	±5%	1/16W	C
RB06	120K	±5%	1/16W	C
RB07	4.3K	±5%	1/16W	C
RB10	680	±5%	1/10W	C
RB11	2K	±5%	1/16W	C
RB12	39	±5%	1/8W	C
RB13	39	±5%	1/8W	C
RB21	1K	±1%	1/16W	C
RB22	10K	±1%	1/16W	C
RB23	10K	±1%	1/16W	C
RB24	8.25K	±1%	1/16W	C
RB25	10K	±1%	1/16W	C
RB26	1K	±5%	1/16W	C
RB27	3K	±5%	1/16W	C
RB28	10K	±5%	1/16W	C
RB29	5.1K	±5%	1/16W	C
RB30	1K	±5%	1/16W	C

CAPACITOR

SYMBOL	CAPACITANCE	TOL.	TYPE	FORM
C101	0.22μ	50V	F	H
C102	330μ	63V	D (PF)	H
C103	470P	630V	C	C
C104				
C111	2.2μ	10V	C(B)	C
C112	1000P	50V	C(B)	C
C113	0.047μ	25V	C(B)	C
C114	220μ	35V	D (PF)	H
C115				
C116				
C121	0.1μ	25V	C(F)	C
C122	100μ	10V	D (PF)	H
C123	0.1μ	25V	C(F)	C
C131	0.22μ	50V	C(B)	C
C132	0.1μ	25V	C(F)	C
C133				
C302	0.1μ	25V	C(F)	C
C303	0.1μ	25V	C(F)	C
C304	0.1μ	25V	C(F)	C
C401	0.1μ	25V	C(F)	C
C501	0.1μ	25V	C(F)	C
C502	0.1μ	25V	C(F)	C
C505	0.1μ	25V	C(F)	C
C506	0.1μ	25V	C(F)	C
C507	0.1μ	25V	C(F)	C

SYMBOL	CAPACITANCE	TOL.	TYPE	FORM
C521	0.1μ	25V	C(F)	C
C522	0.22μ	10V	C(B)	C
C523	0.1μ	25V	C(F)	C
C524	0.1μ	25V	C(F)	C
C601	0.1μ	25V	C(F)	C
C611	1000P	50V	C(B)	C
C621				
C631	1000P	50V	C(B)	C
C651	0.1μ	25V	C(F)	C
C711	0.1μ	25V	C(F)	C
C751	1μ	16V	C(F)	C
C762				
C763	0.1μ	25V	C(F)	C
C801	150P	50V	C(B)	C
C802	0.22μ	50V	F	H
C803	0.1μ	25V	C(F)	C
C804				
C821	0.01μ	50V	F	H
C822	1000P	50V	C(B)	C
C823	0.047μ	25V	C(B)	C
C824	0.01μ	50V	C(B)	C
C825	0.1μ	25V	C(F)	C
IR BOARD C621	47μ	16V	D(PF)	H

TRANSISTOR

SYMBOL	MODEL	FORM
Q111	2SJ518	C
Q112	2SC5209H	C
Q113	2SC5209H	C
Q114		
Q115	2SA1162Y	C
Q116	RN1102	C
Q131		
Q521	RN1102	C
Q722	RN1102	C
Q724	RN1102	C
QB01	RN1102	C
QB02	RN2102	C
QB03	2SC3441E	C
QB21	2SC4738GRY	C

DIODE

SYMBOL	MODEL	FORM
D101	G4DL-6140	H
D111	D1FS6	C
D401		
D403		
D402	1SS355	C
DB21	1SS355	C

LED

SYMBOL	MODEL	COLOR	FORM	
LD721	SEL6914A	YEL	H	LED BOARD
LD723	SEL6214S	RED	H	LED BOARD
LD725	SEL6414E	GRN	H	LED BOARD

ICPS

SYMBOL	MODEL	COLOR	FORM
ICP1	CCP2E-20	0.8A	C
ICP2	CCP2E-50	2.0A	C
ICP3			

OSCILLATOR

SYMBOL	MODEL	FREQ.	FORM
RES1	CSTLS10M2	10MHz	H

ZENER DIODE

SYMBOL	MODEL	FORM
ZD111	RD6.2UJN2	C
ZD121	PTZ20A	C
ZD131	RLZ6.8A	C
ZD211	RD5.1UJN2	C

BUZZER

SYMBOL	MODEL	FORM
BZ	PKM13EPY	H

SWITCH

SYMBOL	MODEL	FORM
IR BOARD SW2	EVQPAC 09K	H

CHIP JUMPER

SYMBOL	USAGE	FORM
J801	NONE	C

INDUCTOR

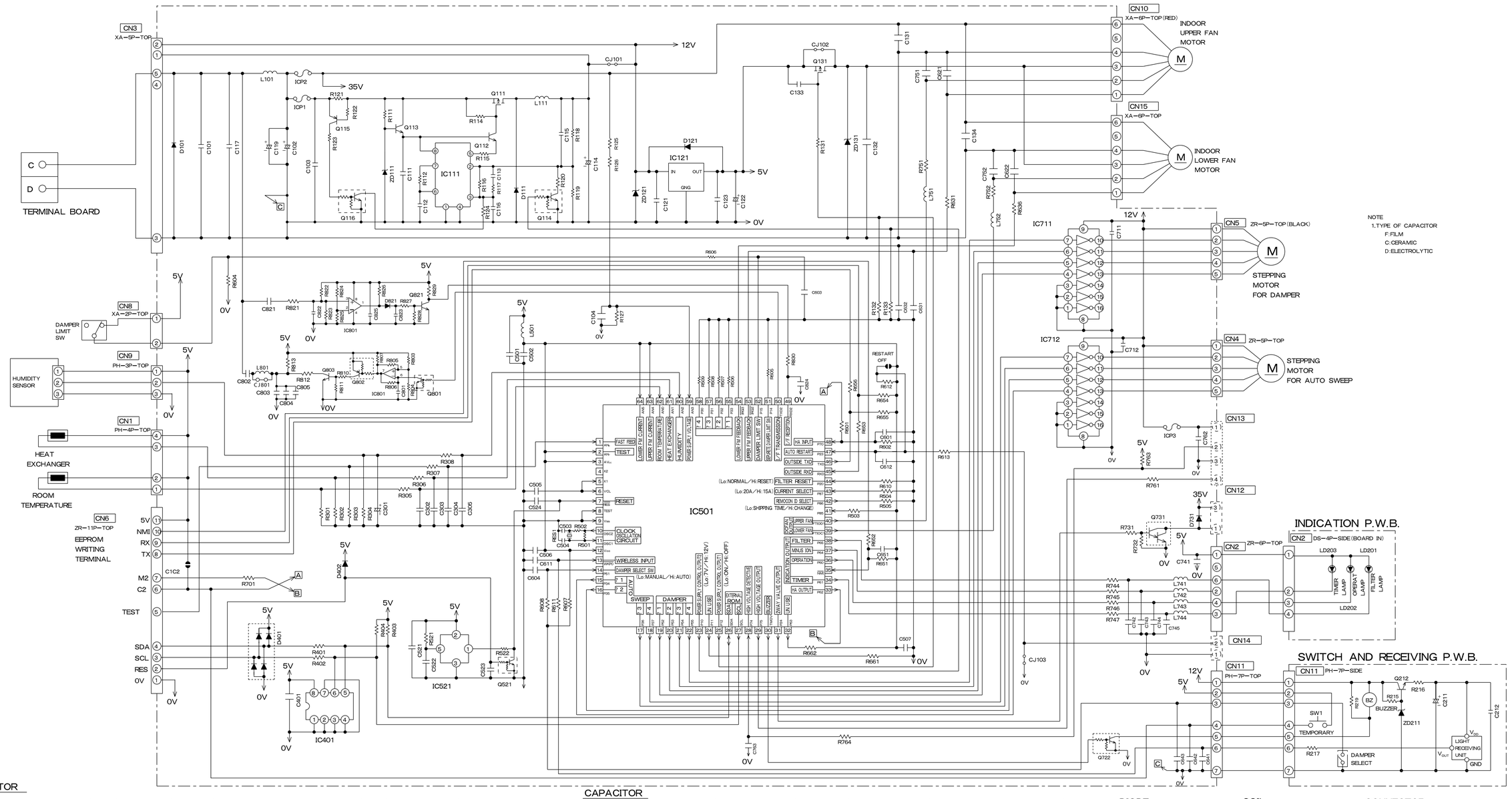
SYMBOL	INDUCTANCE	C. RATING	FORM
L101	82μ	1.3A	H
L111	560μ	0.4A	H
L501	CHIP JUMPER	–	C
L740	EXCELSA35V	–	H
L741	CHIP JUMPER	–	C
L742	CHIP JUMPER	–	C
L743	CHIP JUMPER	–	C
L751	CHIP JUMPER	–	C
IR BOARD L801	100μ	55mA	C

IC

SYMBOL	MODEL	FORM
IC111	NJM2340M	C
REG2	MC7805CT	H
IC401	BR24C02F	C
IC402	S24C08BDP	H
IC501	AX-71M10	C
IC521	RN5VD42C	C
IC711	ULN2003ANS	C
IR BOARD ICB01	NJM2903M	C
RECEIVER	SBX8035-F	H

CONNECTORS

SYMBOL	MODEL NO.	COLOR	FORM	REMARK
CN1	PH-4P (TOP ENTRY)	WHITE	H	ROOM/HEAT EXHG THERMSTOR
CN2	ZR-4P (TOP ENTRY)	IVORY	H	LED BOARD
CN4	EH-4P (TOP ENTRY)	WHITE	H	LED BOARD (MAIN BOARD)
CN5	ZR-8P (SIDE ENTRY)	IVORY	H	EEPROM / TEST
CN6	ZR-5P (TOP ENTRY)	IVORY	H	FLASH ROM
CN8	PH-5P (TOP ENTRY)	WHITE	H	STEPPING MOTOR
CN9	XH-4P (TOP ENTRY)	BLACK	H	HA
CN10	XA-6P (TOP ENTRY)	IVORY	H	INDOOR PWM FAN
CN11	ZR-7P (TOP ENTRY)	IVORY	H	IR BOARD
CN11	EH-5P (TOP ENTRY)	WHITE	H	IR BOARD (MAIN BOARD)
CN12	XH-3P-V2 (TOP ENTRY)	WHITE	H	35V SUPPLY
CN14				
CN15	PH-4P (TOP ENTRY)	BLACK	H	UV-LED UNIT



RESISTOR

SYMBOL	RETER	VALUE	
	?	LIMIT	W
R111	27K	± 5%	1/10W
R112	30K	± 5%	1/16W
R114	750	± 5%	1/8W
R115	560	± 5%	1/8W
R116			1/16W
R117	68K	± 5%	1/16W
R118	75K	± 2%	1/16W
R119	6.8K	± 2%	1/16W
R120			1/16W
R121	0.56	± 5%	1/4W
R122	100	± 5%	1/16W
R123	33K	± 5%	1/16W
R124	100	± 5%	1/16W
R125	30K	± 5%	1/16W
R126	30K	± 5%	1/16W
R127	5.1K	± 5%	1/16W
R131	5.1K	± 5%	1/16W
R132	10K	± 5%	1/16W
R133	10K	± 5%	1/16W
R215	2.7K	± 5%	1/10W
R216	47	± 5%	1/10W
R217	1K	± 5%	1/8W
R219	3.3K	± 5%	1/10W
R301	12.7K	± 1%	1/16W
R302	12.7K	± 1%	1/16W
R303	10K	± 5%	1/16W
R304	100K	± 1%	1/16W

SYMBOL	RETER	VALUE	
	?	LIMIT	W
R305	1K	± 5%	1/16W
R306	1K	± 5%	1/16W
R307	1K	± 5%	1/16W
R308	1K	± 5%	1/16W
R401	390	± 5%	1/16W
R402	390	± 5%	1/16W
R403	5.1K	± 5%	1/16W
R404	5.1K	± 5%	1/16W
R501	1M	± 5%	1/16W
R502	0	± 5%	1/16W
R503	10K	± 5%	1/16W
R504	10K	± 5%	1/16W
R505	10K	± 5%	1/16W
R506	10K	± 5%	1/16W
R507	10K	± 5%	1/16W
R508	10K	± 5%	1/16W
R509	10K	± 5%	1/16W
R521	1M	± 5%	1/16W
R522	1K	± 5%	1/16W
R601	1K	± 5%	1/16W
R602	10K	± 5%	1/16W
R604	10K	± 5%	1/16W
R605	1K	± 5%	1/16W
R606	1K	± 5%	1/16W

SYMBOL	RETER	VALUE	
	?	LIMIT	W
R607	10K	± 5%	1/16W
R608	1K	± 5%	1/16W
R610	10K	± 5%	1/16W
R611	1K	± 5%	1/16W
R612	10K	± 5%	1/16W
R613	1K	± 5%	1/16W
R631	1K	± 5%	1/16W
R636	1K	± 5%	1/16W
R651	1K	± 5%	1/16W
R652	10Ω	± 5%	1/16W
R653	1K	± 5%	1/16W
R654	10K	± 5%	1/16W
R655	10K	± 5%	1/16W
R656	1K	± 5%	1/16W
R661	10K	± 5%	1/16W
R662	10K	± 5%	1/16W
R701	1K	± 5%	1/16W
R731	2.7K	± 5%	1/16W
R732	10K	± 5%	1/16W
R744	300	± 5%	1/10W
R745	300	± 5%	1/10W

SYMBOL	RETER	VALUE	
	?	LIMIT	W
R746	300	± 5%	1/10W
R747	300	± 5%	1/10W
R751	2.7K	± 5%	1/16W
R752	2.7K	± 5%	1/16W
R761	100	± 5%	1/16W
R763	10K	± 5%	1/16W
R764	1K	± 5%	1/16W
R803	120K	± 5%	1/16W
R804	120K	± 5%	1/16W
R805	120K	± 5%	1/16W
R806	120K	± 5%	1/16W
R807	4.3K	± 5%	1/16W
R810	680	± 5%	1/10W
R811	2K	± 5%	1/16W
R812	39	± 5%	1/8W
R813	39	± 5%	1/8W
R821	1K	± 5%	1/16W
R822	10K	± 1%	1/16W
R823	10K	± 1%	1/16W
R824	8.25K	± 1%	1/16W
R825	10K	± 1%	1/16W
R826	1K	± 5%	1/16W
R827	3K	± 5%	1/16W
R828	10K	± 5%	1/16W

SYMBOL	RETER	VALUE	
	?	LIMIT	W
R829	5.1K	± 5%	1/16W
R830	1K	± 5%	1/16W

IC

SYMBOL	MODEL
IC111	NJM2340M
IC121	LF50CDT
IC401	BR24C04FJ-W
IC501	HD64F3687H
IC521	RN5VD42C
IC711	ULN2003ANS
IC712	ULN2003ANS
IC801	NJM2903M

CHIP JUMPER

SYMBOL	MOUNT	NOTE
CJ101	USE	1608
CJ102	USE	1608
CJ103	USE	1608
CJ801	——	1608

OVER CURRENT PROTECTOR

SYMBOL	MODEL	RATING CURRENT
ICP1	CCP2E-20	0.8A
ICP2	CCP2E-50	2.0A
ICP3	ICP-S0.5	0.5A

CAPACITOR

SYMBOL	RETER	VALUE		
	F	V	TYPE	
C101	0.22μ	55V	F	
C102	33Ω	50V	D	
C103	470p	630V	C	
C104	0.1μ	25V	C	
C111	2.2μ	10V	C	
C112	1000P	50V	C	
C113	0.047μ	25V	C	
C114	22Ω	25V	D	
C115				
C116		50V	C	
C117		55V	F	
C119		50V	D	
C121	0.1μ	25V	C	
C122	10Ω	10V	D	
C123	0.1μ	25V	C	
C131	0.22μ	50V	C	
C132	0.1μ	25V	C	
C133	0.1μ	25V	C	
C134	0.22μ	50V	C	
C211	47μ	16V	D	
C212	0.1μ	25V	C	
C301	22μ	4V	D	
C302	0.1μ	25V	C	
C303	0.1μ	25V	C	

SYMBOL	RETER	VALUE		
	F	V	TYPE	
C304	0.1μ	25V	C	
C305	0.1μ	25V	C	
C401	0.1μ	25V	C	
C501	0.1μ	25V	C	
C502	0.1μ	25V	C	
C503	12p	50V	C	
C504	12p	50V	C	
C505	0.1μ	25V	C	
C506	0.1μ	25V	C	
C507	0.1μ	25V	C	
C521	0.1μ	25V	C	
C522	0.22μ	10V	C	
C523	0.1μ	25V	C	
C524	0.1μ	25V	C	
C601	0.1μ	25V	C	
C603	0.1μ	25V	C	
C604	0.1μ	25V	C	
C611	1000P	50V	C	
C612	0.1μ	25V	C	
C621				
C622				

SYMBOL	RETER	VALUE		
	F	V	TYPE	
C631	1000P	50V	C	
C632	1000P	50V	C	
C641				
C642				
C643				
C651	0.1μ	25V	C	
C711	0.1μ	25V	C	
C712	0.1μ	25V	C	
C741	0.1μ	25V	C	
C742				
C743				
C744				
C745				
C751	1μ	16V	C	
C752	1μ	16V	C	
C762	0.1μ	25V	C	
C763	0.1μ	25V	C	
C801	150P	50V	C	
C802	0.22μ	55V	F	
C803	0.1μ	25V	C	
C804		25V	C	
C805		25V	C	

SYMBOL	RETER	VALUE	
	F	V	TYPE
C821	0.01μ	55V	F
C822	1000P	50V	C
C823	0.047μ	25V	C
C824	0.1μ	50V	C
C825	0.1μ	25V	C

TRANSISTOR

SYMBOL	MODEL
Q111	2SJ518
Q112	2SC5209H
Q113	2SC5209H
Q114	RN1102
Q115	2SA1162Y
Q116	RN1102
Q131	2SJ511
Q212	2SC2462LC
Q521	RN1102
Q722	RN1102
Q731	2SD1834
Q801	RN1102
Q802	RN2102
Q803	2SC3441E
Q821	2SC4738GRY

DIODE

SYMBOL	MODEL
D101	DSM3MA2
D111	D1FS6
D121	1SS355
D401	HN1D03FU
D402	1SS355
D731	1SS355
D821	1SS355

ZENER DIODE

SYMBOL	MODEL
ZD111	RD6.2UJN2
ZD121	PTZ20A
ZD131	RLZ6.8A
ZD211	RD5.6UJN2

BUZZER

SYMBOL	MODEL
BZ	PKM13EPY

LIGHT RECEIVING UNIT

SYMBOL	MODEL
RR	GP1U281R

OSCILLATOR

SYMBOL	MODEL	FREQUENCY
RES1	MA-406-10M	10MHz

COIL

SYMBOL	RATING (H)	RATING CURRENT
L101	82μ	1.3A
L111	560μ	0.4A
L501	BLM11A601SPT	0.2A
L741	CHIP JUMPER	—
L742	CHIP JUMPER	—
L743	CHIP JUMPER	—
L744	CHIP JUMPER	—
L751	BLM11A601SPT	0.2A
L752	BLM11A601SPT	0.2A
L801	100μ	55mA

LED

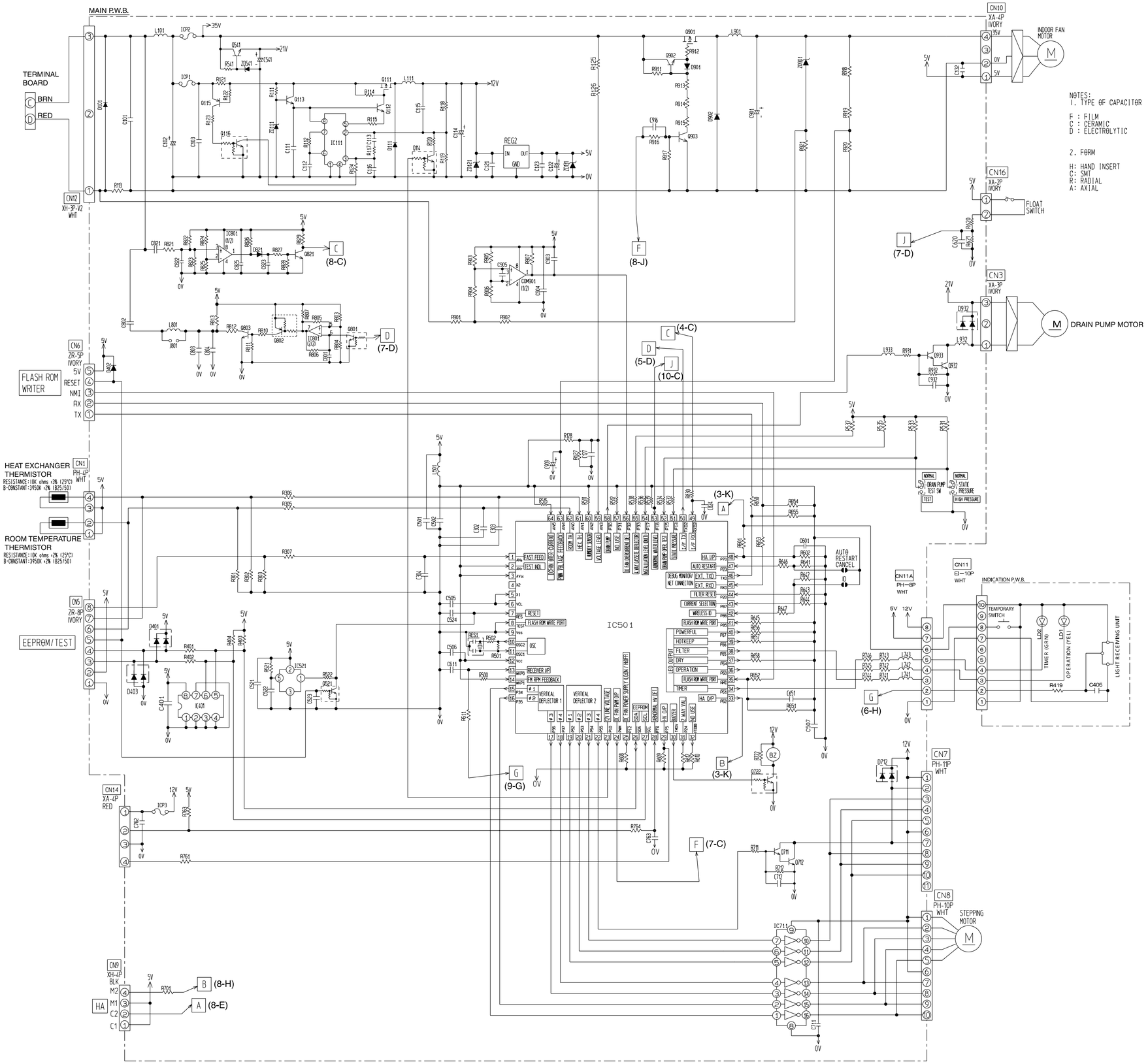
SYMBOL	MODEL	COLOR
LD201	SEL6814A	YELLOW
LD202	SEL6914A	ORANGE
LD203	SEL6414E	GREEN

SWITCH

SYMBOL	MODEL
SW1 (TEMPORARY)	EVQ21509K
SW2 (DAMPER SELECT SW)	ESD170206

CONNECTOR

SYMBOL	MODEL
CN1	PH-4P-TOP
CN2	ZR-6P-TOP
CN2	DS-4P-SIDE(BOARD IN)
CN3	XA-5P-TOP
CN4	ZR-5P-TOP
CN5	ZR-5P-TOP(BLACK)
CN6	ZR-11P-TOP
CN8	XA-2P-TOP
CN9	PH-3P-TOP
CN10	XA-6P-TOP(RED)
CN11	PH-7P-TOP
CN11	PH-7P-SIDE
CN12	SMT-2P-TOP
CN13	ZR-4P-TOP
CN14	
CN15	XA-6P-TOP



RESISTOR

SYMBOL	RESISTANCE	TOL	POWER	TYPE
R111	27K	5%	1/10	C
R112	30K	5%	1/16	C
R113	0.3	5%	1	H
R114	750	5%	1/8	C
R115	560	5%	1/8	C
R117	68K	5%	1/16	C
R118	75K	2%	1/16	C
R119	6.98K	2%	1/16	C
R120	15K	2%	1/16	C
R121	0.56	5%	1/4	C
R122	100	5%	1/16	C
R123	27K	5%	1/10	C
R124	100	5%	1/16	C
R125	30K	5%	1/16	C
R126	30K	5%	1/16	C
R127	5.1K	5%	1/16	C
R128	10K	5%	1/16	C
R301	12.7K	5%	1/16	C
R302	12.7K	5%	1/16	C
R303	10K	5%	1/16	C
R305	1K	5%	1/16	C
R306	1K	5%	1/16	C
R307	1K	5%	1/16	C
R401	390	5%	1/16	C
R402	390	5%	1/16	C
R403	5.1K	5%	1/16	C
R404	5.1K	5%	1/16	C
R419		5%	1/8	A

SYMBOL	RESISTANCE	TOL	POWER	TYPE
R500	10K	5%	1/16	C
R501	1M	5%	1/16	C
R502		5%	1/16	C
R511	10K	5%	1/16	C
R512	10K	5%	1/16	C
R515	10K	5%	1/16	C
R521	1M	5%	1/16	C
R522	1K	5%	1/16	C
R531	10K	5%	1/16	C
R532	1K	5%	1/16	C
R533	10K	5%	1/16	C
R534	1K	5%	1/16	C
R535	10K	5%	1/16	C
R536	1K	5%	1/16	C
R537	10K	5%	1/16	C
R538	1K	5%	1/16	C
R539	10K	5%	1/16	C
R541	3.9K	5%	1/4	C
R601	1K	5%	1/16	C
R602	10K	5%	1/16	C
R608	10K	5%	1/16	C
R609	10K	5%	1/16	C
R610	10K	5%	1/16	C
R611	1K	5%	1/16	C
R612	10K	5%	1/16	C
R620	1K	5%	1/16	C
R621	10K	5%	1/16	C
R641	10K	5%	1/16	C
R642	10K	5%	1/16	C
R643	10K	5%	1/16	C
R644	10K	5%	1/16	C

SYMBOL	RESISTANCE	TOL	POWER	TYPE
R645	10K	5%	1/16	C
R646	1K	5%	1/16	C
R647	1K	5%	1/16	C
R650	1K	5%	1/16	C
R651	1K	5%	1/16	C
R652	100	5%	1/16	C
R653	1K	5%	1/16	C
R654	10K	5%	1/16	C
R655	10K	5%	1/16	C
R656	10K	5%	1/16	C
R657	10K	5%	1/16	C
R658	10K	5%	1/16	C
R701	1K	5%	1/16	C
R711	3K	5%	1/16	C
R712	10K	5%	1/16	C
R722	3.3K	5%	1/16	C
R741	110	5%	1/10	C
R742	110	5%	1/10	C
R749	110	5%	1/10	C
R744	130	5%	1/10	C
R745	130	5%	1/10	C
R746	130	5%	1/10	C
R761	100	5%	1/16	C
R763	10K	5%	1/16	C
R764	1K	5%	1/16	C
R803	120K	5%	1/16	C
R804	120K	5%	1/16	C
R805	120K	5%	1/16	C
R806	120K	5%	1/16	C
R807	4.3K	5%	1/16	C
R810	680	5%	1/10	C
R811	2K	5%	1/16	C

SYMBOL	RESISTANCE	TOL	POWER	TYPE
R812	39	5%	1/8	C
R813	39	5%	1/8	C
R821	1K	5%	1/16	C
R822	10K	1%	1/16	C
R823	10K	1%	1/16	C
R824	8.25K	1%	1/16	C
R825	10K	1%	1/16	C
R826	1K	5%	1/16	C
R827	3K	1%	1/16	C
R823	10K	1%	1/16	C
R823	10K	1%	1/16	C
R823	10K	1%	1/16	C
R823	10K	1%	1/16	C
R803	8.25k	±1%	1/16	C
R804	0	±5%	1/16	C
R805	12.7K	±1%	1/16	C
R806	1K	±1%	1/16	C
R807	2.7K	±5%	1/16	C
R111	1K	±5%	1/4	C
R112	47	±5%	1/10	C
R813	1K	±5%	1/4	C
R814	1K	±5%	1/4	C
R815	1K	±5%	1/4	C
R816	3.3K	±5%	1/16	C
R817	3.3K	±5%	1/16	C
R818	10K	±1%	1/16	C
R819	10K	±1%	1/16	C
R820	2.2K	±1%	1/16	C
R821	10K	±5%	1/16	C
R832	10K	±5%	1/16	C

CAPACITOR

SYMBOL	RATING (uF)	VOL	TYPE	FORM
C101	0.22	50	F	H
C102	330	63	DPF	H
C103	470P	630	C	C
C111	2.2	10	CH	C
C112	1000P	50	CH	C
C113	0.047	25	CH	C
C114	220	35	DPF	H
C115	0.1	25	CH	C
C116	0.1	25	CH	C
C121	0.1	25	CH	C
C122	100	10	DPF	H
C123	0.1	25	CH	C
C127	0.1	25	CH	C
C132	0.1	25	CH	C
C302	0.1	25	CH	C
C303	0.1	25	CH	C
C304	0.1	25	CH	C
C401	0.1	25	CH	C
C411	47	16	D	R
C412	47	16	D	R
C413				
C414				
C501	0.1	25	CH	C
C502	0.1	25	CH	C
C505	0.1	25	CH	C
C506	0.1	25	CH	C
C507	0.1	25	CH	C
C521	0.1	25	CH	C
C522	0.22	10	CH	C

SYMBOL	RATING (uF)	VOL	TYPE	FORM
C523	0.1	25	CH	C
C524	0.1	25	CH	C
C541	100	50	DPF	R
C601	0.1	25	CH	C
C611	1000P	50	CH	C
C620	0.1	25	CH	C
C651	0.1	25	CH	C
C711	0.1	25	CH	C
C712	1	16	CH	C
C762	0.1	25	CH	C
C763	0.1	25	CH	C
C801	150P	50	CH	C
C802	0.22	50	F	H
C803	0.1	25	CH	C
C804	0.1	25	CH	C
C821	0.01	50	F	H
C822	1000P	50	CH	C
C823	0.047	25	CH	C
C824	0.01	50	CH	C
C825	0.1	25	CH	C
C901	330	63	DPF	H
C903	1000P	50	CH	C
C904	0.1	25	CH	C
C905	1	16	CH	C
C909	10	16	MV	H
C916	0.1	25	CH	C
C932	1	16	CH	C

TRANSISTOR

SYMBOL	MODEL	FORM
Q111	2SJ518	C
Q112	2SC5209H	C
Q113	2SC5209H	C
Q114	RN1102	C
Q115	2SA1162Y	C
Q116	RN1102	C
Q521	RN1102	C
Q541	2SD1266-P	H
Q711	2SC4738GRY	C
Q712	2SC344 IE	C
Q722	RN1102	C
Q801	RN1102	C
Q802	RN2102	C
Q803	2SC344 IE	C
Q821	2SC4738GRY	C
Q901	2SJ245S	C
Q902	2SC2462LC	C
Q903	2SC3360	C
Q932	2SC5209H	C
Q933	2SC4738GRY	C

IC

SYMBOL	MODEL	FORM
IC111	NJM2340M	C
REG2	MC7805CT	H
IC401	BR24C04-F	C
IC501	AK-7811	C
IC521	RN5VD42C	C
IC711	ULN2003ANS	C
IC801	NJM2903M	C
IC901	NJM2903M	C

OSCILLATOR

SYMBOL	MODEL	FREQ.	FORM
RES1	CSTLS10MHZ	10MHz	H

ZENER DIODE

SYMBOL	MODEL	FORM
ZD111	RD6.2UJN2	C
ZD121	PTZ20A	C
ZD131	PTZ6.8A	C
ZD411		R
ZD541	RD22UJN2	C
ZD901	UDZ-5.6B	C

CHIP JUMPER

SYMBOL	USAGE	FORM
JU11	EXIST	A
JB01	NONE	C

INDICATION P.W.B.

INDUCTOR

SYMBOL	MODEL	SPEC.	FORM
L101	RCH06-820	82μ, 1.3A	H
L111	RCH08-561	560μ, 0.4A	H
L501	CHIP J.	-	C
L741	CHIP J.	-	C
L742	CHIP J.	-	C
L743	CHIP J.	-	C
L801	LB2518-10M	100μ, 500mA	C
L901	HFE0003	450μ	H
L932	BLM11A601SPT	450Ω 0.2A	C
L933	BLM11A601SPT	450Ω 0.2A	C

BUZZER

SYMBOL	MODEL	FORM
BZ	PKM13EPY	H

LIGHT RECEIVING UNIT

SYMBOL	MODEL	FORM
IRR	GP1U28RA	H

INDICATION P.W.B.

DIODE

SYMBOL	MODEL	FORM
D101	G4DL-6140	H
D111	D1FS6	C
D401	DAN202K	C
D402	ISS355	C
D403	DAP202K	C
D712	DAN202K	C
D821	ISS355	C
D901	LFB01	C
D902	DIFL20U	C
D932	DAN202K	C

CONNECTOR

SYMBOL	MODEL NO.	COLOR	FORM
CN1	PH-4P (TOP ENTRY)	WHITE	H
CN3	XA-3P-V2 (TOP ENTRY)	IVORY	H
CN5	ZR-8P (TOP ENTRY)	IVORY	H
CN6	ZR-5P (TOP ENTRY)	IVORY	H
CN7	PH-11P (TOP ENTRY)	WHITE	H
CN8	PH-10P (TOP ENTRY)	WHITE	H
CN9	XH-4P (TOP ENTRY)	BLACK	H
CN10	XA-4P (TOP ENTRY)	IVORY	H
CN11	SJN-8P (SIDE ENTRY)	WHITE	H
CN11A	PH-8P (TOP ENTRY)	WHITE	H
CN12	XH-3P-V2 (TOP ENTRY)	WHITE	H
CN14	XA-4P (TOP ENTRY)	RED	H
CN16	XA-2P (TOP ENTRY)	IVORY	H

INDICATION P.W.B.

LED

SYMBOL	MODEL	COLOR	FORM
LD1	SEL5420E	RED	H
LD2	SEL5720K	YEL	H
LD3	SEL5920A	GRN	H

INDICATION P.W.B.

SWITCH

SYMBOL	MODEL	FORM
TEMPORARY SW	SKHHLU-SW	H
DRAIN PUMP TEST SW	SSSS9AE	H
STATE PRESSURE	SSSS9AE	H

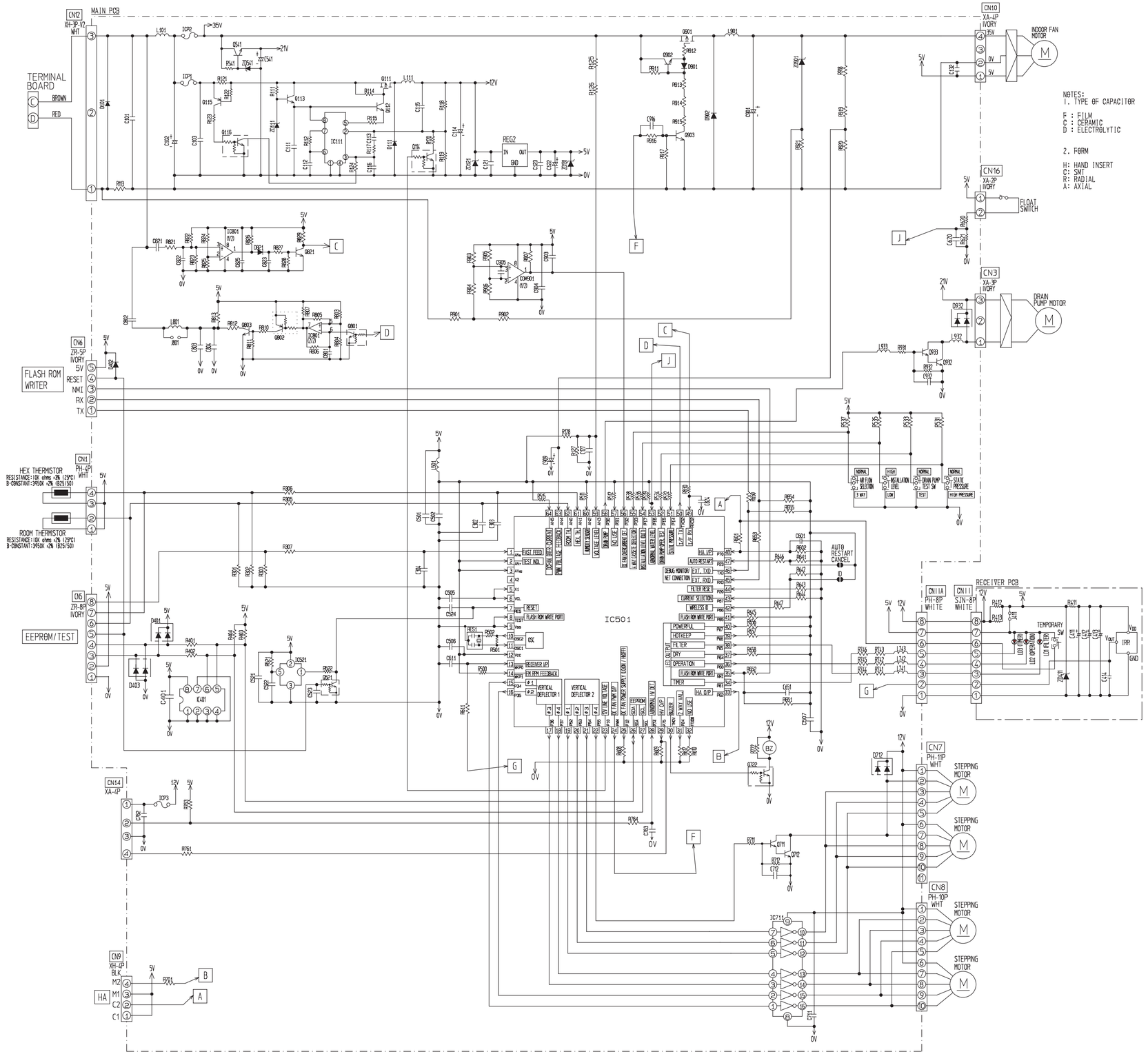
INDICATION P.W.B.

ICP

SYMBOL	MODEL	CUR.	FORM
ICP1	CCP2E-20	0.8A	C
ICP2	CCP2E-50	2.0A	C
ICP3	ICP-50.5	0.5A	C

CIRCUIT DIAGRAM

MODEL RAI-25NH5, RAI-35NH5, RAI-50NH5



RESISTOR

SYMBOL	Ω	±(%)	P(W)	FORM
R111	27K	±5%	1/10	C
R112	30K	±5%	1/16	C
R113	0.3	±5%	1	H
R114	750	±5%	1/8	C
R115	560	±5%	1/8	C
R117	68K	±5%	1/16	C
R118	75K	±2%	1/16	C
R119	6.98K	±2%	1/16	C
R120				
R121	0.56	±5%	1/4W	C
R122	100	±5%	1/16	C
R123	33K	±5%	1/16	C
R124	100	±5%	1/16	C
R125				
R126				
R127				
R128	10K	±5%	1/16	C
R301	12.7K	±1%	1/16	C
R302	12.7K	±1%	1/16	C
R303	10K	±5%	1/16	C
R305	1K	±5%	1/16	C
R306	1K	±5%	1/16	C
R307	1K	±5%	1/16	C
R401	390	±5%	1/16	C
R402	390	±5%	1/16	C
R403	5.1K	±5%	1/16	C
R404	5.1K	±5%	1/16	C
R411				REGISTER PCB
R412				REGISTER PCB
R413				REGISTER PCB

SYMBOL	Ω	±(%)	P(W)	FORM
R500	10K	±5%	1/16	C
R501	1M	±5%	1/16	C
R502	0	±5%	1/16	C
R511	10K	±5%	1/16	C
R512	10K	±5%	1/16	C
R515	10K	±5%	1/16	C
R521	1M	±5%	1/16	C
R522	1K	±5%	1/16	C
R531	10K	±5%	1/16	C
R532	1K	±5%	1/16	C
R533	10K	±5%	1/16	C
R534	1K	±5%	1/16	C
R535	10K	±5%	1/16	C
R536	1K	±5%	1/16	C
R537	10K	±5%	1/16	C
R538	1K	±5%	1/16	C
R539				
R541	3.9K	±5%	1/4	C
R601	1K	±5%	1/16	C
R602	10K	±5%	1/16	C
R608	10K	±5%	1/16	C
R609	10K	±5%	1/16	C
R610	10K	±5%	1/16	C
R611	1K	±5%	1/16	C
R612	10K	±5%	1/16	C
R620	1K	±5%	1/16	C
R621	10K	±5%	1/16	C
R641	10K	±5%	1/16	C
R642	10K	±5%	1/16	C
R643	10K	±5%	1/16	C
R644	10K	±5%	1/16	C

SYMBOL	Ω	±(%)	P(W)	FORM
R645	10K	±5%	1/16	C
R646	1K	±5%	1/16	C
R647	1K	±5%	1/16	C
R650	1K	±5%	1/16	C
R651	1K	±5%	1/16	C
R652	100	±5%	1/16	C
R653	1K	±5%	1/16	C
R654	10K	±5%	1/16	C
R655	10K	±5%	1/16	C
R656	10K	±5%	1/16	C
R657	10K	±5%	1/16	C
R658	10K	±5%	1/16	C
R701	1K	±5%	1/16	C
R711	3K	±5%	1/16	C
R712	10K	±5%	1/16	C
R722	3.3K	±5%	1/10	C
R741	110	±5%	1/10	C
R742	110	±5%	1/10	C
R743	110	±5%	1/10	C
R744	130	±5%	1/10	C
R745	130	±5%	1/10	C
R746	130	±5%	1/10	C
R761				
R763	10K	±5%	1/16	C
R764	1K	±5%	1/16	C
R803	120K	±5%	1/16	C
R804	120K	±5%	1/16	C
R805	120K	±5%	1/16	C
R806	120K	±5%	1/16	C
R807	4.3K	±5%	1/16	C
R810	680	±5%	1/10	C
R811	2K	±5%	1/16	C

SYMBOL	Ω	±(%)	P(W)	FORM
R812	39	±5%	1/8	C
R813	39	±5%	1/8	C
R821	1K	±5%	1/16	C
R822	10K	±1%	1/16	C
R823	10K	±1%	1/16	C
R824	8.25K	±1%	1/16	C
R825	10K	±1%	1/16	C
R826	1K	±5%	1/16	C
R827	3K	±5%	1/16	C
R828	10K	±5%	1/16	C
R829	5.1K	±5%	1/16	C
R830	1K	±5%	1/16	C
R901	1K	±1%	1/10	C
R902	87K	±5%	1/16	C
R903	8.25K	±1%	1/16	C
R904	0	±5%	1/16	C
R905	12.7K	±1%	1/16	C
R906	1K	±1%	1/16	C
R907	2.7K	±5%	1/16	C
R911	1K	±5%	1/4	C
R912	47	±5%	1/10	C
R913	1K	±5%	1/4	C
R914	1K	±5%	1/4	C
R915	1K	±5%	1/4	C
R916	3.3K	±5%	1/16	C
R917	3.3K	±5%	1/16	C
R918	10K	±1%	1/16	C
R919	10K	±1%	1/16	C
R920	2.2K	±1%	1/16	C
R921	12K	±5%	1/16	C
R931	3K	±5%	1/16	C
R932	10K	±5%	1/16	C

CAPACITOR

SYMBOL	MF	V	TYPE	FORM
C101	0.22	50	F	H
C102	330	63	D(PF)	H
C103	470P	630	C	C
C111	2.2	10	C(B)	C
C112	1000P	50	C(B)	C
C113	0.047	25	C(B)	C
C114	220	35	D(PF)	H
C115				
C116				
C121	0.1	25	C(F)	C
C122	100	10	D(PF)	H
C123	0.1	25	C(F)	C
C127				
C132	0.1	25	C(F)	C
C302	0.1	25	C(F)	C
C303	0.1	25	C(F)	C
C304	0.1	25	C(F)	C
C401	0.1	25	C(F)	C
C411	47	16	D	R
C412	47	16	D	R
C413				
C414				
C501	0.1	25	C(F)	C
C502	0.1	25	C(F)	C
C505	0.1	25	C(F)	C
C506	0.1	25	C(F)	C
C507	0.1	25	C(F)	C
C521	0.1	25	C(F)	C
C522	0.22	10	C(B)	C

SYMBOL	MF	V	TYPE	FORM
C523	0.1	25	C(F)	C
C524	0.1	25	C(F)	C
C541	100	50	D(PF)	R
C601	0.1	25	C(F)	C
C611	1000P	50	C(B)	C
C620	0.1	25	C(F)	C
C651	0.1	25	C(F)	C
C711	0.1	25	C(F)	C
C712				
C762				
C763	0.1	25	C(F)	C
C801	150P	50	C(CH)	C
C802	0.22	50	F	H
C803	0.1	25	C(F)	C
C804				
C821	0.01	50	F	H
C822	1000P	50	C(B)	C
C823	0.047	25	C(B)	C
C824	0.01	50	C(B)	C
C825	0.1	25	C(F)	C
C901	330	63	D(PF)	H
C903	1000P	50	C(B)	C
C904	0.1	25	C(F)	C
C905	1	16	C(F)	C
C909	10	16	D(VX)	H
C916				
C932	1	16	C(F)	C

TRANSISTOR

SYMBOL	MODEL	FORM
Q111	2SJ518	C
Q112	2SC5209H	C
Q113	2SC5209H	C
Q114		
Q115	2SA1162Y	C
Q116	RN1102	C
Q521	RN1102	C
Q541	2SD1266-P	H
Q711	2SC4738GRY	C
Q712	2SC344 IE	C
Q722	RN1102	C
QB01	RN1102	C
QB02	RN2102	C
QB03	2SC344 IE	C
QB21	2SC4738GRY	C
Q901	2SJ245S	C
Q902	2SC2462LC	C
Q903	2SC3360	C
Q932	2SC5209H	C
Q933	2SC4738GRY	C

IC

SYMBOL	MODEL	FORM
IC111	NJM2340M	C
REG2	MC7805CT	H
IC401	BR24C04F	C
IC501	AX-7R11	C
IC521	RN5VD42C	C
IC711	ULN2003ANS	C
IC801	NJM2903M	C
IC901	NJM2903M	C

OSCILLATOR

SYMBOL	MODEL	FREQ.	FORM
RES1	OSTLS10MHZ	10MHz	H

ZENER DIODE

SYMBOL	MODEL	FORM
ZD111	RD6.2UUN2	C
ZD121	PTZ20A	C
ZD131	PL7.5B-A	C
ZD411		R REGISTER PCB
ZD541	RD22UUN2	C
ZD901	UDZ-15B	C

CHIP JUMPER

SYMBOL	USAGE	FORM
J411	EXIST	A REGISTER PCB
J801	NONE	C

CONNECTORS

SYMBOL	MODEL NO.	COLOR	FORM	REMARK
CN1	PH-4P (TOP ENTRY)	WHITE	H	ROOM/HEAT EXHG THERMISTOR
CN3	XA-3P-V2 (TOP ENTRY)	IVORY	H	DRAIN PUMP
CN5	ZR-8P (TOP ENTRY)	IVORY	H	EEPROM / TEST
CN6	ZR-5P (TOP ENTRY)	IVORY	H	FLASH ROM
CN7	PH-11P (TOP ENTRY)	WHITE	H	STEPPING MOTOR
CN8	PH-10P (TOP ENTRY)	WHITE	H	STEPPING MOTOR
CN9	XH-4P (TOP ENTRY)	BLACK	H	HA
CN10	XA-4P (TOP ENTRY)	IVORY	H	INDOOR FAN FAN
CN11	SJN-8P (SIDE ENTRY)	WHITE	H	IR BOARD REGISTER PCB
CN11A	PH-8P (TOP ENTRY)	WHITE	H	IR BOARD
CN12	XH-3P-V2 (TOP ENTRY)	WHITE	H	35V SUPPLY
CN14				
CN16	XA-2P (TOP ENTRY)	IVORY	H	FLOAT SW

BUZZER

SYMBOL	MODEL	FORM
BZ	PKM13EPY	H

LIGHT RECEIVING UNIT

SYMBOL	MODEL	FORM
IRR	GP1UZ8RA	H REGISTER PCB

LED

SYMBOL	MODEL	COLOR	FORM
LD1	SEL5420E	RED	H REGISTER PCB
LD2	SEL5720K	YEL	H REGISTER PCB
LD3	SEL5920A	GRN	H REGISTER PCB

ICPS

SYMBOL	MODEL	CUR.	FORM
ICP1	CCP2E-20	0.8A	C
ICP2	CCP2E-50	2.0A	C
ICP3			

SWITCH

SYMBOL	MODEL	FORM
TEMPORARY SW	SKHHLU-SW	H REGISTER PCB
DRAIN PUMP TEST SW	SSSS9AE	H
STATE PRESSURE	SSSS9AE	H
AIR FLOW SELECTION	SSSS9AE	H
INSTALLATION LEVEL	SSSS9AE	H

INDUCTOR

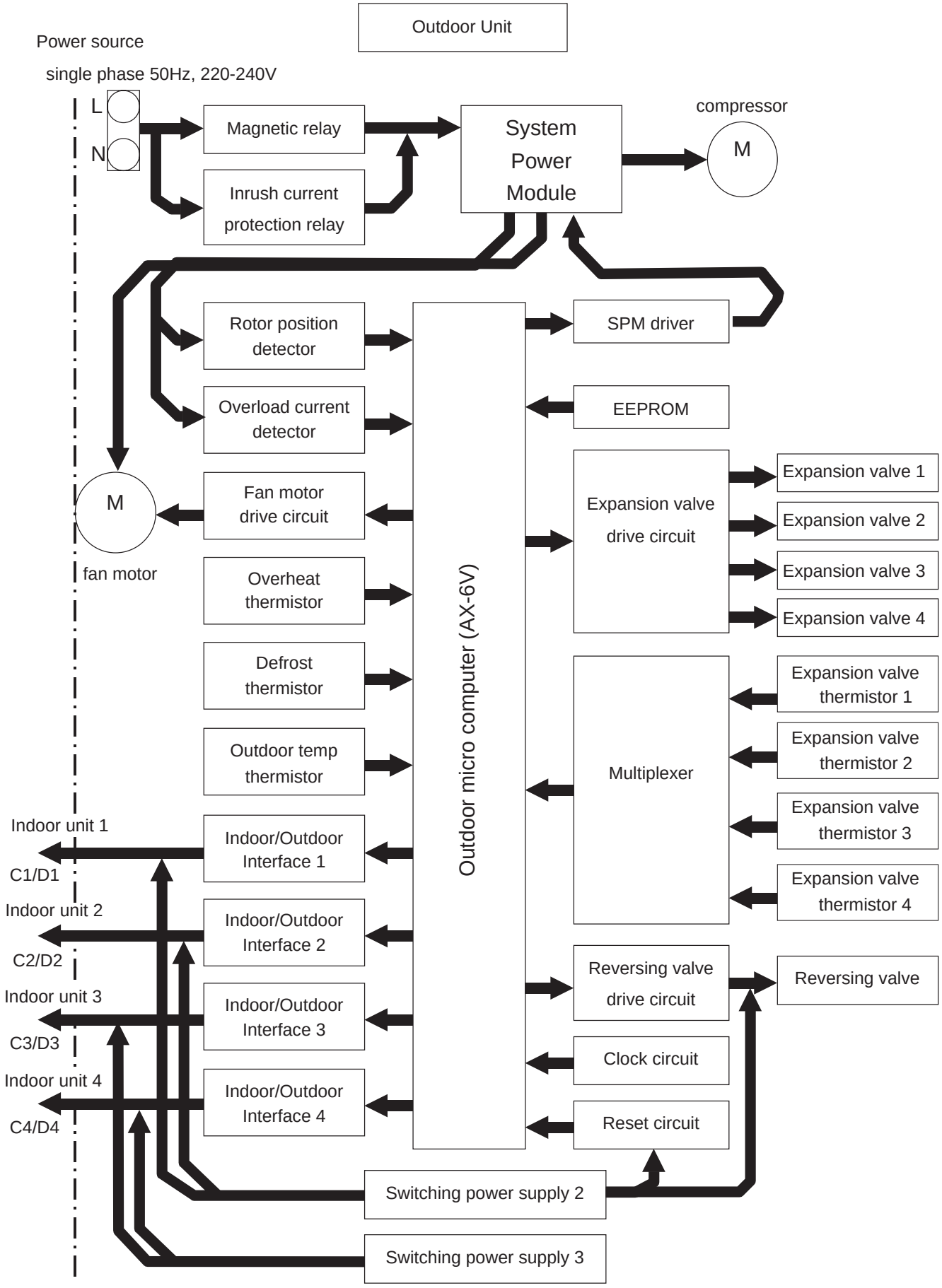
SYMBOL	MODEL	SPEC.	FORM
L101	RCH105-820	82μ, 1.3A	H
L111	RCH108-561	560μ, 0.4A	H
L501	CHIP JUMPER	-	C
L741	CHIP JUMPER	-	C
L742	CHIP JUMPER	-	C
L743	CHIP JUMPER	-	C
L801	LB2518-10M	10Ω, 500mA	C
L901	HFE0013	450μ	H
L932	BLM11A601SPT	450Ω 0.2A	C
L933	BLM11A601SPT	450Ω 0.2A	C

DIODE

SYMBOL	MODEL	FORM
D101	G4CL-6140	H
D111	D1FS6	C
D401	DAN202K	C
D402	ISS355	C
D403	DAP202K	C
D712	DAN202K	C
D821	ISS355	C
D901	LFB01	C
D902	D1FL20U	C
D932	DAN202K	C

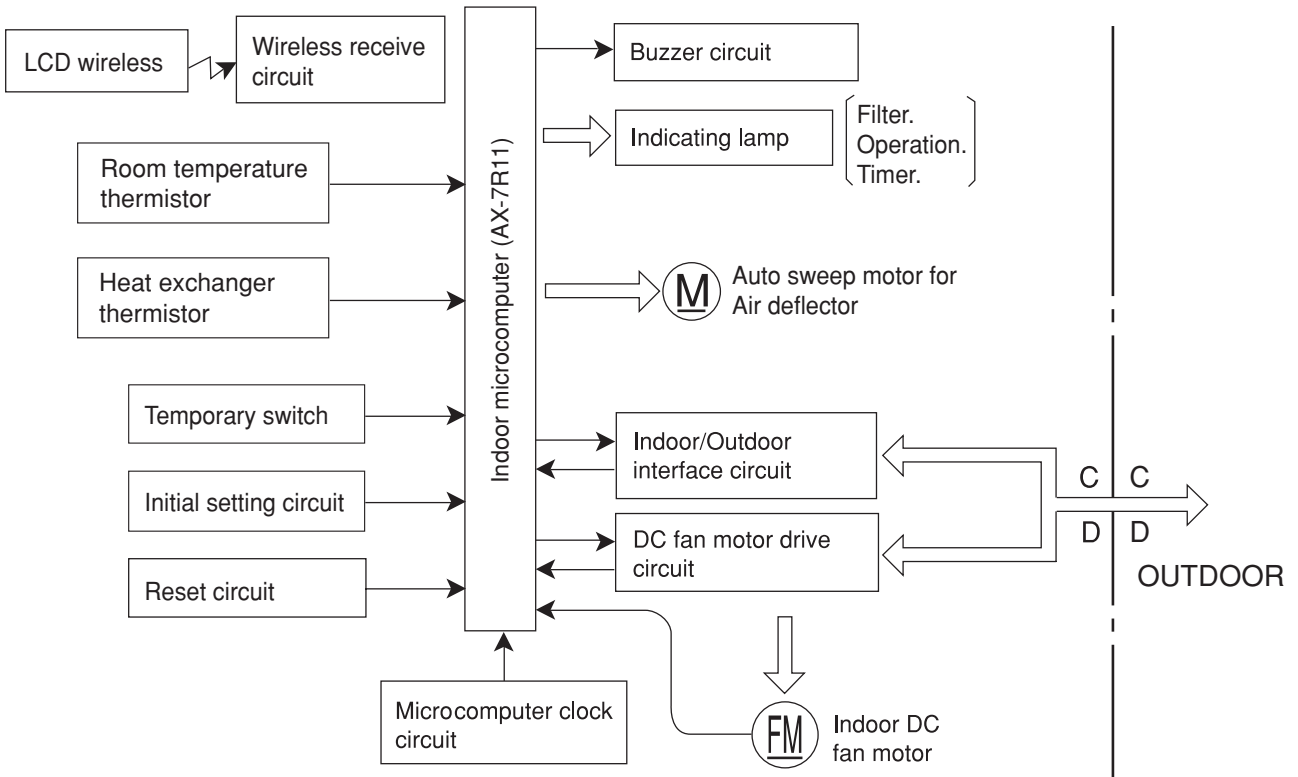
BLOCK DIAGRAM

MODEL RAM-72QH5

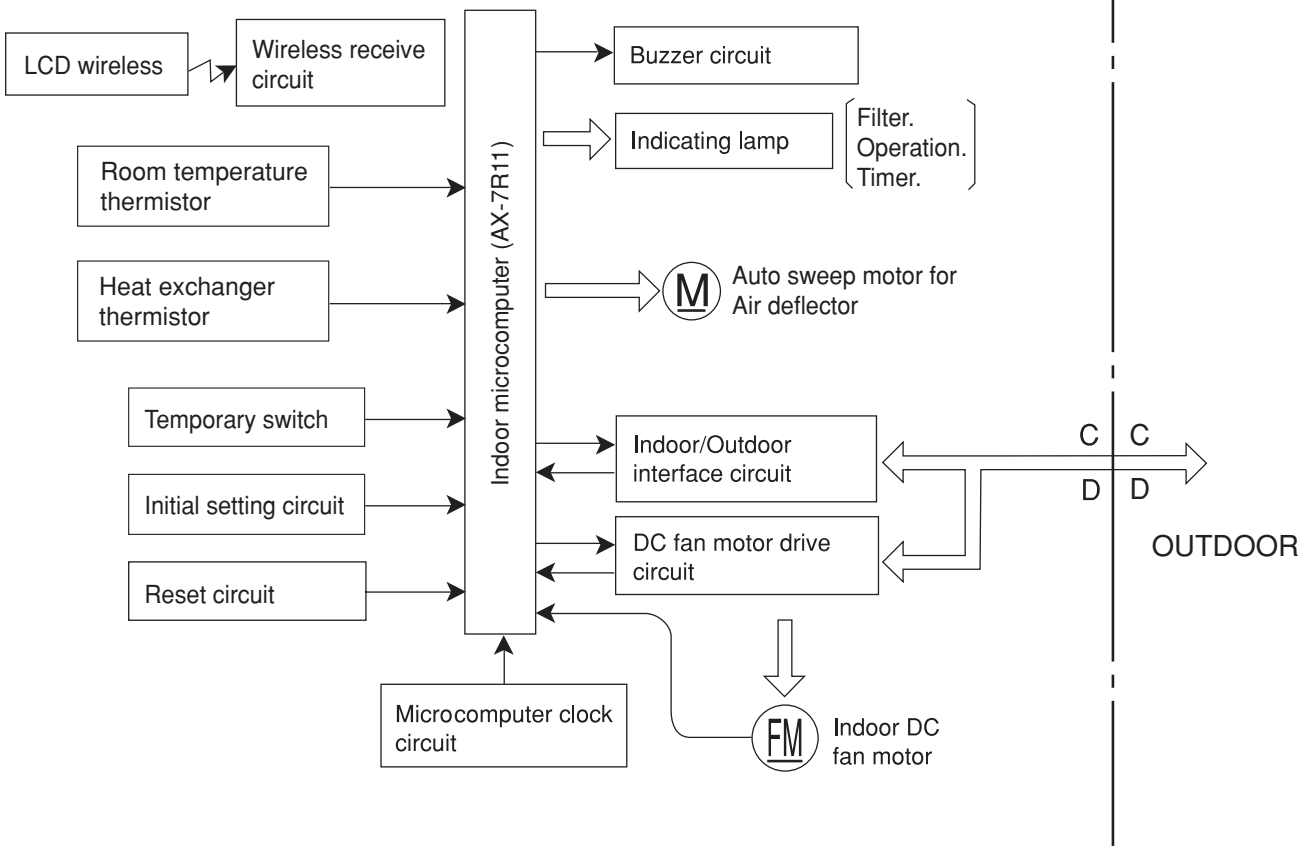


BLOCK DIAGRAM

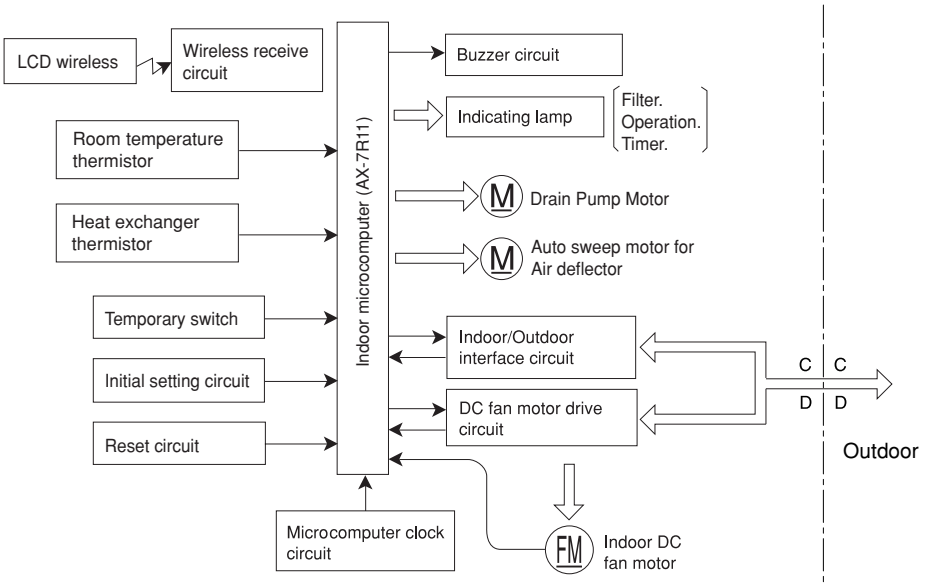
MODEL RAK-18NH5, RAK-25NH5, RAK-35NH5



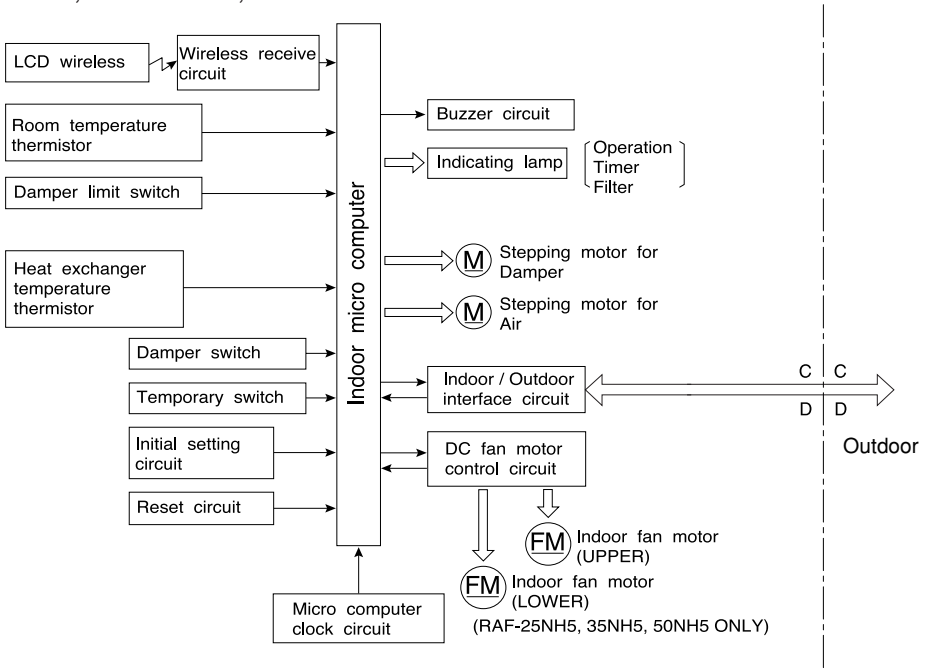
MODEL RAK-65NH5



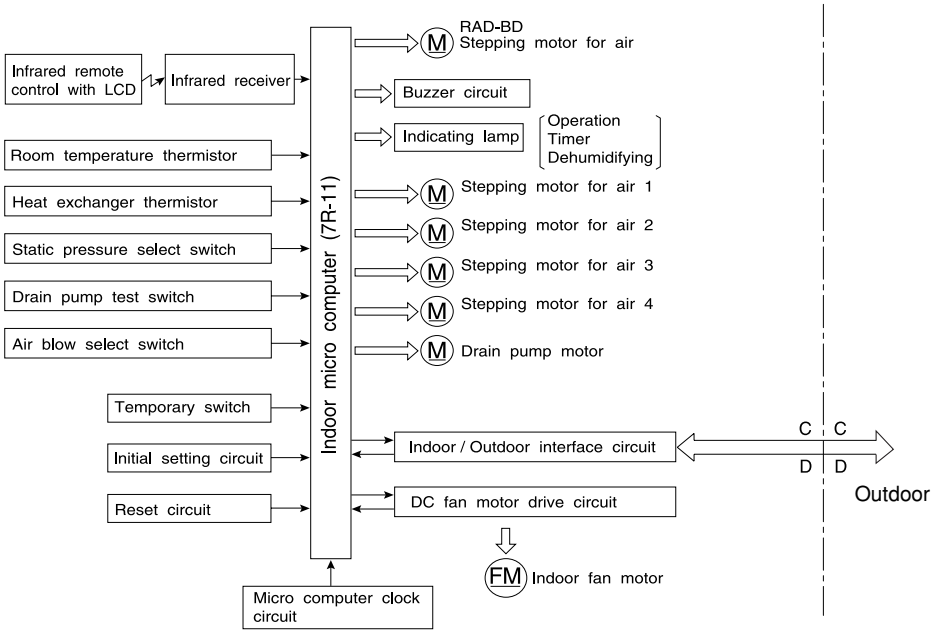
MODEL RAI-25NH5, RAI-35NH5, RAI-50NH5



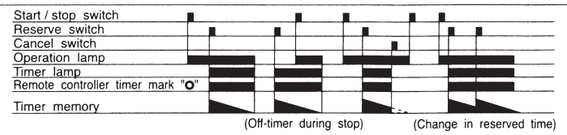
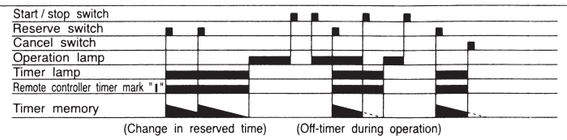
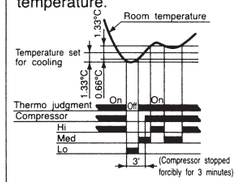
MODEL RAF-25NH5, RAF-35NH5, RAF-50NH5

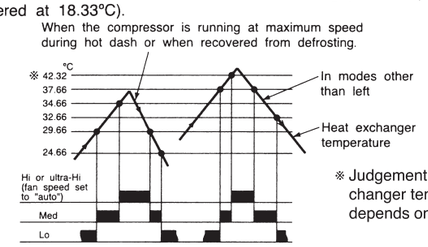


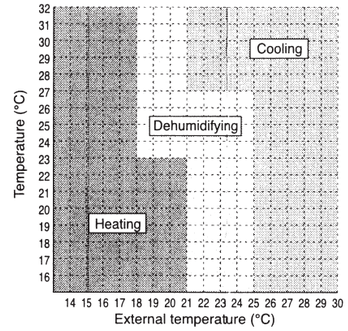
MODEL RAD-25NH5, RAD-35NH5, RAD-50NH5



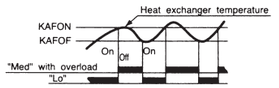
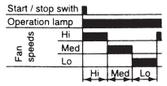
BASIC MODE

<table>
<tr><th colspan="2">Operation mode</th><th>Fan</th><th>Cooling</th><th>Dehumidifying</th><th>Heating</th><th>Auto</th></tr>
<tr><td colspan="2">Basic operation of start / stop switch</td><td colspan="5"> 
</td></tr>
<tr><td rowspan="2">Timer functions</td><td>Off-timer</td><td colspan="5"> 
</td></tr>
<tr><td>On-timer</td><td colspan="5"> 
</td></tr>
<tr><td rowspan="5">Fan speed mode (indoor fan)</td><td>Auto</td><td></td><td>Changes from "Hi" to "Med" or "Lo" depending on room temperature.
 

1. Runs at "Hi" until first thermo off after operation is started.
2. Runs at "Lo" when thermo is off.</td><td></td><td>Set to "Ultra-Lo", "Lo", "Med", "Hi", "Ultra-Hi" or "stop" depending on the room temperature, time and heat exchange temperature. Set to "stop" if the room temperature is 18°C in the "Ultra-Lo" mode other than during preheating (cooling is recovered at 18.33°C).
 

※ Judgement of heat-ex changer temperature depends on the model.</td><td rowspan="4">(Operation mode)
o Judgment based on the room temperature and external temperature:
Cooling: external temperature ≧ 25°C, or 21°C ≦ external temperature < 25°C and room temperature > 27°C
Heating: external temperature < 18°C, or 18°C ≦ external temperature < 21°C and room temperature ≦ 23°C
Dehumidifying: 21°C ≦ external temperature < 25°C and room temperature ≦ 27°C, or 18°C ≦ external temperature < 21°C and room temperature > 23°C
o Set to the mode of the indoor unit that has previously been operating.
If, when one indoor unit is heating, the other unit is set to auto, the other unit will also enter the heating operation.
If, when one indoor unit is cooling or dehumidifying, the other unit is set to auto, the other unit will enter the cooling or dehumidifying operation.
 

※ Operation mode stays uncharged even if the room or ambient temperature changes during operation.

(Set room temperature)
o All the following temperatures can be compensated for ±3°C using the remote control:
Cooling: 27°C
Heating: 23°C
Dehumidifying: Current room temperature (upper limit: 27°C, lower limit: 23°C)
※ Operates at a target of set temperature minus 2°C.</td></tr>
<tr><td>Hi</td><td>Operates at "Hi" regardless of the room temperature.</td><td>Set to "Ultra-Hi" when the compressor runs at maximum speed, and to "Hi" in other modes.</td><td></td><td>Set to "Ultra-Lo", "Lo", "Med", "Hi", "Ultra-Hi" or "Stop" depending on the room temperature and time.
Set to "Stop" if the room temperature is 18°C in the "Ultra-Lo" mode other than during preheating (cooling is recovered at 18.33°C).
Set to "Ultra-Hi" when the compressor is running at maximum speed during hot dash or when recovered from defrosting.</td></tr>
<tr><td>Med</td><td>Operates at "Med" regardless of the room temperature.</td><td>Same as at left.</td><td></td><td>Set to "Ultra-Lo", "Lo", "Med" or "Stop" depending on the room temperature and time.
Set to "Stop" if the room temperature is 18°C in the "Ultra-Lo" mode other than during preheating (cooling is recovered at 18.33°C).</td></tr>
<tr><td>Lo</td><td>Operates at "Lo" regardless of the room temperature.</td><td>Same as at left.</td><td>Set to "Lo" in modes other than when the compressor stops.</td><td>Set to "Ultra-Lo", "Lo", or "Stop" depending on the room temperature and time.
Set to "Stop" if the room temperature is 18°C in the "Ultra-Lo" mode other than during preheating (cooling is recovered at 18.33°C).
The fan speed is controlled by the heat exchanger temperature; the overload control is executed as in the following diagram:
 
</td></tr>
<tr><td colspan="2">Basic operation of temperature controller</td><td>Performs only fan operation at the set speed regardless of the room temperature.
 
</td><td>See page 53.</td><td>See page 95.</td><td>See page 99.</td></tr>
<tr><td colspan="2">Sleep operation (with sleep button ON)</td><td>Enters sleep operation after set as on the left.
Action during sleep operation silent (sleep) operation</td><td>·Same as at left.
·See page 55.</td><td>·Same as at left.
·See page 97.</td><td>·Same as at left.
·See page 99.</td><td>·Same as at left.
·Performs the sleep operation of each operation mode.</td></tr>
</table>

Combination of operations:

(When operation mode is selected:)

·You cannot operate the indoor units in the following combinations.
·The indoor unit which is switched on first continues to operate, but other indoor units which is switched on later, does not operate while the lamp lights.

One unit	Other unit
Heating	Cooling
	Dehumidifying
	Circulating (fan)

(During automatic operation:)

·When heating operation is automatically selected for the first indoor unit, the next indoor unit will then start to heat. Also, if cooling or dehumidifying is automatically selected for the first indoor unit, the next indoor unit will also start to cool or dehumidify.

Notes:
1. Refer to the PWRITE-ZU data for the constants expressed by capital alphabet letters in the drawing.
2. The speed set of rotaion for the fan motor in each operation mode are as shown in Table 1.
3. The set room temperatures in the diagram include the shift values in Table 2.

MODEL		RAK-18NH5	RAK-25NH5	RAK-35NH5	RAK-50NH5
PROM NO.	LABEL NAME	REQUIRED VALUE OF UNIT SIDE	REQUIRED VALUE OF UNIT SIDE	REQUIRED VALUE OF UNIT SIDE	REQUIRED VALUE OF UNIT SIDE
0A2	RTOTSA	0 °C	0 °C	2.00 °C	2.00 °C
120	WMAX_M	5300 min^{-1}	5300 min^{-1}	5000 min^{-1}	4500 min^{-1}
121	WMAX2_M	5300 min^{-1}	5300 min^{-1}	5000 min^{-1}	4500 min^{-1}
122	WSTD_M	4000 min^{-1}	4000 min^{-1}	4000 min^{-1}	4000 min^{-1}
123	WJKMAX_M	3700 min^{-1}	3700 min^{-1}	3700 min^{-1}	4000 min^{-1}
124	WBEMAX_M	3500 min^{-1}	3500 min^{-1}	3500 min^{-1}	3700 min^{-1}
127	CMAX_M	3300 min^{-1}	3300 min^{-1}	3300 min^{-1}	4000 min^{-1}
128	CMAX2_M	3300 min^{-1}	3300 min^{-1}	3300 min^{-1}	4000 min^{-1}
129	CSTD_M	3250 min^{-1}	3250 min^{-1}	3150 min^{-1}	3100 min^{-1}
12A	CKYMAX_M	2800 min^{-1}	2800 min^{-1}	2800 min^{-1}	2800 min^{-1}
12B	CJKMAX_M	2750 min^{-1}	2750 min^{-1}	2750 min^{-1}	2750 min^{-1}
12C	CBEMAX_M	2500 min^{-1}	2500 min^{-1}	2500 min^{-1}	2500 min^{-1}
12F	SDMAX_M	2400 min^{-1}	2400 min^{-1}	1550 min^{-1}	1800 min^{-1}
130	SDRPM_M	2100 min^{-1}	2100 min^{-1}	1400 min^{-1}	1100 min^{-1}
138	WMIN_M	800 min^{-1}	800 min^{-1}	800 min^{-1}	800 min^{-1}
139	CMINHI_M	800 min^{-1}	800 min^{-1}	800 min^{-1}	800 min^{-1}
13A	CMIN_M	1200 min^{-1}	1200 min^{-1}	1200 min^{-1}	1200 min^{-1}
13B	DMIN_M	1200 min^{-1}	1200 min^{-1}	1200 min^{-1}	1200 min^{-1}
13C	PKOU_M	550 min^{-1}	550 min^{-1}	550 min^{-1}	550 min^{-1}
13D	FZZY_GN_M	1.5	1.5	1.5	1.5
13E	FZZYTM_M	4 min.	4 min.	4 min.	4 min.
144	SHIFTW_M	2.00 °C	2.00 °C	2.00 °C	2.00 °C
145	SFTSZW_M	2.00 °C	2.00 °C	2.00 °C	2.00 °C
146	SHIFTC_M	1.33 °C	1.33 °C	1.33 °C	1.33 °C
147	SHIFTD_M	3.33 °C	3.33 °C	3.33 °C	3.33 °C
148	CLMXTP_M	30.00 °C	30.00 °C	30.00 °C	30.00 °C
149	YNEOF_M	25.00 °C	25.00 °C	25.00 °C	20.00 °C
14E	TEION_M	2.00 °C	2.00 °C	2.00 °C	2.00 °C
14F	TEIOF_M	9.00 °C	9.00 °C	9.00 °C	9.00 °C
157	CMNLMT_M	0 min^{-1}	0 min^{-1}	0 min^{-1}	1950 min^{-1}
178	FWSS_M	500 min^{-1}	500 min^{-1}	500 min^{-1}	450 min^{-1}
179	FWSOY_M	600 min^{-1}	600 min^{-1}	700 min^{-1}	760 min^{-1}
17A	FWS_M	720 min^{-1}	750 min^{-1}	820 min^{-1}	850 min^{-1}
17B	FWKAF_M	840 min^{-1}	850 min^{-1}	920 min^{-1}	1000 min^{-1}
17C	FWL_M	840 min^{-1}	850 min^{-1}	920 min^{-1}	1130 min^{-1}
17D	FWAH_M	940 min^{-1}	1050 min^{-1}	1120 min^{-1}	1270 min^{-1}
17E	FWH_M	940 min^{-1}	1050 min^{-1}	1120 min^{-1}	1330 min^{-1}
17F	FWHH_M	1030 min^{-1}	1170 min^{-1}	1250 min^{-1}	1330 min^{-1}
180	FCSOY_M	550 min^{-1}	600 min^{-1}	680 min^{-1}	700 min^{-1}
181	FCS_M	650 min^{-1}	750 min^{-1}	780 min^{-1}	800 min^{-1}
182	FCL_M	740 min^{-1}	870 min^{-1}	950 min^{-1}	1040 min^{-1}
183	FCAH_M	850 min^{-1}	980 min^{-1}	1030 min^{-1}	1410 min^{-1}
184	FCH_M	890 min^{-1}	1030 min^{-1}	1170 min^{-1}	1410 min^{-1}
185	FCHH_M	990 min^{-1}	1030 min^{-1}	1200 min^{-1}	1410 min^{-1}
186	FDOY_M	600 min^{-1}	600 min^{-1}	680 min^{-1}	700 min^{-1}
187	FDS1_M	720 min^{-1}	750 min^{-1}	780 min^{-1}	800 min^{-1}
188	FDS2_M	720 min^{-1}	750 min^{-1}	780 min^{-1}	800 min^{-1}

Table 1 Fan speed by mode

Operation mode	Fan speed mode		Label name
Heating operation	Ultra Lo		FWSS_M
	Sleep		FWSOY_M
	Lo		FWS_M
	Overload		FWKAF_M
	Med		FWL_M
	Hi	Set fan speed "AUTO"	FWAH_M
	Hi	Set fan speed "HI"	FWH_M
	Ultra Hi		FWHH_M
Cooling operation	Sleep		FCSOY_M
	Lo		FCS_M
	Med		FCL_M
	Hi	Set fan speed "AUTO"	FCAH_M
	Hi	Set fan speed "HI"	FCH_M
	Ultra Hi		FCHH_M
Dehumidifying operation	Sleep		FDOY_M
	Lo 1		FDS1_M
	Lo 2		FDS2_M

Table 2 Room temperature shift value

Operation mode		Label name
Heating operation	Fan speed "AUTO, Hi, Med"	SHIFTW_M
	Fan speed "Lo, Sleep"	SFTSZW_M
Cooling operation		SHIFTC_M
Dehumidifying operation		SHIFTD_M

Table 1 Mode data file

	RAK-65NH5
LABEL NAME	**VALUE**
WMAX	6300 min^{-1}
WMAX2	6300 min^{-1}
WSTD	5900 min^{-1}
WBEMAX	3600 min^{-1}
CMAX	6300 min^{-1}
CMAX2	6300 min^{-1}
CSTD	5850 min^{-1}
CKYMAX	4550 min^{-1}
CJKMAX	3700 min^{-1}
CBEMAX	3000 min^{-1}
WMIN	1200 min^{-1}
CMIN	1500 min^{-1}
STARTMC	60 Seconds
DWNRATEW	80%
DWNRATEC	80%
SHIFTW	3.33°C
SHIFTC	0.33°C
CLMXTP	30.00°C
YNEOF	28.00°C
TEION	2.00°C
TEIOF	9.00°C
SFTDSW	1.00°C
DFTIM1	45 Minutes
DFTIM2	60 Minutes

MODEL		RAF-25NH5	RAF-35NH5	RAF-50NH5
N O .	LABEL NAME	REQUIRED VALUE OF UNIT SIDE	REQUIRED VALUE OF UNIT SIDE	REQUIRED VALUE OF UNIT SIDE
09C	RTOTSA	2.00 °C	2.00 °C	2.00 °C
120	WMAX_M	5300 min^{-1}	5000 min^{-1}	4500 min^{-1}
121	WMAX2_M	5300 min^{-1}	5000 min^{-1}	4500 min^{-1}
122	WSTD_M	4000 min^{-1}	4000 min^{-1}	4000 min^{-1}
123	WJKMAX_M	3700 min^{-1}	3700 min^{-1}	4000 min^{-1}
124	WBEMAX_M	3500 min^{-1}	3500 min^{-1}	3700 min^{-1}
125	CMAX_M	3500 min^{-1}	3300 min^{-1}	4000 min^{-1}
126	CMAX2_M	3500 min^{-1}	3300 min^{-1}	4000 min^{-1}
127	CSTD_M	3250 min^{-1}	3150 min^{-1}	3100 min^{-1}
128	CKYMAX_M	2800 min^{-1}	2800 min^{-1}	2800 min^{-1}
129	CJKMAX_M	2750 min^{-1}	2750 min^{-1}	2750 min^{-1}
12A	CBEMAX_M	2500 min^{-1}	2500 min^{-1}	2500 min^{-1}
12B	SDMAX_M	2400 min^{-1}	2400 min^{-1}	1800 min^{-1}
12C	SDRPM_M	2000 min^{-1}	2000 min^{-1}	1100 min^{-1}
132	WMIN_M	800 min^{-1}	800 min^{-1}	800 min^{-1}
133	CMINHI_M	800 min^{-1}	800 min^{-1}	800 min^{-1}
134	CMIN_M	1200 min^{-1}	1200 min^{-1}	1200 min^{-1}
135	DMIN_M	1200 min^{-1}	1200 min^{-1}	1100 min^{-1}
136	PKOU_M	500 min^{-1}	500 min^{-1}	500 min^{-1}
137	FZZY_GN_M	1.0	1.0	1.0
138	FZZYTM_M	3 min.	3 min.	3 min.
13E	SHIFTW_M	2.33 °C	2.33 °C	2.33 °C
13F	SFTSZW_M	0.66 °C	0.66 °C	0.66 °C
140	SHIFTO_M	-0.66 °C	-0.66 °C	-0.66 °C
141	SHIFTD_M	-0.66 °C	-0.66 °C	-0.66 °C
142	CLMXTP_M	30.00 °C	30.00 °C	30.00 °C
143	YNEOF_M	23.00 °C	23.00 °C	23.00 °C
148	TEION_M	2.00 °C	2.00 °C	2.00 °C
149	TEIOF_M	9.00 °C	9.00 °C	9.00 °C
150	CMNLMT_M	1900 min^{-1}	1900 min^{-1}	1900 min^{-1}
16D	FWSS_M	400 min^{-1}	400 min^{-1}	400 min^{-1}
16E	FWSOY_M	710 min^{-1}	720 min^{-1}	740 min^{-1}
16F	FWS_M	710 min^{-1}	800 min^{-1}	820 min^{-1}
170	FWKAF_M	790 min^{-1}	880 min^{-1}	950 min^{-1}
171	FWL_M	790 min^{-1}	880 min^{-1}	950 min^{-1}
172	FWAH_M	830 min^{-1}	960 min^{-1}	1040 min^{-1}
173	FWH_M	870 min^{-1}	1000 min^{-1}	1080 min^{-1}
174	FWHM_M	960 min^{-1}	1050 min^{-1}	1100 min^{-1}
175	FWHH_M	960 min^{-1}	1050 min^{-1}	1110 min^{-1}
176	FCSOY_M	670 min^{-1}	670 min^{-1}	670 min^{-1}
177	FCS_M	670 min^{-1}	770 min^{-1}	730 min^{-1}
178	FCL_M	750 min^{-1}	860 min^{-1}	920 min^{-1}
179	FCAH_M	790 min^{-1}	950 min^{-1}	1000 min^{-1}
17A	FCH_M	830 min^{-1}	1000 min^{-1}	1050 min^{-1}
17B	FCHM_M	880 min^{-1}	1040 min^{-1}	1090 min^{-1}
17C	FCHH_M	880 min^{-1}	1040 min^{-1}	1090 min^{-1}
17D	FDOY_M	670 min^{-1}	700 min^{-1}	730 min^{-1}
17E	FDS1_M	670 min^{-1}	700 min^{-1}	730 min^{-1}
17F	FDS2_M	670 min^{-1}	700 min^{-1}	730 min^{-1}
180	FCLN_M	600 min^{-1}	600 min^{-1}	600 min^{-1}
186	FWOPN_M	1060 min^{-1}	960 min^{-1}	1250 min^{-1}
187	FCOPN_M	1020 min^{-1}	880 min^{-1}	1090 min^{-1}
188	FWCLD_M	1060 min^{-1}	960 min^{-1}	1250 min^{-1}
189	FCCLD_M	1020 min^{-1}	880 min^{-1}	1090 min^{-1}
18A	FWUDSS_M	400 min^{-1}	400 min^{-1}	400 min^{-1}
18B	FWUDSOY_M	640 min^{-1}	640 min^{-1}	660 min^{-1}
18C	FWUDS_M	640 min^{-1}	720 min^{-1}	740 min^{-1}
18D	FWUDKAF_M	710 min^{-1}	780 min^{-1}	860 min^{-1}
18E	FWUDL_M	710 min^{-1}	780 min^{-1}	860 min^{-1}
18F	FWUDAH_M	750 min^{-1}	880 min^{-1}	950 min^{-1}
190	FWUDH_M	780 min^{-1}	900 min^{-1}	970 min^{-1}
191	FWUDHH_M	870 min^{-1}	950 min^{-1}	990 min^{-1}
192	FCUDSOY_M	600 min^{-1}	630 min^{-1}	660 min^{-1}
193	FCUDS_M	600 min^{-1}	630 min^{-1}	660 min^{-1}
194	FCUDL_M	680 min^{-1}	780 min^{-1}	820 min^{-1}
195	FCUDAH_M	710 min^{-1}	860 min^{-1}	900 min^{-1}
196	FCUDH_M	750 min^{-1}	900 min^{-1}	940 min^{-1}
197	FCUDHH_M	790 min^{-1}	940 min^{-1}	980 min^{-1}
19D	FWUDOPN_M	950 min^{-1}	870 min^{-1}	1100 min^{-1}
19E	FCUDOPN_M	900 min^{-1}	790 min^{-1}	980 min^{-1}

Table 1 Fan speed by mode

Operation mode		Fan speed mode		Label name
Heating operation	Upper Fan	Ultra Lo		FWSS_M
		Sleep		FWSOY_M
		Lo		FWS_M
		Overload		FWKAF_M
		Med		FWL_M
		Hi	Set fan speed "HI"	FWH_M
		Ultra Hi	(When AIR OUTLET SWITCH "ON")	FWHM_M
		Ultra Hi	(When AIR OUTLET SWITCH "OFF")	FWHM_M
		Hi	Set fan speed "AUTO"	FWAH_M
	Lower Fan	Ultra Lo		FWUDSS_M
		Sleep		FWUDSOY_M
		Lo		FWUDS_M
		Overload		FWUDKAF_M
		Med		FWUDL_M
		Hi	Set fan speed "HI"	FWUDH_M
		Ultra Hi		FWUDHH_M
		Hi	Set fan speed "AUTO"	FWUDAH_M
Cooling operation	Upper Fan	Sleep		FCSOY_M
		Lo		FCS_M
		Med		FCL_M
		Hi	Set fan speed "HI"	FCH_M
		Ultra Hi	(When AIR OUTLET SWITCH "ON")	FCHM_M
		Ultra Hi	(When AIR OUTLET SWITCH "OFF")	FCHH_M
		Hi	Set fan speed "AUTO"	FCAH_M
	Lower Fan	Sleep		FCUDSOY_M
		Lo		FCUDS_M
		Med		FCUDL_M
		Hi	Set fan speed "HI"	FCUDH_M
		Ultra Hi		FCUDHH_M
		Hi	Set fan speed "AUTO"	FCUDAH_M
Dehumidifying operation		Sleep		FDOY_M
		Lo1		FDS1_M
		Lo2		FDS2_M

Table 2 Room temperature shift value

Operation mode		Shift value
Heating operation	Fan speed "AUTO, Hi, Med"	SHIFTW
	Fan speed "Lo, Sleep"	SFTSZW
Cooling operation		SHIFTC
Dehumidifying operation		SHIFTD

MODEL		RAD-25NH5	RAD-35NH5
PROM NO.	LABEL NAME	REQUIRED VALUE OF UNIT SIDE	REQUIRED VALUE OF UNIT SIDE
0A2	RTOTSA	2.00 °C	2.00 °C
120	WMAX_M	5300 min^{-1}	5000 min^{-1}
121	WMAX2_M	5300 min^{-1}	5000 min^{-1}
122	WSTD_M	4000 min^{-1}	4000 min^{-1}
123	WJKMAX_M	3600 min^{-1}	3700 min^{-1}
124	WBEMAX_M	3200 min^{-1}	3500 min^{-1}
127	CMAX_M	3300 min^{-1}	3300 min^{-1}
128	CMAX2_M	3300 min^{-1}	3300 min^{-1}
129	CSTD_M	3000 min^{-1}	3150 min^{-1}
12A	CKYMAX_M	2500 min^{-1}	2800 min^{-1}
12B	CJKMAX_M	2300 min^{-1}	2750 min^{-1}
12C	CBEMAX_M	1900 min^{-1}	2500 min^{-1}
12F	SDMAX_M	2050 min^{-1}	2400 min^{-1}
130	SDRPM_M	1800 min^{-1}	2000 min^{-1}
138	WMIN_M	800 min^{-1}	800 min^{-1}
139	CMINHI_M	800 min^{-1}	800 min^{-1}
13A	CMIN_M	1000 min^{-1}	1200 min^{-1}
13B	DMIN_M	1000 min^{-1}	1200 min^{-1}
13C	PKOU_M	500 min^{-1}	500 min^{-1}
13D	FZZY_GN_M	1.0	1.0
13E	FZZYTM_M	3 min.	3 min.
144	SHIFTW_M	5.00 °C	5.00 °C
145	SFTSZW_M	5.00 °C	5.00 °C
146	SHIFTC_M	1.66 °C	1.66 °C
147	SHIFTD_M	1.66 °C	1.66 °C
148	CLMXTP_M	30.00 °C	30.00 °C
149	YNEOF_M	20.00 °C	20.00 °C
14E	TEION_M	0.00 °C	0.00 °C
14F	TEIOF_M	9.00 °C	9.00 °C
157	CMNLMT_M	0 min^{-1}	0 min^{-1}
178	FWSS_M	13.1 V	13.1 V
179	FWSOY_M	17.6 V	17.6 V
17A	FWS_M	20.3 V	20.3 V
17B	FWKAF_M	22.9 V	22.9 V
17C	FWL_M	22.9 V	22.9 V
17D	FWAH_M	27.9 V	27.9 V
17E	FWH_M	28.3 V	28.3 V
17F	FWHH_M	28.3 V	28.3 V
180	FCSOY_M	18.0 V	18.0 V
181	FCS_M	20.5 V	20.5 V
182	FCL_M	25.0 V	25.0 V
183	FCAH_M	27.9 V	27.9 V
184	FCH_M	27.9 V	27.9 V
185	FCHH_M	27.9 V	27.9 V
186	FDOY_M	18.0 V	18.0 V
187	FDS1_M	20.5 V	20.5 V
188	FDS2_M	20.5 V	20.5 V

Table 1 Fan speed by mode

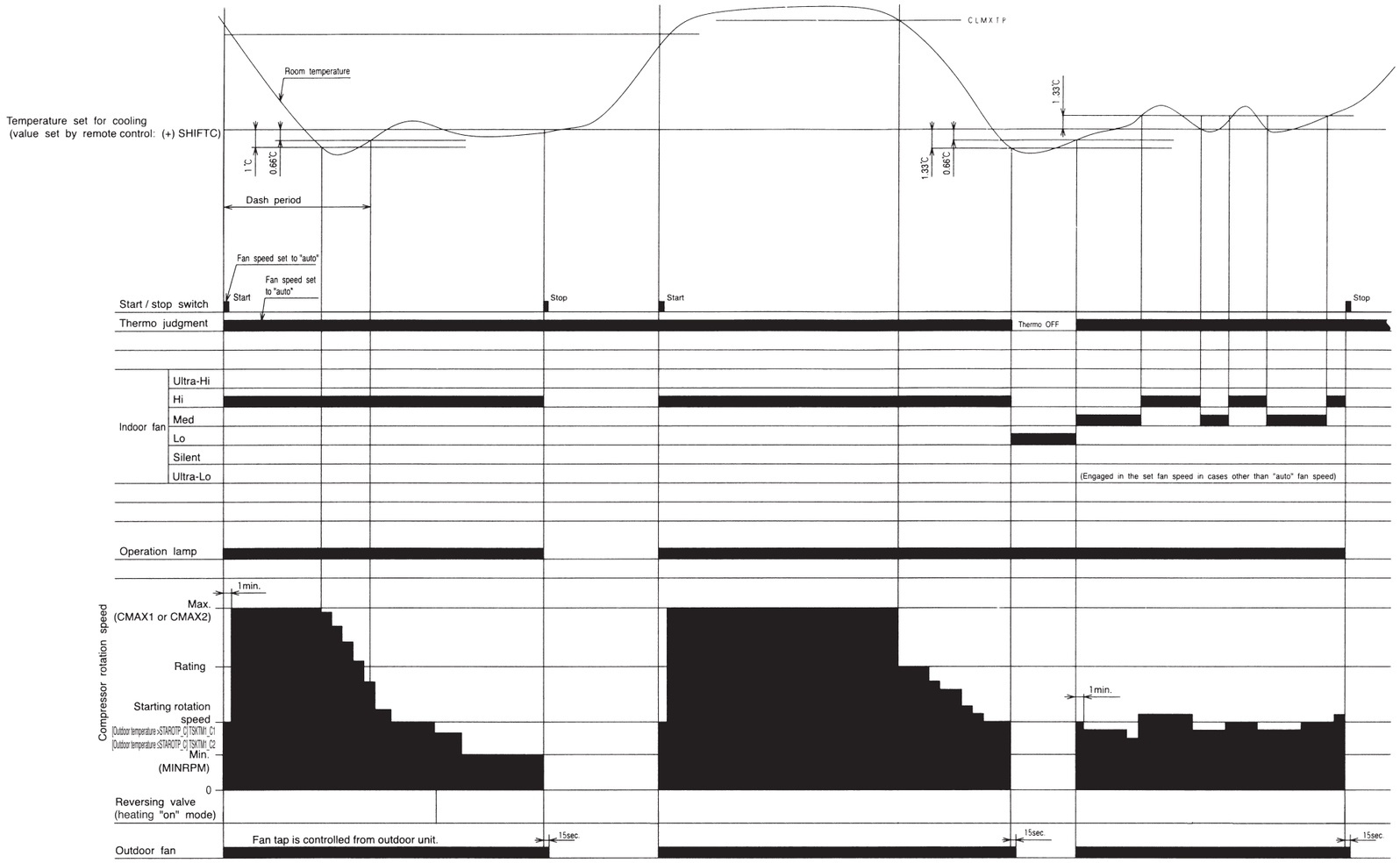
Operation mode	Fan speed mode		Label name
Heating operation	Ultra Lo		FWSS_M
	Sleep		FWSOY_M
	Lo		FWS_M
	Overload		FWKAF_M
	Med		FWL_M
	Hi	Set fan speed "AUTO"	FWAH_M
	Hi	Set fan speed "HI"	FWH_M
	Ultra Hi		FWHH_M
Cooling operation	Sleep		FCSOY_M
	Lo		FCS_M
	Med		FCL_M
	Hi	Set fan speed "AUTO"	FCAH_M
	Hi	Set fan speed "HI"	FCH_M
	Ultra Hi		FCHH_M
Dehumidifying operation	Sleep		FDOY_M
	Lo 1		FDS1_M
	Lo 2		FDS2_M

Table 2 Room temperature shift value

Operation mode		Label name
Heating operation	Fan speed "AUTO, Hi, Med"	SHIFTW_M
	Fan speed "Lo, Sleep"	SFTSZW_M
Cooling operation		SHIFTC_M
Dehumidifying operation		SHIFTD_M

MODEL		RAM-72QH5	
PROM NO.	LABEL NAME	REQUIRED VALUE OF UNIT SIDE	
040	PSTARTC1$	200	
041	PSTARTC1K$	250	
042	PSTARTC2$	130	
043	PSTARTC2K$	200	
044	PSTARTH$	200	
045	PSTARTH2$	250	
046	PMIN$	86	
047	DFCTPS$	100	
048	DFCTPN$	240	
049	DFSPPS$	44	
04A	DFPSMX$	480	
04B	PCLOSH$	86	
OFD	CMAX1	5800	min^{-1}
OFE	CMAX2	5000	min^{-1}
101	CMAX3	5100	min^{-1}
108	WMAX1	6000	min^{-1}
109	WMAX2	6500	min^{-1}
10C	WMAX3	6500	min^{-1}
11E	STAROTP_C	25	°C
11F	SDRCT1_C1	2500	min^{-1}
120	TSKTM1_C1	60	sec
121	SDRCT1_C2	2500	min^{-1}
122	TSKTM_C2	60	sec
123	STAROTP_W	4.8	°C
124	SDRCT1_W1	2500	min^{-1}
125	TSKTM1_W1	60	sec
126	SDRCT1_W2	2500	min^{-1}
127	TSKTM1_W2	60	sec
128	SDSTEP	500	min^{-1}
129	TSKSPT	30	sec
12A	KYO_RPM	3000	min^{-1}
198	TDF414	90	sec
199	DFMXTM	12	min^{-1}
19A	SDRCT2	2000	min^{-1}
19B	TSKTM2	60	sec
19C	DFSTEP	1000	min^{-1}
19D	TDFSPT	90	sec
19E	DEFMAX	6000	min^{-1}
19F	TDF415	90	sec
1A0	DFSTMB	50	min.
1A1	DFSTMB2	60	min.
01F	NDWN_ON	97.2	°C
020	NDWN_OFF	95	°C
021	OH_ON	118.2	°C
022	OH_OFF	104.7	°C

Basic Cooling Operation



Notes:

(1) Cool dash is started when the operation is started at fan speed "AUTO" or "HI" or when the fan speed is changed to "AUTO" or "HI" during cooling operation, and when the compressor speed (P item) reaches (CMAX1 or CMAX2) or higher.

(2) The maximum compressor speed period during cool dash is finished ① when 25 minutes have elapsed after cool dash was started ② when the room temperature reaches the cooling set temperature -1℃ (including cooling shift) and then becomes lower than the preset temperature by 0.66℃ after the steady speed period, ③ when thermo is OFF.
(If cool dash finished in the above ①, the compressor does not go through the steady speed period but it starts fuzzy control.)

(3) The thermo OFF temperature during cool dash is cooling set temperature (including cooling shift) -3℃. After thermo OFF, cool dash is finished and fuzzy control starts.

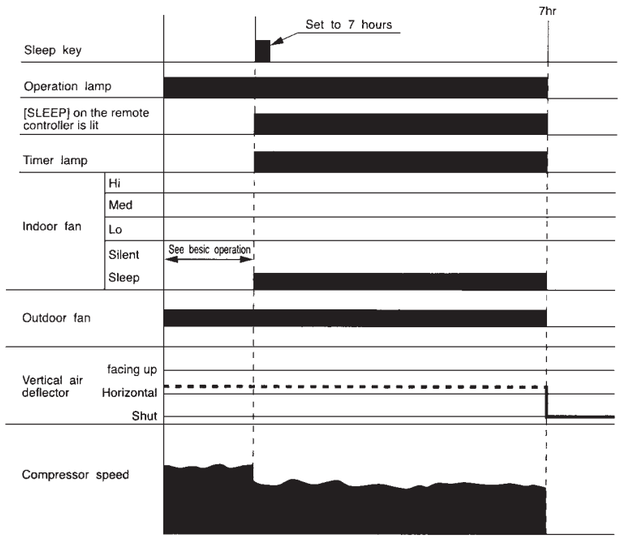
(4) The compressor minimum ON time and minimum OFF time is 3 minutes.

(5) The time limit for which the maximum compressor speed (CMAX1 or CMAX2) during normal cooling can be maintained is less than 60 minutes when the room temperature is less than CLMXTP: it is not provided when the room temperature is CLMXTP or more.

(6) Compressor speed is determined by instruction sent from indoor unit and corrected by outdoor unit according to such factors as capacity, fan speed, number of units being operated, outdoor temperature, etc.

(7) If another indoor unit is doing heating operation, cooling operation cannot be done.

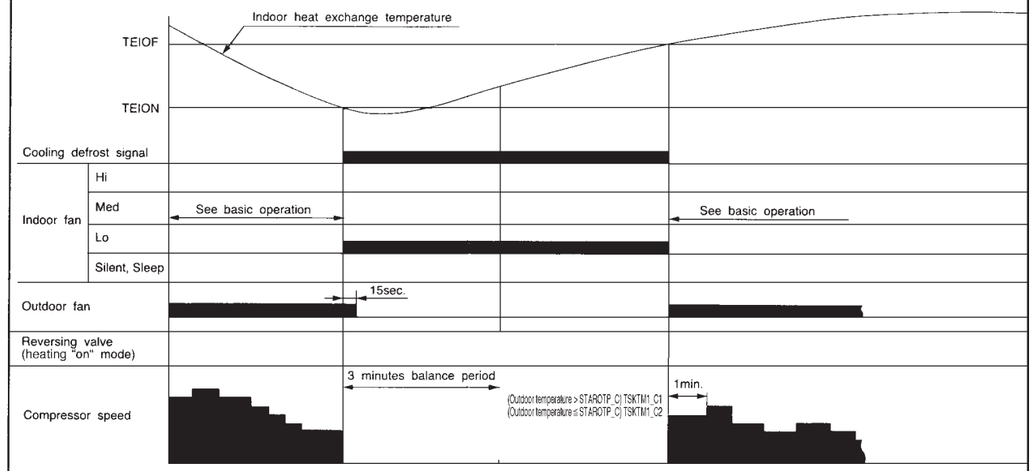
Cooling Sleep Operation



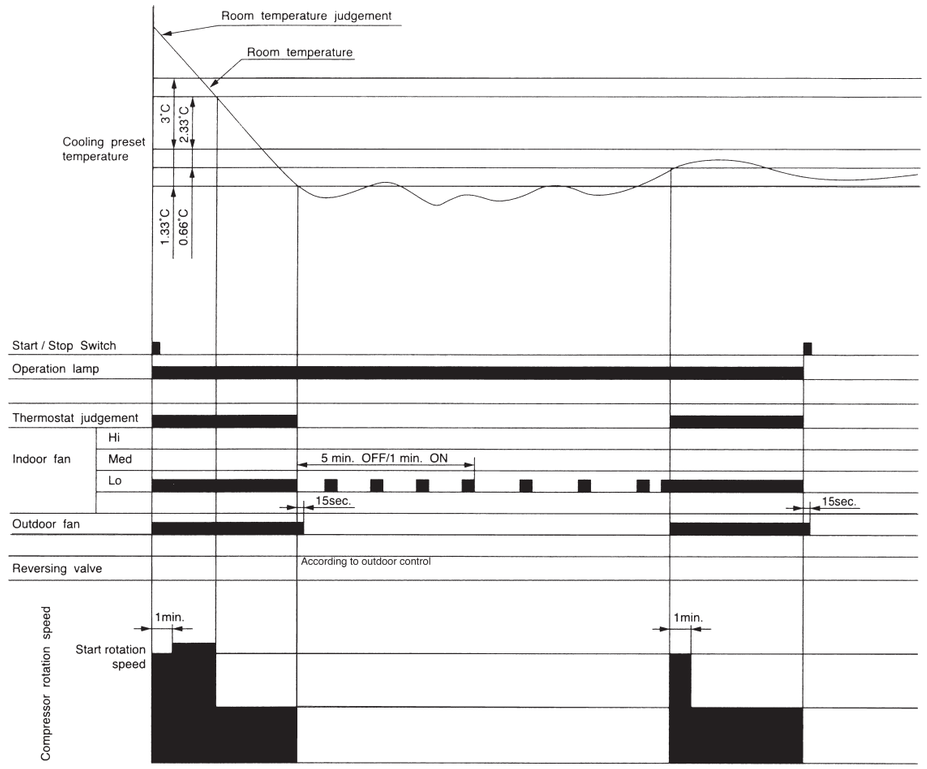
Notes:
(1) The sleep operation starts when the sleep key is pressed.
(2) When the sleep key is set, the indoor fan is set to "sleep silent" (FCSOY_M or AFCSOY).
(3) The indoor fan speed does not change even when the fan speed mode is changed.
(4) If the set time is changed during sleep operation, all data including set temperature, time, etc. is cleared and restarted.
(5) If sleep operation is canceled by the cancel key or sleep key, all data is cleared.
(6) If the position of air deflector is being operated using remote control, the operation will be performed at any desired position of air deflector.

Note:
1. Refer to the PWRITE-ZU data for the constants expressed by capital alphabet letters in the drawing.

Cooling Defrost



Dehumidifying



Notes:

(1) The indoor fan is operated in the "Lo" mode, OFF for 5 minutes and ON for 1 minute, repeatedly according to the humidity judgement when the thermostat is turned OFF.

(2) The commpressor is operated forcedly for 3 minutes after operation is started.

(3) The minimum ON time and OFF time of the compressor are 3 minutes.

(4) At the start of operation, the thermostat will be off when room temperature ≦ setting temperature –1.33°C; the thermostat will be on when room temperature ≧ setting temperature –0.66°C.

(5) The following procedure is performed to prevent excessive cooling during operation other than start. However, this procedure applies only when the thermostat is intermittent:

· Whether THERMO ON is to continue or not depends on the thermal condition when the 3-minute forced operation ceases.

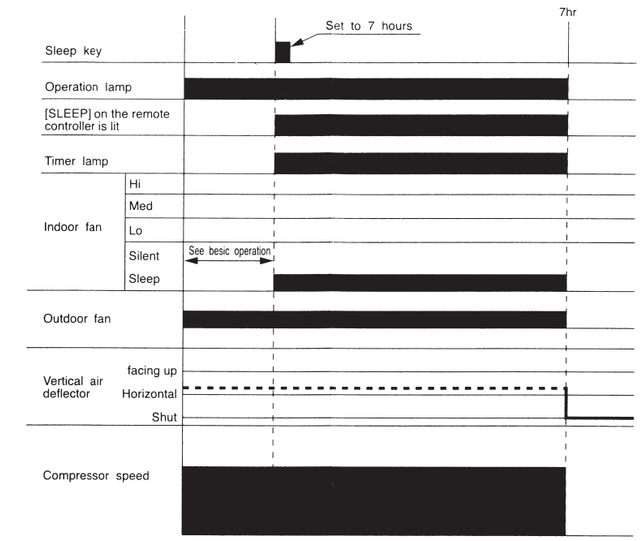
① "THERMO ON continues" when room temperature ≧ setting temperature +1°C: (The THERMO operation value is usually the same as that at "start of operation")

② "Forced THERMO OFF" when room temperature < setting temperature +1°C: (The same THERMO operation value as that at "start of operation" is usually used for recovery)

Therefore, if the air-conditioner is stabilized under this thermal condition, it will enter intermittent operation, which is "3-minute operation/3-minute stop".

(6) Compressor speed is determined by instruction sent from indoor unit and corrected by outdoor unit according to such factors as capacity, fan speed, number of units being operated, outdoor temperature, etc.

Dehumidifying Sleep Operation



Notes:

(1) The sleep operation starts when the sleep key is pressed.

(2) When the sleep key is set, the indoor fan is set to "sleep silent" (FDOY_M or AFDOY).

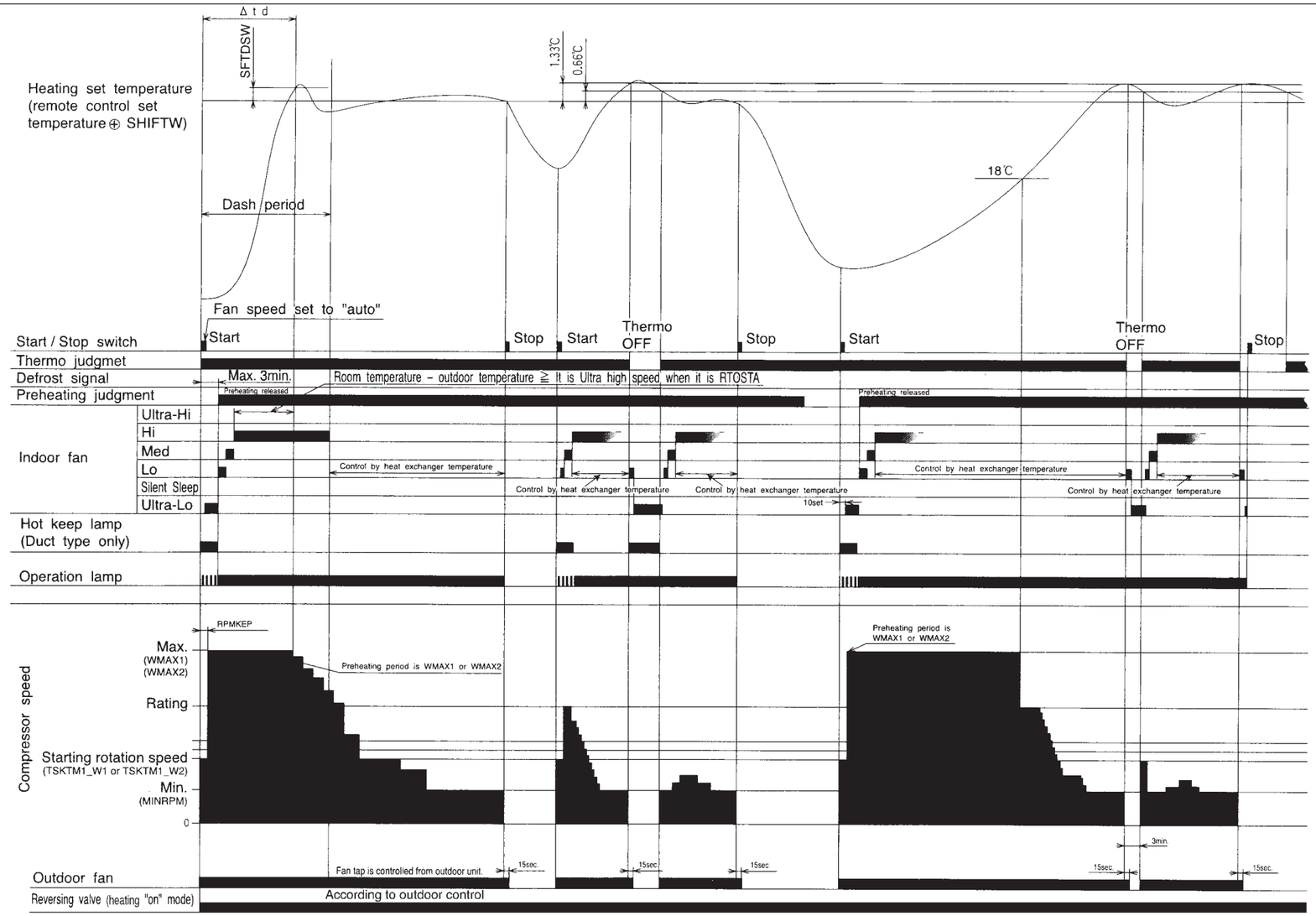
(3) The indoor fan speed does not change even when the fan speed mode is changed.

(4) If the set time is changed during sleep operation, all data including set temperature, time, etc. is cleared and restarted.

(5) If sleep operation is canceled by the cancel key or sleep key, all data is cleared.

(6) If the position of air deflector is being operated using remote control, the operation will be performed at any desired position of air deflector.

Heating Basic Operation



Notes:

(1) Hot Dash is started when the operation is started at fan speed “AUTO” or “HI” or when the fan speed is changed to “AUTO” or “HI” during heating operation, and when the compressor speed (P item) reaches (WMAX1 or WMAX2) or higher with the room temperature at 8℃ or less and outdoor temperature at 10℃ or less.

(2) The maximum compressor speed period during hot dash is finished (1) when the room temperature reaches the heating set temperature (including heating shift) plus SFTDSW or (2) when the thermo is off.

(3) The thermo OFF temperature during hot dash is heating set temperature (including heating shift) plus 3℃. After thermo OFF, hot dash finishes, and PI control starts.

(4) The compressor minimum ON time and minimum OFF time is 3 minutes.

(5) The time limit for which the maximum compressor speed (WMAX1 or WMAX2) during normal heating (except for hot dash) can be maintained is less than 120 minutes when the room temperature is 18℃ or more; it is not provided when the room temperature is less than 18℃ and outdoor temperature is less than 4℃.

(6) The operation indicator will blink every second during initial cycle operation, preheating, defrosting (including balance time after defrost is finished), or auto fresh defrosting. However, with duct type models, operation indicator does not blink, but Hot Keep indicator will light. And Hot Keep indicator will also light in “Thermo OFF” mode.

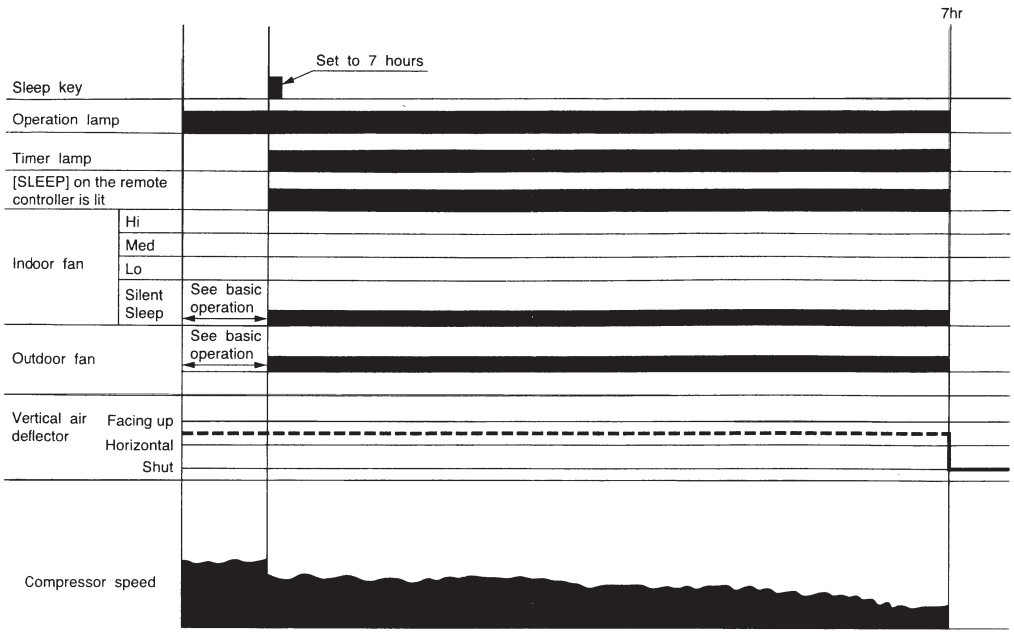
(7) For preheating judgment, preheating starts if the heat exchange temperature is lower than YNEOFC and is cancelled if the heat exchange temperature is YNEOF plus 0.33℃ or higher at the start of operation using the START / STOP button.

(8) If the room temperature falls to less than 18℃ in the "Ultra-Lo" mode, the indoor fan stops. When the room temperature is 18℃+0.33℃ or more, the ultra-Lo operation restarts. However, the ultra-Lo operation during preheating or preheating after defrosting does not stop if the room temperature is less than 18℃.

(9) Compressor speed is determined by instruction sent from indoor unit and corrected by outdoor unit according to such factors as capacity, fan speed, number of units being operated, outdoor temperature, etc.

(10) If another indoor unit is doing cooling operation, dehumidifying operation or fan operation, heating operation cannot be done.

Heating Sleep Operation



Notes:

(1) The sleep operation starts when the sleep key is pressed.

(2) When the sleep key is set, the indoor fan is set to "Sleep Silent" (FWSOY_M or AFWSOY).

(3) The indoor fan speed does not change even when the fan speed mode is changed.

(4) When defrosting is to be set during sleep operation, defrosting is engaged and sleep operation is restored after defrosting.

(5) If the set time is changed during sleep operation, all data including set temperature, time, etc. is cleared and restarted.

(6) If sleep operation is canceled by the cancel key or sleep key all data is cleared.

(7) If the position of air deflector is being operated using remote control, the operation will be performed at any desired position of air deflector.

NOTE:

1. Refer to the PWRITE-ZU data for the constats expressed by capital alphabet letters in the drawing.

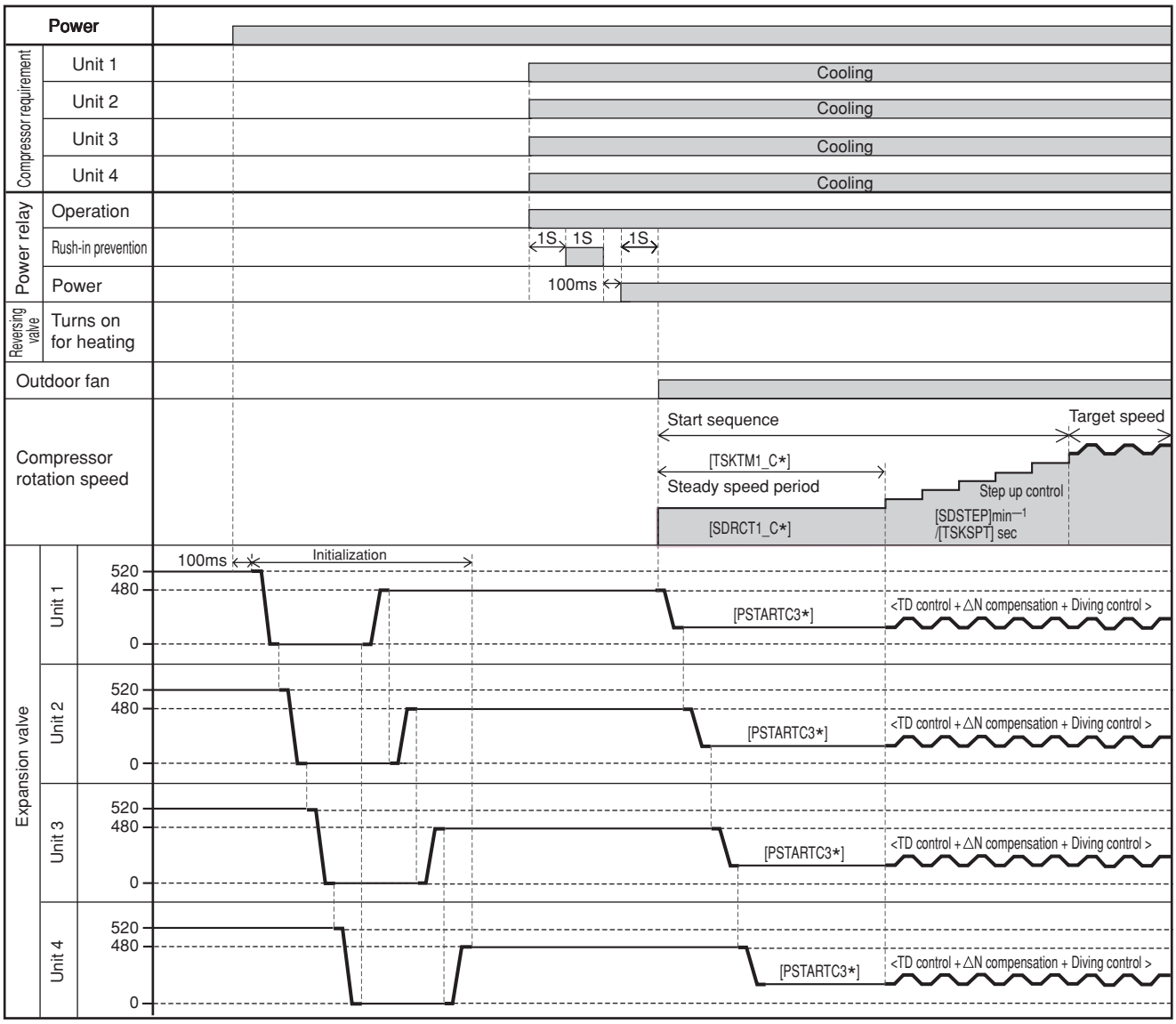
MODEL RAM-72QH5

◇ Expansion valves

- The expansion valves are initialized when power is supplied. The valve for unit 1 is fully closed (–520 pulses), and then that for unit 2 is fully opened (480 pulses). The valve for unit 2 is fully closed (–520 pulses), and then that for unit 3 is fully opened (480 pulses). The valve for unit 3 is fully closed (-520 pulses), and then that for unit 4 is fully opened (480 pulses). When the valve for unit 1, 2, 3, 4 is fully closed (0 pulse), start-up is possible.
- The start openings are held during the steady speed period when the compressor is started. After the steady speed period is finished, the TD control is entered. The start openings are set to PSTARTH when the outdoor temperature at start 40°C or more, and to PSTART when it is less than 40°C.
  PSTART C3 is used for 3 rooms and 4 rooms operation.

◇ Compressor rotation speed

- When the compressor is started, the SDRCT1 speed / TSTKTM1 second is held. (Steady speed period)
  After the steady speed period is finished, the speed increases at the rate of SDSTEP speed / TSKSPT second until the target speed is reached.



※ TSKTM1, SDRCT1, SDSTEP, TSKSPT, CMAX2, PSTART and PSTARTH are EEPROM data.

DEFROST

• Reversing valve defrost system is employed: it consists of balancing period→ reversing cycle period→ balancing period.

(1) Defrost start condition

- When all the following conditions are established defrost is executed:
  - ① Normal operation
  - ② Heat exchange temperature is within defrost range specified by outdoor temperature and heat exchange temperature. (Defrost signal occured).
  - ③ Defrost inhibit period linked to outdoor temperature has passed.

(2) Defrost release condition

- If any one of the following conditions is established, defrost is released:
  - ① Heat exchange temperature returns (heat exchange temperarure ≥ DEFOFF).
  - ② Defrost max time of 12 minutes has elapsed.
- Released by condition ① during balancing period: When remaining balancing period has elapsed, returned to initial condition (ASTUS=0).
- Released by condition ① or ② during reversing cycle period: [TDF415] Shifted to balancing period.

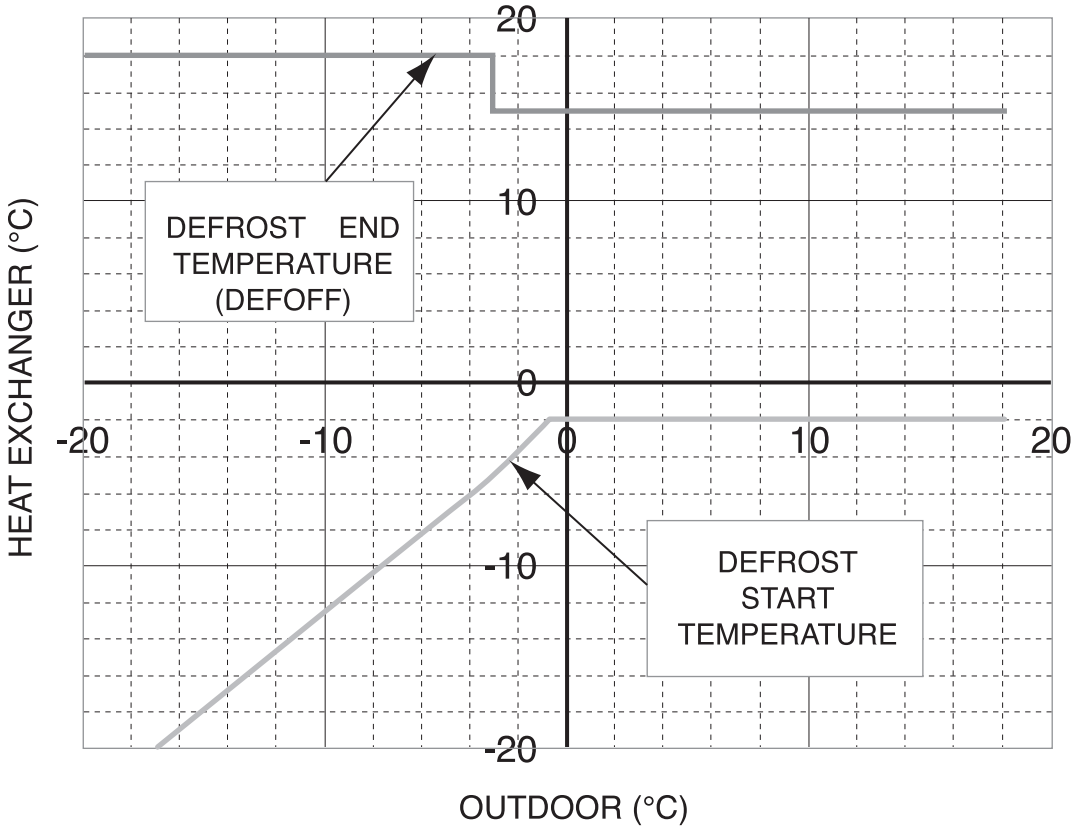
(3) Outputs during defrost

- Indoor defrost request: Transmitted to all units being operated in heating mode.
- Compressor : Balancing period for [TDF414] seconds→ Starting of reversing cycle period by [SDRCT2] min^{-1} for [TSKTM2] seconds →Accelerating by [DFSTEP]min^{-1}/[TDFSPT] seconds in remaining reversing cycle period until defrost MAX speed [DEFMAX] is reached→ Balancing period for [TDF415] seconds
- Electric expansion valve

  Unit being stopped : [FULL CLOSE] 30 seconds after balancing period has passed →[FULL CLOSE] during reversing cycle period→ [PCLOSH$] 15 seconds before balancing period is finished

  Unit being operated : [DFCTPS] 30 seconds before balancing period is finished→ Synchronized with step-up of rotation speed of compressor, opened by [DFSPPS] pulses and reaches MAX opening degree [DEFSMX] when rotation speed of compressor reaches [DEFMAX].

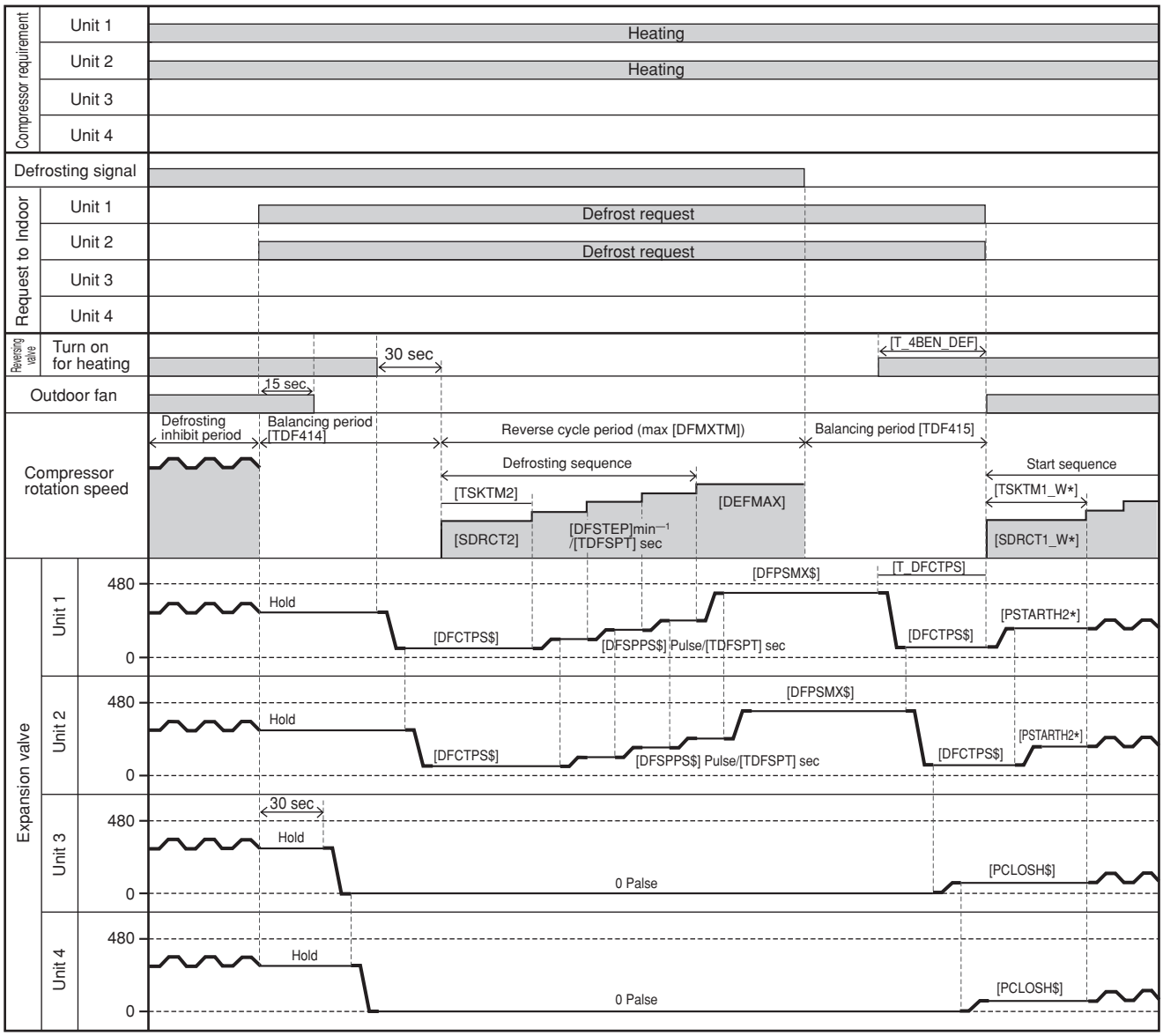
RAM-72QH5 DEFROST TEMPERATURE



* above graph is showing the ideal value by micon program.
* guaranteed temperature range of this model is –15˚C to +27˚C at heating.

MODEL RAM-72QH5

• Time chart when executing defrost (Unit 1 and Unit 2 operated, Unit 3 and Unit 4 stopped)



AUTO-FRESH DEFROST

• During heating operation is stopped, and when auto-fresh condition is established, defrost operation will be performed while operation is stopped.
Auto-fresh consists of balancing period at start of defrost for [TDF414] seconds → Reverse cycle period for MAX 12 minutes.

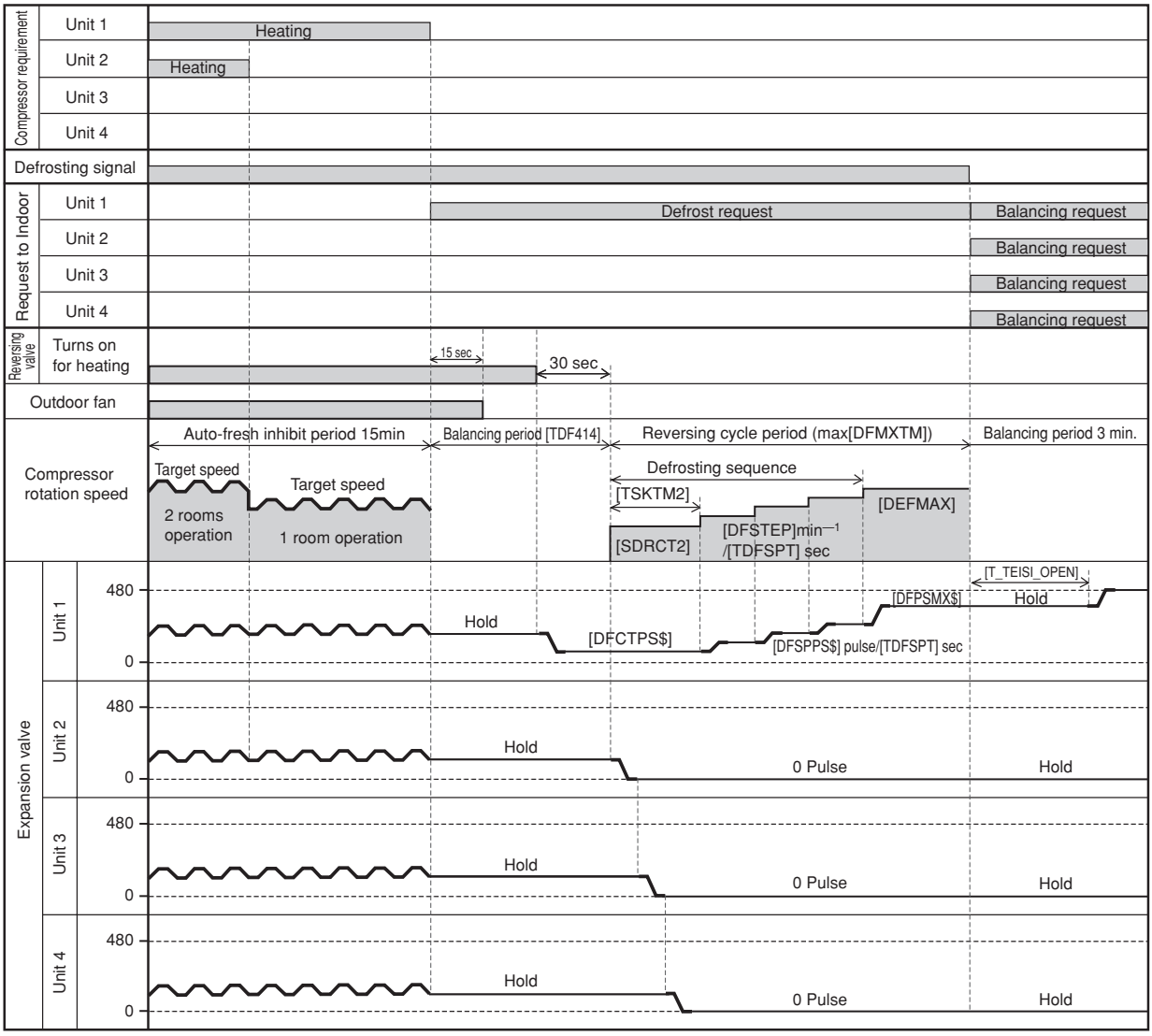
(1) Start conditions for auto-fresh
- When all the following conditions are established, auto-fresh is executed:
  ① Defrost request signal is present.
  ② All indoor units are stopped.
  ③ 15 minutes of auto-fresh inhibit period has elapsed.
  ④ Compressor is ON when operation is stopped.
  ⑤ Compressor delay command is sent from indoor unit when operation is stopped.

(2) Release condition of auto-fresh
- If any one of following conditions is established, auto-fresh is released:
  ① Heat exchange temperature returns (heat exchange temperature ≥ DEFOFF)
  ② 12 minutes of defrost MAX time has elapsed.
  ③ Failure occurred.
  ④ Either unit 1 or unit 2 or unit 3 or unit 4 started operation.
  ※ Released during start of balancing period : Stopped or started after remaining balancing period has elapsed.
  Released during reverse cycle period : Stopped or started after balancing for 3 minutes.

(3) Outputs during auto-fresh
[Indoor unit defrost request]: Transmitted only to unit to which auto-fresh is applied (indoor unit stopped last).
[Compressor]: Accelerated by DFSTEP min^{-1}/TDFSPT seconds and reaches defrost MAX speed [DEFMAX].
[Electric expansion valve]:
Unit auto-fresh not applied: FULL CLOSE when balancing for 30 seconds has elapsed at start of defrost.
Unit auto-fresh applied : Synchronized with step-up of rotation speed of compressor, opened by [DFSPPS] pulses and reaches MAX opening degree [DEFSMX] when rotation speed of compressor reaches [DEFMAX].

(4) Note
- Shifted to auto-fresh in defrost mode when operation is stopped.
- All indoor units must be stopped to fulfill condition for auto-fresh.
If signal is delayed, auto-fresh condition will not be established.

MODEL RAM-72QH5



MODEL RAM-72QH5

FORCED COOLING

• In order to accumulate refrigerant, units operate in cooling cycle.
  Execution condition and operation status are shown below.

[Execution condition]

• With neither indoor unit 1, 2, 3 and 4 not operated, when forced cooling switch is turned ON, forced cooling will be performed.

• Always operation status of indoor units are monitored and forced cooling is inhibited when operation of any unit is detected.

[Operation status]

• Outdoor unit fan: Fixed in LO.

• Compressor rotation speed: Fixed in 3000min^{-1}.

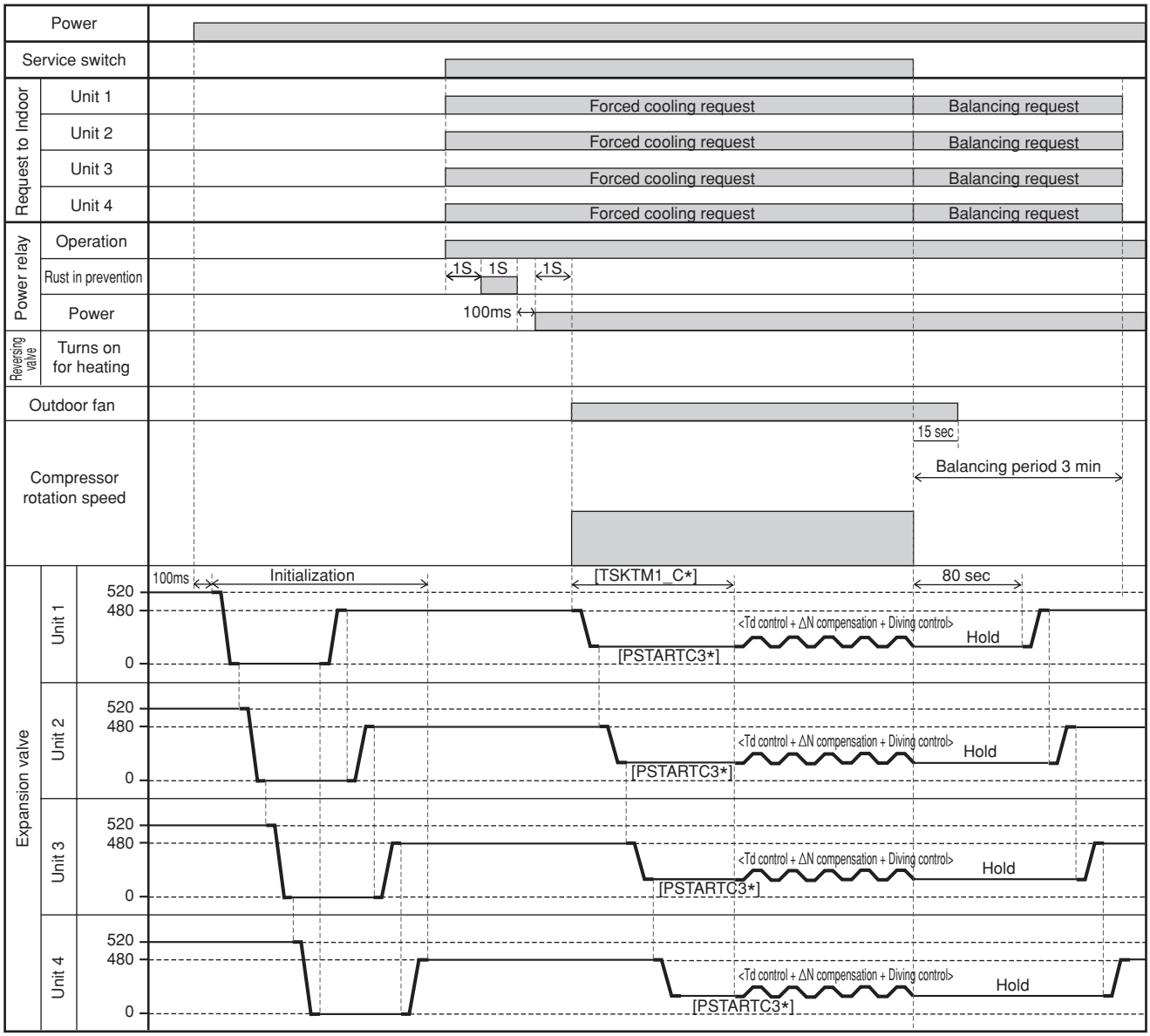
• Expansion valve/reversing valve : Set in normal conditions.

[Note]

• During forced cooling, if failure occurs in outdoor unit, thermostat is turned off. However, it is not counted.

• Since rotation speed of compressor is fixed in 3000min^{-1} during forced cooling, steady speed period of compressor at start is not performed.

• The following shows the operation state of forced cooling.



※ TSKTM1_C and PSTARTC2$ are EEPROM data.

MODEL RAM-72QH5

PROCESSING AT OVERHEAT THERMISTOR (OH) HIGH TEMPERATURE

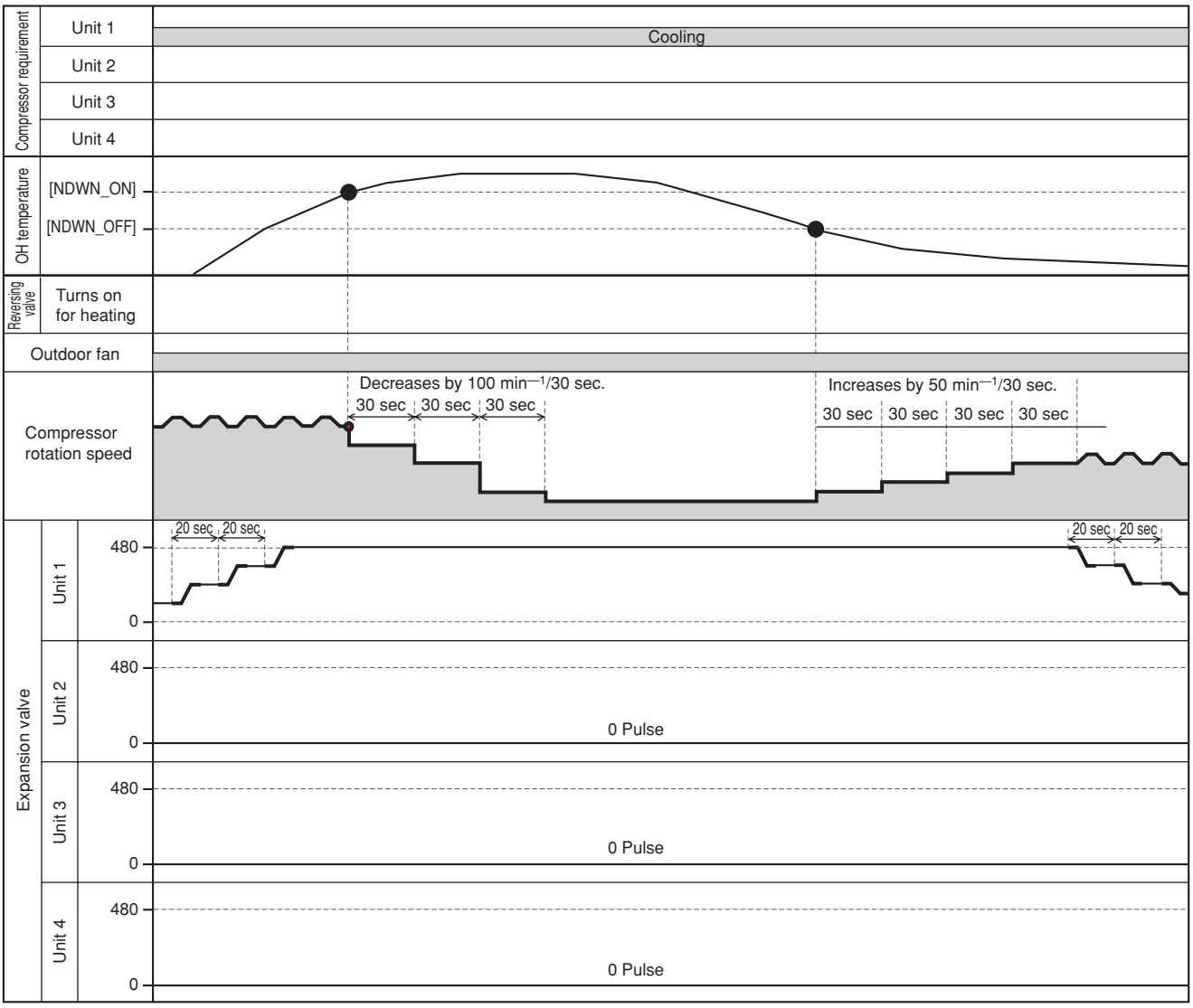
◇ Restriction Start Conditions

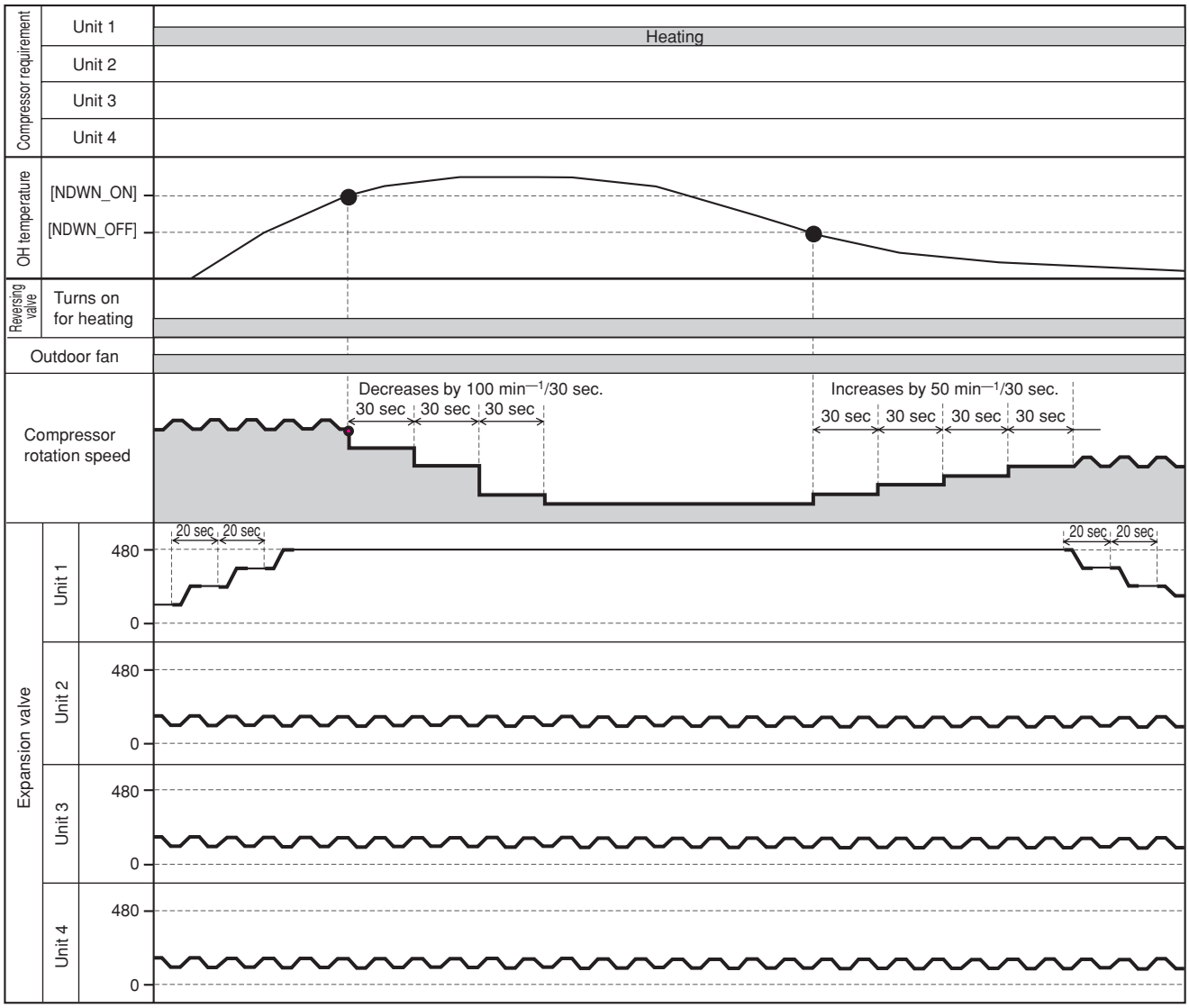
- If any expansion valve is operated at 480 pulses and the OH temperature > [NDOWN_ON], the compressor speed will be reduced at a rate of 100 min^{-1}/30 seconds.
- This reduced rotation speed is based on the speed when the reduction started, and will be maintained until the reduction is finished. However, the reference speed will be exchanged only if the target speed is lower than the speed when the reduction started.
- If [NDOWN_OFF] ≤ OH temperature ≤ [NDOWN_ON] and the OH temperature does not rise from that 20 seconds before, the reduction of compressor speed will not occur.

◇ Restriction Release Condition (in common for all)

- The restriction will be released when OH temperature < [NDOWN_OFF], and the compressor speed will be increased at a rate of 50 min^{-1}/30 seconds to restore the target speed.

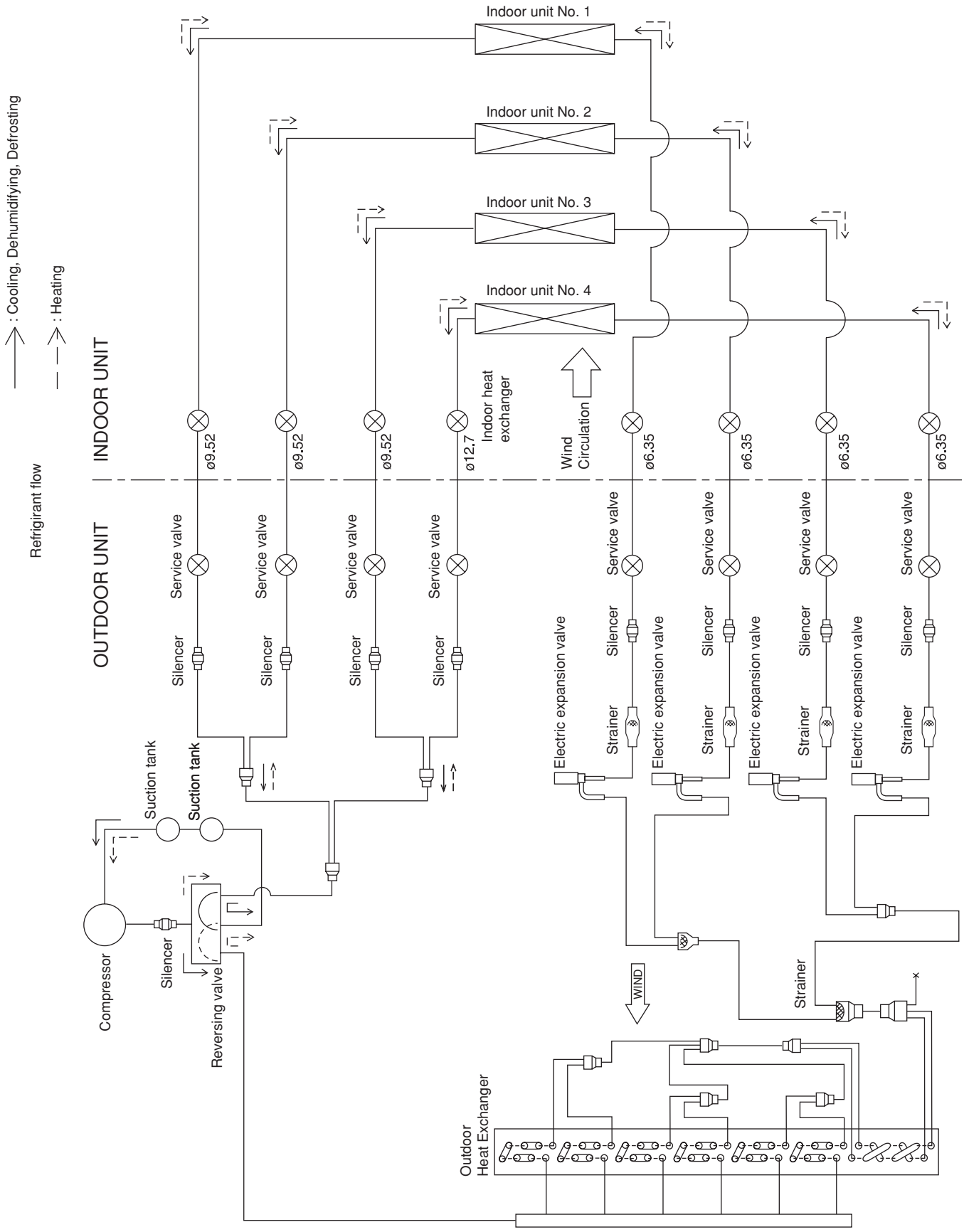
When one unit is operated for cooling





REFRIGERATING CYCLE DIAGRAM

MODEL RAM-72QH5



AUTO SWING FUNCTION

MODEL: RAK-18NH5, RAK-25NH5, RAK-35NH5, RAK-50NH5, RAK-65NH5

INPUT SIGNAL	PRESENT CONDITION			OPERATING SPECIFICATION	REFERENCE
	OPERATION	OPERATION MODE	AIR DEFLECTOR		
KEY INPUT	STOP	EACH MODE	STOP	ONE SWING (CLOSING AIR DEFLECTOR) ① DOWNWARD ② UPWARD	INITIALIZE AT NEXT OPERATION.
			DURING ONE SWING	STOP AT THE MOMENT.	
	DURING OPERATION	AUTO COOL COOL FAN AUTO DRY DRY	STOP	START SWINGING ① DOWNWARD ② UPWARD ③ DOWNWARD	
			DURING SWINGING	STOP AT THE MOMENT.	
		AUTO HEAT HEAT CIRCULATOR	STOP	START SWINGING ① DOWNWARD ② UPWARD ③ DOWNWARD	
			DURING SWINGING	STOP AT THE MOMENT.	
THERMO. ON (INTERNAL FAN ON)	DURING OPERATION	AUTO DRY DRY AUTO HEAT HEAT CIRCULATOR	TEMPORARY STOP	START SWING AGAIN.	
THERMO. ON (INTERNAL FAN OFF)			DURING SWINGING	STOP SWINGING TEMPORARILY. (SWING MODE IS CLEARED IF SWING COMMAND IS TRANSMITTED DURING TEMPORARY STOP.)	
MAIN SWITCH ON	STOP	COOL FAN DRY	STOP DURING ONE SWING	INITIALIZE ① DOWNWARD ② UPWARD	
		HEAT CIRCULATOR	STOP DURING ONE SWING	INITIALIZE ① DOWNWARD	
MAIN SWITCH OFF	DURING OPERATION	EACH MODE	STOP DURING SWINGING	ONE SWING (CLOSING AIR DEFLECTOR) ① DOWNWARD ② UPWARD	INITIALIZE AT NEXT OPERATION.
			DURING INITIALIZING		
CHANGE OF OPERATION	DURING OPERATION	EACH MODE	STOP	INITIALIZING CONDITION OF EACH MODE.	
			DURING SWINGING	STOP SWINGING AND MODE BECOMES INITIALIZING CONDITION.	

AUTO SWING FUNCTION

MODEL: RAI-25NH5, RAI-35NH5, RAI-50NH5

INPUT SIGNAL	PRESENT CONDITION			OPERATING SPECIFICATION	REFERENCE
	OPERATION	OPERATION MODE	AIR DEFLECTOR		
KEY INPUT	STOP	EACH MODE	STOP	ONE SWING (CLOSING AIR DEFLECTOR) ① DOWNWARD ② UPWARD	INITIALIZE AT NEXT OPERATION.
			DURING ONE SWING	STOP AT THE MOMENT.	
	DURING OPERATION	AUTO COOL COOL FAN AUTO DRY DRY	STOP	START SWINGING ① DOWNWARD ② UPWARD ③ DOWNWARD	
			DURING SWINGING	STOP AT THE MOMENT.	
		AUTO HEAT HEAT CIRCULATOR	STOP	START SWINGING ① DOWNWARD ② UPWARD ③ DOWNWARD	
			DURING SWINGING	STOP AT THE MOMENT.	
THERMO. ON (INTERNAL FAN ON)	DURING OPERATION	AUTO DRY DRY AUTO HAET HEAT CIRCULATOR	TEMPORARY STOP	START SWING AGAIN.	
THERMO. ON (INTERNAL FAN OFF)			DURING SWINGING	STOP SWINGING TEMPORARILY. (SWING MODE IS CLEARED IF SWING COMMAND IS TRANSMITTED DURING TEMPORARY STOP.)	
MAIN SWITCH ON	STOP	COOL FAN DRY	STOP DURING ONE SWING	INITIALIZE ① DOWNWARD ② UPWARD	
		HEAT CIRCULATOR	STOP DURING ONE SWING	INITIALIZE ① DOWNWARD	
MAIN SWITCH OFF	DURING OPERATION	EACH MODE	STOP DURING SWINGING	ONE SWING (CLOSING AIR DEFLECTOR) ① DOWNWARD ② UPWARD	INITIALIZE AT NEXT OPERATION.
			DURING INITIALIZING		
CHANGE OF OPERATION	DURING OPERATION	EACH MODE	STOP	INITIALIZING CONDITION OF EACH MODE.	
			DURING SWINGING	STOP SWINGING AND MODE BECOMES INITIALIZING CONDITION.	

AUTO SWING FUNCTION

MODEL: RAD-25NH5, RAD-35NH5

INPUT SIGNAL	PRESENT CONDITION			OPERATING SPECIFICATION	REFERENCE
	OPERATION	OPERATION MODE	AIR DEFLECTOR		
KEY INPUT	STOP	EACH MODE	STOP	ONE SWING (CLOSING AIR DEFLECTOR) ① DOWNWARD ② UPWARD	INITIALIZE AT NEXT OPERATION.
			DURING ONE SWING	STOP AT THE MOMENT.	
	DURING OPERATION	AUTO COOL COOL FAN AUTO DRY DRY	STOP	START SWINGING ① DOWNWARD ② UPWARD ③ DOWNWARD	
			DURING SWINGING	STOP AT THE MOMENT.	
		AUTO HEAT HEAT	STOP	START SWINGING ① DOWNWARD ② UPWARD ③ DOWNWARD	
			DURING SWINGING	STOP AT THE MOMENT.	
THERMO. ON (INTERNAL FAN ON)	DURING OPERATION	AUTO DRY DRY AUTO HEAT HEAT	TEMPORARY STOP	START SWING AGAIN.	
THERMO. ON (INTERNAL FAN OFF)			DURING SWINGING	STOP SWINGING TEMPORARILY. (SWING MODE IS CLEARED IF SWING COMMAND IS TRANSMITTED DURING TEMPORARY STOP.)	
MAIN OPERATION ON	STOP	COOL FAN DRY	STOP DURING ONE SWING	INITIALIZE ① DOWNWARD ② UPWARD	
		HEAT	STOP DURING ONE SWING	INITIALIZE ① DOWNWARD	
MAIN OPERATION OFF	DURING OPERATION	EACH MODE	STOP DURING SWINGING	ONE SWING (CLOSING AIR DEFLECTOR) ① DOWNWARD ② UPWARD	INITIALIZE AT NEXT OPERATION.
			DURING INITIALIZING		
CHANGE OF OPERATION	DURING OPERATION	EACH MODE	STOP	INITIALIZING CONDITION OF EACH MODE.	
			DURING SWINGING	STOP SWINGING AND MODE BECOMES INITIALIZING CONDITION.	

DESCRIPTION OF MAIN CIRCUIT OPERATION

MODEL RAM-72QH5

1. Power Circuit

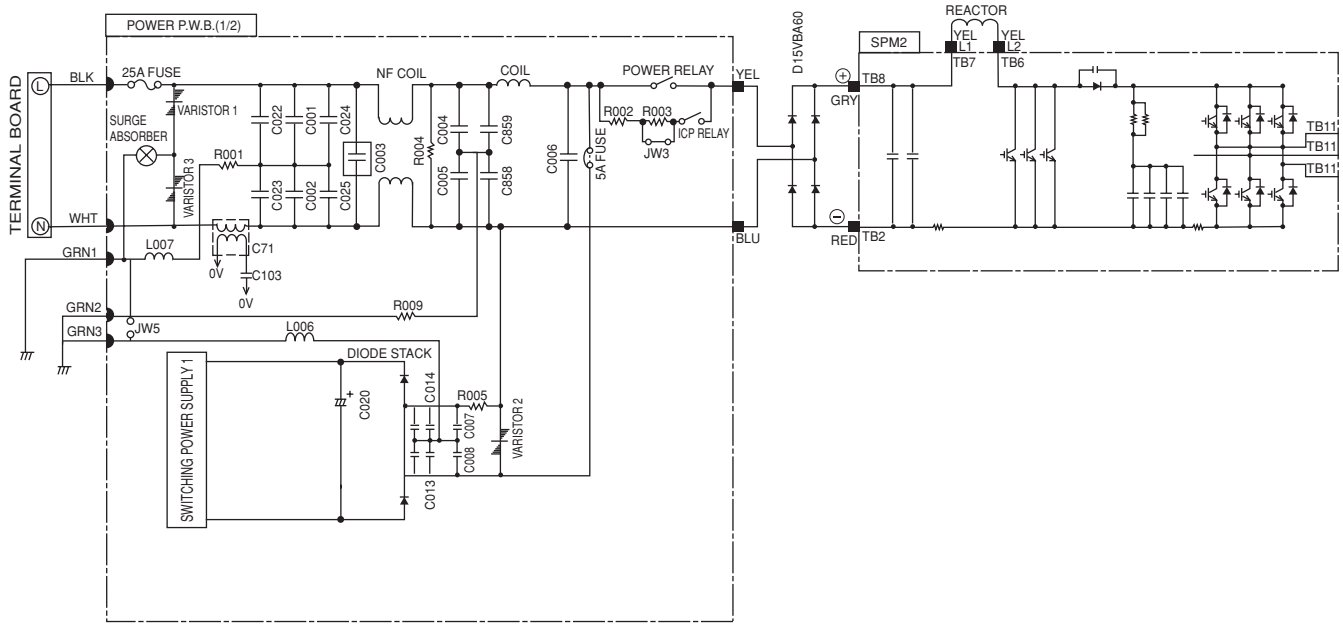


Fig. 1-1

- This circuit full-wave rectifies 220-240 AC applied between terminals L and N, and boosts it to a required voltage with the active module, to create a DC voltage.

The voltage becomes 320-360V when the compressor is operated.

(1) System power module (SPM)
(Current ACT module, smoothing capacitors and power module are combined into one unit)

① Active module

The active filter, consisting of a reactor and switching element, eliminates higher harmonic components contained in the current generated when the compressor is operated, and improves the power-factor. Smoothing capacitor smoothes voltage, which has been rectified by diode stack and boosted at ACT section.

② Power module section

Refer to Item 3 System Power Module Circuit.

(2) Diode stacks

These rectify the 220-240V AC from terminals L and N to a DC power supply.

< Reference >

- In case of malfunction or defective connection: Immediately after the compressor starts, it may stop due to “abnormally low speed” active error, etc.

  The compressor may continue to operate normally, but the power-factor will decrease, the operation current will increase, and the overcurrent breaker of the household power board will probably activate.
- In case of active module faulty or defective connection:

  Although the compressor continues to operate normally, the power-factor will decrease, the operation current will increase, and the overcurrent breaker of the household power board will probably activate.

< Reference >

- If D15VBA60 is faulty, the compressor may stop due to “lp”, “anbormally low speed”, etc. immediately after it starts, or it may not operate at all because no DC voltage is generated between the positive e and negative d terminals.

  If diode bridge 1 is faulty, be aware that the 25A fuse might also have blown.
- If diode stack is faulty, DC voltage may be not generated and the compressor may not operate at all. Also, be aware that the 5A fuse might have blown.

(3) Smoothing capacitor (C501, C502, C503, 400μF, 450V)

This smoothes (averages) the voltage rectified by the diode stacks.

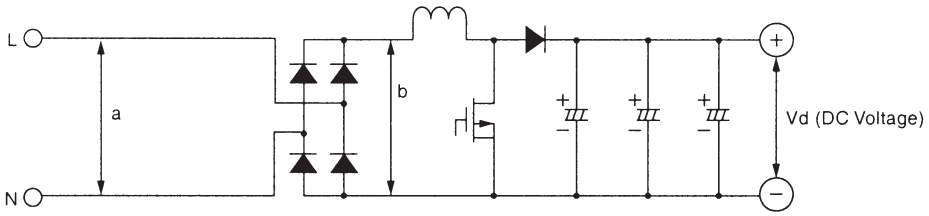


Fig. 1-2

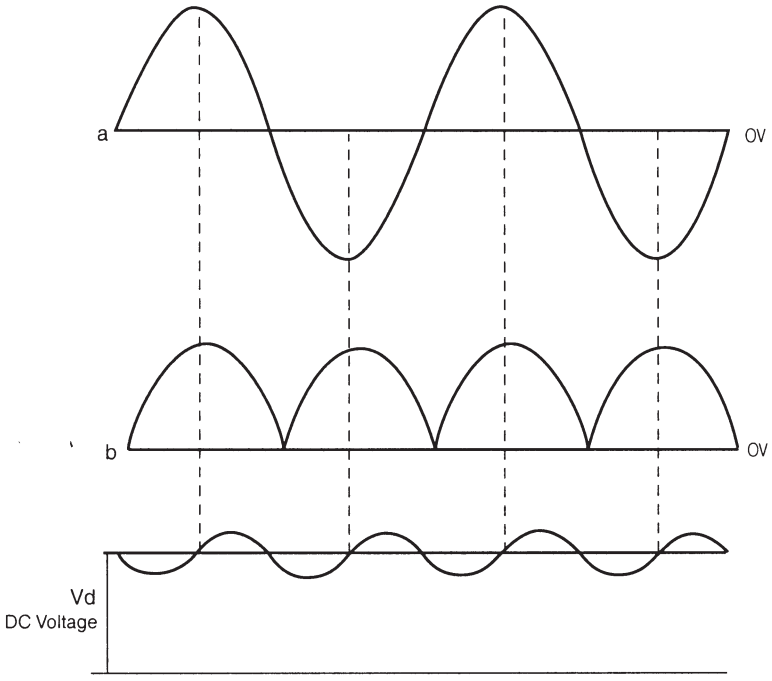


Fig. 1-3

(Approx. 300-330V during operation)

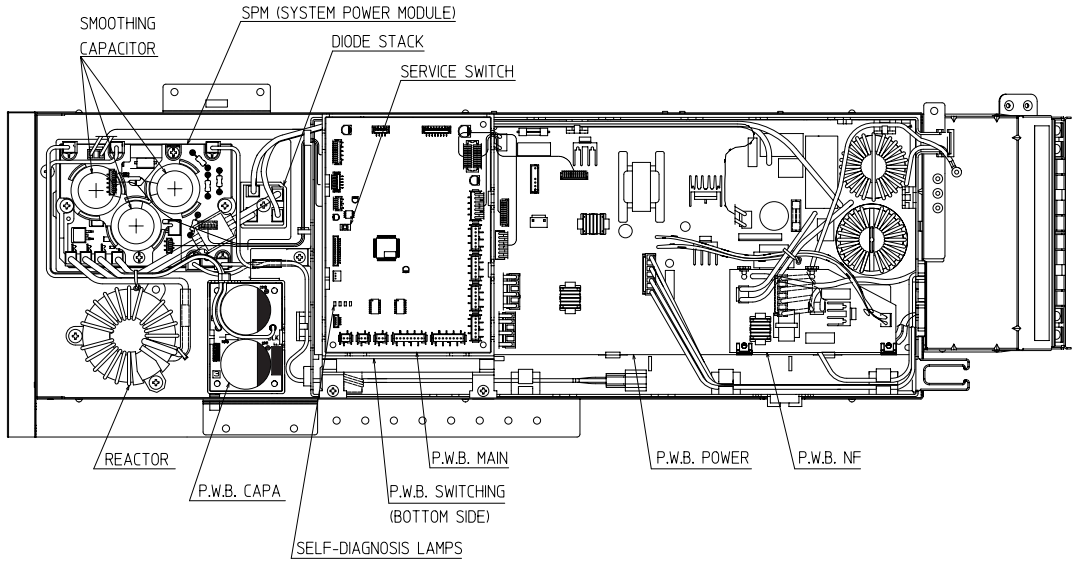


Fig. 1-4

- Be careful to avoid an electric shock as a high voltage is generated. Also take care not to cause a short-circuit through incorrect connection of test equipment terminals. The circuit board could be damaged.

(4) Smoothing capacitor (C020, 270μF, DC 450V)

This smoothes (averages) the voltage rectified by the diode stacks.

A DC voltage is generated in the same way as in Fig. 1-3. Voltage between C020 $\oplus$ side and $\ominus$ side is about 330V.

(5) C001 to C008, C013, C014, C022 to C5, C888, C89, NF COIL1
These absorb electrical noise generated during operation of compressor, and also absorb external noise entering from power line to protect electronic parts.

(6) Surge absorber, Varistor 1, 2, 3,
These absorbs external power surge.

(7) Inrush protective resistor (R002)
This works to protect from overcurrent when power is turned on.

※ Be sure to ground outdoor unit.
If not grounded, noise filter circuit does not operate correctly.

※ If outdoor unit is not grounded, “surge absorber”, “varistors 1 and 3” do not operate.
Be sure to perform grounding.

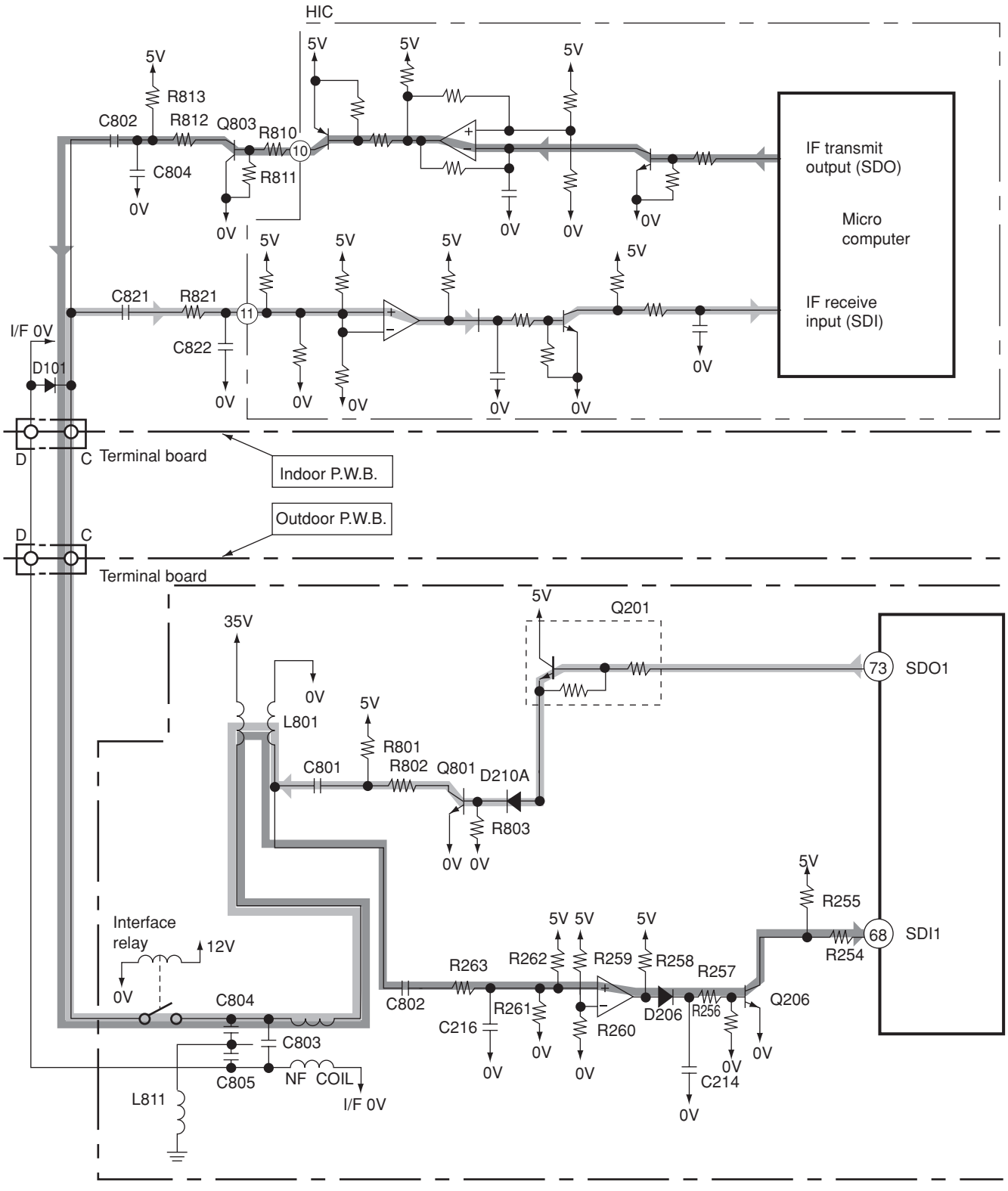
< Reference >

- When inrush protective resistor is defective, D15VBA60 may malfunction. As a result, DC voltage is not generated and no operation can be done. In this case, 5A fuse may have been blown. Take care.

2. Indoor/Outdoor Interface Circuit

- The interface circuit superimposes an interface signal on the 35V DC line supplied from the outdoor unit to perform communications between indoor and outdoor units. This circuit consists of a transmiting circuit which superimposes an interface signal transmit from the microcomputer on the 35V DC line and a transmiting circuit which detects the interface signal on the 35V DC line and outputs it to the microcomputer.
- Communications are performed by mutually transmiting and receiving the 4-frame outdoor request signal one frame of which consists of a leader of approx. 100 ms., start bit, 8-bit data and stop bit and the command signal with the same format transmit from the indoor unit.
- From outdoor microcomputer to indoor microcomputer.
  The request signal output from microcomputer pin ⑬, ⑭, ⑨, ⑩ is input to the transmitting circuit. The transmitting circuit modulates this signal by approx. 38kHz high-frequency. This high-frequency signal is amplified by a transistor, superimposed on the DC 35V line via C801 (or C811, C821, C831) and L801 (or L802, L803, L804) and supplied to the indoor unit.
  To prevent erroneous reception, the outdoor microcomputer is designed so that it cannot receive a signal while it is outputting a request signal.
  The receiving circuit in the indoor unit consists of a comparator and transistor. The interface signal from the outdoor unit on the DC 35V line is supplied to C821, where DC components are eliminated, and is then shaped by the comparator. The shaped signal is detected by diode, amplified by amp, and supplied to receiving input of the indoor microcomputer.
  Fig. 2-2 shows the voltages at each component when data is transferred from the outdoor microcomputer to the indoor microcomputer.
- Indoor microcomputer to outdoor microcomputer.
  The communications from the indoor microcomputer to the outdoor micro computer are the same. Fig. 2-3 shows the voltages and waveforms at each circuit.

- Fig. 2-1 shows the interface circuit used for the indoor and outdoor microcomputers to communicate with each other.

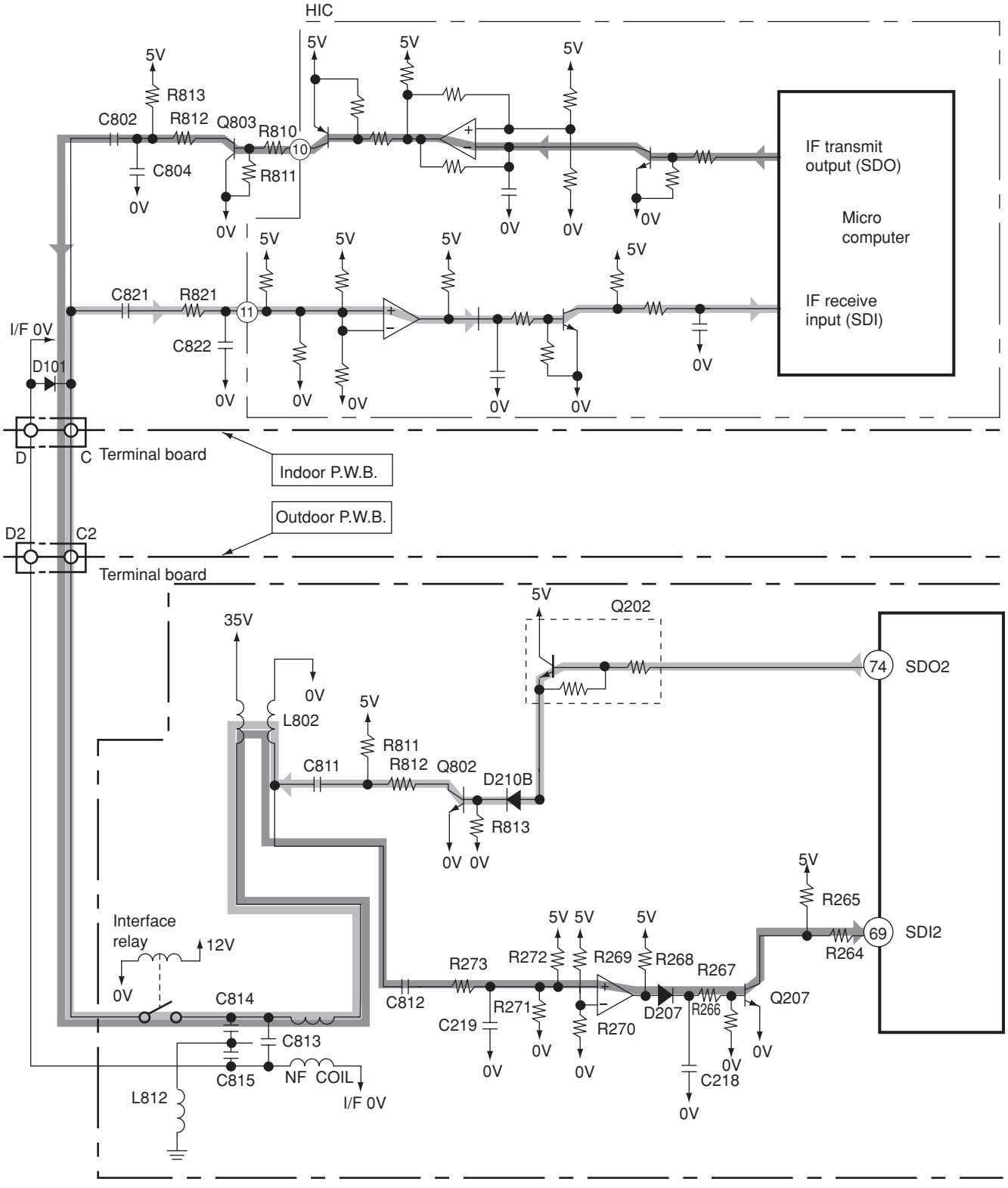


(Communications from indoor micro computer to outdoor micro computer)

(Communications from outdoor micro computer to indoor micro computer)

Fig. 2-1 Indoor / Outdoor interface Circuit 1

- Fig. 2-1 shows the interface circuit used for the indoor and outdoor microcomputers to communicate with each other.

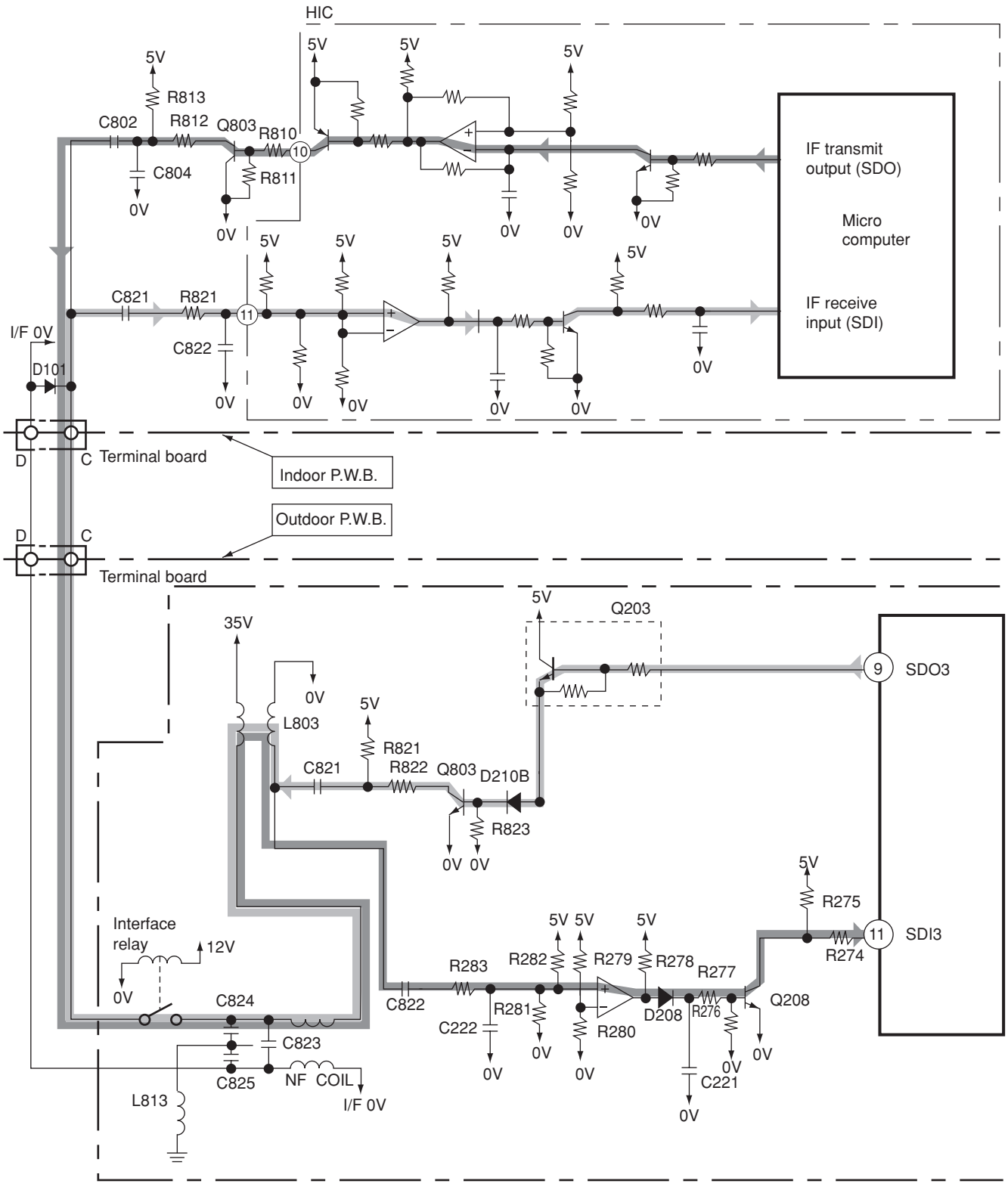


(Communications from indoor micro computer to outdoor micro computer)

(Communications from outdoor micro computer to indoor micro computer)

Fig. 2-1 Indoor / Outdoor interface Circuit 2

- Fig. 2-1 shows the interface circuit used for the indoor and outdoor microcomputers to communicate with each other.



(Communications from indoor micro computer to outdoor micro computer)

(Communications from outdoor micro computer to indoor micro computer)

Fig. 2-1 Indoor / Outdoor interface Circuit 3

- Fig. 2-1 shows the interface circuit used for the indoor and outdoor microcomputers to communicate with each other.

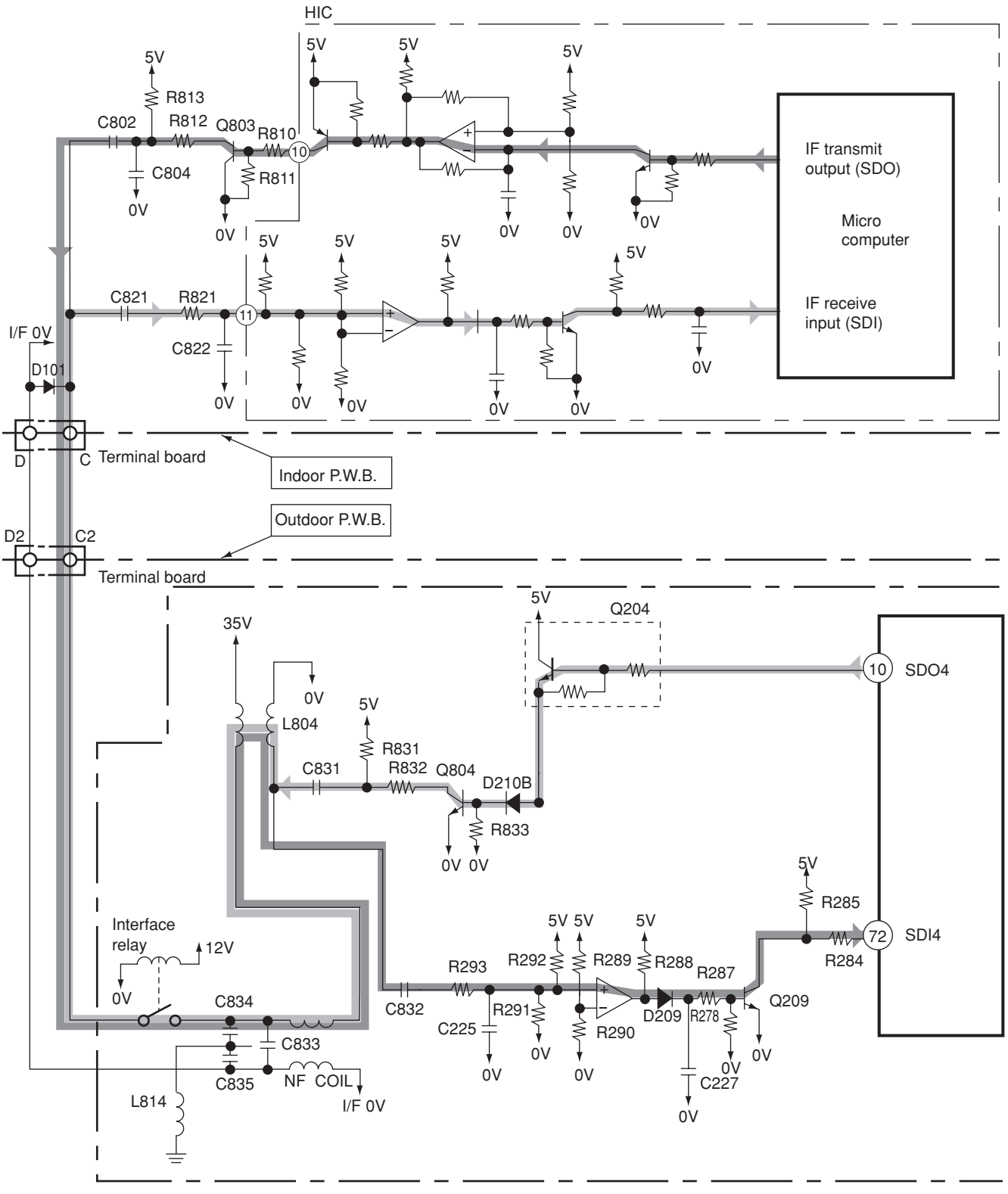


Fig. 2-1 Indoor / Outdoor interface Circuit 4

3. System power Module Circuit

● Fig. 3-1 shows the system power module and its peripheral circuits. (Current ACT module and power module are combined into one unit.)
The three transistors on the positive ⊕ side are called the upper arm, and the three transistors on the negative ⊖ side, the lower arm.

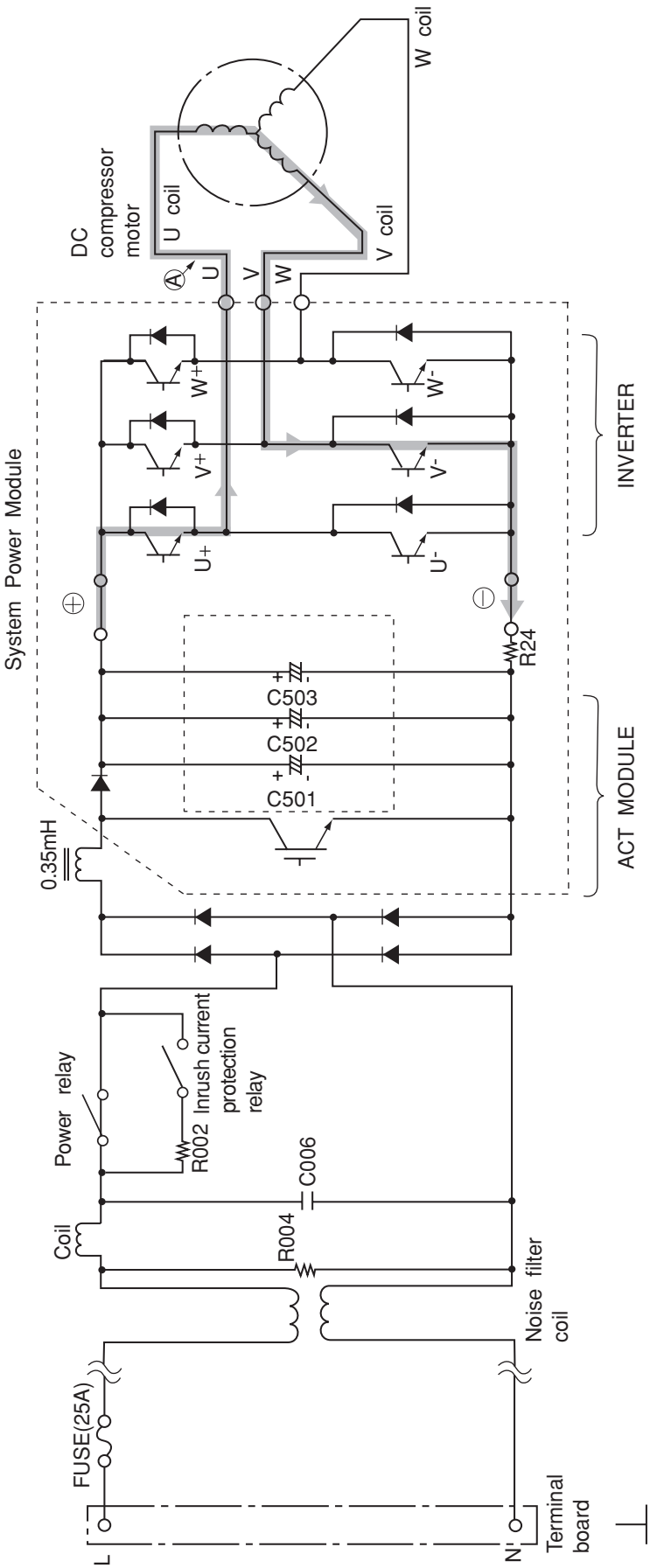


Fig. 3-1 System power module circuit (U^+ is ON, V^- is ON)

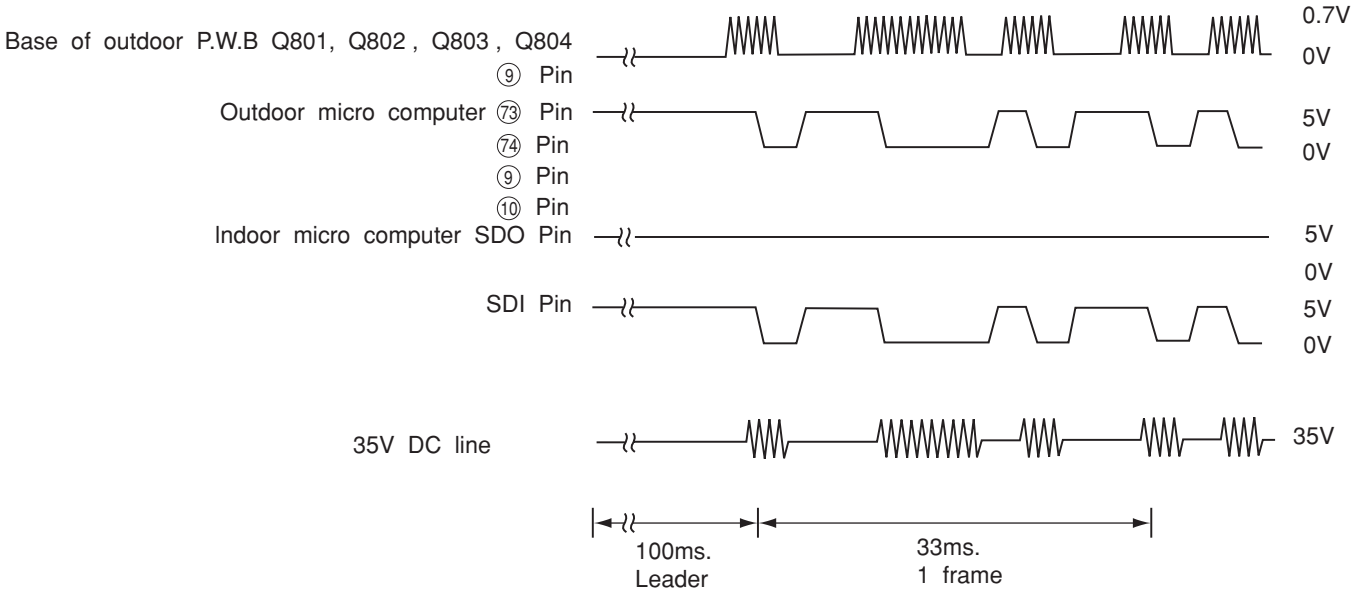


Fig. 2-2 Voltages Waveforms of indoor / Outdoor Micro computers (Outdoor to Indoor Communications)

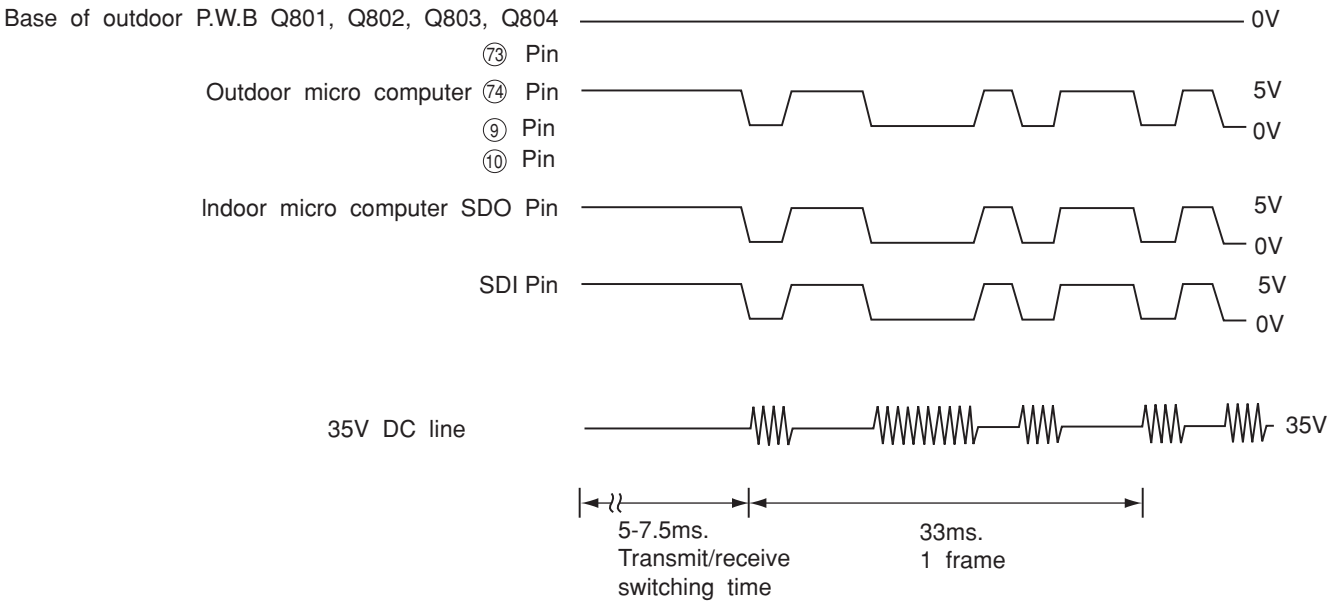


Fig. 2-3 Voltages Waveforms of indoor / Outdoor Micro computers (Indoor to Outdoor Communications)

- DC 320-360V is input to power module and power module switches power supply current according to rotation position of magnet rotor. The switching order is as shown in Fig. 3-2.

[※ At point E: U^+ is ON, V^- is ON (circuit in Fig. 3-1)
※ At point F: U^+ is chopped (OFF), V^- is ON (circuit in Fig. 3-4)]

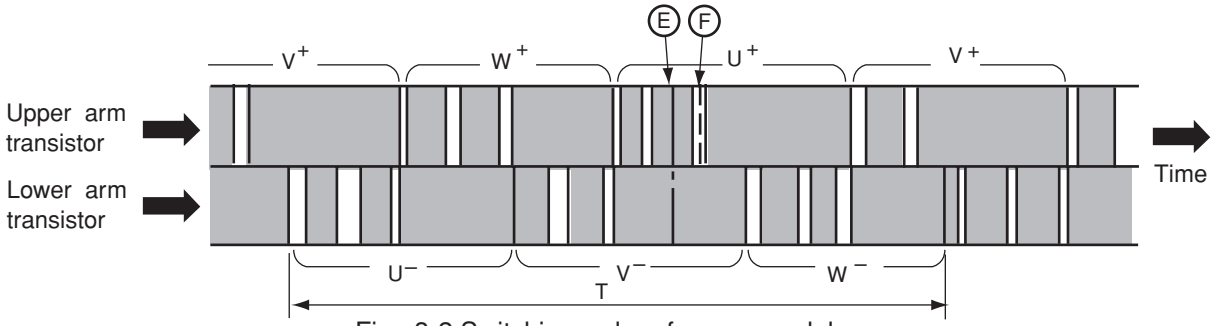


Fig. 3-2 Switching order of power module

- Upper arm transistor is controlled to ON/OFF by 3.2kHz chopper signal. Rotation speed of the compress is proportional to duty ratio (ON time/ ON time + OFF time) of this chopper signal.
- Time T in Fig. 3-2 shows the switching period, and relation with rotation speed (N) of the compressor is shown by formula below;

$$N = 60/2 \times 1/T$$

- Fig. 3-3 shows voltage / current waveform at each point shown in Figs. 3-1 and 3-4. First half of upper arm is chopper, second half is ON, and first half of lower arm is chopper, second half is ON.

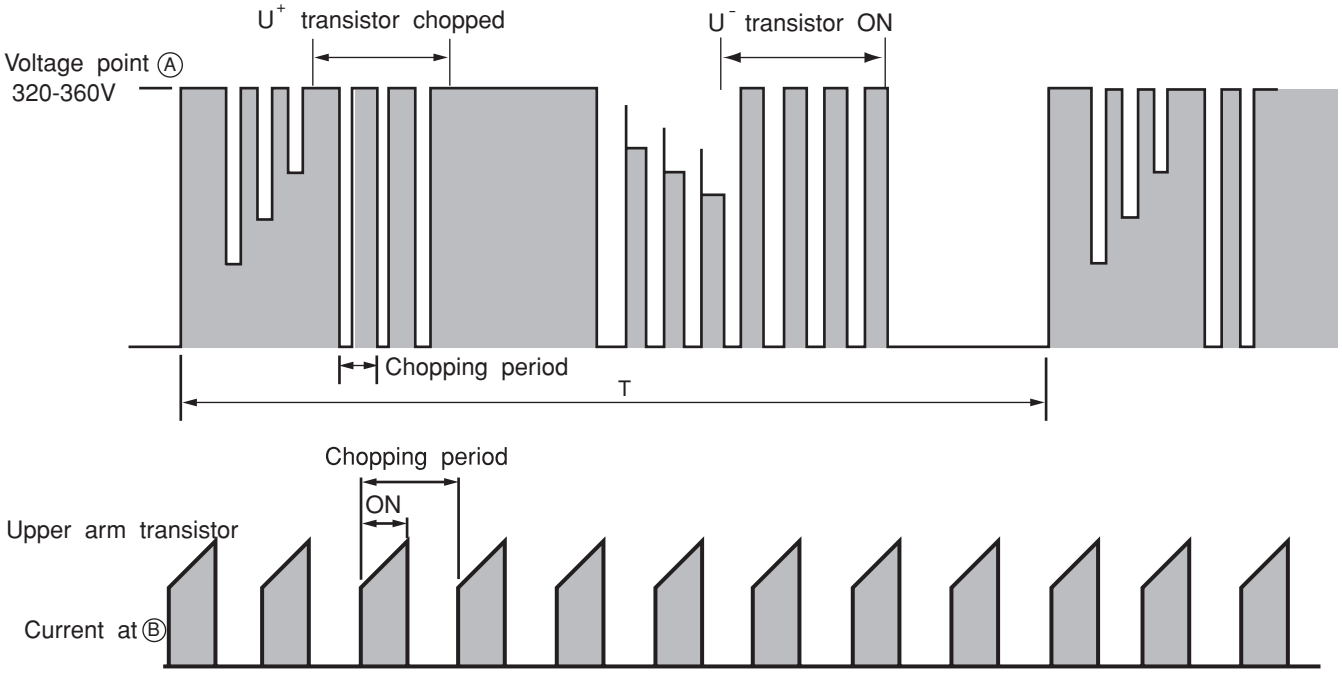


Fig. 3-3 Voltage waveform at each point

- When power is supplied $U^+ \rightarrow U^-$, because of that U^+ is chopped, current flows as shown below; Ⓑ
  (1) When U^+ transistor is ON: U^+ transistor → U coil → V coil → V^- transistor → DC current detection resistor → Point Ⓑ (Fig. 3-1)
  (2) When U^+ transistor is OFF: (by inductance of motor coil) U coil → V coil → V^- transistor → Return diode → Point Ⓐ (Fig. 3-4)

4. Power Supply Circuit

- Fig. 4-1 shows the power circuit.

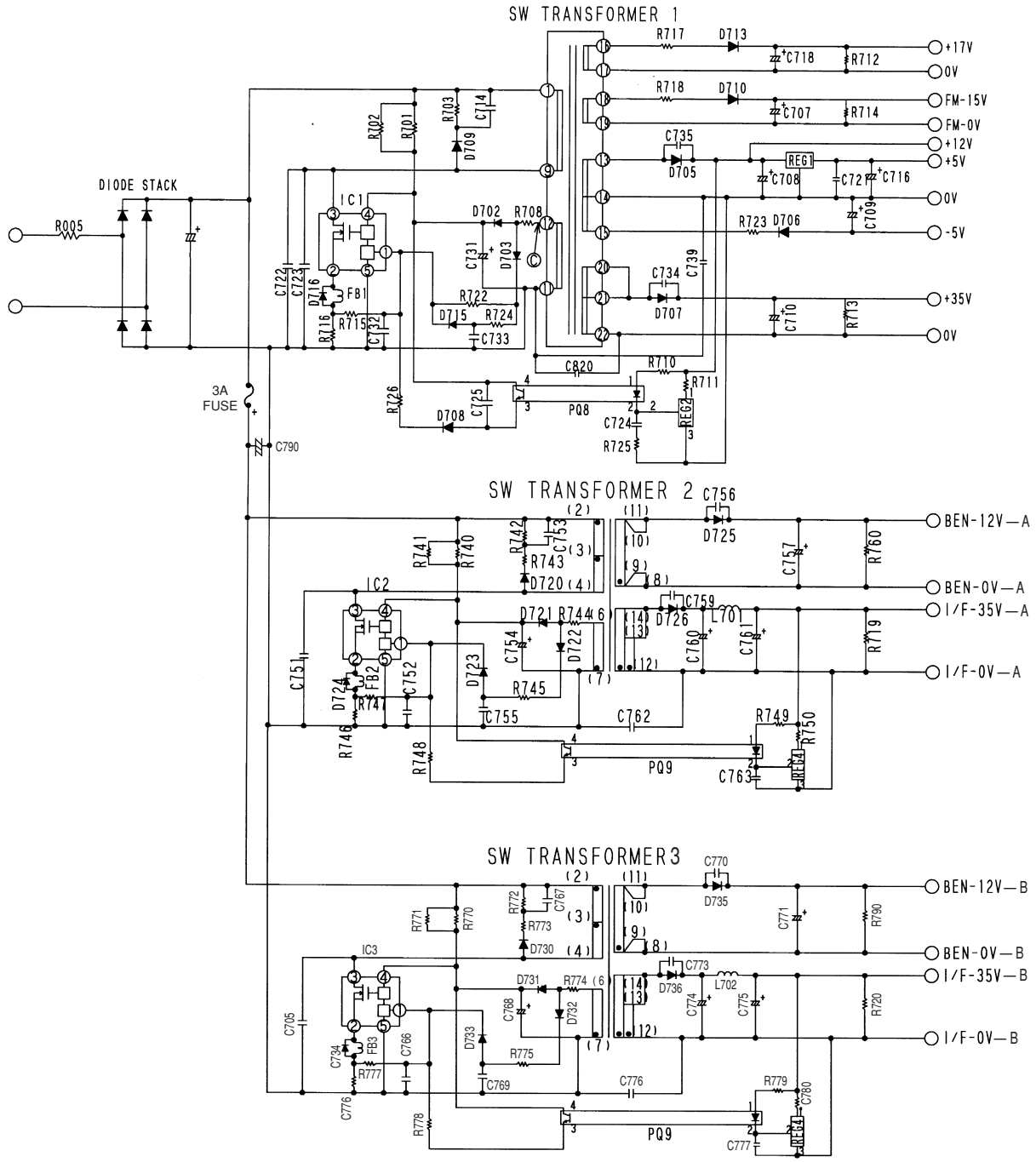


Fig. 4-1 Power circuit for P.W.B.

- There are two switching power supply in Power PWB.
- Switching power supply 1 is generating the secondary power for control circuits.
- Switching power supply 2 is generating the DC12V for expansion valve and DC35V for indoor unit 1 and 2.
- Switching power supply 3 is generating the DC12V for expansion valve and DC35V for indoor unit 3 and 4.
- Switching power supply performs voltage conversion effectively by switching transistor IC1 to convert DC330V to high frequency of approximately 20kHz to 200kHz.
- Transistor IC1 operates as follows:

(1) Shifting from OFF to ON

- DC about 330V is applied from smoothing capacitors C020 ⊕ and ⊖ in the control power circuit. With this power, current flows to pin ④ of IC1 via R701 and IC1 starts to tum ON. Since voltage in the direction of arrow generates at point Ⓒ at the same time, current passing through R708 and D702 is positive-fed back to IC1.

(2) During ON

- The drain current at IC1 increases linearly. During this period, the gate voltage and current become constant because of the saturation characteristics of the transformer.

(3) Shifting from ON to OFF

- This circuit applies a negative feedback signal from the 12V output. When the voltage across C708 reaches the specified value, REG2 turns on and current flows to PQ8 ①-②. This turns the secondary circuits on, sets IC1 pin ① to "Hi", and turns IC1 off.

(4) During OFF

- While IC1 is on, the following energy charges the primary windings of the transformer:

  Energy=$LI^2/2$. Here, L : Primary inductance

  I : Current when IC1 is off

  This energy discharges to the secondary windings during power off. That is, C707-C710, C718 is charged according to the turn ratio of each winding.
- At the start, an overcurrent flows to IC1 because of the charged current at C707-C710, C718.
- The drain current at IC1 generates a voltage across R716. If it exceeds the IC1 base voltage, it sets the IC gate voltage to "HI".
- R716 limits the gate voltage to prevent excessive collector current from flowing to IC1.
- This SW power circuit uses a frequency as low as 20kHz, especially at a low load (when both the indoor and outdoor units stop): This reduces power loss in standby status.

<Reference>

- If the power circuit for P.W.B. seems to be faulty:

(1) Make sure that 5V, 12V, 15V, 17V and -5V on the control P.W.B. power voltage are the specified values.

(2) When only the 5V output is low:
REG 1 (regulator) faulty, 5V-0V shorted, output is too high, or REG 1 is abnormal.

(3) When 12V and 5V are abnormal:
The following defects can be considered:
① Fan, operation, power, rush prevention relay (shorting in relay, etc.)
② REG 1 (regulator is abnormal), etc.
Shorting on primary circuits.
When shorting occurs in the secondary circuits, there is no abnormality in the primary circuits because of overcurrent protection.
The voltage rises when an opening occurs in the primary circuits, or the feedback system is abnormal.

(4) When 15V and 17V power supply is abnormal:
D710, D713 or Drive circuit is abnormal.

(5) When all voltage are abnormal:
IC1, R716, may possibly be defective. Also D cable may possibly be reverse connected.
If IC1 is abnormal, be aware that other components, such as the power module, REG (regulator), etc. are possibly defective.

[When the switching power supply seems to be abnormal, the voltage between IC1 pin ④ (to be measured at the leads of R9701and R702) and IC1 pin ⑤ (to be measured at R216 lead) may be between 11 and 16V. This is because the protection circuit of IC1 is operating.]

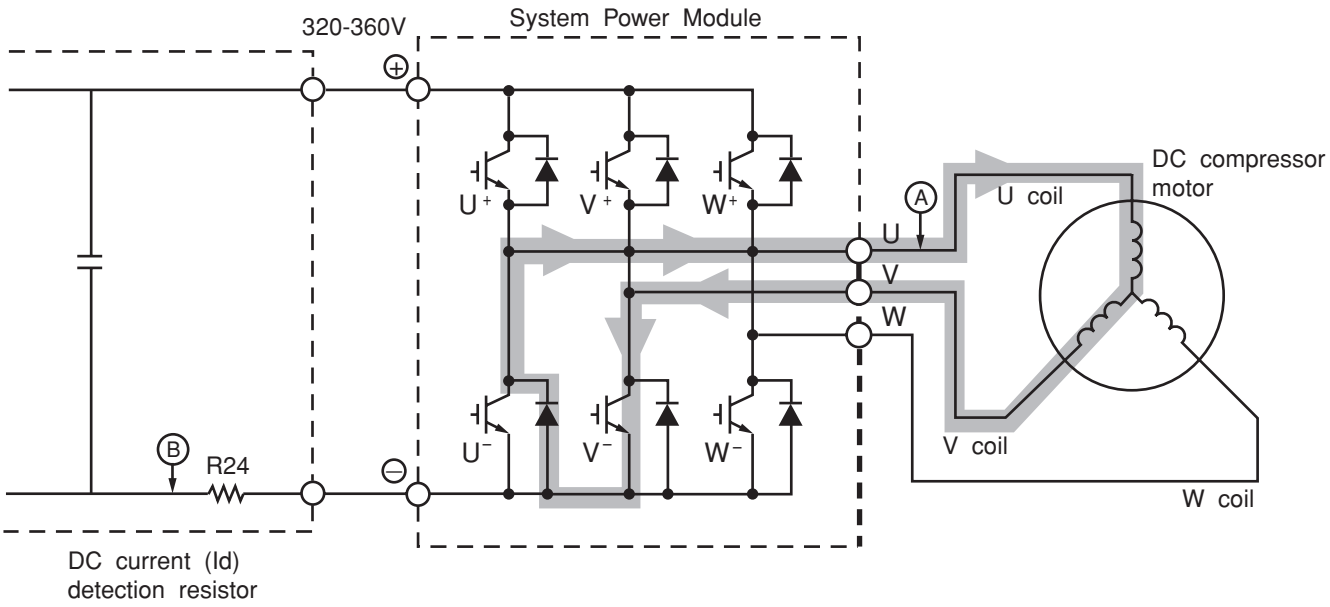


Fig. 3-4 System Power module circuit (U^+ is OFF, V^- is ON)

- Since current flows at point Ⓑ only when U+ transistor and V^- transistor is ON, the current waveform at point Ⓑ becomes intermittent waveform as shown in Fig. 3-3. Since current at point Ⓑ is approximately proportional to the input current of the air conditioner, input current is controlled by using DC current (Id) detection resistor.

<Reference>

If power module is detective, self diagnosis lamps on the control P.W.B. may indicate as shown below:

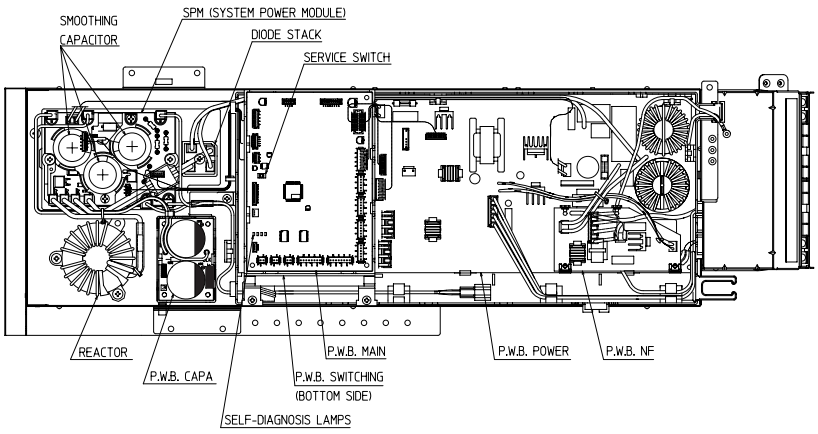


Table 3-1

Self-diagnosis	Self-diagnosis lamp and mode	
Ip (peak current cut)	LD301	Blinks 2 times
Abnormal low speed rotation	LD301	Blinks 3 times
Switching incomplete	LD301	Blinks 4 times

Fig. 3-5

※ From results of power module simple inspection (inspection mode when operated with compressor lead disconnected), LD310 blinks four times about 2 seconds later: Unit has not entered the normal operation.

5. Reversing valve control circuit

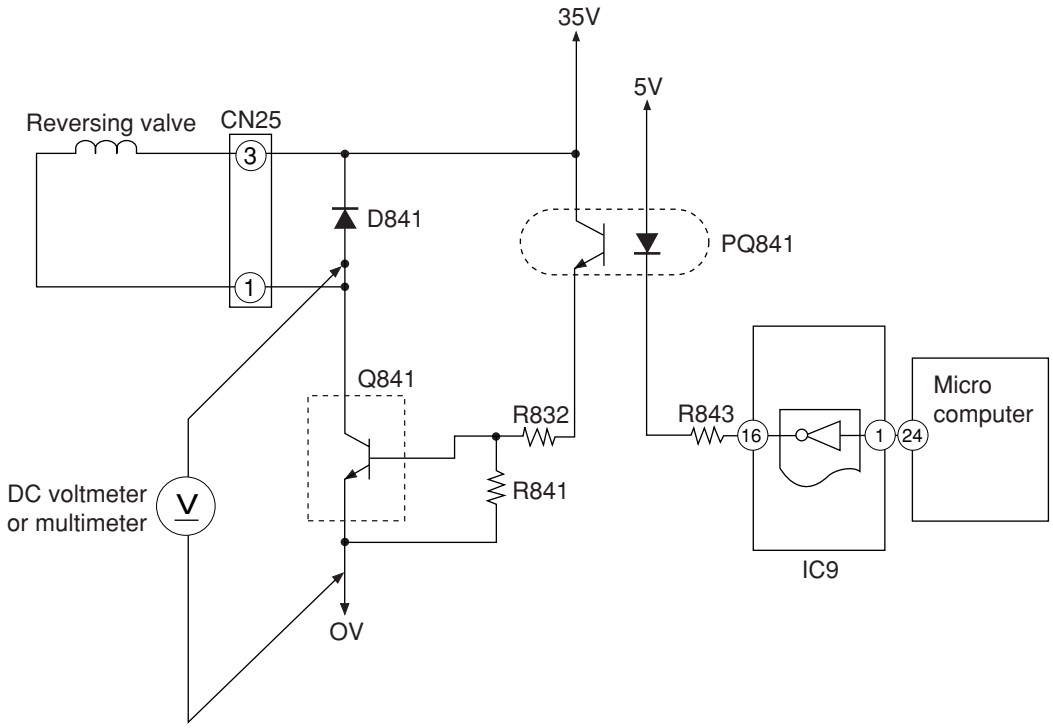


Fig. 5-1

Since the reversing valve is differential pressure system, even when reversing valve is ON (collector of Q841 is about 0.8V normally), compressor rotation speed instructed by indoor microcomputer exceeds 3300min^{-1}, signal at pin of ㉔ microcomputer changes, and collector voltage of Q841 will be about 35V. This does not indicate trouble. When rotation speed is reduced under 2700min^{-1}, collector voltage of Q841 will fall to about 0.8V again. To measure voltage, connect ⊕ terminal of tester to D841 anode and ⊖ terminal to D line on the terminal board.

- By reversing valve control circuit you can switch reversing valve ON/OFF (cooling ON) according to instruction from indoor microcomputer and depending on operation condition.

  Voltage at each point in each operation condition is approximately as shown below when measured by tester. (When collector voltage of Q831 is measured)

Table 5-1

Operation condition		Collector voltage of Q841
Cooling	General operation of cooling	About 0.8V
Heating	In normal heating operation	About 35V
	MAX. rotation speed instructed by indoor microcomputer after defrost is completed	About 35V
	Defrosting	About 0.8V
Dehumidifying	Sensor dry	About 0.8V

6. Rotor magnetic pole position detection circuit

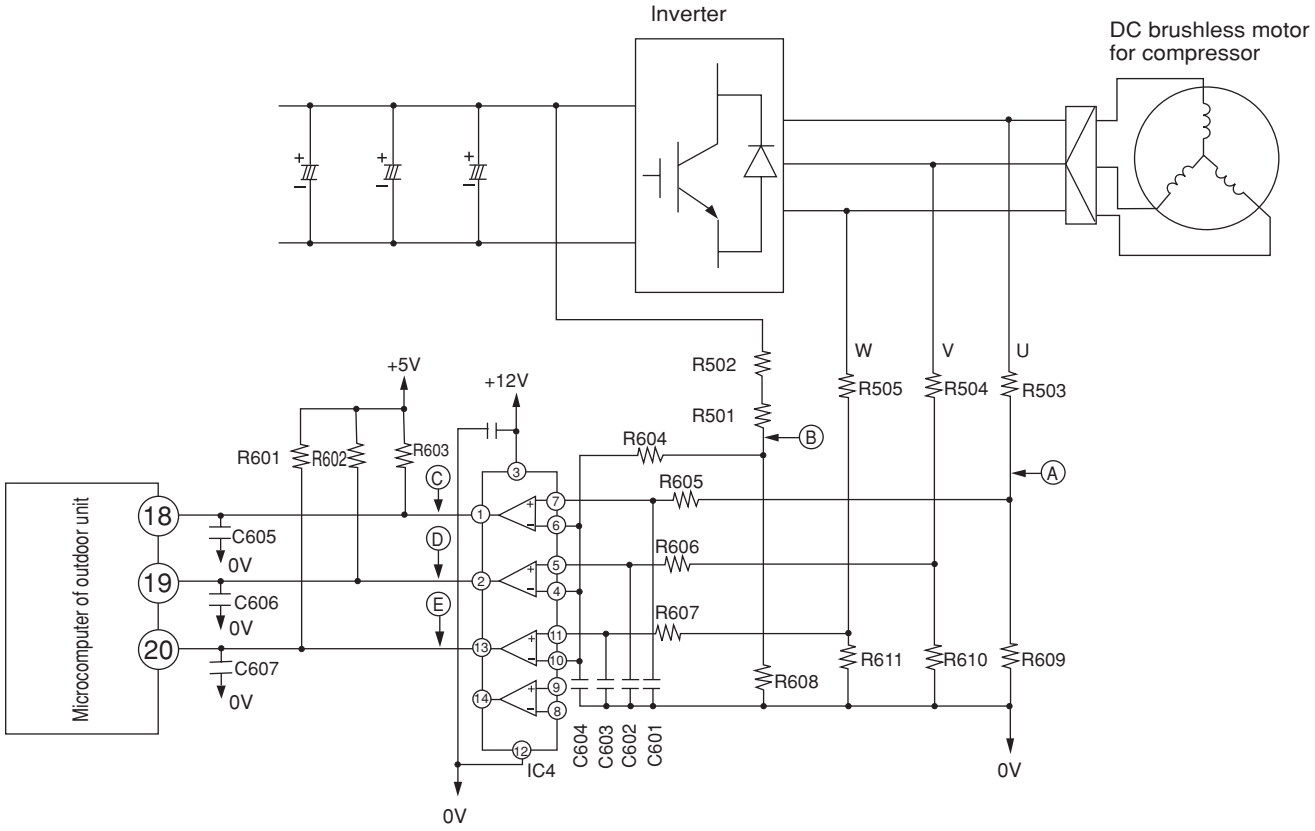


Fig. 6-1 Rotor magnetic pole position detection circuit

When the DC brushless motor is rotated, it also operates as power generator, generating reverse electromotive force according to number of rotations. This reverse electromotive force is voltage-divided by R503 - R505 and R609 - R611, and appears as point Ⓐ voltage. IC3 compares and digitalizes point Ⓐ voltage with point Ⓑ voltage (in which DC voltage (Vd) is voltage-divided by R501, R502 and R608), and inputs this to microcomputer as position detection signals for points Ⓒ, Ⓓ and Ⓔ . Microcomputer switches inverter using optimum timing based on position detection signals, in order to control the rotation of the brushless motor.

7. Peripheral circuit of microcomputer

- Fig. 7-1 shows the microcomputer and its peripheral circuits.
  Table 7-1, the basic operations of each circuit block, and Fig. 7-2, the system configuration.

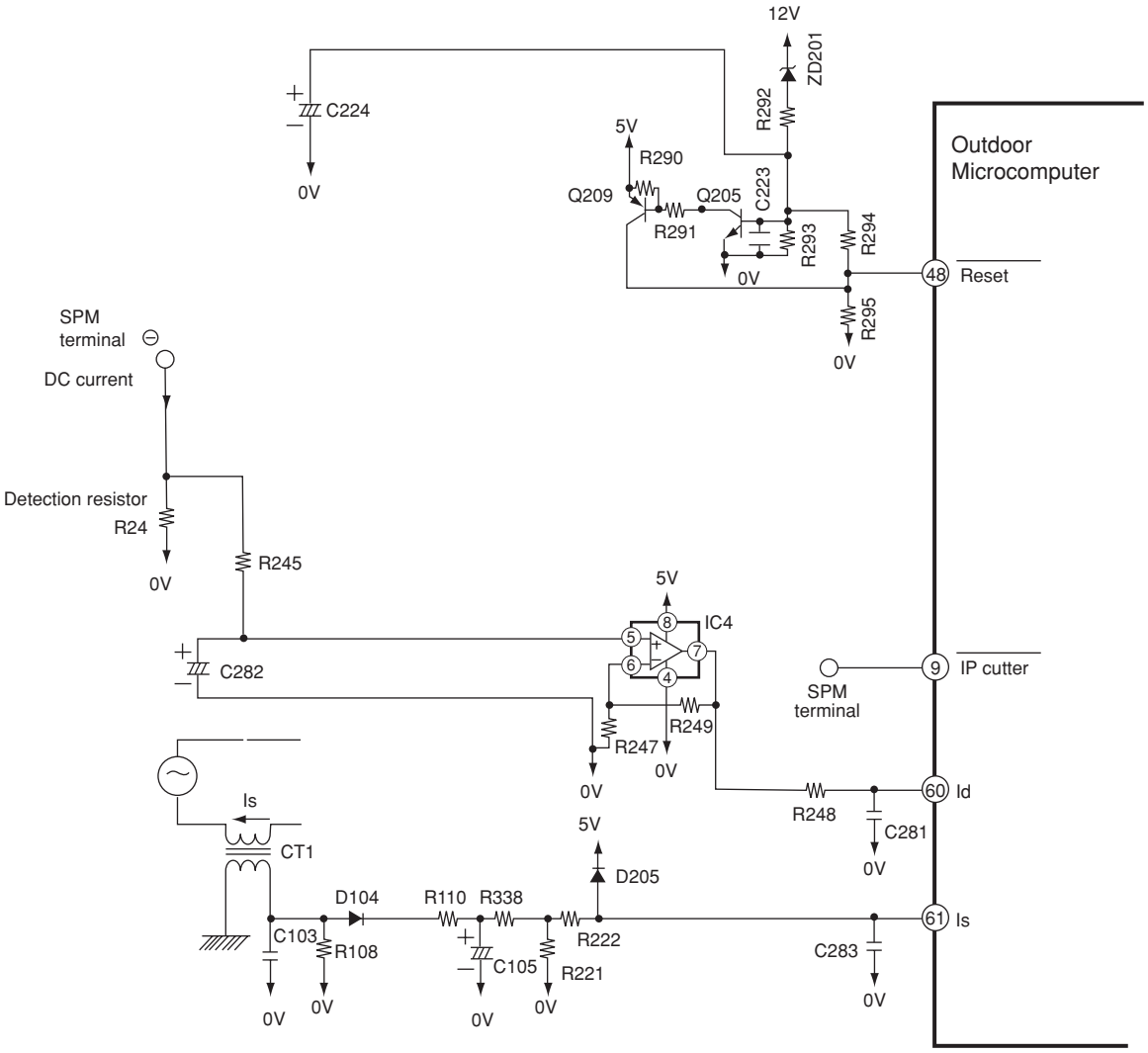


Fig. 7-1 Peripheral circuit of microcomputer

Table 7-1

Circuit block	Basic operation
Peak current cut off circuit	This circuit detects DC current flowing power module: When over-current (instantaneous value) flows, it stops upper and lower arm drive circuit and also produces Ip signal to stop microcomputer.
Overload external judgment circuit	This circuit detects DC current flowing to power module and produces signal to notify microcomputer of overload status.
Voltage amplifier circuit	This circuit voltage-amplifies DC current level detected by detection resistor and sends it to microcomputer. In addition, setting of internal/external overload judgment is performed.
Reset circuit	This circuit produces reset voltage.

8. Overload control circuit (OVL control circuit)

- Overload control is to decrease the speed of the compressor and reduce the load when the load on the air conditioner increases to an overload state, in order to protect the compressor, electronic components and power breaker.
- Overloads are judged by comparing the DC current level and set value.
- Fig. 8-1 shows the overload control system configuration and Fig. 8-2 is a characteristic diagram of overload judgement values. There are two judgement methods-external judgement which mompares the externally set value with the DC current value regardless of the rotation speed and internal judgement which compares the set value that according to the rotation speed programmed in the micro computer software with the DC current value.

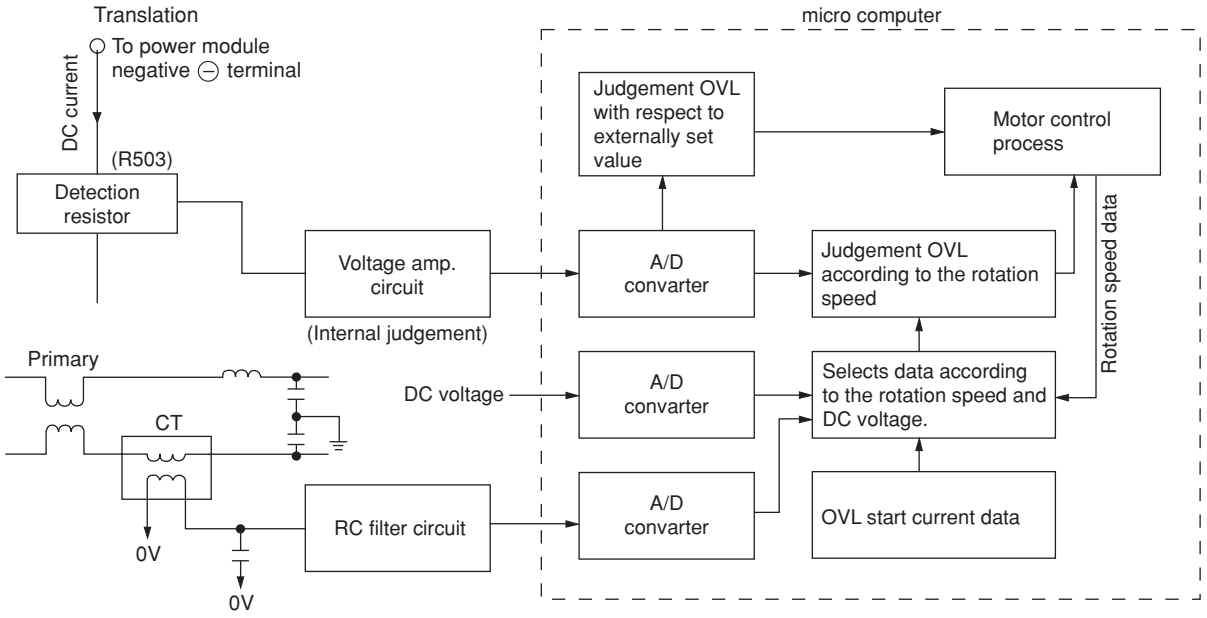


Fig. 8-1 Overload Control System Configuration

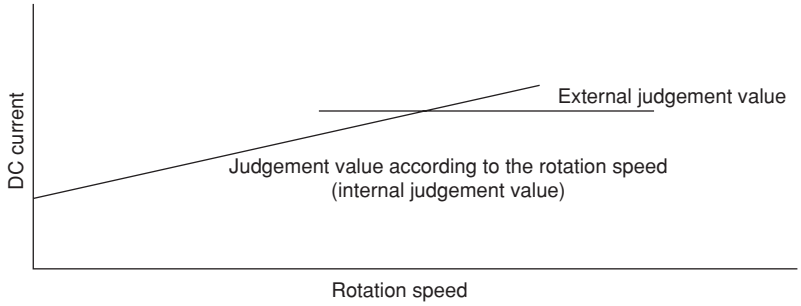


Fig. 8-2

9. Reset circuit

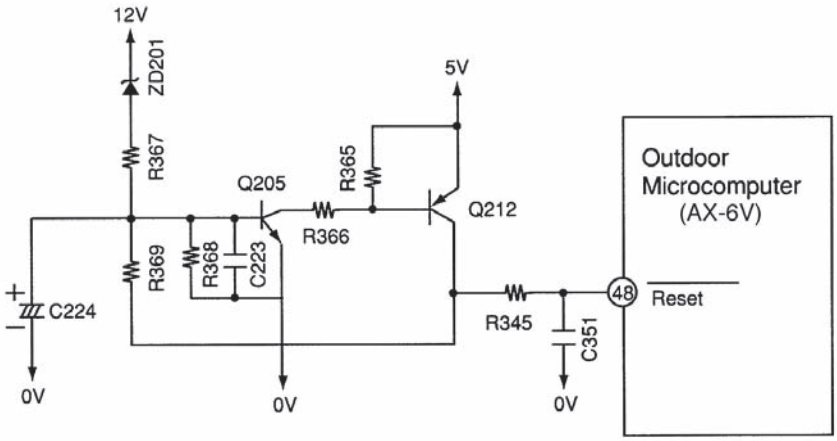


Fig. 9-1

- Reset circuit performs initial setting of microcomputer program when power is turned on.
- Microcomputer resets program with reset voltage set to Lo, to enable operation at Hi level.
- Fig. 9-1 shows reset circuit, and Fig. 9-2 shows waveforms at each point when power is turned on and off.
- After power is turned on, 12V line and 5V line voltages rise: When 12V line voltage reaches 7.2V (Zener voltage of ZD201) ZD201 turns ON and Q212 and Q205 turn on, and reset voltage becomes Hi. Reset voltage is not set to Hi until VDD of microcomputer rises to 5V, enabling operation, due to ZD201.
- After power turns off, when 12V line voltage drops, ZD201 also turns OFF.

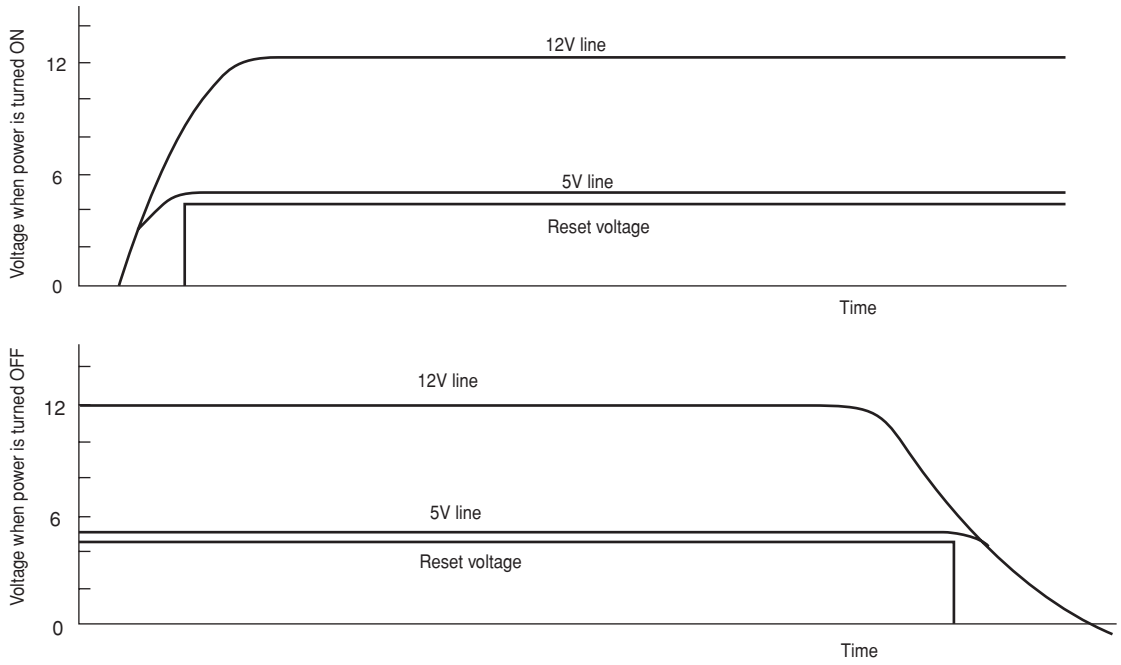


Fig. 9-2

10. Temperature Detection Circuit

- The outdoor units (this model) provides with the outdoor temperature thermistor, DEF (defrost) thermistor, OH (overheat) thermistor and electric expansion valve thermistor so that they detect the temperatures of the unit and control the system.
- The circuit of the thermistors is shown as Fig. 10-1 for model RAM-72QH5 and their roles and temperature measuring points are shown as Table 10-1.

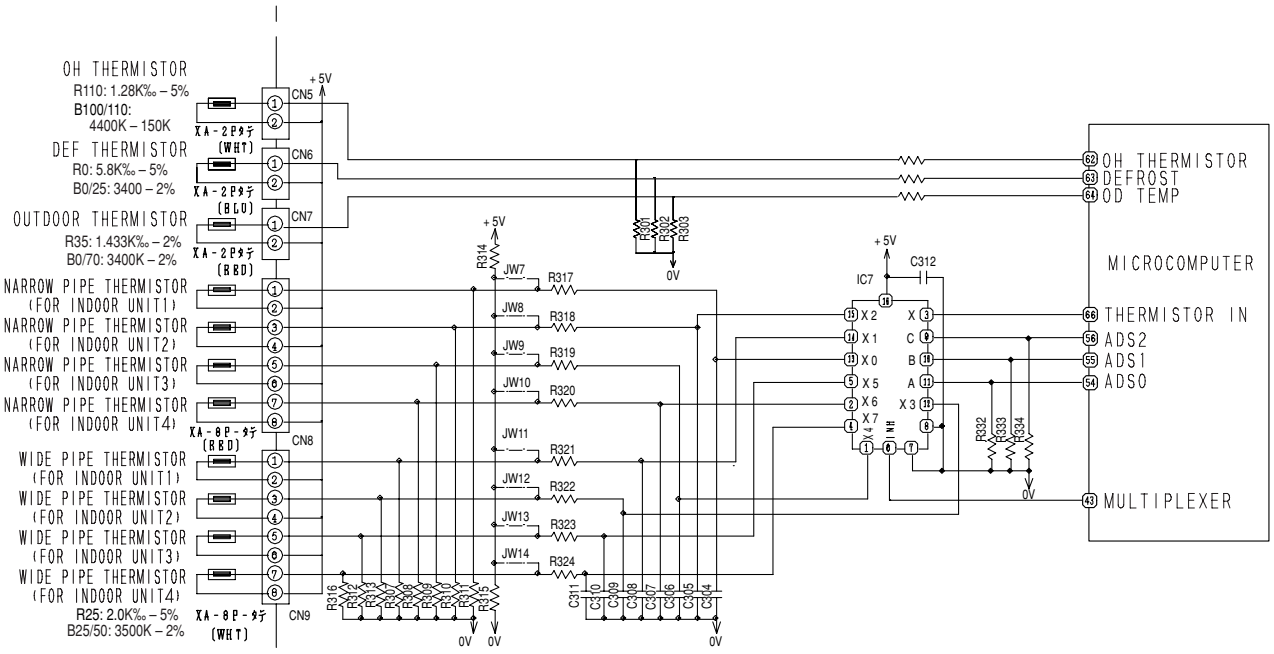


Fig. 10-1 Temperature Detection Circuit

Table 10-1 Name and Role of each thermistor

Name	Connector No	Measuring Point	Role
OH thermistor	CN5	Compressor head	If the temperature of the compressor rises abnormally (118˚C), the compressor will be stopped. The temperature is used to decide the operation of the valve.
DEF thermistor	CN6	Heat exchanger	The thermistors decide the defrost operation during heating combined the data of the outside temperature and its data.
Outdoor temperature thermistor	CN7	Outside temperature	Outdoor temperature is used to decide the various operations of the air conditioner.
Electric expansion valve thermistor (NARROW PIPE 1)	CN8	Indoor unit 1 (NARROW PIPE)	The thermistors detect the temperatures of the piping to the indoor units. The temperatures are used to decide how much the expansion valve is opened.
Electric expansion valve thermistor (NARROW PIPE 2)		Indoor unit 2 (NARROW PIPE)	
Electric expansion valve thermistor (NARROW PIPE 3)		Indoor unit 3 (NARROW PIPE)	
Electric expansion valve thermistor (NARROW PIPE 4)		Indoor unit 4 (NARROW PIPE)	
Electric expansion valve thermistor (WIDE PIPE 1)	CN9	Indoor unit 1 (WIDE PIPE)	
Electric expansion valve thermistor (WIDE PIPE 2)		Indoor unit 2 (WIDE PIPE)	
Electric expansion valve thermistor (WIDE PIPE 3)		Indoor unit 3 (WIDE PIPE)	
Electric expansion valve thermistor (WIDE PIPE 4)		Indoor unit 4 (WIDE PIPE)	

- Table 10-2 shows the correspondence between the thermistor's resistance and the temperature. They should be used as reference values. The value, which you measure, may be slightly difference from that in the table. It depends on the instrument.
- When you measure the resistance, pull out the connector after turning off the power supply. Pulling out the connector while the power supply is turned on will cause troubles.

Table 10-2 Correspondence between each thermistor's resistance and temperature (reference value)

Electric expansion valve thermistor DEF thermistor	Temperature	Resistance	Microcomputer pin potential
	-15˚C	12.6kΩ	1.0V
	0˚C	6.1kΩ	1.7V
	25˚C	2.2kΩ	3.0V
	50˚C	860Ω	3.9V
	75˚C	400Ω	4.4V
Outdoor temperature thermistor	Temperature	Resistance	Potential
	-15˚C	12.6kΩ	1.0V
	0˚C	6.1kΩ	1.7V
	15˚C	3.2kΩ	2.4V
	30˚C	2kΩ	3.1V
OH thermistor	Temperature	Resistance	Potential
	25˚C	33.9kΩ	0.5V
	50˚C	10.8kΩ	1.3V
	75˚C	4.1kΩ	2.4V
	100˚C	1.7kΩ	3.4V
	105˚C	1.5kΩ	3.6V
	118˚C	1kΩ	3.9V

- When the connectors of the thermistors are disconnected or the thermistors is open or short, LD301 (red) lights and LD302 (red) blinks so that they indicate troubled parts. Combinations of LD301 and LD302 are set up for indicating troubled thermistors. The correspondences between the number of blink time and troubled parts are shown as Table 10-3. Look in the table (LD301 and LD302 blink) for troubled parts, and if the disconnections of them are checked out, they are replaced.

- If you can see two or more troubled thermistors, a small number of blink takes precedence of others.

- The electric expansions valve thermistor is put togrther with 3 pieces, when replacing the thermistor, replace one set of 3 pieces as taking care of positioning. If you don't do so, the unit may not operate normally and its cooling and heating performance may drop.

- Be ware that only an open-circuit for OH thermistor has to be checked in 5 minutes after the compressor starts.

- If the unit operates abnormally after replacing the thermistor, replace the control P.W.B. because it malfunctions.

Table 10-3 LED lighting mode at the thermistors troubled

LED lighting mode		Troubled thermistor	Judgement	
LD301	LD302		Open	Short
Lights	1 blink	OH thermistor	0.04V or less	4.96V or more
Lights	2 blinks	DEF thermistor		
Lights	3 blinks	Outdoor temperature thermistor		
Lights	4 blinks	Electric expansion value thermistor (narrow pipe 1)		
Lights	5 blinks	Electric expansion value thermistor (wide pipe 1)		
Lights	6 blinks	Electric expansion value thermistor (narrow pipe 2)		
Lights	7 blinks	Electric expansion value thermistor (wide pipe 2)		
Lights	8 blinks	Electric expansion value thermistor (narrow pipe 3)		
Lights	9 blinks	Electric expansion value thermistor (wide pipe 3)		
Lights	10 blinks	Electric expansion value thermistor (narrow pipe 4)		
Lights	11 blinks	Electric expansion value thermistor (narrow pipe 4)		

- The OH thermistors are detecting the compressor head temperatures. If the temperature rises over 118ßC, the compressor in the cycle will be stopped to protect itself and LD301 will blink 6 times (OH STOP). When the compressor temperature fells under 105ßC, the compressor will restart. During OH STOP, the fan continues to spin. The other cycles without a trouble operates normally.

- If OH STOP often occurs, the refrigerant may be leaking.

11. Electric expansion valve

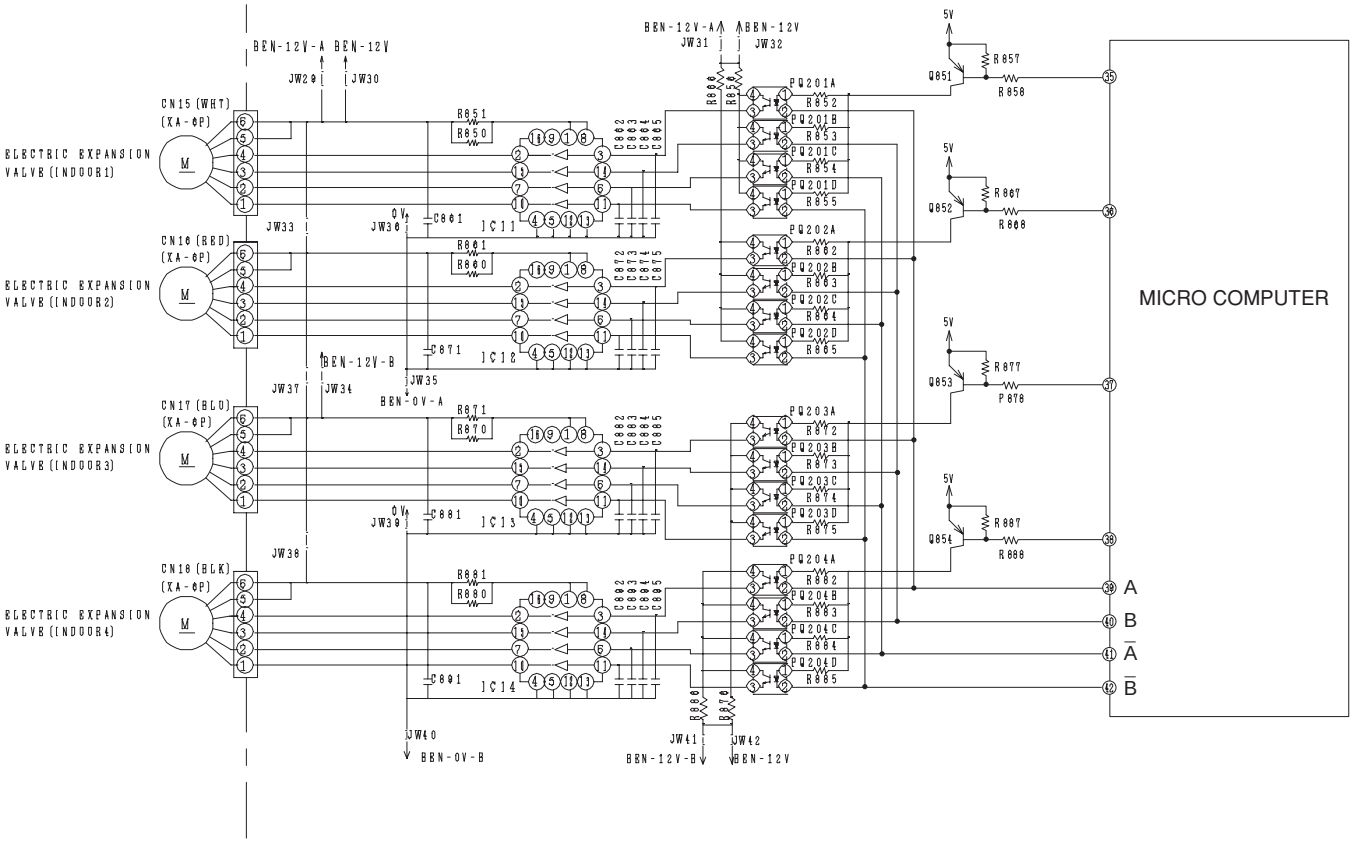


Table 11-1

- The electric expansion valve is driven by DC 12V. Power is supplied to 1 or 2 phases of 4-phase winding to switch magnetic pole of winding in order to control opening degree.
- Relationship between power switching direction of phase and open/close direction is shown below. When power is supplied, voltages at pins 4 to 1 of CN15~CN18 are about 0.9V; they are about 12V when no power is supplied. When power is reset, initialization is performed for 10 or 20 seconds. During initialization, measure all voltages at pins 4 to 1 of CN15~CN18 using mutimeter. If there is any pin with voltage that has not changed from around 0.9V or 12V, expansion valve or microcomputer is defective.
- Fig. 11-2 shows logic waveform when expansion valve is operating.

Table 11-2

Pin phase No.	Lear wire	Drive status							
		1	2	3	4	5	6	7	8
④	White	ON	ON	OFF	OFF	OFF	OFF	OFF	ON
③	Yellow	OFF	ON	ON	ON	OFF	OFF	OFF	OFF
②	Orange	OFF	OFF	OFF	ON	ON	ON	OFF	OFF
①	Blue	OFF	OFF	OFF	OFF	OFF	ON	ON	ON

Operation mode
1→2→3→4→5→6→7→8 VALVE CLOSE
8→7→6→5→4→3→2→1 VALVE OPEN

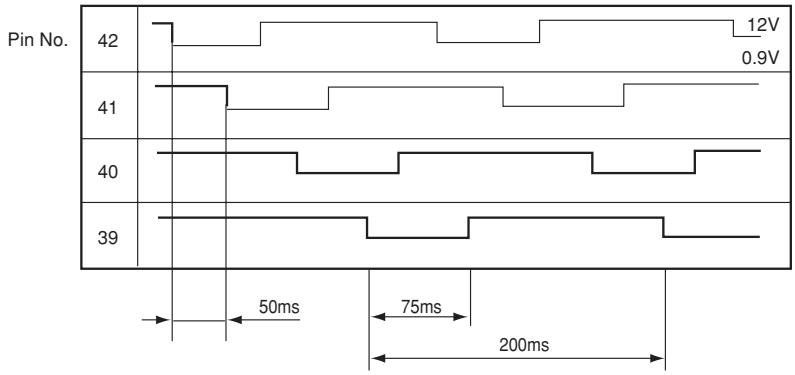


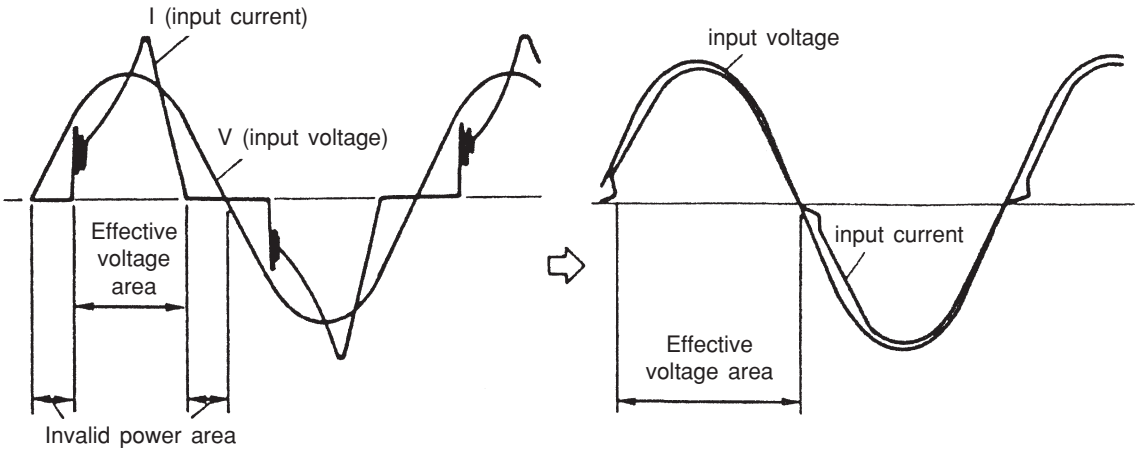
Fig. 11-2

With expansion valve control, opening degree is adjusted to stabilize target temperature, by detecting temperature of compressor head.

The period of control is about once per 20 seconds, and output a few pulses.

12. Power Factor Control Circuit

Power factor is controlled by almost 100%. (Effective use of power)
With IC in ACT module, control is performed so that input current waveform will be similar to waveform of input voltage.



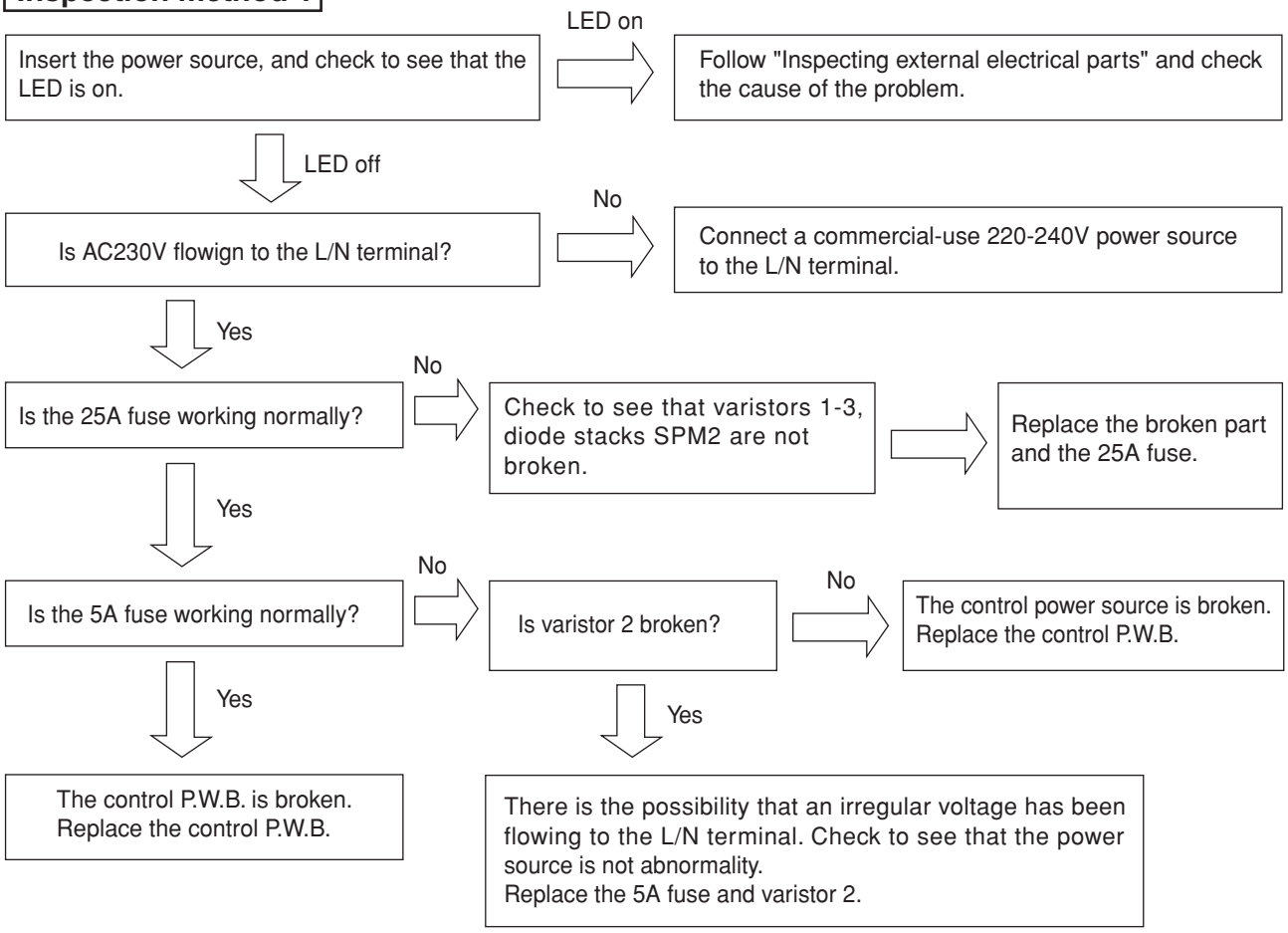
*Assuming the same current capacity (20A), power can be used about 10% effective, comparing with curent use (power factor of 90%), and maximum capacity is thereby improved.

INSPECTING OUTDOOR ELECTRICAL PARTS

• Check to see that the LED is either on or blinking.
• Carry out inspections by examining the on/blinking status of LEDs 301-304.

LED number	LD301	LD302	LD303	LD304	Status	Checkpoints
Name	Diagnosis lamp 1	Diagnosis lamp 2	Communications lamp	Operation lamp		
Case 1	Off	Off	Off	Off	Normal off status or unconnected microcomputer power source	If the LED is not on even when the power source is connected the microcomputer power source is unconnected. → Inspection method 1
Case 2	Blinks once	Off	Off	Off	Microcomputer reset status (immediately after inserting power source or immediately after power source abnormally)	If is normal for LD301 to blink once after the power source has been inserted. If the unit stops when it is in operation and LD301 blinks once, it is possible that the power source has been temporarily interrupted by lightning or for some other reason. Replace the control PCB if this occurs frequently.
Case 3	Blinks	Off	Off	Off	Abnormally stop	Abnormally stop is shown by the number of times the LED blinks. → Inspection method 2
Case 4	On	Blinks	Off	Off	Thermistor abnormally	Thermistor abnormally is shown by the number of times the LED blinks. → Inspection method 3
Case 5	Off (blinks once)	Off	Off	Blinks	Communications error	Communications error is shown by the number of times the LED blinks. → Inspection method 4 *In the case that an internal unit is not connected, the number of connected internal units is shown by the number of times the LED blinks. This is not a abnormally. The internal unit has no communications error and is able to operate normally.
Case 6	Off	Off	On	Off	Normal operation	Normal operation
Case 7	On	Off	On	Off	OVL1 operation	Normal operation
Case 8	Off	On	On	Off	OVL2 operation	Normal operation
Case 9	On	On	On	Off	OVL3 operation	Normal operation

Inspection method 1



Inspection method 2

Check the number of times LD301 blinks.

LD301: Blinks once / Reset stop — Yes → The power source or some other reason may have caused the microcomputer to reset. Replace the control P.W.B. if the LED blinks once and then stops frequently during operation.
* The LED blinks once after the power source has been inserted.

No

LD301: Blinks twice / Peak current cut — Yes → Is LD302 blinking?

Blinks twice → The SPM2 is broken. Replace the SPM2.

Doesn't work even after the SPM2 is replaced. → If the unit doesn't work even after the SPM2 is replaced, the drive circuit may be broken or the CN14 cable may be cut. Check to see that an electrical current is flowing through the CN14 cable.

- Cable abnormally → Replace the CN14 cable.
- No cable abnormally → Replace the MAIN P.W.B..

Doesn't blink → Check to see the approximate length of time it takes for the compressor to stop after switching on and operating two or three times.
* Wait for three minutes or more before operating.

Restarts quickly every time. → (back to The SPM2 is broken. Replace the SPM2.)

Takes several minutes to restart. → There is the possibility that the cycly load has become heavy and the compressor has come loose. Check the compressor.
* In this case the LED may blink three times before stopping.

No

LD301: Blinks three times / Low speed — Yes → Check to see the approximate length of time it takes for the compressor to stop after switching on and operating two or three times.
* Wait for three minutes or more before operating.

Restarts quickly every time. → Ia the wire from the SPM2 to the compressor loose or broken, or has it been connected improperly?

- Cable abnormally → In the case that one of the compressor cables has become loose (or broken), the compressor may work even if it is missing a phase. The compressor occasionally operates in reverse if one of the compressor cables has been connected improperly. Replace the cable or rewire as appropriate.
- No abnormally → Doesn't work even after the SPM2 is replaced. → The SPM2 may be broken. Replace the SPM2. → If the unit doesn't work even after replacing the SPM2, the drive circuit may be broken. Replace the MAIN P.W.B..

Takes several minutes to restart. → There is the chance that the cycle load has become heavy and the compressor has come loose. Check the compressor.
* In this case the LED may blink twice before stopping.

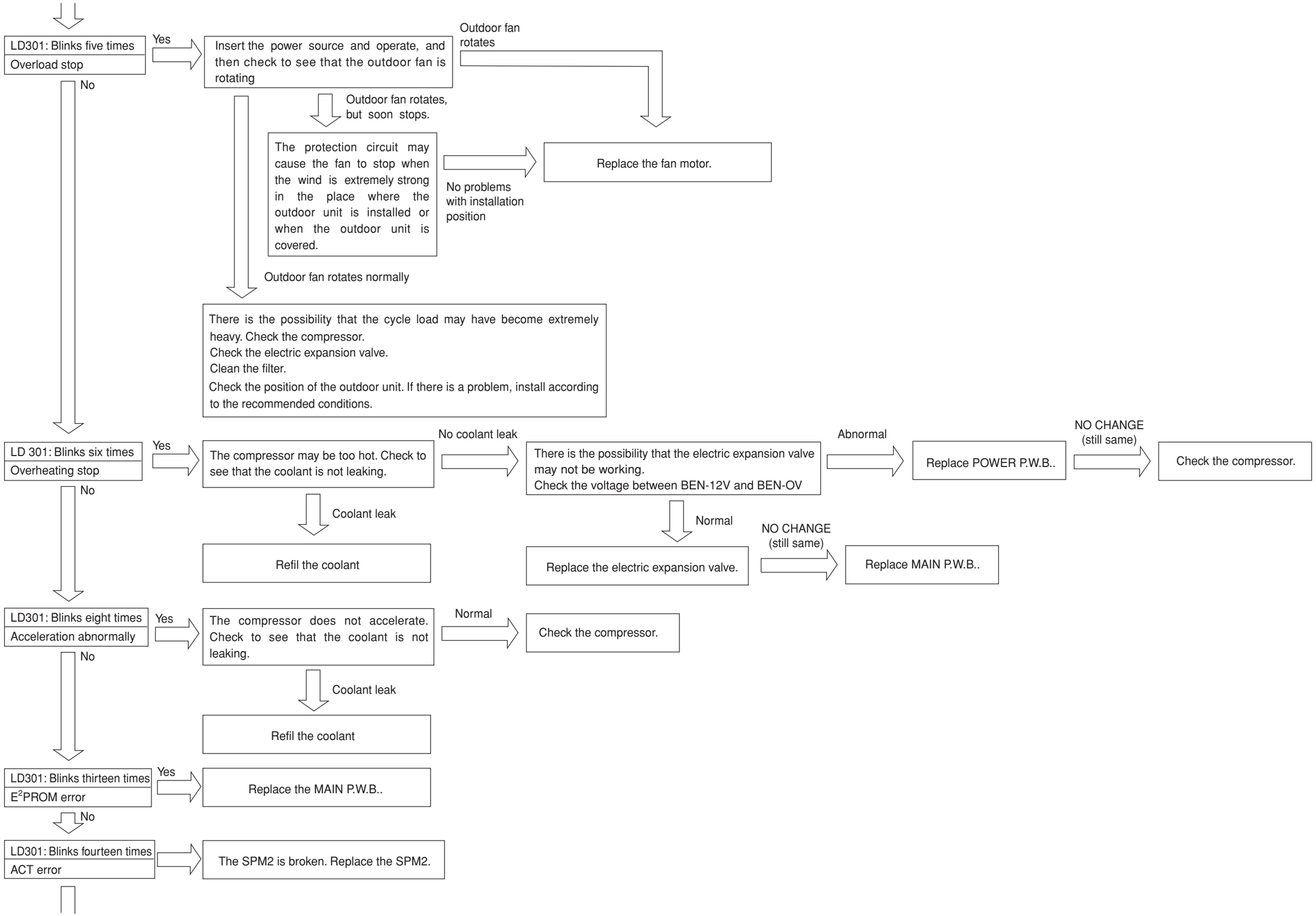
No

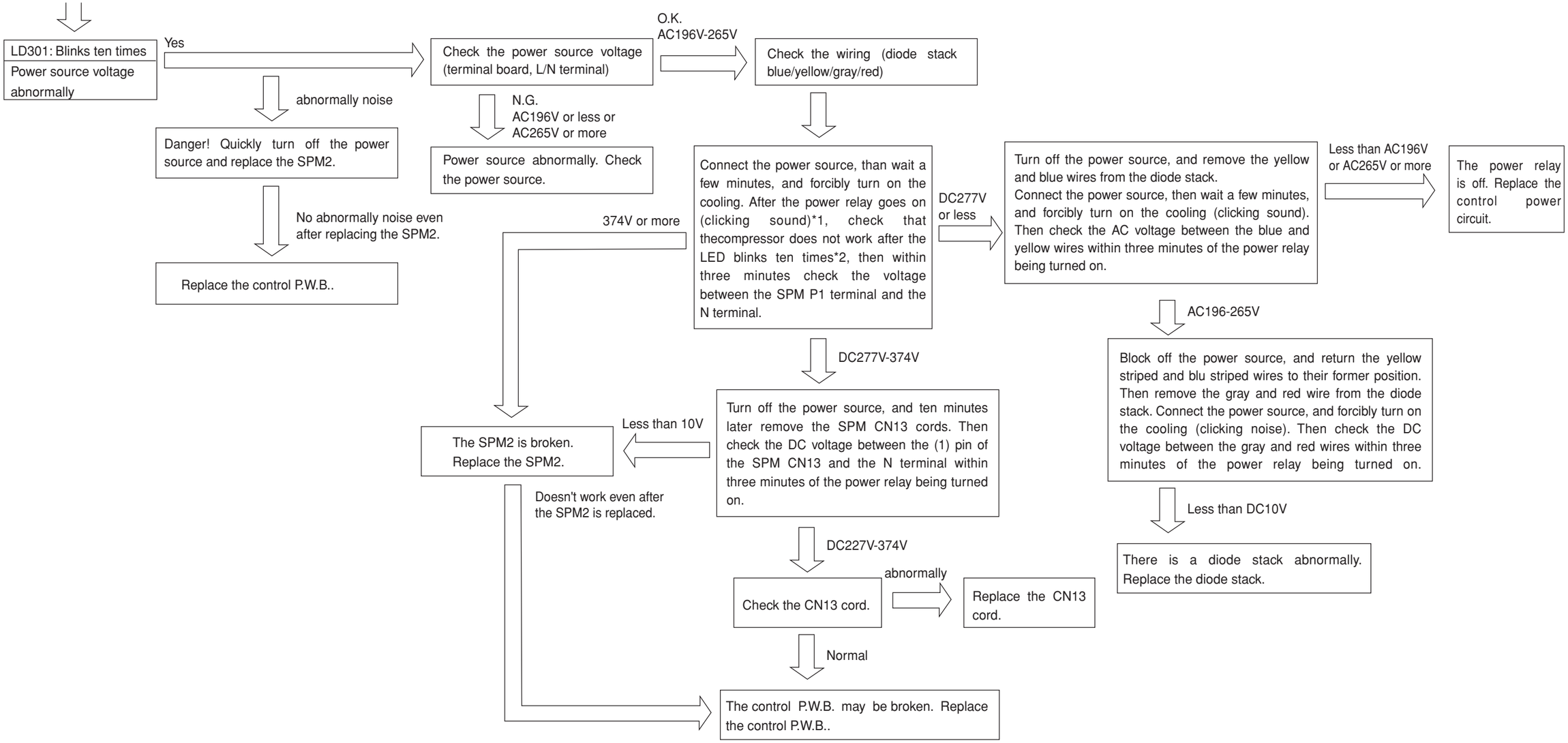
LD301: Blinks four times / Switch failure — Yes → Check to see that the MAIN P.W.B. has 17V.
* Be sure to check the correct points for measuring.

O.K. (16-19V) → Ia the wire from the SPM2 to the compressor loose or broken, or has it been connected improperly?

- Cable abnormally → The compressor switch fails if two or more compressor cables are loose (or broken).
There is the possibility that the compressor will not operate if the compressor cables have been connected improperly.
Replace the cable or rewire as appropriate.
- No abnormally → Doesn't work even after the SPM2 is replaced. → The SPM2 may be broken. Replace the SPM2. → If the unit doesn't work even after replacing the SPM2, the position detection circuit may be broken. Replace the MAIN P.W.B..

abnormally → The power source circuit is broken. Replace the control P.W.B..

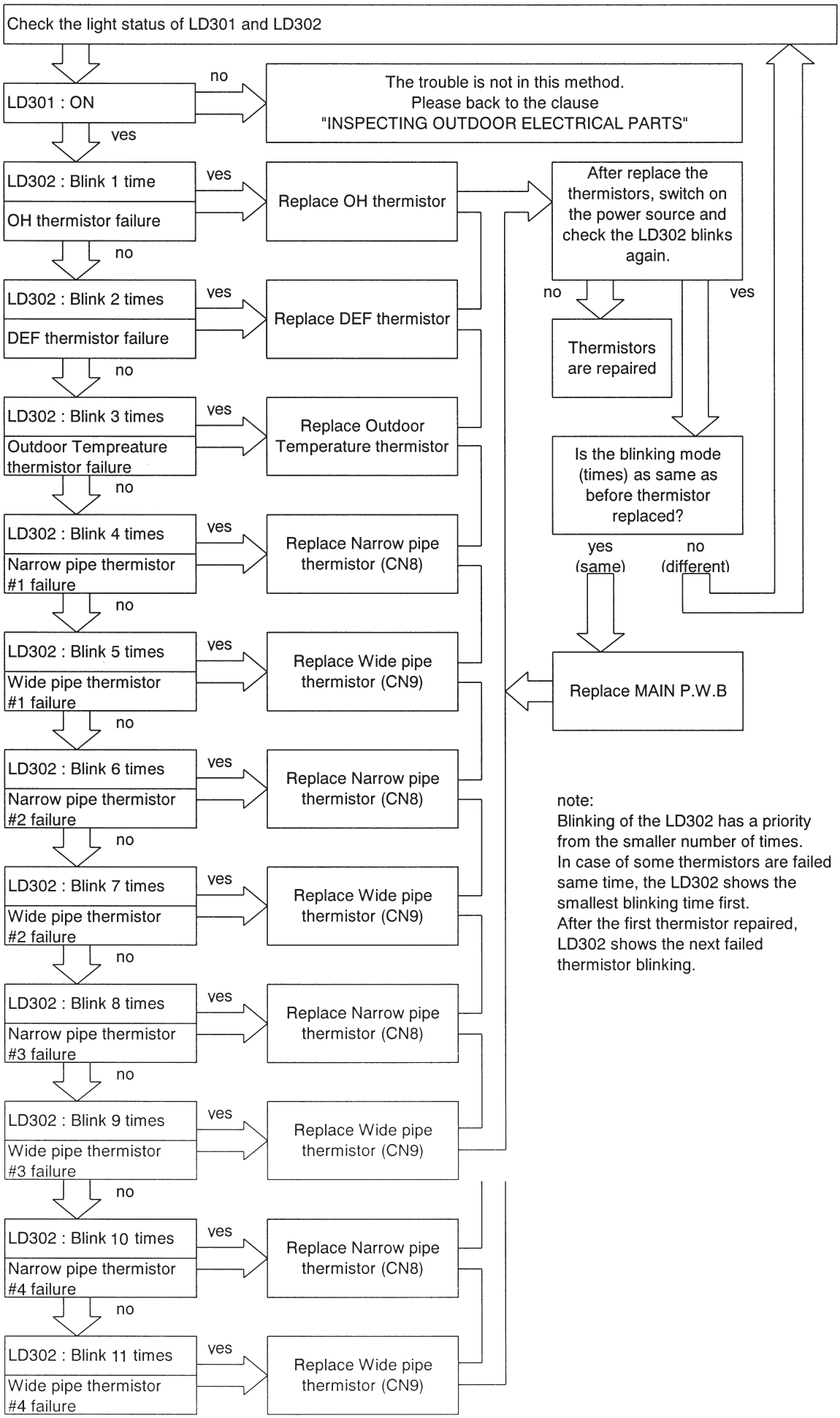




* 1 The power relay does not turn on without an operation order. In the case of a abnormally stop, the power relay turns off after approximately three minutes.

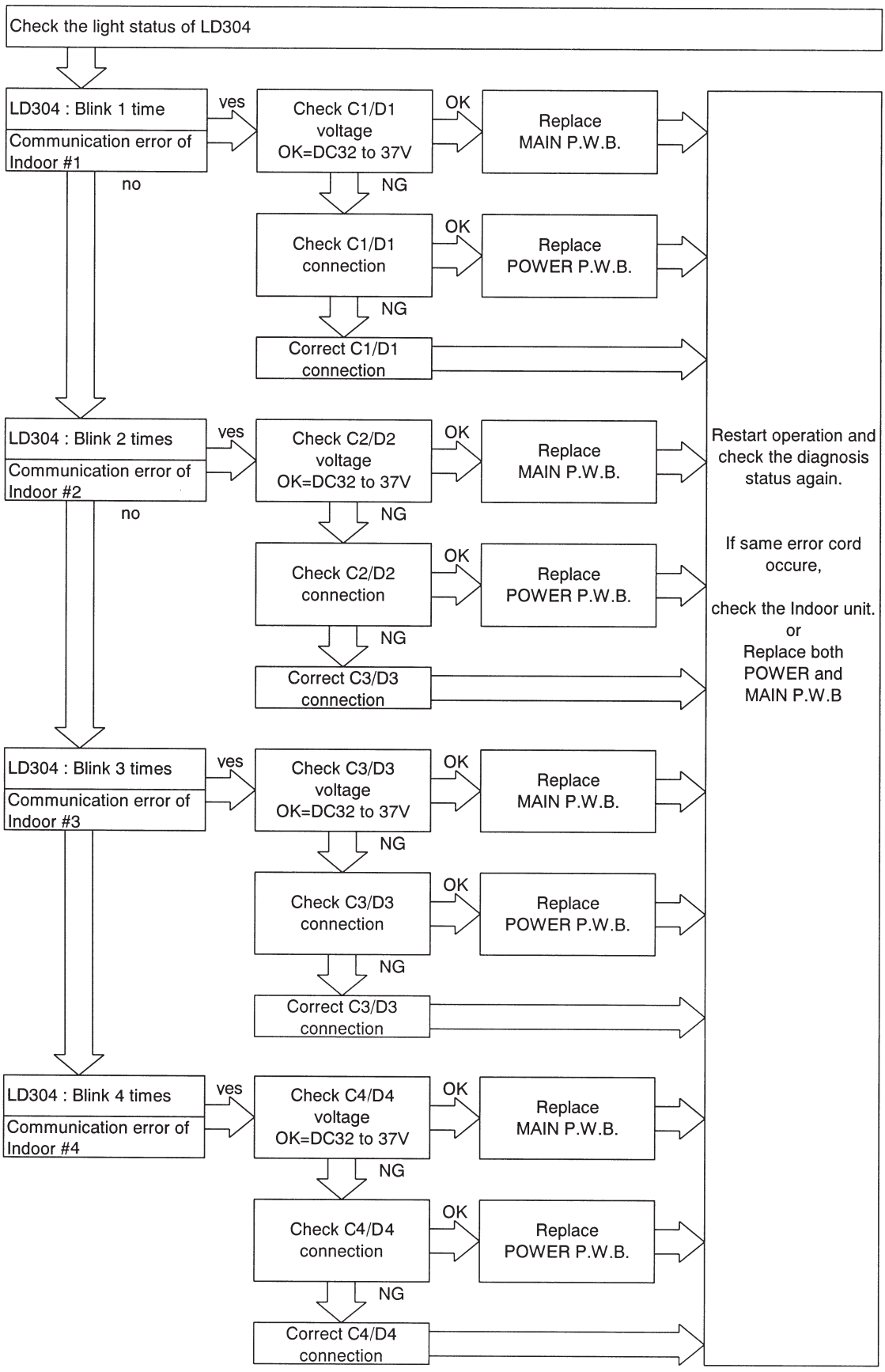
* 2 Carry out each of the voltage checks in the three minutes between the power relay turning on and turning off.

Inspection method 3



note:
Blinking of the LD302 has a priority from the smaller number of times.
In case of some thermistors are failed same time, the LD302 shows the smallest blinking time first.
After the first thermistor repaired, LD302 shows the next failed thermistor blinking.

Inspection method 4



note:
If Indoor unit is not installed, the correspond error cord will be generated.
Blinking of the LD304 has a priority from the smaller number of times.
In case of some indoors are failed at same time, the LD304 shows the smallest blinking time first.
After the first failure repaired, LD304 shows the next fail.

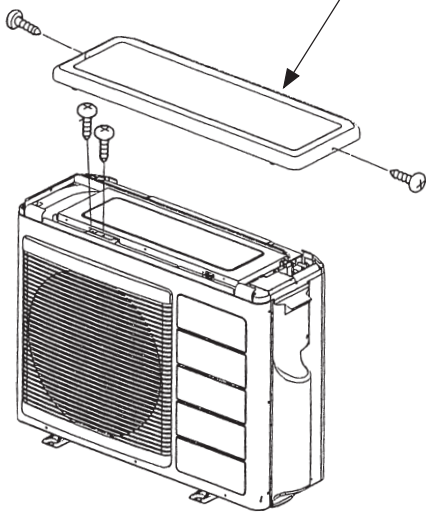
HOW TO OPERATE USING THE SERVICE SWITCH THE OUTDOOR UNIT

MODEL RAM-72QH5

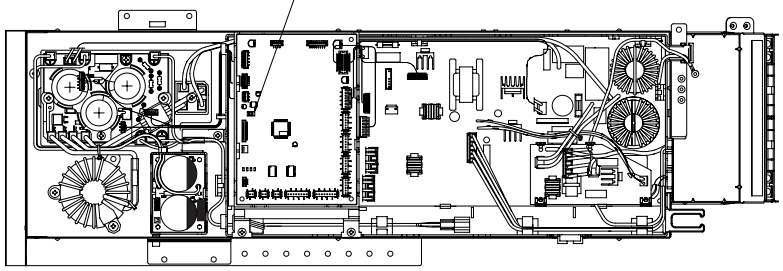
1. Turn the Power switch off and then turn on again.
2. Remove the electrical parts cover.
3. Press the service switch for one second or more (wait for at least 30 seconds after turning the power source switch on).

Never operate the unit in this state for more than 5 minutes.

Open the upper cover



Service switch
(forced-cooling mode is set by pressing for 1 second or more, and stopped by pressing again.)



(Cautions)

(1) If interface signal (35V DC) terminals C and D are not connected when the outdoor unit service switch is used for checking, the outdoor unit defects indicator (LD304) will blink to indicate communication error.

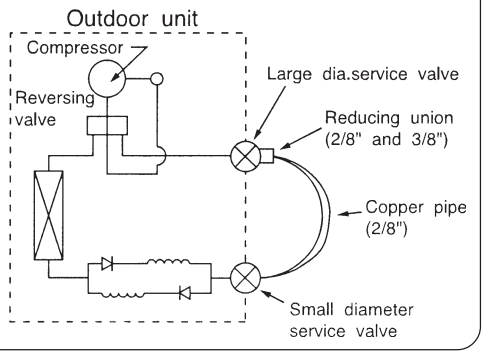
(2) If you do this with the compressor connector in a removed state, LD301 will blink four times, and the unit will not work.

HOW TO OPERATE THE OUTDOOR UNIT INDEPENDENTLY

1. Connect the large dia. pipe side and small dia. pipe side service valves using a pipe.

Connect the small diameter service value and the large diameter service valve using the reducing union and copper pipe as shown on the right.

Charge refrigerant of 300g after vacuuming (※1)



Parts to be prepared

(1) Reducing union
2/8" (6.35mm)
3/8" (9.52mm)

(2) Copper pipe (2/8" and 3/8")

Do not operate for 5 minutes or more

The operation method is the same as "How to operate using the connector to servicing the outdoor unit"

※ 1 The charging amount of 300g is equivalent to the load in normal operation.

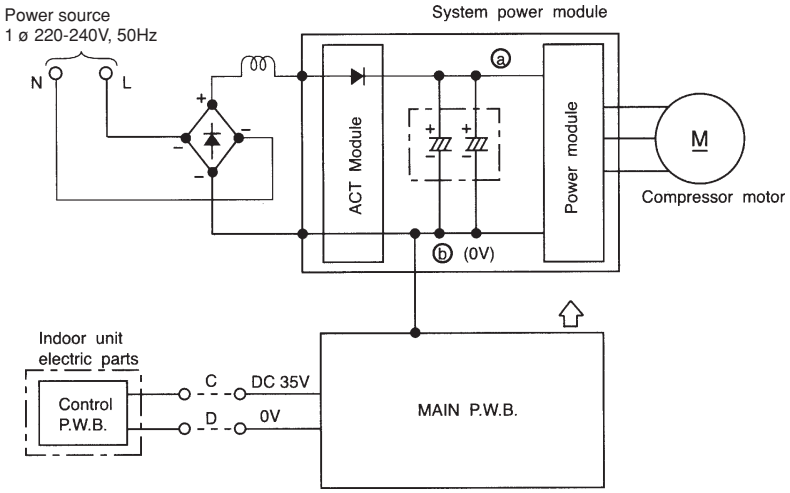
TROUBLE SHOOTING

Model RAM-72QH5

PRECAUTIONS FOR CHECKING

DANGER

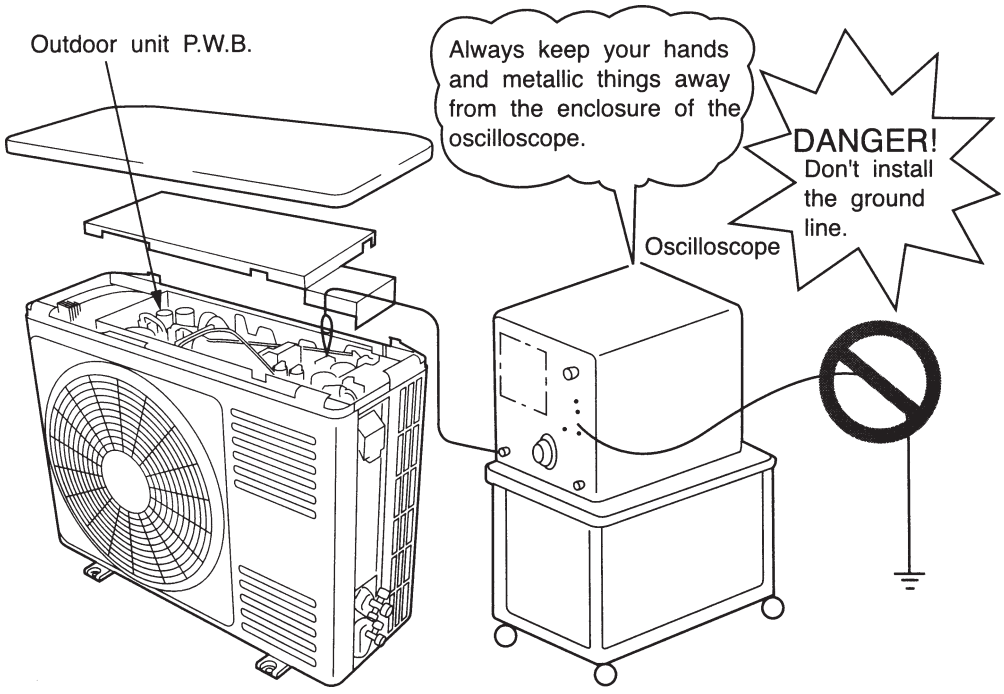
1. Remember that the 0V line is biased to 162V in reference to the ground level.
2. Also note that it takes about 10 minutes until the voltage fall after the power switch is turned off.



Across ⓐ – ⓑ (0V line)..... approx 360V
Across ⓐ – ground..... approx 155-170V
Across ⓑ (0V line)– ground..... approx 155-170V

DANGER

When using an oscilloscope, never ground it. Don't forget that high voltages as noted above may apply to the oscilloscope.



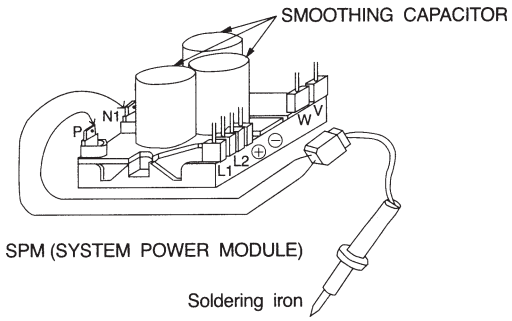
Discharge procedure and how to cut off power to power circuit

WARNING

Caution

- Voltage of about 360V is charged at both ends of smoothing capacitor 330μF x 3.
- High voltage (DC 360V) is also charged at screw and terminal sections of system power module.
- During continuity check of each circuit of electrical parts in outdoor unit is performed, to prevent secondary trouble, disconnect red/gray wire connected to system power module (SPM) from diode stack. (Also be sure to perform discharging of smoothing capacitor.)

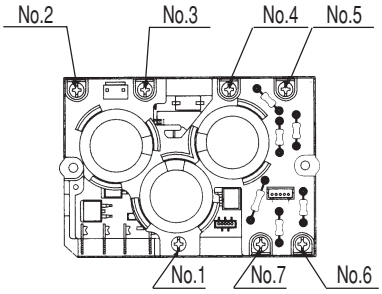
1. Disconnect power plug.
2. Wait for 10 minutes or more after power is turned off and then remove electrical parts box lid. As shown below. Apply soldering iron of 30-75W for 15 seconds or more to P1 and N1 black/white lead receptacles on system power module to discharge voltage from smoothing capacitor.
   Do not loosen or remove screws of system power module: If screw is loose, voltage will not be discharged.
3. Before operation check of each part of circuit, remove receptacle of red/gray lead connected to system power modelu from diodde stack.

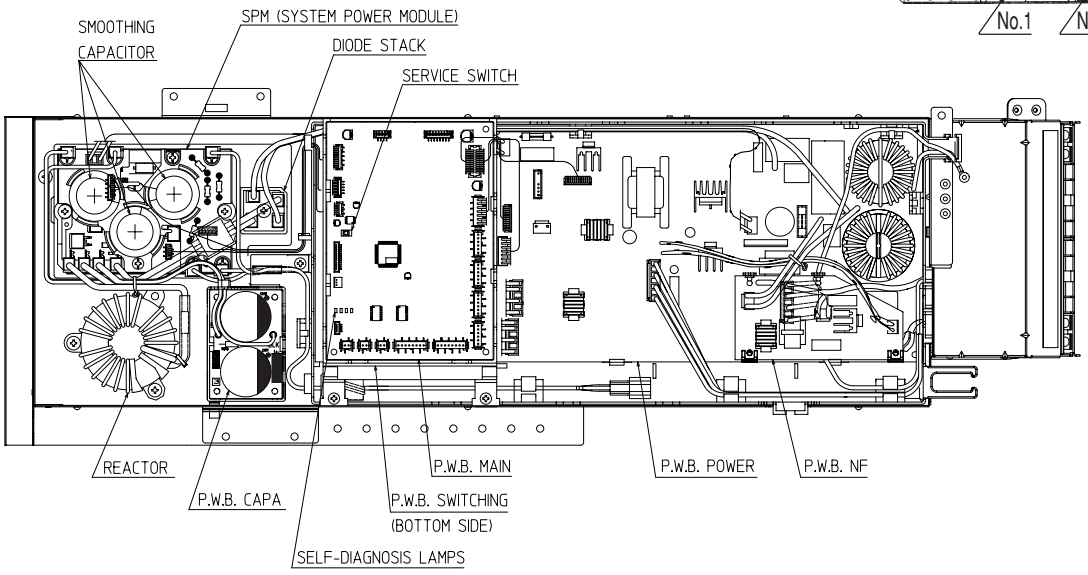


Do not use soldering iron with transformer: Doing so will blow thermal fuse inside transformer.

As shown left, apply soldering iron to metal parts (receptacles) in sleeve corresponding to P and N1 terminals of system power module.

Screws of system power module are live parts: Do not touch them. Screw tightening torque and method are strictly specified. When the screw is loosened or removed once, be sure to tighten according to the procedure shown on the right, with tightening torque of 0.8±0.2N•m.

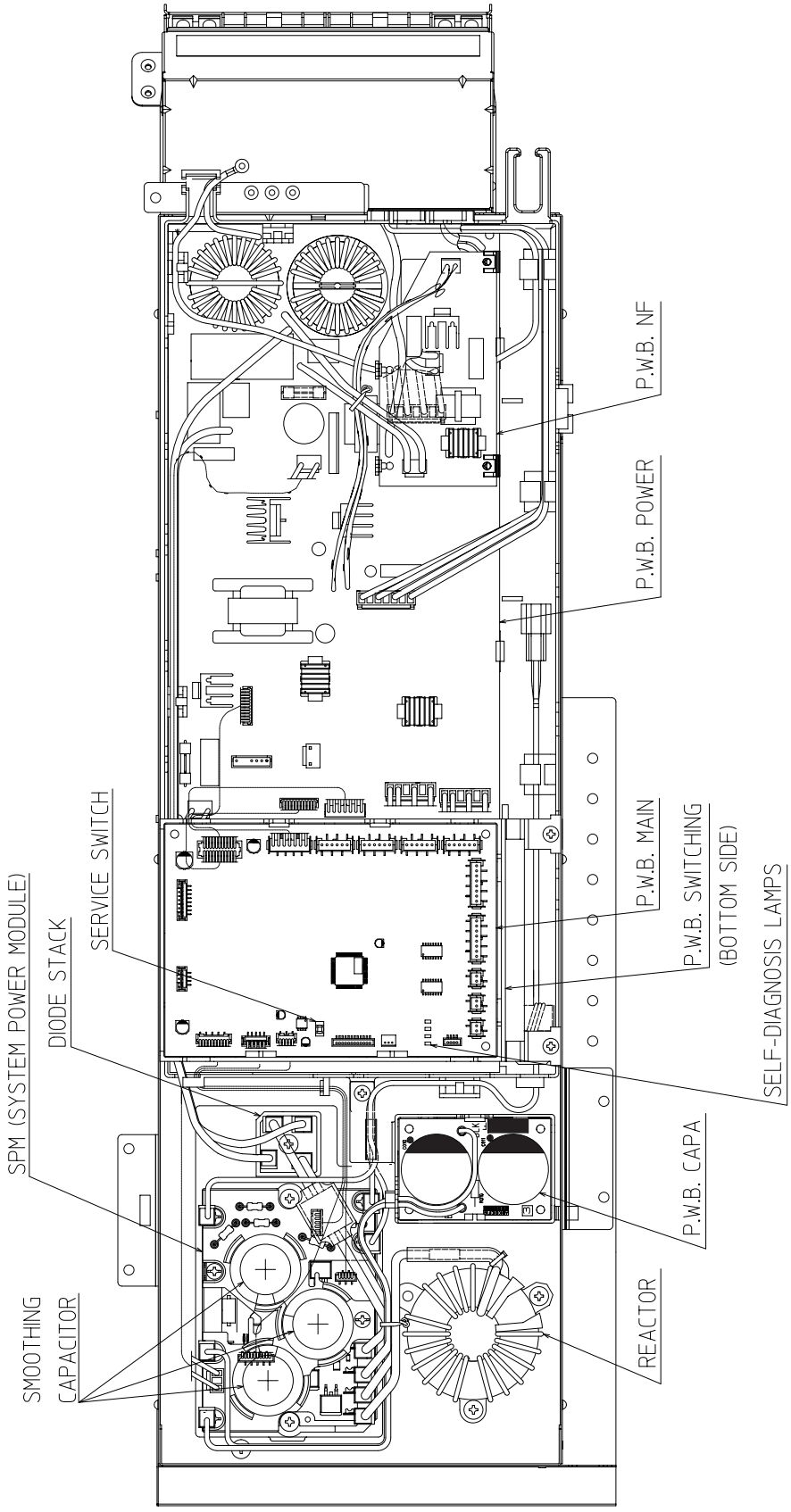




Lighting mode self-diagnosis lamp

RAM-72QH5

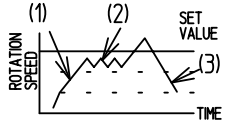
1 Location of self-diagnosis lamp



DANGER (DC360V)

● SWITCH OFF MAIN POWER SUPPLY TO THE OUTDOOR UNIT AT LEAST 10 MINUTES BEFORE START THE SERVICING WORK.

SELF-DIAGNOSIS LIGHTING MODE ■ LIT ▨ BLINKING □ OFF

LD301 RED	LD302 RED	LD303 RED	LD304 GRN	SELF-DIAGNOSIS NAME	DETAILS	MAIN CHECK POINT
[1] DURING OPERATION						
□	□	■	□	NORMAL OPERATION	COMPRESSOR OPERATION	NOT MALFUNCTION
■	□	■	□	OVERLOAD (1)	 UNDER OVERLOAD CONDITION, THE ROTATION SPEED IS CONTROLLED AUTOMATICALLY IN ORDER TO PROTECT THE COMPRESSOR.	THIS SHOWS AN OVERLOAD, NOT MALFUNCTION.
□	■	■	□	OVERLOAD (2)		
■	■	■	□	OVERLOAD (3)		

※ EXAMPLE OF BLINKING (5 TIMES) ■■■■■ 2SEC ■ (■ •• LIGHTS FOR 0.25 SEC. AT INTERVAL OF 0.25 SEC.)

[2] DURING STOP

LD301	LD302	LD303	LD304			
■	▨	□	□	ABNORMAL THERMISTOR	THERMISTOR IS OPENED OR SHORTED. REFER TO BELOW TABLE "CORRESPONDENCE TABLE FOR ABNORMAL THERMISTOR"	① THERMISTOR ② CONNECTION OF THERMISTOR IS FAULTY ③ THERMISTOR CIRCUIT
LIT	1~11 TIMES					

BLINKING TIME	CORRESPONDENCE TABLE FOR ABNORMAL THERMISTOR
1 TIME	OVERHEAT THERMISTOR
2 TIMES	DEFROST THERMISTOR
3 TIMES	OUTDOOR TEMPERATURE THERMISTOR
4 TIMES	NARROW PIPE THERMISTOR (INDOOR 1)
5 TIMES	WIDE PIPE THERMISTOR (INDOOR 1)
6 TIMES	NARROW PIPE THERMISTOR (INDOOR 2)
7 TIMES	WIDE PIPE THERMISTOR (INDOOR 2)
8 TIMES	NARROW PIPE THERMISTOR (INDOOR 3)
9 TIMES	WIDE PIPE THERMISTOR (INDOOR 3)
10 TIMES	NARROW PIPE THERMISTOR (INDOOR 4)
11 TIMES	WIDE PIPE THERMISTOR (INDOOR 4)

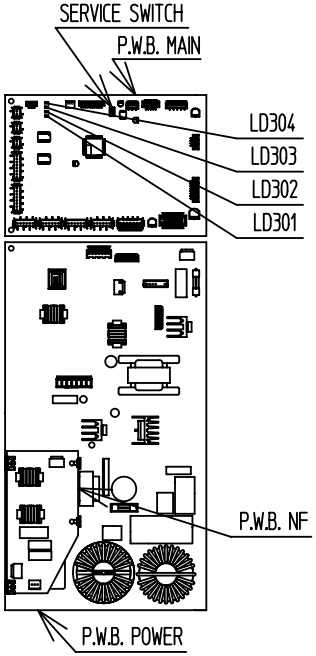
[2] DURING STOP

LD301	LD302	LD303	LD304				
□	□	□	□	NORMAL STOP	INDOOR THERMOSTAT OFF. MAIN OPERATION OFF.		NOT MALFUNCTION.
▨	□	□	□	RESET STOP	WHEN STOPPED WITH POWER RESET. (NORMAL WHEN POWER HAS BEEN TURNED ON).		① P.W.B.s (POWER CIRCUIT,HIC, ETC.)
1 TIME							
▨	□	□	□	PEAK CURRENT CUT	OVER CURRENT IS DETECTED.		① COMPRESSOR ② P.W.B.s
▨	▨	□	□				① SYSTEM POWER MODULE ② P.W.B.s
2 TIMES							
▨	□	□	□	ABNORMAL LOW SPEED ROTATION	POSITION DETECTION SIGNAL IS NOT INPUT DURING OPERATION.		① SYSTEM POWER MODULE ② COMPRESSOR ③ P.W.B.s
3 TIMES							
▨	□	□	□	SWITCHING FAILURE	FAIL TO SWITCH FROM INITIAL LOW FREQUENCY SYNC. TO POSITION DETECTION SYNC. .		① SYSTEM POWER MODULE ② COMPRESSOR ③ P.W.B.s
4 TIMES							
▨	□	□	□	OVERLOAD LOWER LIMIT CUT	OVERLOAD CONDITION STILL PERSISTING EVEN WHEN ROTATION SPEED IS BELOW THE LOWER RPM LIMIT.		① OUTDOOR UNIT IS EXPOSED TO DIRECT SUNLIGHT OR ITS AIRFLOW BLOCKED. ② FAN MOTOR ③ FAN MOTOR CIRCUIT ④ THE VOLTAGE IS EXTREMELY LOW.
5 TIMES							
▨	□	□	□	OH THERMISTOR TEMP. RISE	OH THERMISTOR IS OPERATING.		① LEAK OF REFRIGERANT ② COMPRESSOR ③ OH THERMISTOR CIRCUIT ④ FAN MOTOR ⑤ FAN MOTOR CIRCUIT
6 TIMES							
▨	□	□	□	ACCELERATION DEFECTIVE	NO ACCELERATION ABOVE THE LOWER LIMIT OF THE ROTATION SPEED.		① LEAK OF REFRIGERANT ② COMPRESSOR
8 TIMES							
▨	□	□	□	POWER SUPPLY VOLTAGE ERROR	POWER SUPPLY VOLTAGE IS INCORRECT.		① POWER SUPPLY VOLTAGE ② RECEPTACLE OF WIRE AT SYSTEM POWER MODULE IS NOT PROPERLY INSERTED
10 TIMES							
▨	□	□	□	FAN LOCK ERROR	OUTDOOR FAN RPM IS NOT ROTATE AS INTENDED RPM.		① FAN MOTOR ② FAN MOTOR CIRCUIT
12 TIMES							
▨	□	□	□	EEPROM READING ERROR	MICROCOMPUTER CANNOT READ THE DATA IN EEPROM.		① MAIN P.W.B.
13 TIMES							
▨	□	□	□	ACTIVE CONVERTER DEFECTIVE	OVER VOLTAGE IS DETECTED BY SYSTEM POWER MODULE.		① SYSTEM POWER MODULE
14 TIMES							
□	□	□	▨	COMMUNICATION ERROR BETWEEN INDOOR AND OUTDOOR UNIT	COMMUNICATION ERROR OF INDOOR 1	WHEN INDOOR UNIT IS NOT CONNECTED, IT BLINKS SIMILARLY. NOT MALFUNTION.	① CABLE IS WRONG CONNECTED ② CABLE IS OPEN ③ INTERFACE CIRCUIT BETWEEN NDOOR AND OUTDOOR UNIT.
1 TIME							
□	□	□	▨		COMMUNICATION ERROR OF INDOOR 2		
2 TIMES							
□	□	□	▨		COMMUNICATION ERROR OF INDOOR 3		
3 TIMES							
□	□	□	▨		COMMUNICATION ERROR OF INDOOR 4		
4 TIMES							

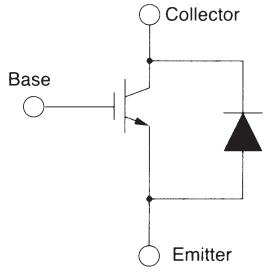
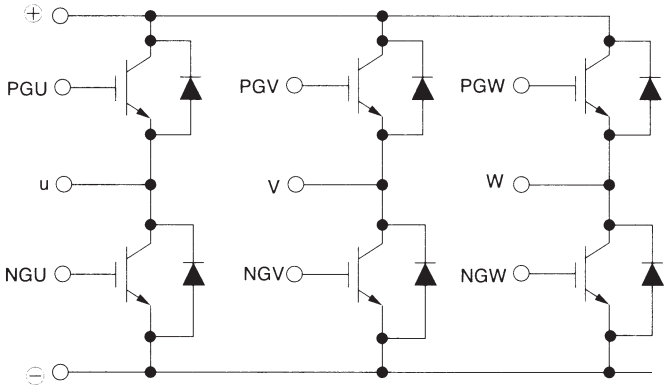
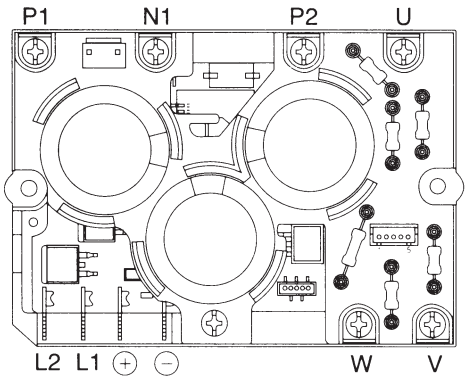
SERVICE OPERATION

COLLECT REFRIGERANT FROM INDOOR UNIT AND STORE AT OUTDOOR UNIT.

1. SWITCH OFF THE MAIN POWER SUPPLY AND THEN SWITCH IT ON AGAIN. WAIT FOR 1 MINUTE.
2. PRESS AND HOLD THE SERVICE SWITCH FOR 1 SECOND TO START OUTDOOR UNIT IN COOLING OPERATION. IN ORDER TO PREVENT PARTS FROM DAMAGE, DO NOT OPERATE THE OUTDOOR UNIT FOR MORE THAN 5 MINUTES.
3. PRESS AND HOLD THE SERVICE SWITCH FOR 1 SECOND TO STOP THESERVICE OPERATION.
4. REPEAT STEP 1 TO 3 IF SERVICE OPERATION NEED TO BE REPEATED.



TROUBLESHOOTING OF THE SYSTEM POWER MODULE

Type	GT15V31ISM
Element circuit	
Internal circuit of the module	
Terminal symbol of system module ※See next page for values measured by tester	

※ Do not disassemble the system power module when troubleshooting is performed.

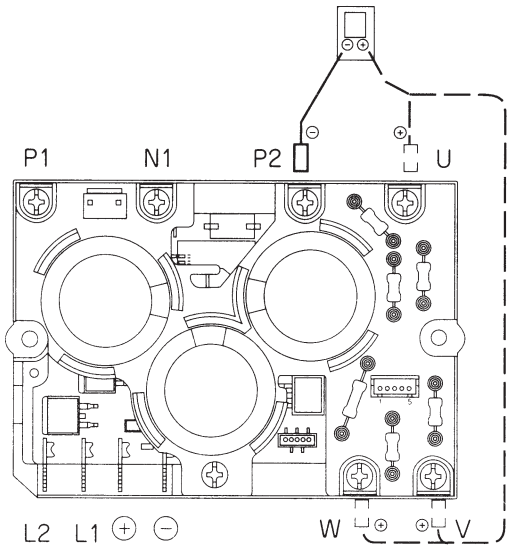
HOW TO CHECK POWER MODULE

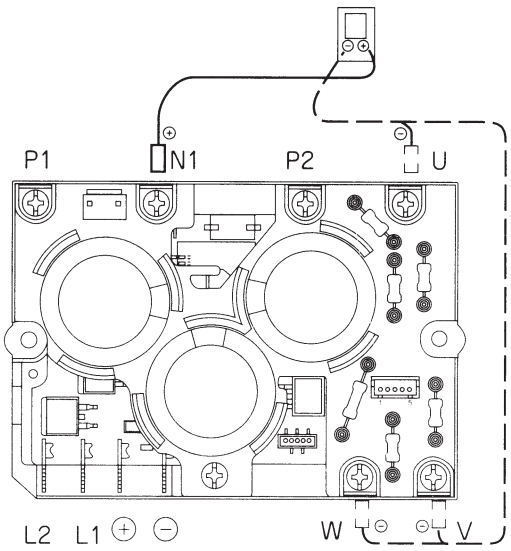
Checking power module using tester

Set tester to resistance range (×100)
If indicator does not swing in the following conductivity check, the power module is normal.
(In case of digital tester, since built-in battery is set in reverse direction, ⊕ and ⊖ terminals are reversed.)

⚠ CAUTION

If inner circuit of power module is disconnected (open), the indicator of tester will not swing and this may assumed as normal. In this case, if indicator swings when ⊕ and ⊖ terminals are connected in reverse of diagram below, it is normal. Furthemore, compare how indicator swings at U, V and W phases. If indicator swings the same way at each point, it is normal.





DESCRIPTION OF MAIN CIRCUIT OPERATION

RAK-18NH5, RAK-25NH5, RAK-35NH5, RAK-50NH5

1. Reset Circuit

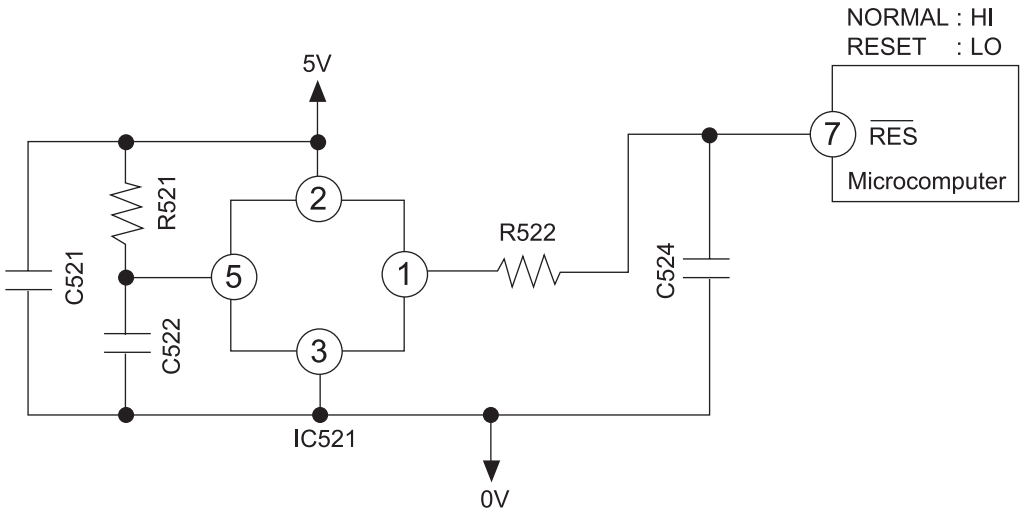


Fig. 1-1

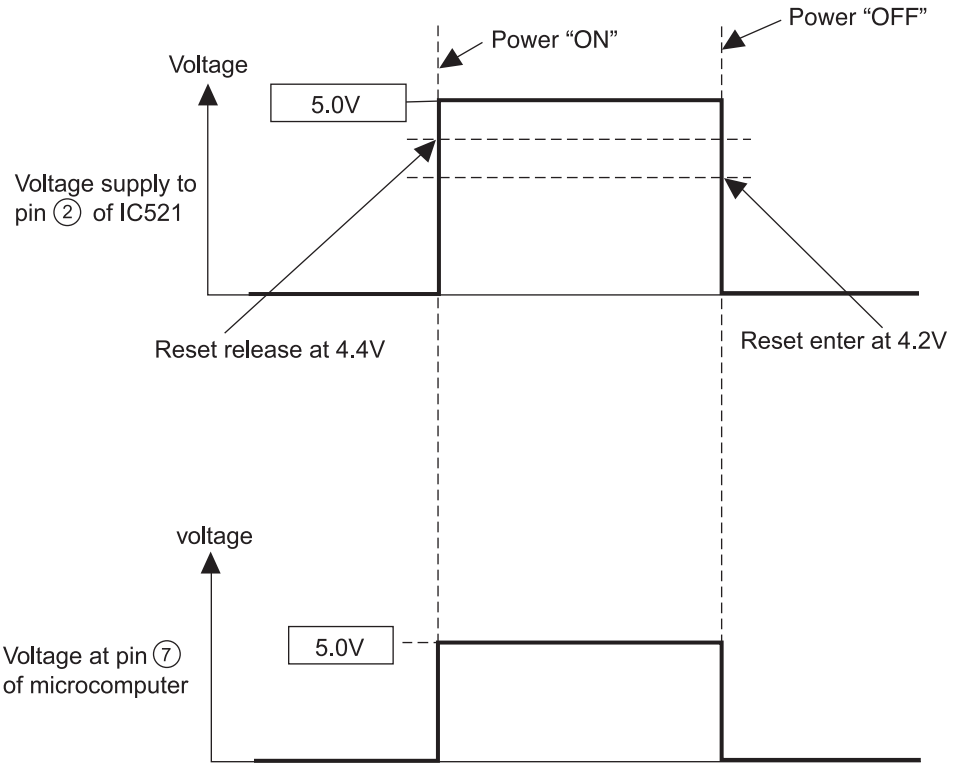


Fig. 1-2

- The reset circuit initializes the microcomputer program when power is ON or OFF.
- Low voltage at pin ⑦ resets the microcomputer and Hi activates the microcomputer.
- When power "ON" 5V voltage rises and reaches 4.4V, pin ① of IC521 is set to "Hi". At this time the microcomputer starts operation.
- When power "OFF" voltage drops and reaches 4.2V, pin ① of IC521 is set to "Low". This will RESET the microcomputer.

2. Receiver Circuit

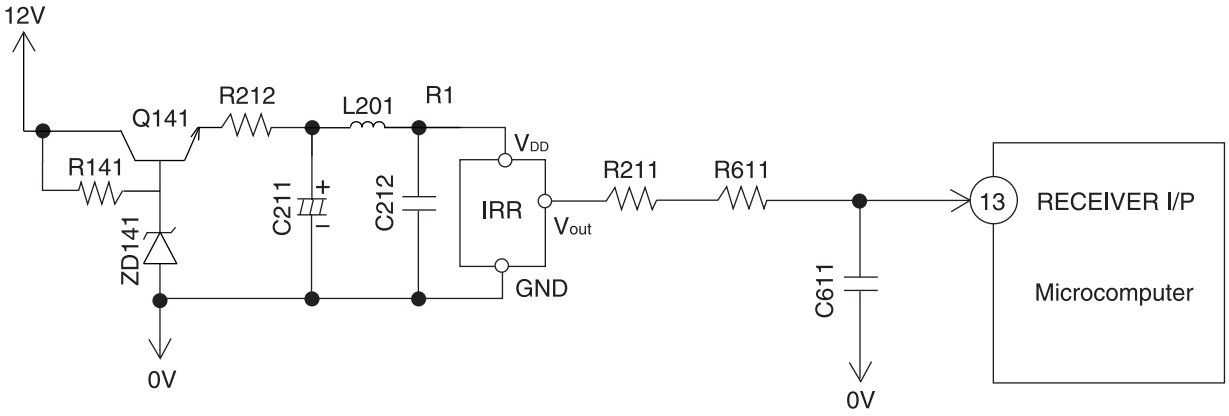


Fig. 2-1

- The light receiver unit receives the infrared signal from the wireless remote control. The receiver amplifies and shapes the signal and outputs it.

3. Buzzer Circuit

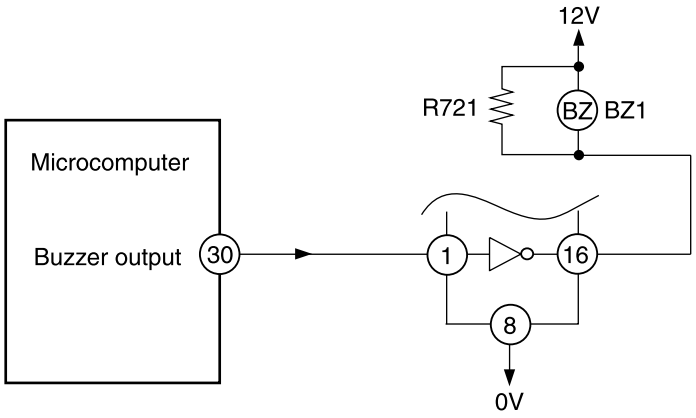


Fig. 3-1 Buzzer Circuit

- When the buzzer sounds, an approx. 3.9kHz square signal is output from buzzer output pin (30) of the microcomputer. After the amplitude of this signal has been set to 12Vp-p by a transistor, it is applied to the buzzer. The piezoelectric element in the buzzer oscillates to generate the buzzer's sound.

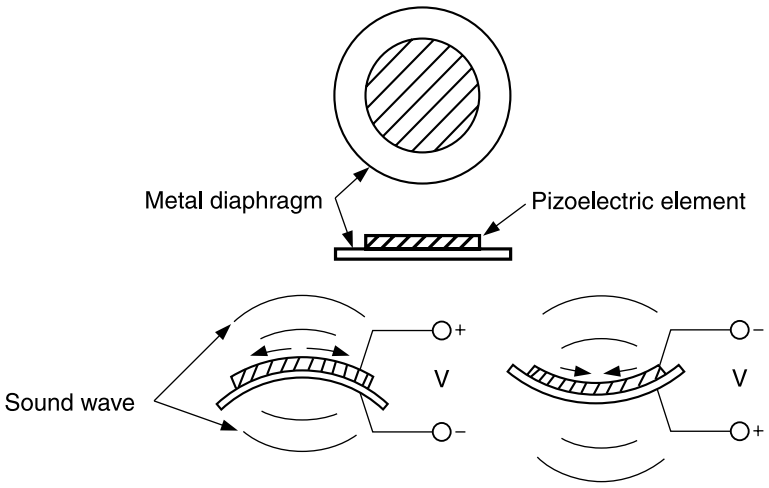


Fig. 3-2 Buzzer Operation

4. Auto Sweep Motor Circuit

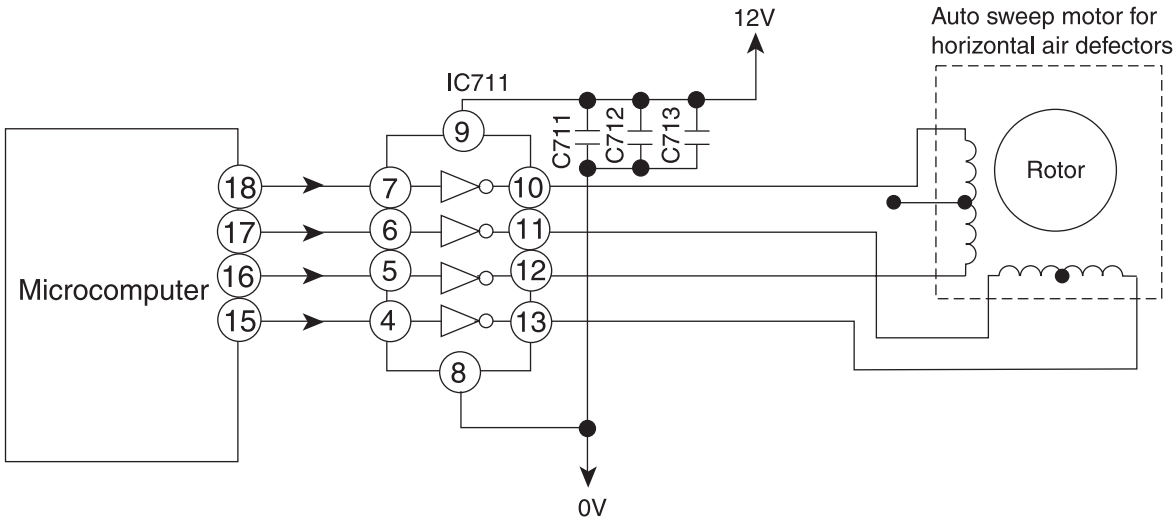


Fig.4-1

- Fig. 4-1 shows the Auto sweep motor drive circuit; the signals shown in Fig.4-2 are output from pins ⑮ – ⑱ of microcomputer.

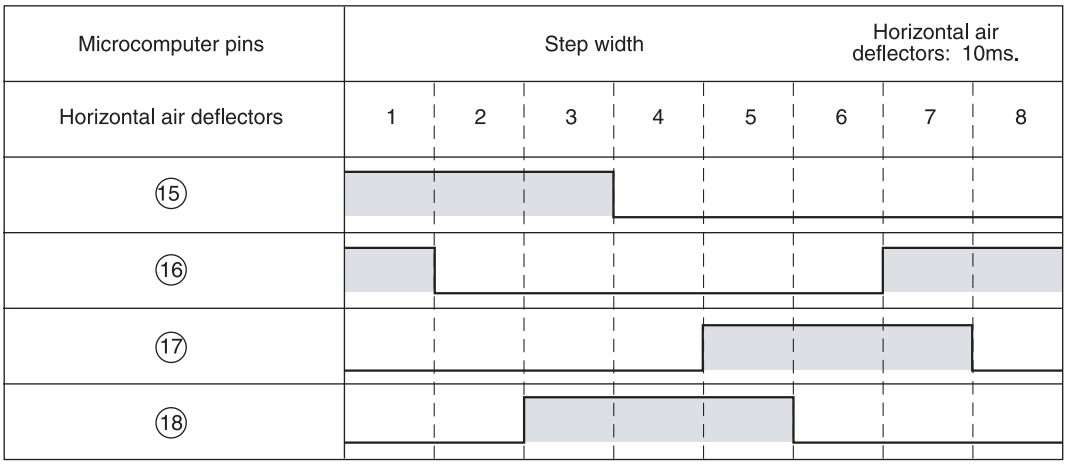


Fig.4-2 Microcomputer Output Signals

- As the microcomputer's outputs change as shown in Fig.4-2, the core of the auto sweep motor is excited to turn the rotor. Table 4-1 shows the rotation angle of horizontal air deflectors.

Table 4-1 Auto sweep Motor Rotation

	Rotation angle per step (°)	Time per step (ms.)
Horizontal air deflectors	0.0882	10

5. Room Temperature Thermistor Circuit

- Fig. 5-1 shows the room temperature thermistor circuit.

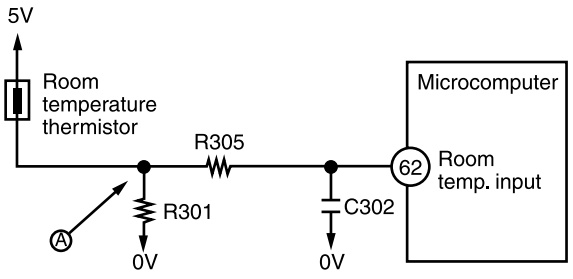


Fig. 5-1

- The voltage at Ⓐ depends on the room temperature as shown in Fig. 5-2.

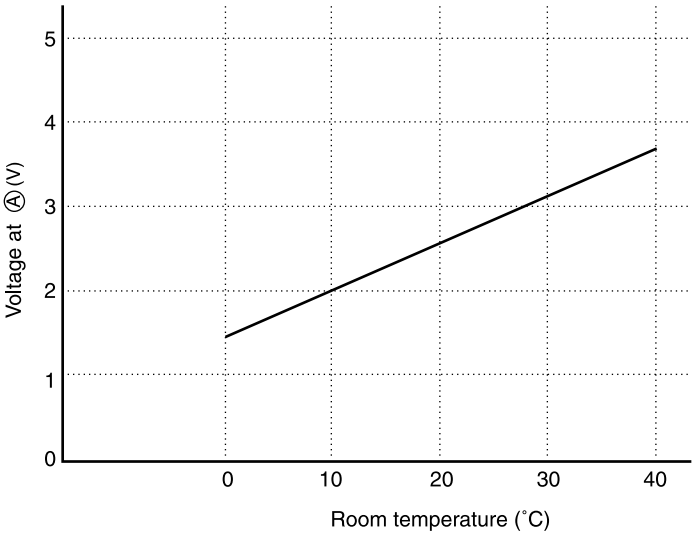


Fig. 5-2

6. Heat exchanger temperature thermistor circuit

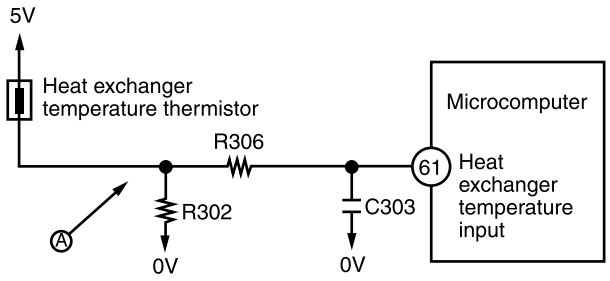


Fig. 6-1

- The circuit detects the indoor heat exchanger temperature and controls the following.

  (1) Preheating.

  (2) Low-temperature defrosting during cooling and dehumidifying operation.

  (3) Detection of the reversing valve non-operation or heat exchanger temperature thermistor open.

  The voltage at Ⓐ depends on the heat exchanger temperature as shown in Fig. 6-2.

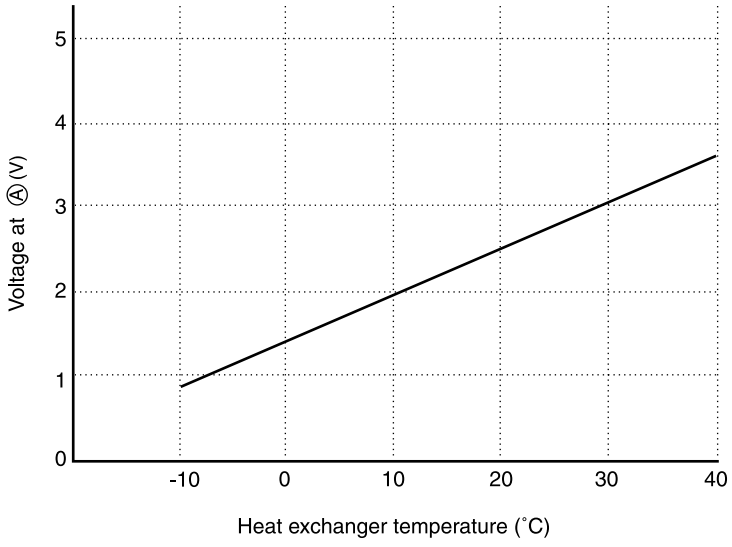


Fig. 6-2

7. Initial Setting Circuit (IC401)

- When power is supplied, the microcomputer reads the data in IC401 or IC402 (E^2PROM) and sets the preheating activation value and the rating and maximum speed of the compressor, etc. to their initial values.
- Data of self-diagnosis mode is stored in IC401 or IC402; data will not be erased even when power is turned off.

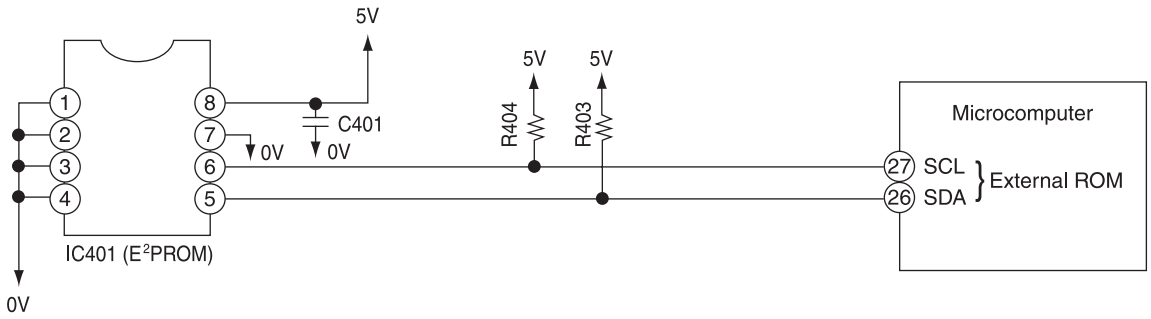


Fig. 7-1

DESCRIPTION OF MAIN CIRCUIT OPERATION

MODEL RAK-65NH5

1. Reset Circuit

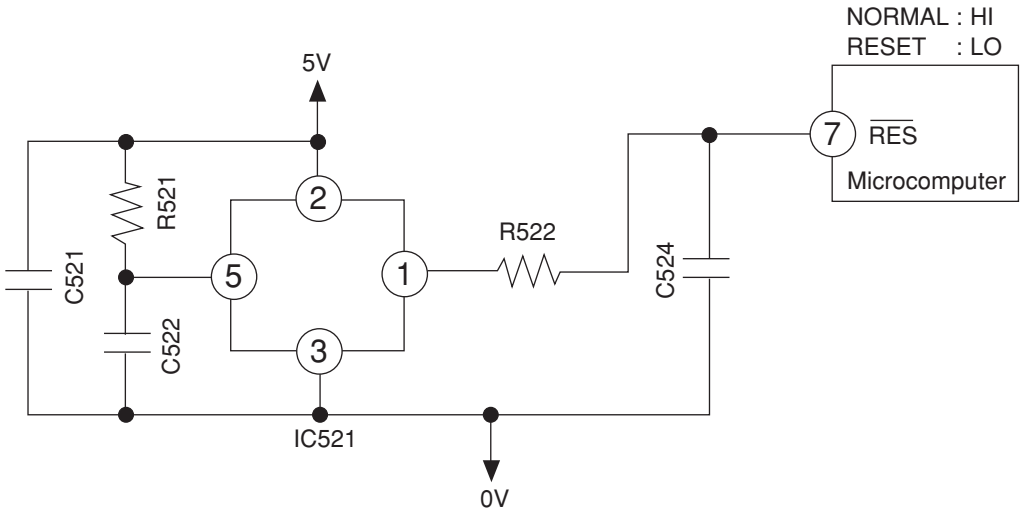


Fig. 1-1

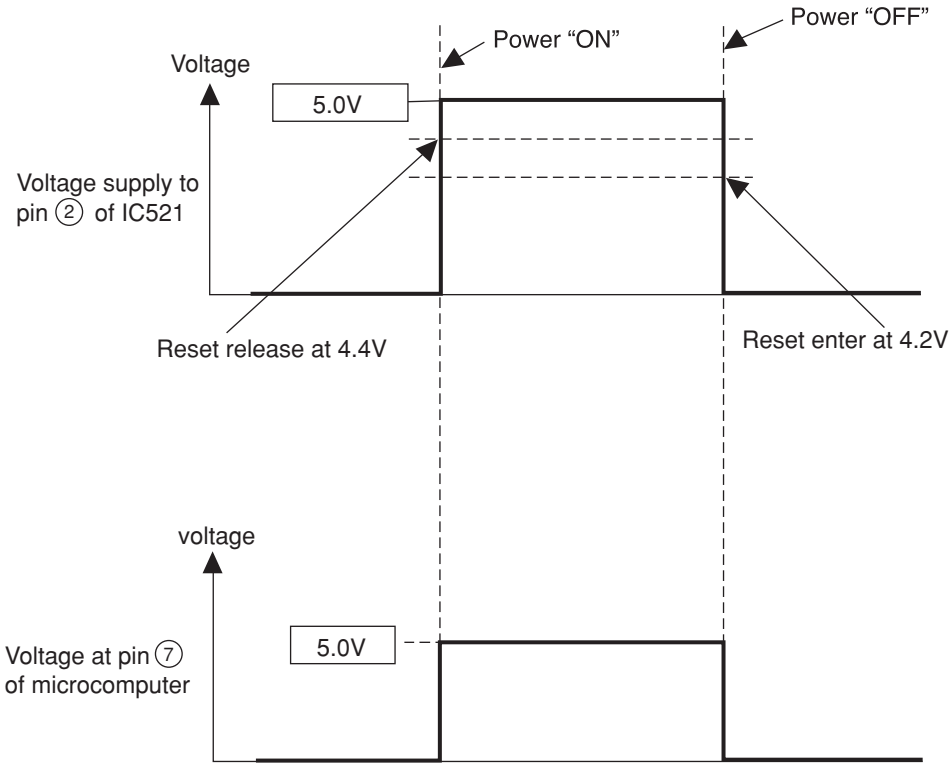


Fig. 1-2

- The reset circuit initializes the microcomputer program when power is ON or OFF.
- Low voltage at pin ⑦ resets the microcomputer and Hi activates the microcomputer.
- When power "ON" 5V voltage rises and reaches 4.4V, pin ① of IC521 is set to "Hi". At this time the microcomputer starts operation.
- When power "OFF" voltage drops and reaches 4.2V, pin ① of IC521 is set to "Low". This will RESET the microcomputer.

2. Receiver Circuit

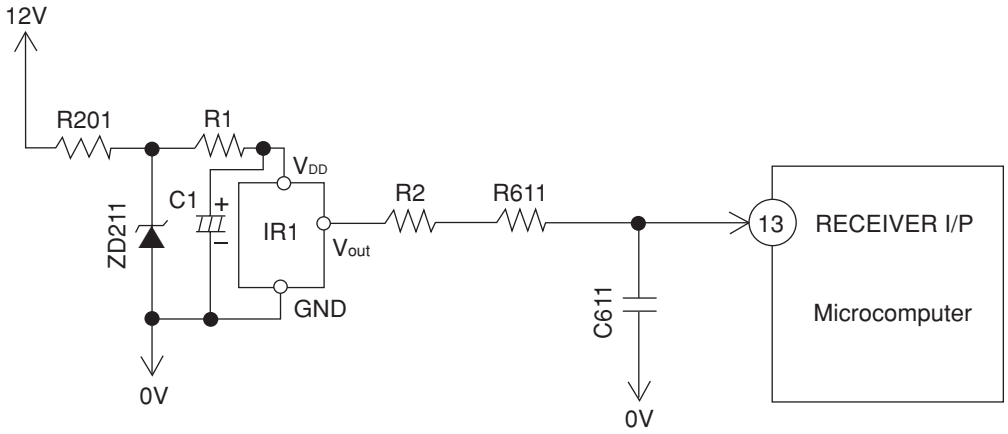


Fig. 2-1

- The light receiver unit receives the infrared signal from the wireless remote control. The receiver amplifies and shapes the signal and outputs it.

3. Buzzer Circuit

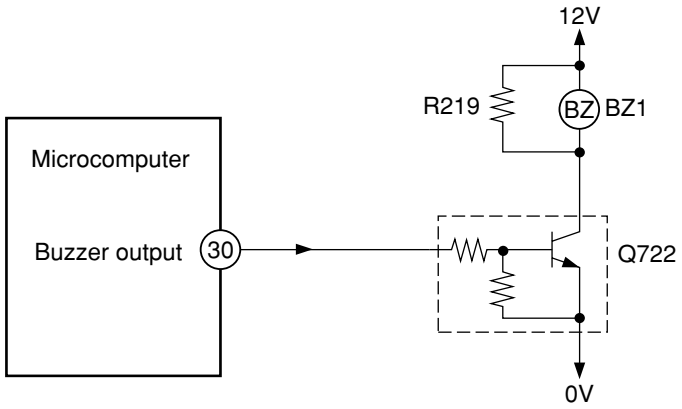


Fig. 3-1 Buzzer Circuit

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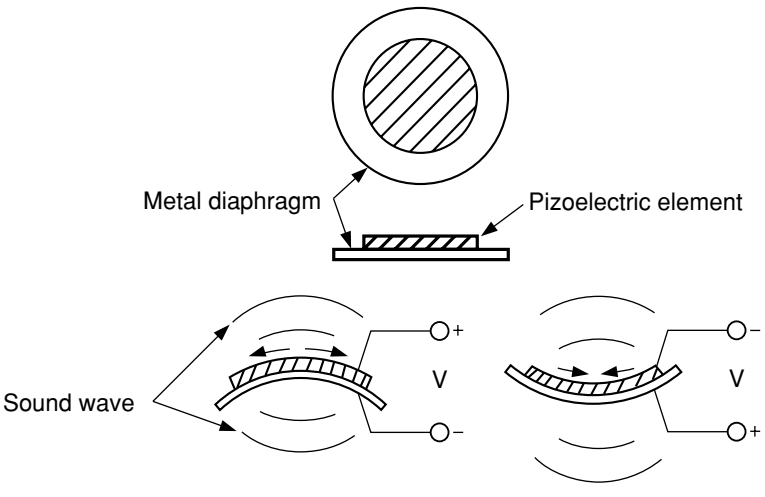

Fig. 3-2 Buzzer Operation

4. Auto Sweep Motor Circuit

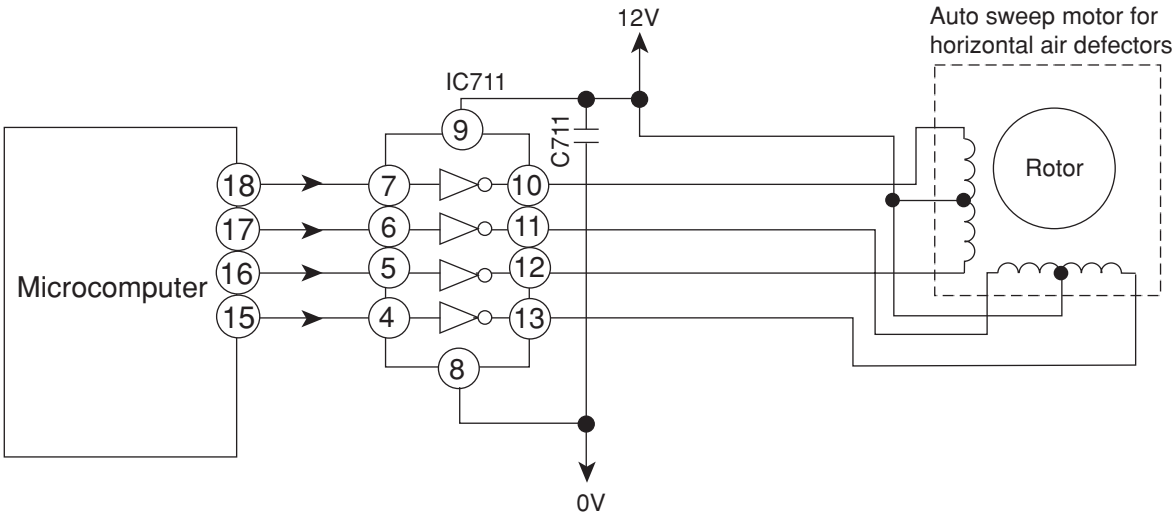

Fig.4-1

- Fig. 4-1 shows the Auto sweep motor drive circuit; the signals shown in Fig.4-2 are output from pins ⑮ – ⑱ of microcomputer.

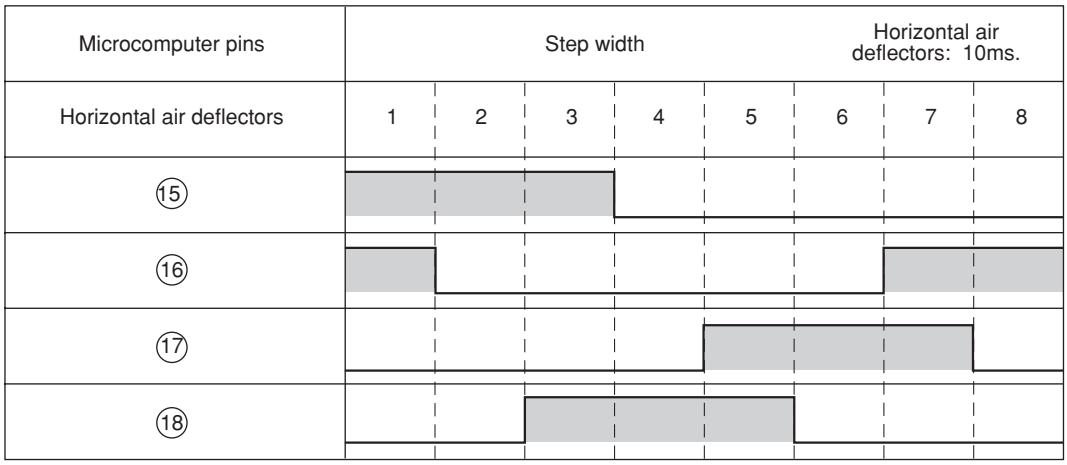

Fig.4-2 Microcomputer Output Signals

- As the microcomputer's outputs change as shown in Fig.4-2, the core of the auto sweep motor is excited to turn the rotor. Table 4-1 shows the rotation angle of horizontal air deflectors.

Table 4-1 Auto sweep Motor Rotation

	Rotation angle per step (˚)	Time per step (ms.)
Horizontal air deflectors	0.0882	10

5. Room Temperature Thermistor Circuit

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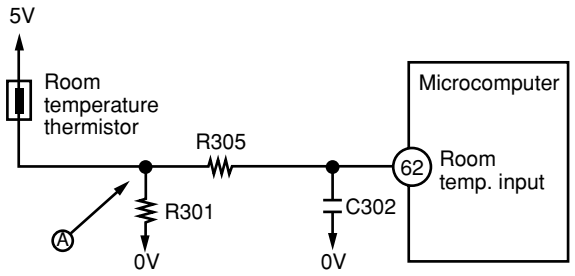


Fig. 5-1

- The voltage at Ⓐ depends on the room temperature as shown in Fig. 5-2.

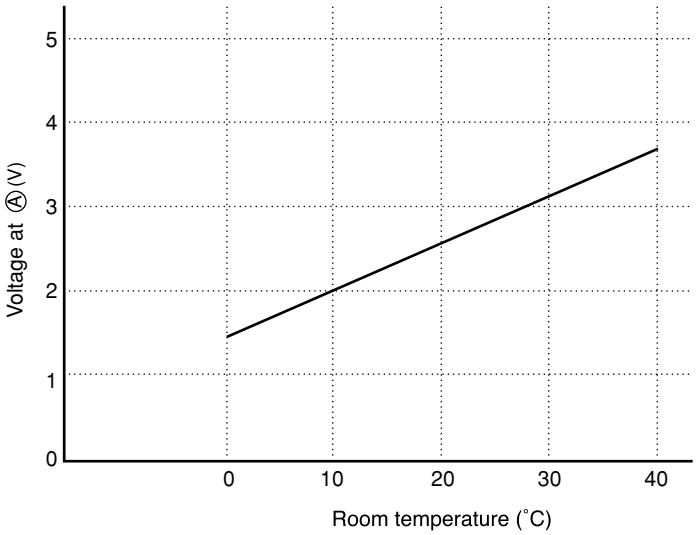


Fig. 5-2

6. Heat exchanger temperature thermistor circuit

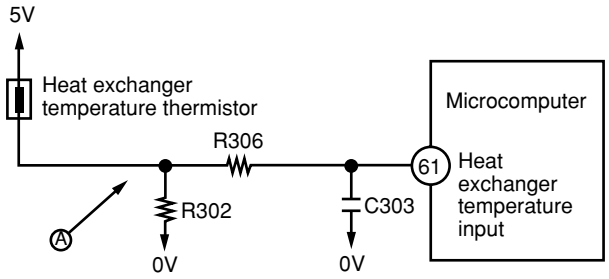


Fig. 6-1

- The circuit detects the indoor heat exchanger temperature and controls the following.

  (1) Preheating.

  (2) Low-temperature defrosting during cooling and dehumidifying operation.

  (3) Detection of the reversing valve non-operation or heat exchanger temperature thermistor open.

  The voltage at Ⓐ depends on the heat exchanger temperature as shown in Fig. 6-2.

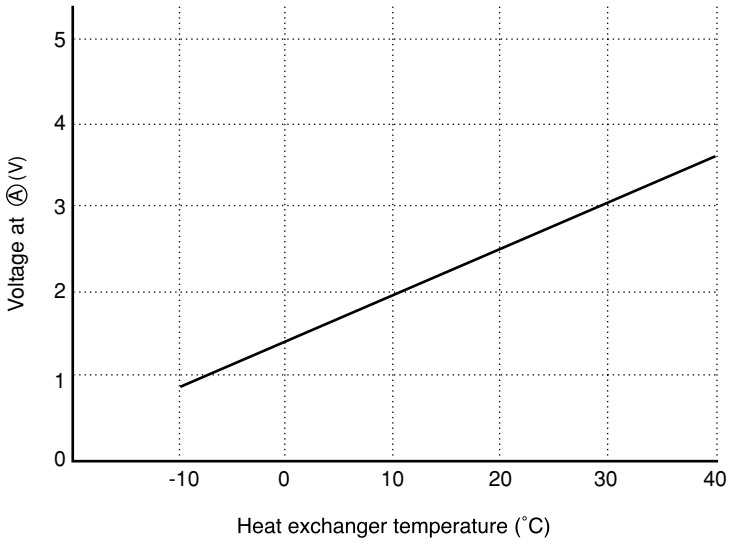


Fig. 6-2

7. Initial Setting Circuit (IC401)

- When power is supplied, the microcomputer reads the data in IC401 or IC402 (E^2PROM) and sets the preheating activation value and the rating and maximum speed of the compressor, etc. to their initial values.
- Data of self-diagnosis mode is stored in IC401 or IC402; data will not be erased even when power is turned off.

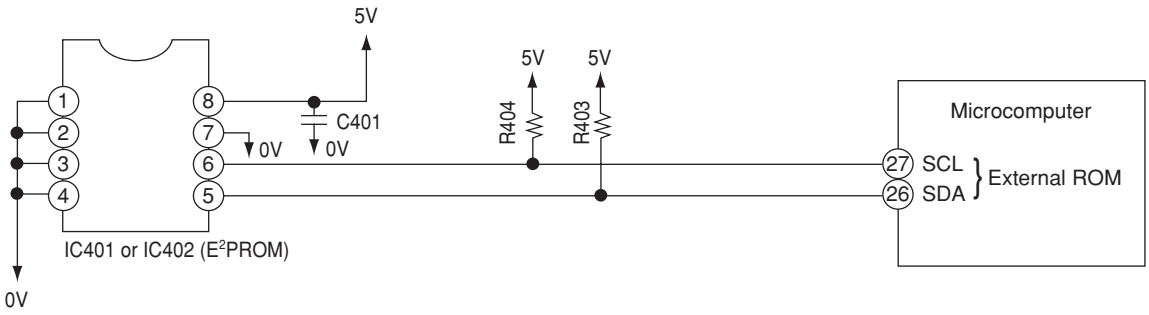


Fig. 7-1

CHECKING THE REFRIGERATING CYCLE

(JUDGING BETWEEN GAS LEAKAGE AND COMPRESSOR DEFECTIVE)

Troubleshooting procedure (No operaton, No heating, No cooling)

If the indoor pipe or service valve becomes frosted during heating of one unit, check the operation of Reversing valve.

Connect U.V.W phase leads to the power module again and operate the air conditioner.

Is the self-diagnosis lamp mode as shown on the right?

Selfdiagnosis Lamp \ Lighting mode	Blinks 2 times	Blinks 3 times	Blinks 4 times	Blinks 5 times	Blinks 6 times	Blinks 8 times
LD301	▨	▨	▨	▨	▨	▨
LD302	□	□	□	□	□	□
Time until the lamp lights	2-3 seconds			Approx 10 seconds	Within approx 30 minutes	Approx 10 seconds
Possible malfunctioning part	Compressor				Gas leakage	Compressor

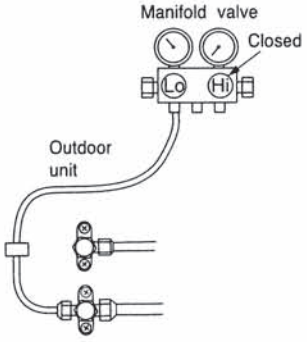
▨ Blinking □ Off

YES

Stop to operate and check the gas pressure in balancing mode.

Outdoor air temperature (℃)	Charge port pressure Mpa(G) {kgf/cm²(G)}
50	2.96 {30.14}
45	2.62 {26.72}
40	2.31 {23.58}
35	2.03 {20.73}
30	1.78 {18.14}
25	1.55 {15.79}
20	1.34 {13.66}
15	1.15 {11.74}
10	0.98 {10.02}
5	0.83 { 8.48}
0	0.70 { 7.10}
-5	0.58 { 5.89}
-10	0.47 { 4.81}

(R410A)



Normal

Abnormal
Gas leaking

Checking the power module.

When the self-diagnosis lamp lights in the same condition as above.

Gas leaks.
Repair and seal refrigerant.

The compressor is defective. Replace it and seal refrigerant.
(If the compressor checker for an inverter type air conditioner is available, re-check using it.)

Perform a final check of operation.

DESCRIPTION OF MAIN CIRCUIT OPERATION

MODEL RAF-25NH5, RAF-35NH5, RAF-50NH5

1. Power circuit

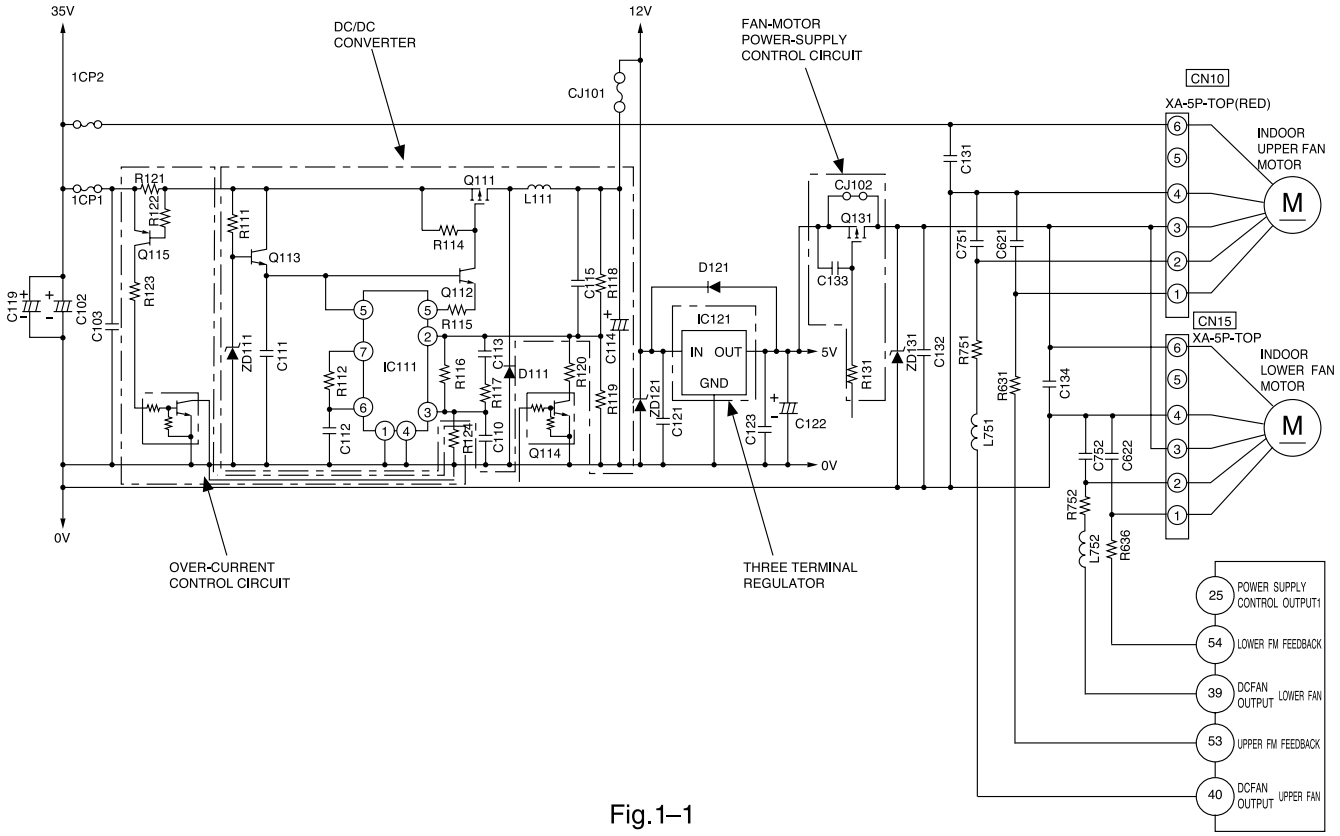


Fig.1–1

Power to operate indoor unit (DC35V) is generated at the power supply in outdoor unit and it is sent to indoor unit through the connecting cord C and D.
Then, DC 12V (12V line) is generated using DC/DC converter from the voltage sent from outdoor unit, as the control voltage of 12V is required to drive the stepping motor and others.
Furthermore, 5V (5V line), which is necessary to drive the microcomputer and to control the fan motor, is generated using three-terminal regulator IC121.

2. Reset Circuit

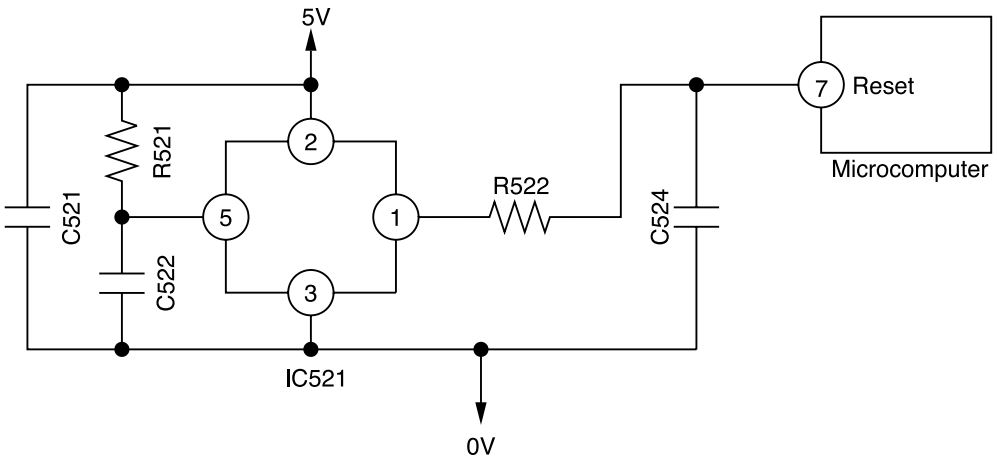


Fig.2-1

Timing chart

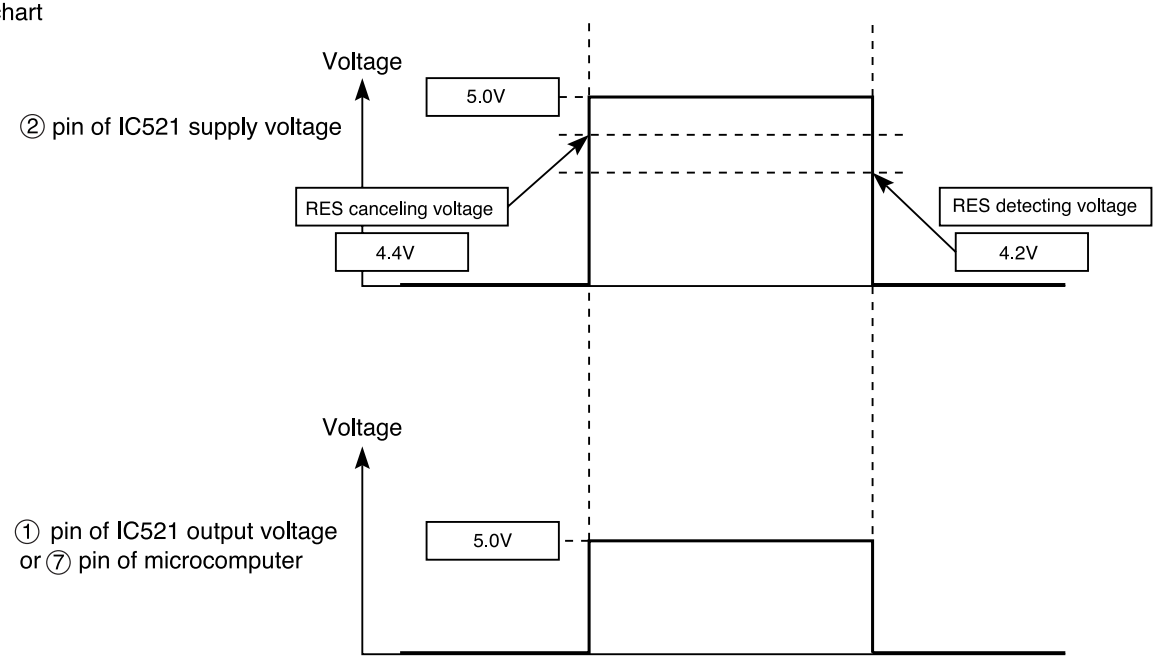


Fig.2-2

- Reset circuit is to initialize the indoor unit microcomputer when switching ON the power or after recovering from power failure.
- Microcomputer operates when ⑦ pin of the indoor unit microcomputer (reset input) is "Lo" for resetting and "Hi" for hitting.
- Waveform of each part when switching ON the power and when shutting down is shown in the Fig. 2-2.
- After switching ON the power, ① pin of IC521 and ⑦ pin of microcomputer becomes Hi when DC5V line rises and reaches approximately 4.4V or higher.
  Then, resetting will be cancelled and microcomputer starts operating.
- After shutting down the power, ① pin of IC521 and ⑦ pin of microcomputer becomes Lo when DC5V line falls and reaches approximately 4.2V or lower.
  Then, the microcomputer will be in reset condition.

3. Room Temperature Thermistor Circuit

A room temperature thermistor circuit is shown in Fig. 3-1.
According to room temperature, the voltage of point Ⓐ becomes as it is shown in Fig.3-2.

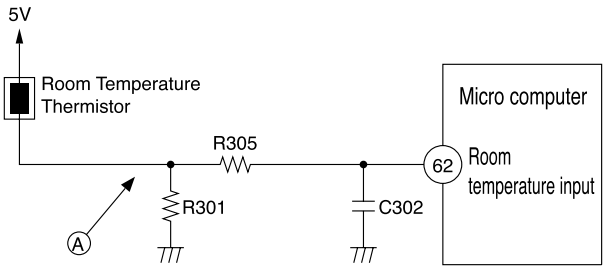


Fig. 3-1

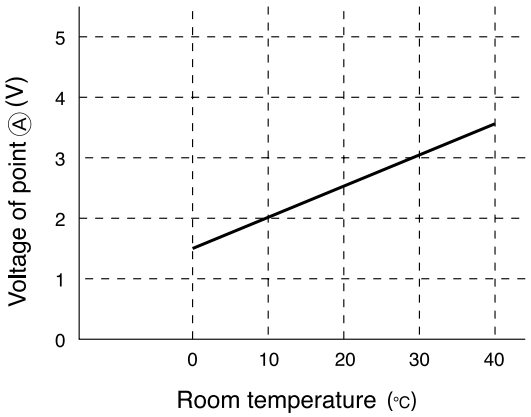


Fig. 3-2

4. Heat Exchanger Thermistor Circuit

Heat exchanger temperature is noticed inside the room
(1) Preheating
(2) Low-temperature defrosts at cooling·dehumidification operation time.
(3) Not working of reversing valve or detection of opening of heat exchange thermistor is controlled.

According to heat exchange temperature, the voltage of point Ⓐ becomes as it is shown in Fig. 4-2.

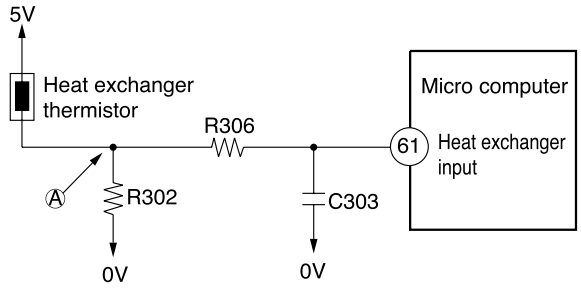


Fig. 4-1

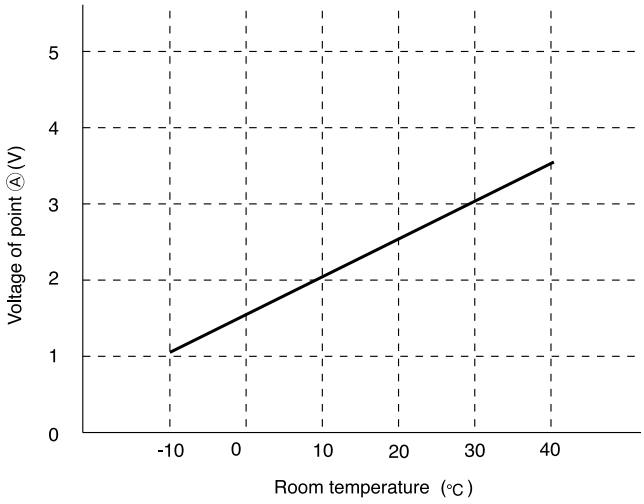


Fig. 4-2

5. Humidity Sensor Circuit

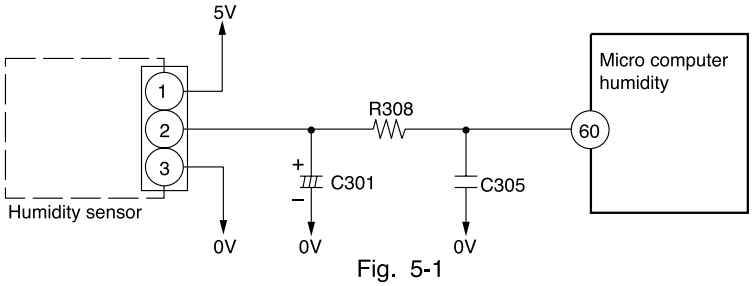


Fig. 5-1

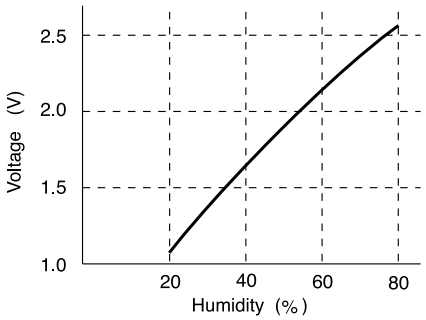


Fig. 5-2

- From the output (② pin) of humidity sensor, the 5V pulse3 of different width is output according to detected humidity. Smooth output pulse is carried out by C301 and it changes into the characteristic of voltage-humidity as shown in Fig.5-2. The micro computer detects and controls humidity by reading this voltage directly.

6. Fan Motor Drive Circuit

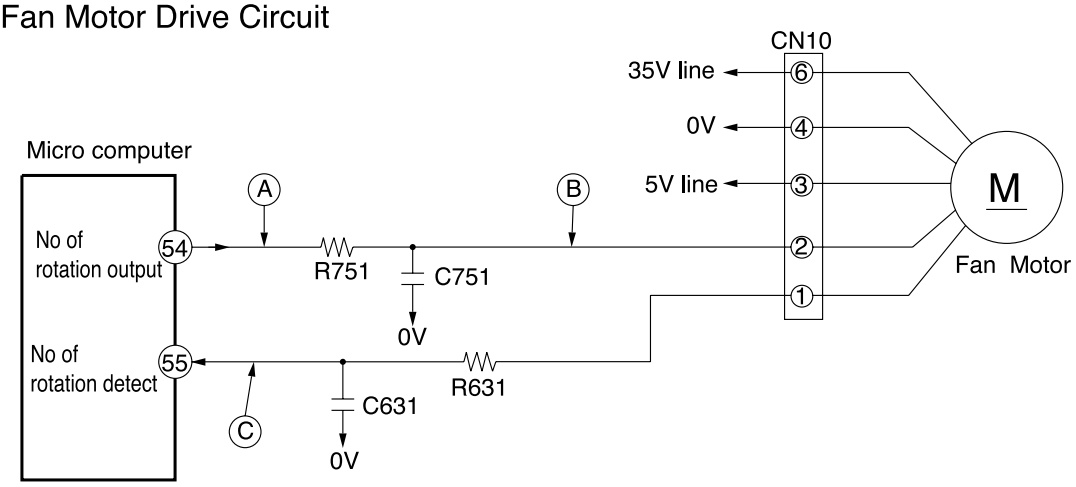


Fig. 6-1

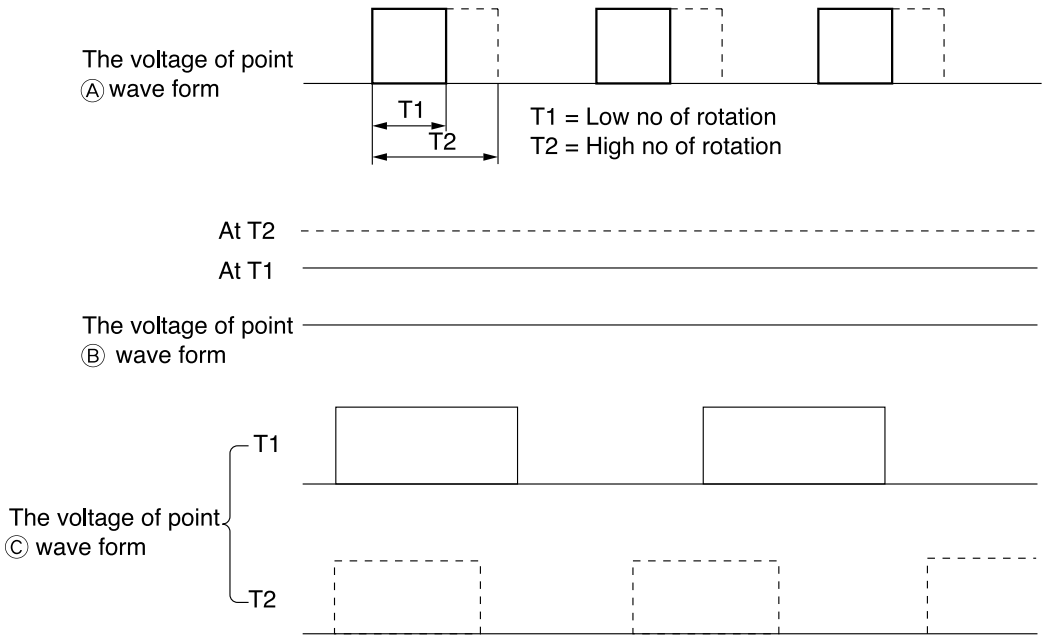


Fig. 6-2

- The 15.7 kHz PWM pulse shown in Fig.6-2 from the micro computer pin ⑭ is output to point Ⓐ. The width of this pulse changes with instruction number of rotations.
- This pulse changes to analog voltage by R751 and C751 and it is applied to the fan motor as instruction voltage number of rotations. The relationship between the voltage of point Ⓑ and number of rotations becomes as shown in Fig.6-3. (The gap may arise depending on the condition of unit.)
- The feedback pulse of number of rotation is outputted from the fan motor and input to micro computer pin ⑮. The frequency of this pulse is 12/60 of the number of rotations. (Ex: 1000min^{-1}X 12/60=200Hz) The micro computer observes this frequency and to make it as the instruction number of rotation all the time, adjusts the output pulse width of pin ⑭.
- If the feedback pulse becomes lower than 100min^{-1} caused by lock or failure of a fan motor, the fan output stops temporary as the fan lock is faulty. The pulse will output again after 10 seconds. If the abnormal in fan lock is detected twice in 10 minutes, the unit is completely stopped and change to the fault mode which the timer lamp blinks 10 times.

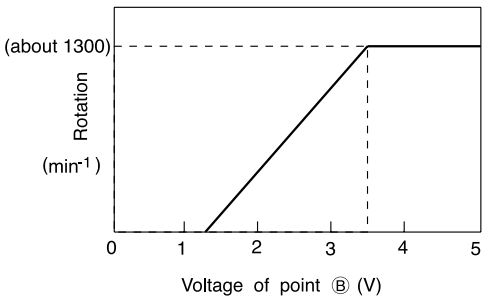


Fig. 6-3

Damper control

1. Precondition

The damper has 2-directional output and realizes OPEN/CLOSE using a stepping motor.
Damper control functions only when the Air outlet SW is set to " ".

2. OPEN/CLOSE Operation

(1) OPEN operation
Start up the damper towards OPEN direction by overall angle width [DNPALD1]. When the start up completes, turn off the output.

(2) CLOSE operation
Start up the damper towards CLOSE direction by overall angle width [DNPALD1] + tightening angle [CNPPLS1]. When start up completes, turn off the output.

3. Initial Operation

Initial operation is performed only once when the main power is switched ON. The damper should be operated as follows due to its structure.
① Damper OPEN (Damper limit SW = OFF signal)
② Damper CLOSE (Damper limit SW = ON signal)
Its travel speed is pulse output speed [DNPPPS].

4. Monitor Function of Damper Limit SW

Monitoring of damper limit SW is inhibited during start up and for 2 seconds after starting up the damper, after which the damper limit SW will be monitored.

(1) Damper limit SW signal at the completion of initial operation is monitored. If the signal is OFF, it is judged as malfunction and the malfunction mode is entered immediately.
(2) Monitoring of damper limit SW signal is inhibited while the unit is stopped.
(3) Damper limit SW is always monitored while the unit is in operation. Right after the unit operation is started, however, malfunction judgment is not made and the damper performs the following operation.
When "ON" signal is detected (Normal signal): Start up towards CLOSE direction by tightening angle.
When "OFF" signal is detected (Abnormal signal): Start up towards CLOSE direction by overall angle width plus tightening angle.
(4) After performing the above operation, malfunction judgment will always be carried out. If abnormality is detected for 4 times consecutively within 30 minutes, the malfunction mode is entered at the moment the 4th abnormality is detected.
In the case where 3 or less abnormality are detected, retry operation is performed.
Abnormal OPEN location
If the signal is "ON", the damper is judged to be at CLOSE location (abnormal). The retry operation, which is the same as OPEN operation by overall angle width, will be performed.
Abnormal CLOSE location
If the signal is "OFF", the damper is judged to be at OPEN location (abnormal). The retry operation, which is the same as CLOSE operation by overall angle width + tightening angle, will be performed.
(5) Self diagnosis mode of the damper is indicated by "Timer lamp blinks for 8 times".

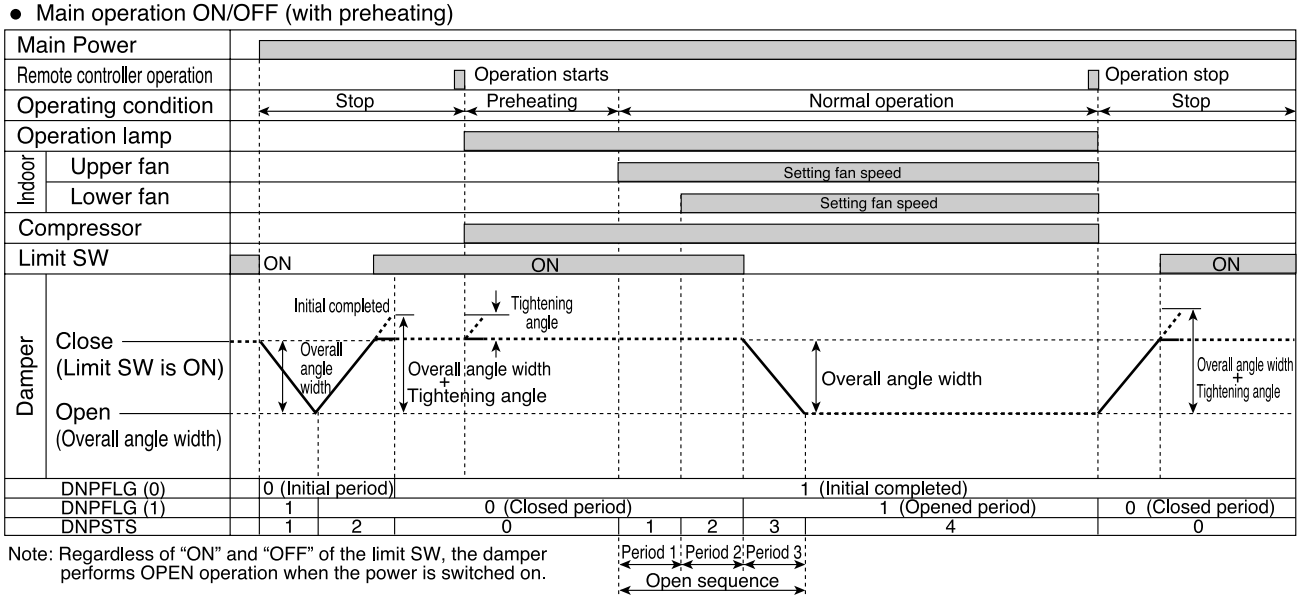
5. Damper operation by operating modes

The damper functions only during heating and cooling operation. It stays closed during other operating modes.

Heating mode

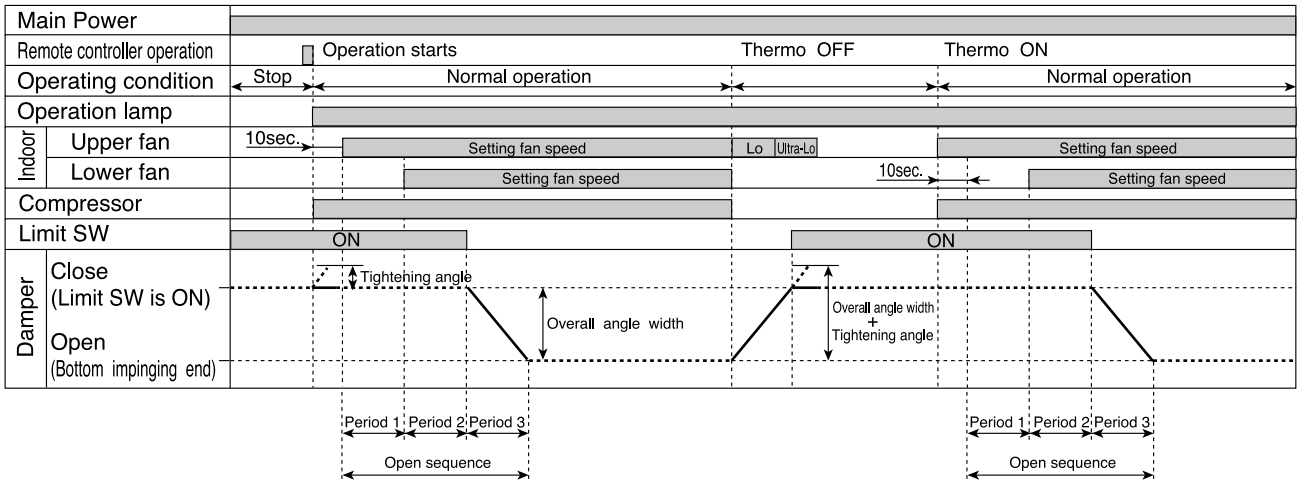
The damper is open during normal heating operation (except for 10 seconds after thermo resumes, during sleep operation and during nice temperature). It is closed during other types of operation.
The damper closes immediately if the damper changeover SW is set to "manual". When the damper is starting up, however, it closes only after open operation completed.

- Main operation ON/OFF (with preheating)

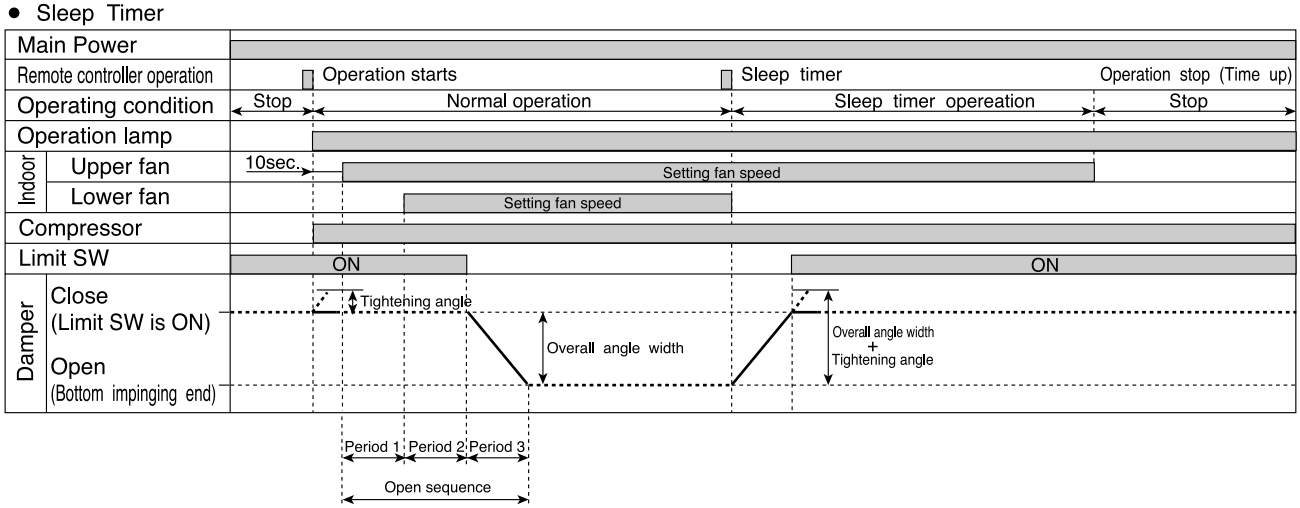


Note: Regardless of "ON" and "OFF" of the limit SW, the damper performs OPEN operation when the power is switched on.

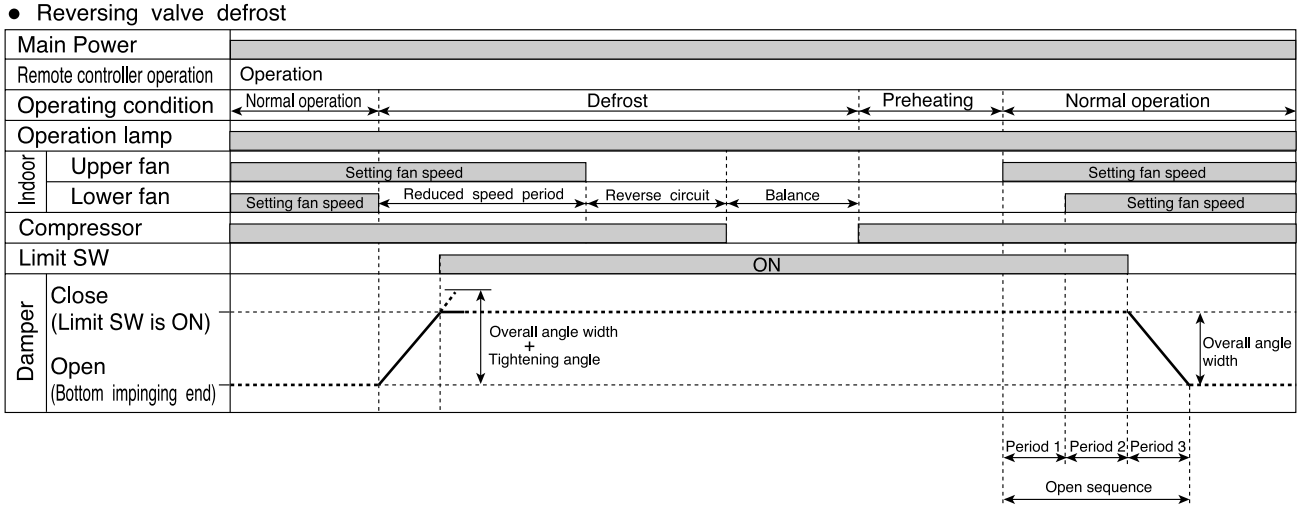
● Thermo intermittence



● Sleep Timer



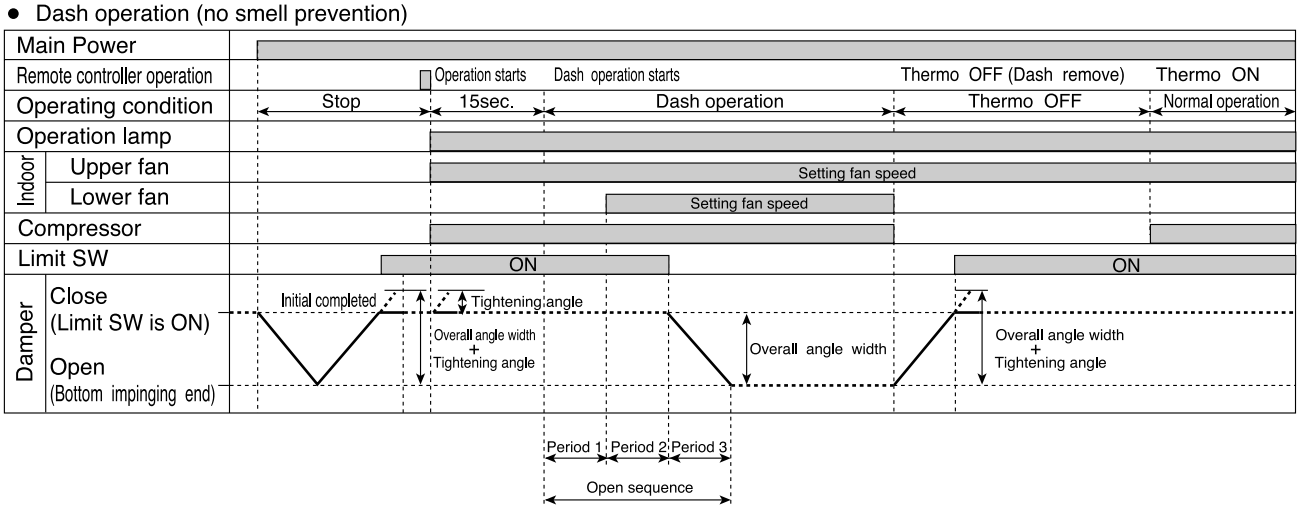
● Reversing valve defrost



Cooling mode

The damper opens at cool dash (excluding smell prevention) and closes at the completion of cool dash.
The damper also closes at the moment the Air outlet SW is set to " ".

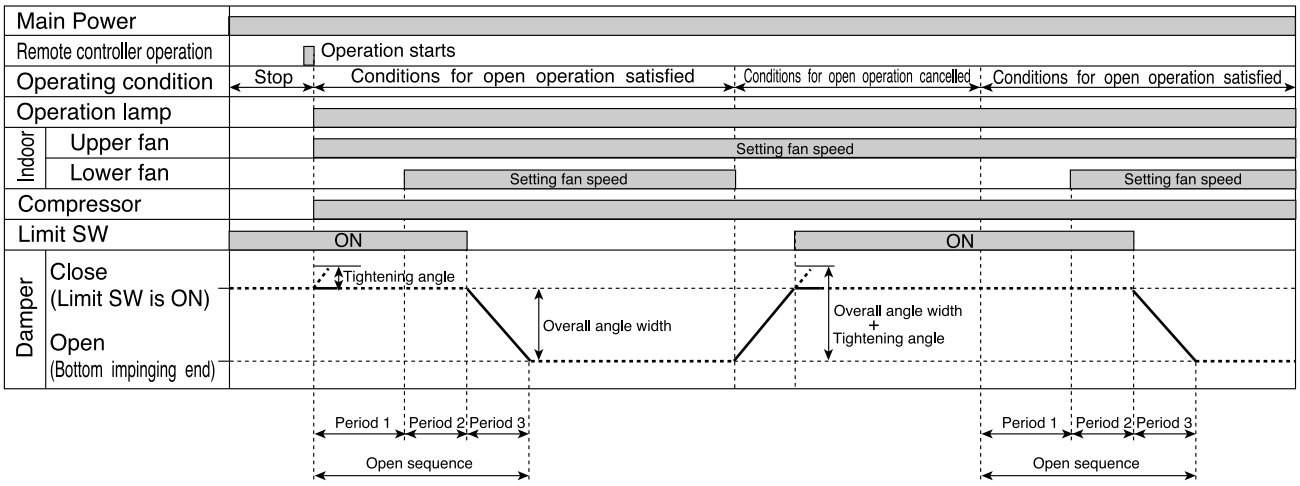
- Dash operation (no smell prevention)



- Damper open operation (except dash)

  This function is allowed when the damper open control select flag on EEPROM at cooling operation and fan speed of HI is set to [FLGET8 (3) = 1] and all the following conditions are satisfied. If any of the following conditions is unsatisfied, the damper will be closed.

  (a) Operating mode: "Manual cooling"
  (b) Preset fan speed: "Hi"
  (c) Preset temperature: "16°C"
  (d) [Room temperature (RMTM) – Final preset temperature (THERW2)] ≧ [ONDOSA] However, the condition. (d) will be cancelled when [Room temperature (RMTM) – Final preset temperature (THERW2)] ≦ [ONDOSA].
  (e) Thermo ON condition (ASTUS=3)



DESCRIPTION OF MAIN CIRCUIT OPERATION

MODEL RAD-25NH5, RAD-35HN5

1. Reset Circuit

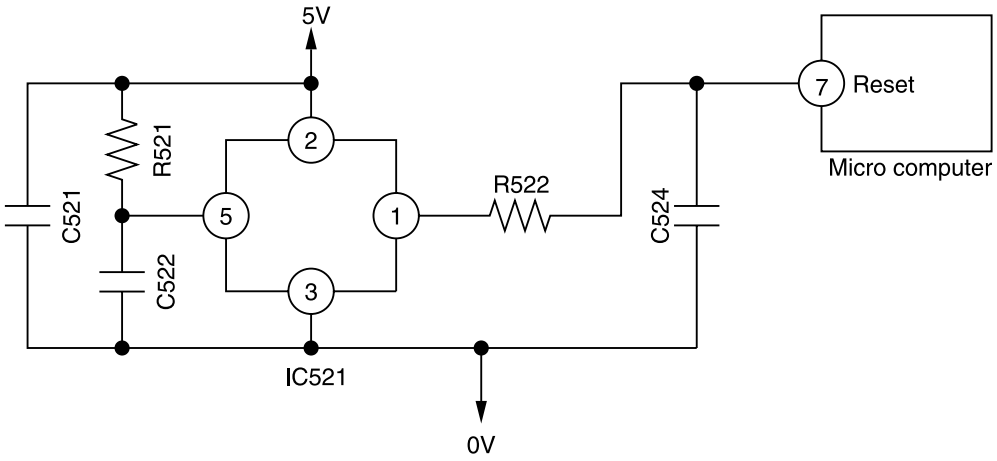


Fig.2-1

Timing chart

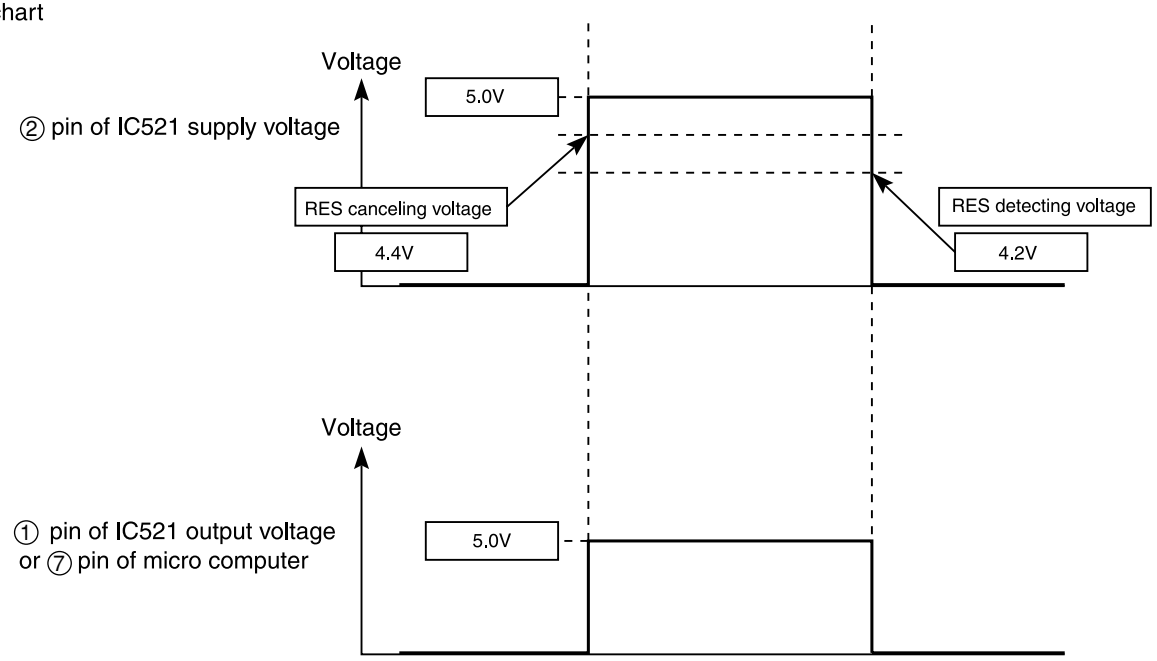
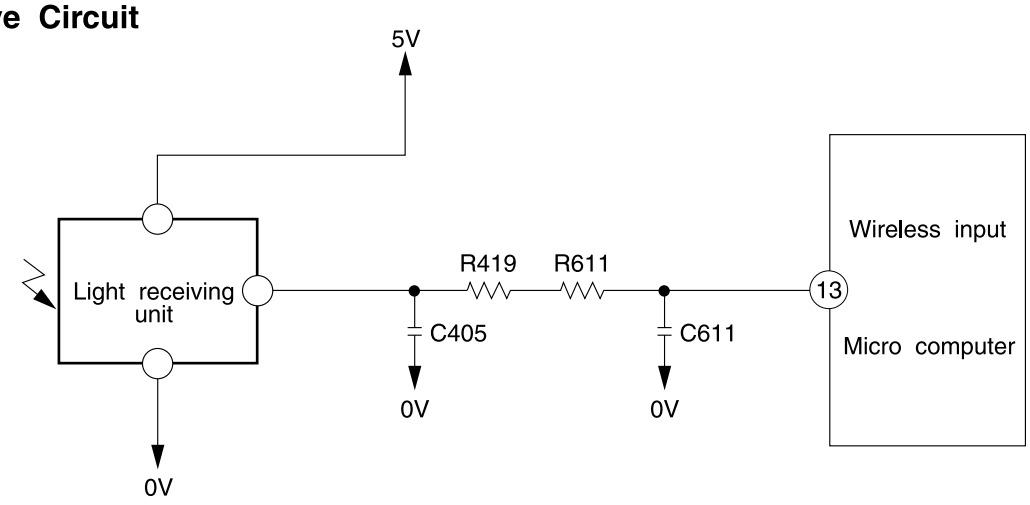


Fig.2-2

- Reset circuit is to initialize the indoor unit micro computer when switching ON the power or after recovering from power failure.
- Micro computer operates when ⑦ pin of the indoor unit micro computer (reset input) is "Lo" for resetting and "Hi" for hitting.
- Waveform of each part when switching ON the power and when shutting down is shown in the Fig. 2-2.
- After switching ON the power, ① pin of IC521 and ⑦ pin of micro computer becomes Hi when DC5V line rises and reaches approximately 4.4V or higher.
  Then, resetting will be cancelled and micro computer starts operating.
- After shutting down the power, ① pin of IC521 and ⑦ pin of micro computer becomes Lo when DC5V line falls and reaches approximately 4.2V or lower.
  Then, the micro computer will be in reset condition.

2. Receive Circuit



• The Light receiving unit receives an infrared signal from the wireless remote control. The receiver amplifies and shapes the signal and outputs it.

3. Buzzer Circuit

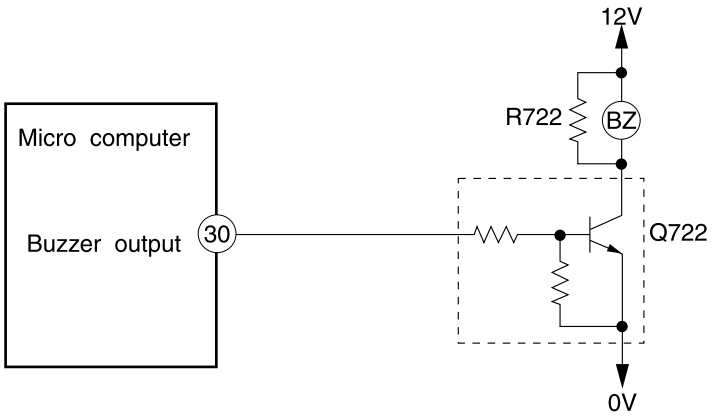


Fig.3-1 Buzzer Circuit

• When the buzzer sounds, an approx. 3.9kHz square signal is output from buzzer output pin ㊲ of the micro computer. After the amplitude of this signal has been set to 12Vp-p by a transistor, it is applied to the buzzer. The piezoelectric element in the buzzer oscillates to generate the buzzer's sound.

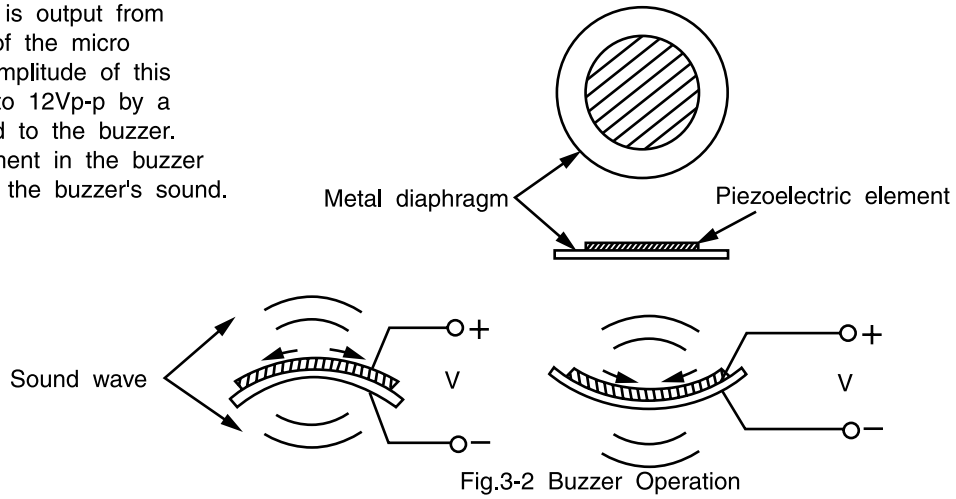


Fig.3-2 Buzzer Operation

4. Auto Sweep Motor Circuit

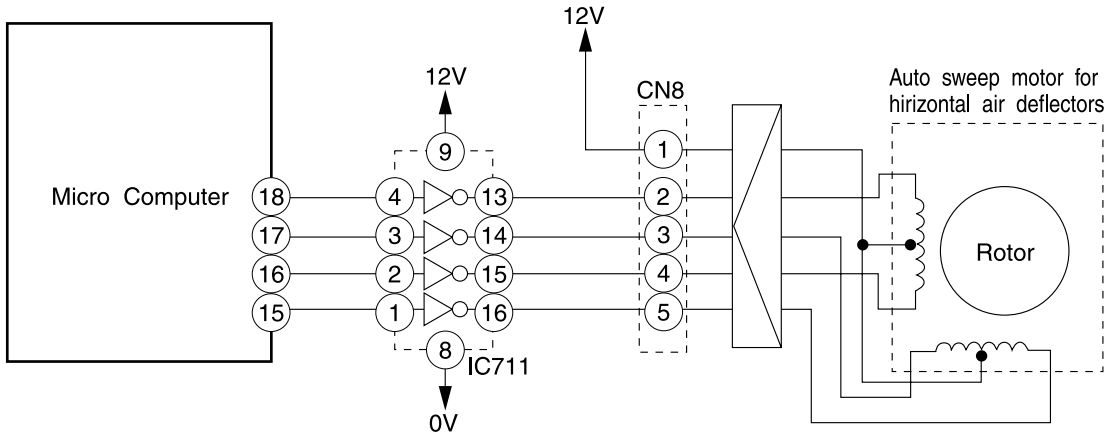


Fig.4-1 Auto Sweep Motor Circuit (Horizontal air deflectors)

• Fig.4-1 shows the Auto sweep Motor drive cicuit; the signals shown in Fig.4-2 are output from pins ⑮- ⑱ of the micro computer.

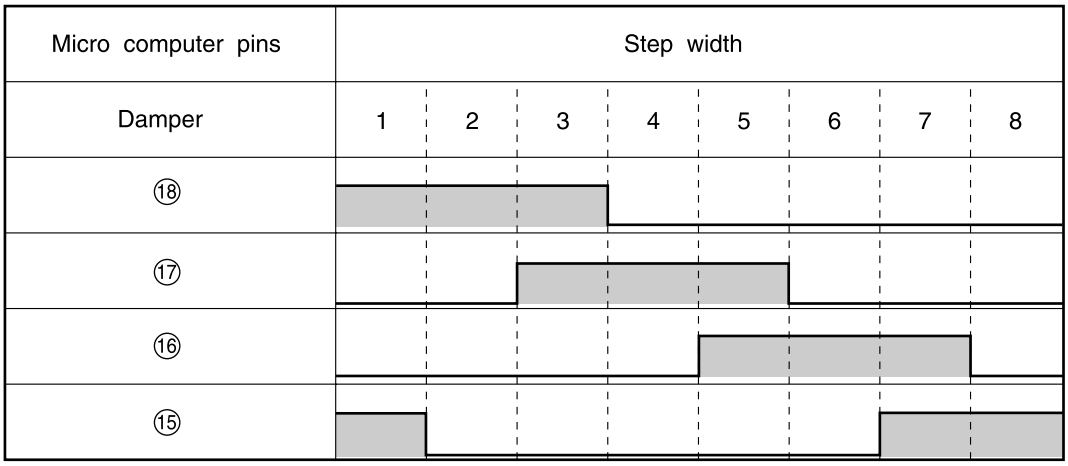


Fig.4-2 Micro computer Output Signals

• As the micro computer's outputs change as shown in Fig.4-2, the core of the stepping motor is excited to turn the rotor. Table 4-1 shows the rotation angle of horizontal air deflectors.

Table 4-1 Auto sweep Motor Rotation

	Rotation angle per step(°)	Time per step(ms.)
Horizontal air deflectors	0.0882	10

5. Room Temperature Thermistor Circuit

Fig. 5-1 shows the room temperature thermistor circuit.

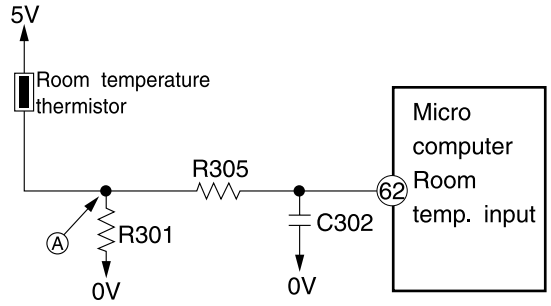


Fig. 5-1

The Voltage at Ⓐ depends on the room temperature as shown in Fig. 5-2

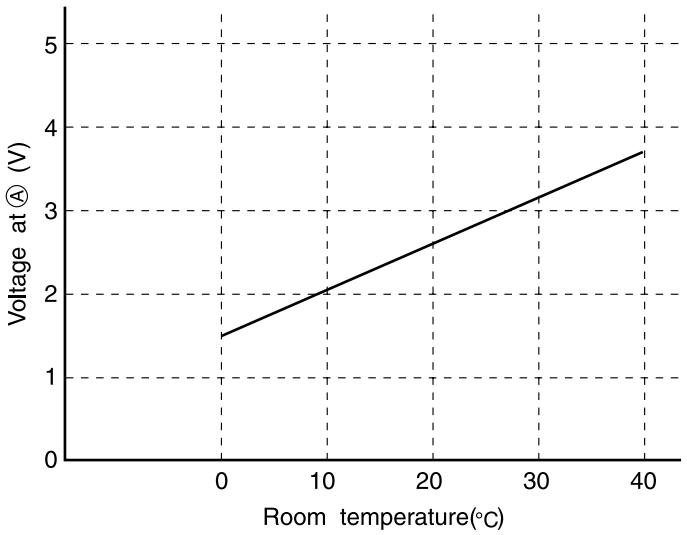


Fig. 5-2

6. Heat exchanger temperature thermistor circuit

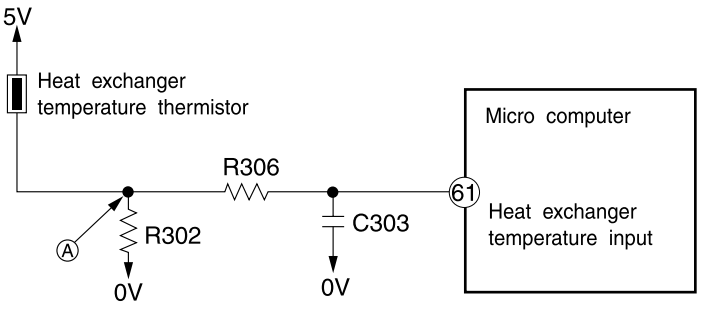


Fig. 6-1

The circuit detects the indoor heat exchanger temperature and controls the following.

(1) Preheation.
(2) Low-temperature defrosting during cooling and dehumidifying operation.
(3) Detection of the reversing valve non-operation or heat exchanger temperature thermistor open.

The voltage at Ⓐ depends on the heat exchanger temperature as shown in Fig. 6-2

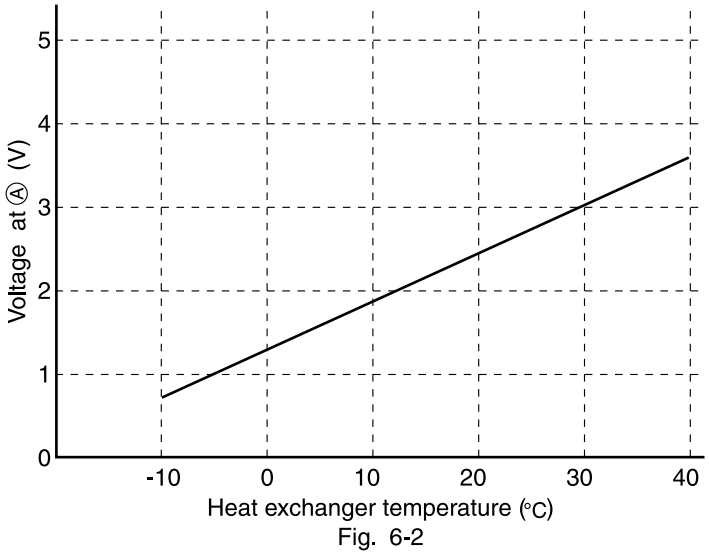


Fig. 6-2

7. Initial Setting Circuit (IC401)

- When power is supplied, the micro computer reads the data in IC401 (E^2PROM) and sets the preheating activation value and the rating and maximum speed of the compressor, etc. to their initial values.

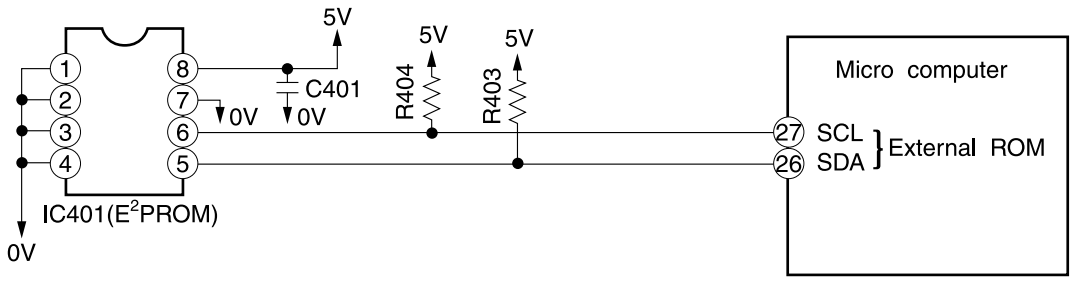


Fig. 7-1

8. Temporary Switch

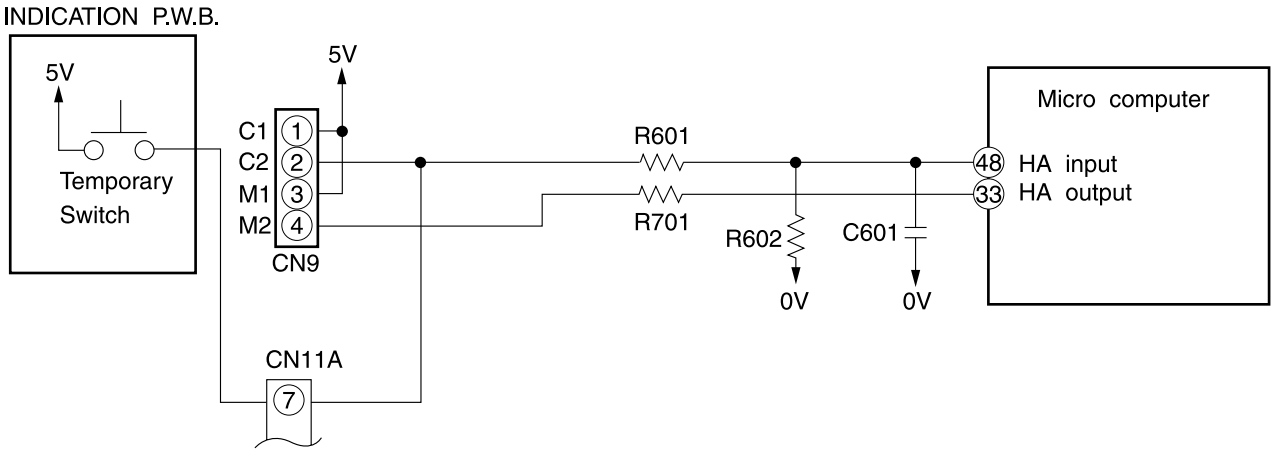


Fig. 8-1

- The temporary switch is used to operate the air conditioner temporarily when the wireless remote control is lost or faulty.
- The air conditioner operates in the previous mode at the previously set temperature. However, when the power switch is set to OFF, it starts automatic operation.

9. Drain pump drive circuit

When cool or dehumidifying operation, pin ⑱ of the micro computer goes "Hi", Q333 and Q932 turn on and the drain pump drive.

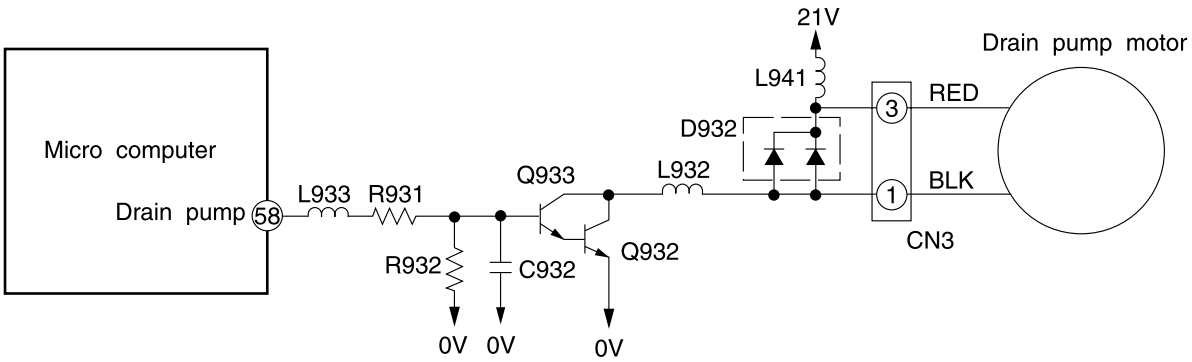
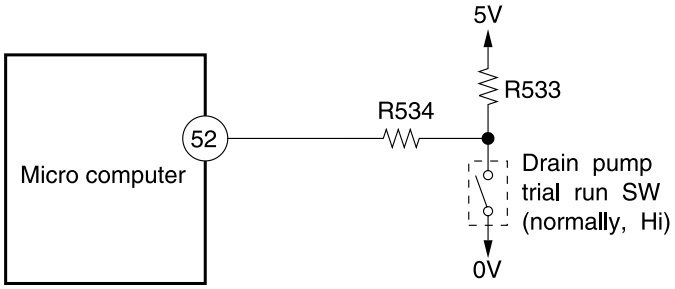


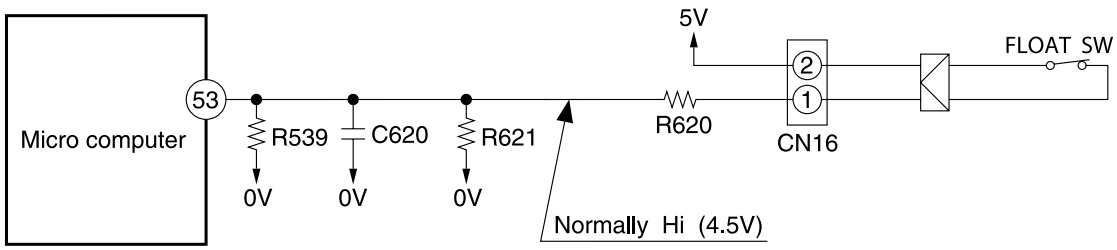
Fig. 9-1

10. Drain pump trial run switch



- This switch forcibly turns the drain pump on. When the drain pump trial run switch is turned on, the timer indicator will blink seven times, and no remote signal will be accepted.

11. Float switch



- This is a float type switch that monitors the drain level of drain pan. The switch will be activated and will stop operation if the drain pump is faulty or drain hose is stopped up, disabling drainage, causing the drain level to rise abnormally.
- When the float switch is activated, the timer indicator will flash six times. Note that the float switch will also be activated, disabling operation if the connector of float switch has defective contact or is connected incompletely.

12. DC Fan Motor Drive Circuit

MODEL RAD-25NH5, RAD-35NH5

- Fig. 12-1 shows the indoor DC fan motor drive circuit.

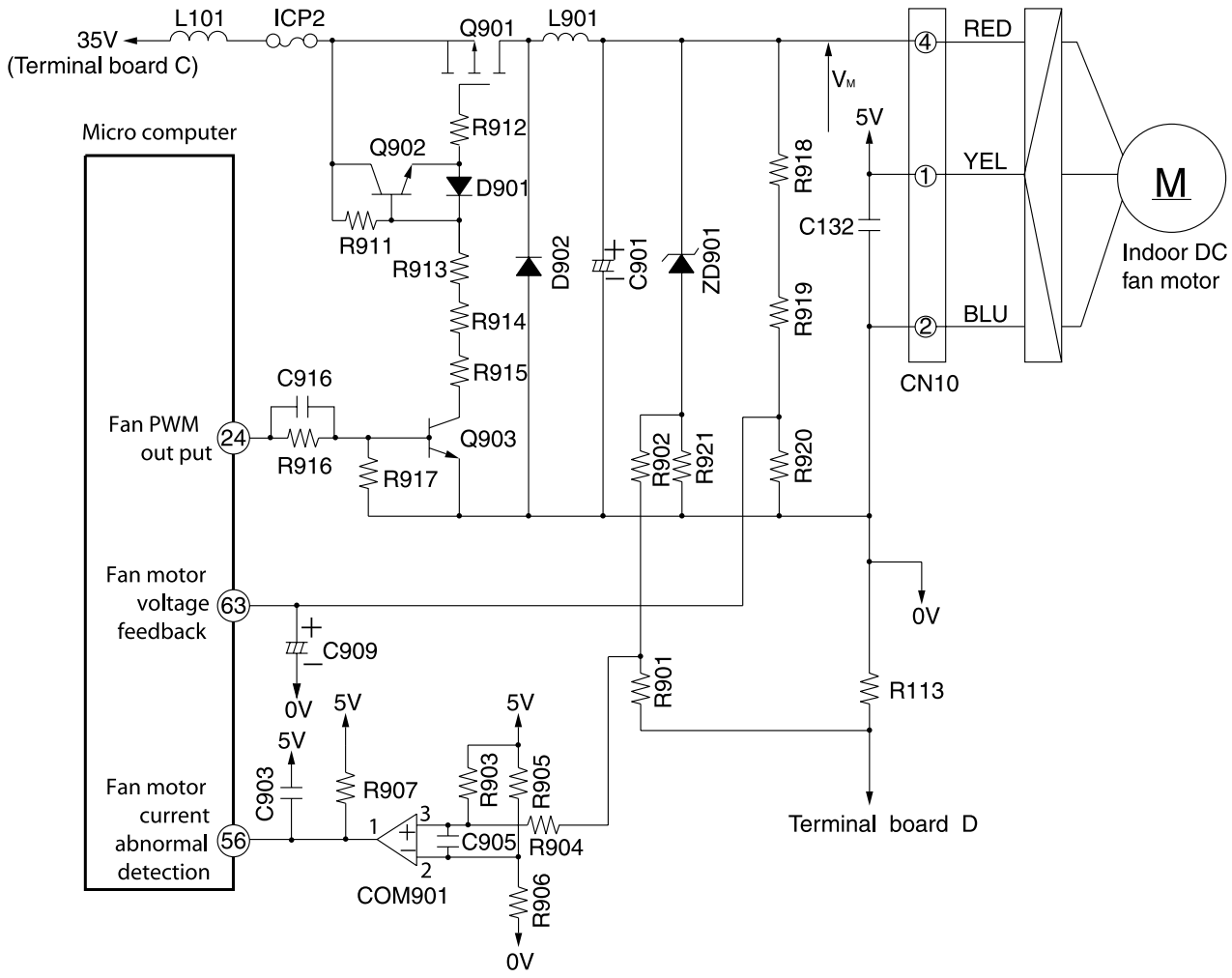


Fig. 12-1

- The circuit produces the fan motor drive voltages, 8-33V, from 35V DC supplied from the outdoor unit and controls the fan motor speed.
- Q901 is switched on and off according to the signal at fan PWM output pin ㉔ to control the voltage which is smoothed by C901, L901 to drive the fan motor.
- The output voltage is divided by R918, R919 and R920 and is input to divided voltage output pin ㊸; the micro computer controls the fan PWM output so the output Voltage is set to the specified value. The chopper frequency of the fan PWM output is 15.7kHz.
- The fan current abnormality detector detects the fan motor current using R113 and COM91 determines an overcurrent and outputs it to fan current abnormality pin ㊻ which is "Hi" during normal operation and "Lo" when overcurrent occrus.
- REG2 supplies 5V DC to the DC fan motor.

13. High static-pressure switch (Full duct type and semi duct type)

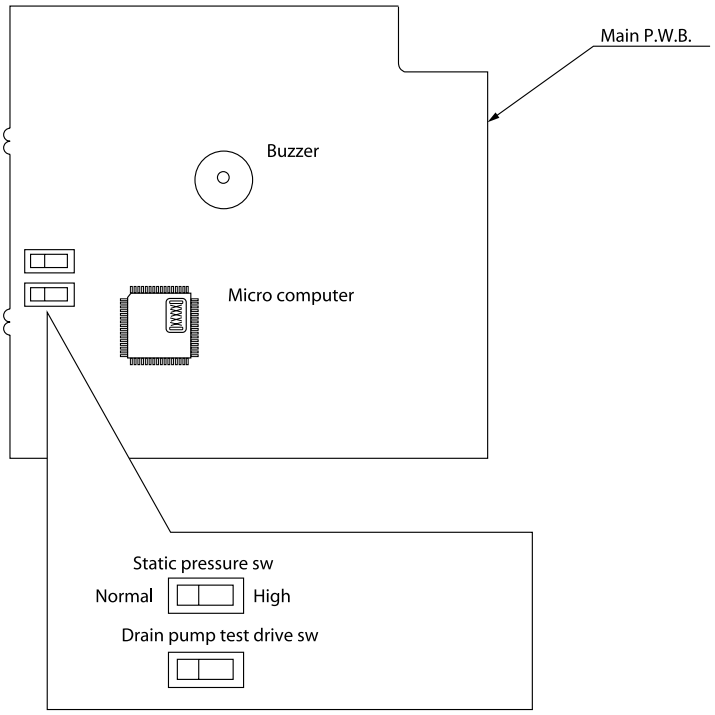


Fig. 13-1

- For full duct type and semi duct type, set the high to HIGH STATIC-PRESSURE.
- If not set to HIGH, there will be reduction of cooling and heating capacities.

DESCRIPTION OF MAIN CIRCUIT OPERATION

MODEL RAI-25NH5, RAI-35NH5, RAI-50NH5

1. Reset Circuit

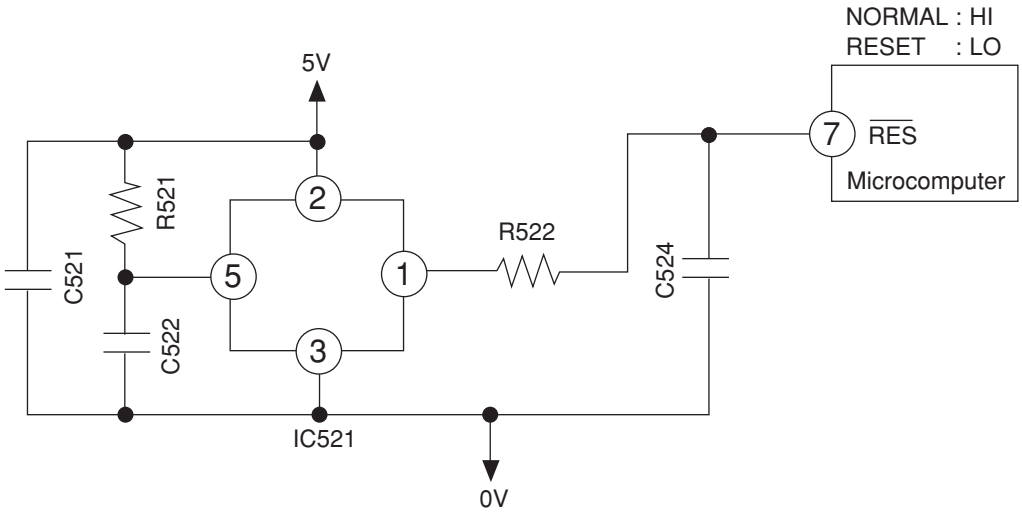


Fig. 1-1

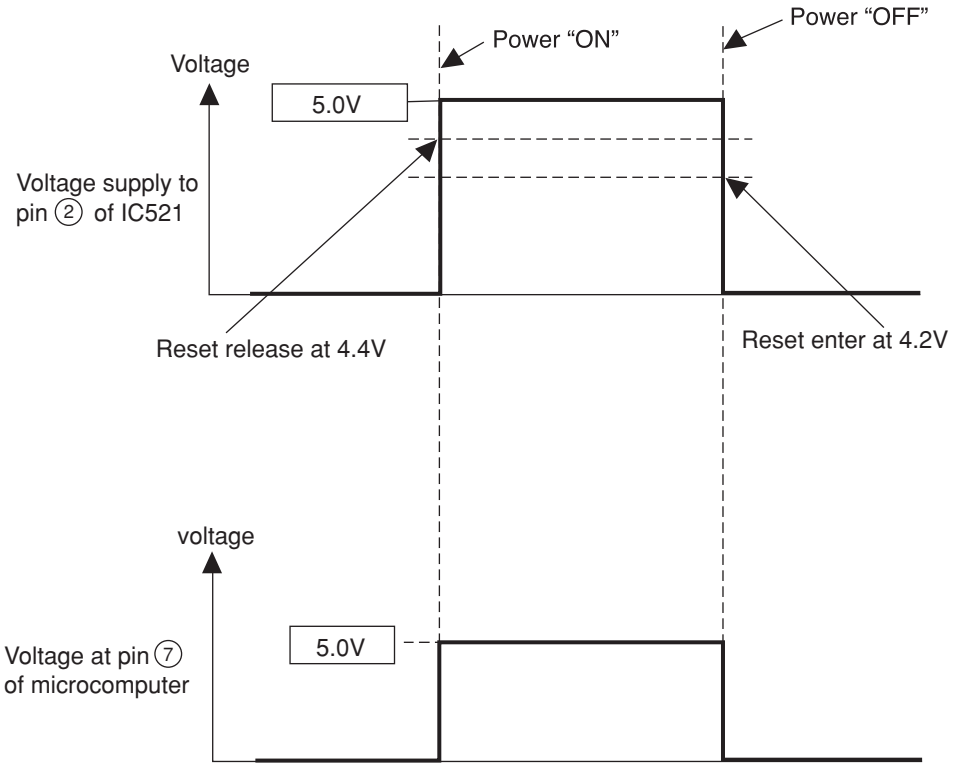


Fig. 1-2

- The reset circuit initializes the microcomputer program when power is ON or OFF.
- Low voltage at pin ⑦ resets the microcomputer and Hi activates the microcomputer.
- When power "ON" 5V voltage rises and reaches 4.4V, pin ① of IC521 is set to "Hi". At this time the microcomputer starts operation.
- When power "OFF" voltage drops and reaches 4.2V, pin ① of IC521 is set to "Low". This will RESET the microcomputer.

2. Receiver Circuit

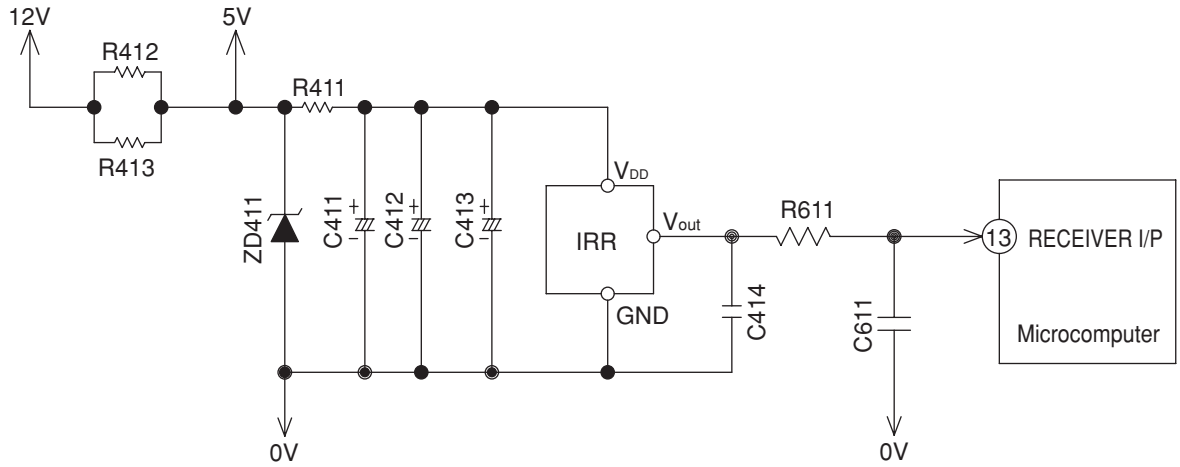


Fig. 2-1

- The light receiver unit receives the infrared signal from the wireless remote control. The receiver amplifies and shapes the signal and outputs it.

3. Buzzer Circuit

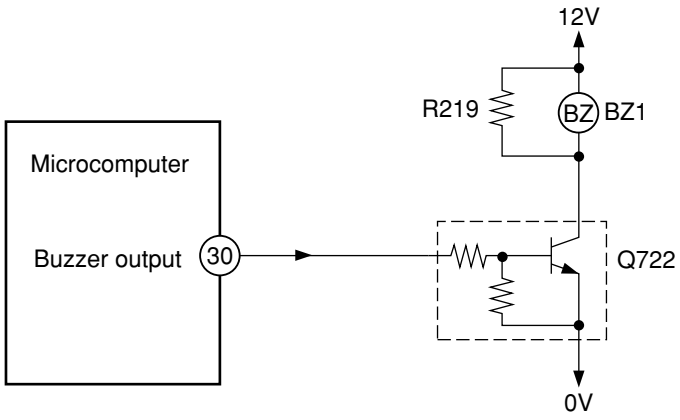


Fig. 3-1 Buzzer Circuit

- When the buzzer sounds, an approx. 3.9kHz square signal is output from buzzer output pin (30) of the microcomputer. After the amplitude of this signal has been set to 12Vp-p by a transistor, it is applied to the buzzer. The piezoelectric element in the buzzer oscillates to generate the buzzer's sound.

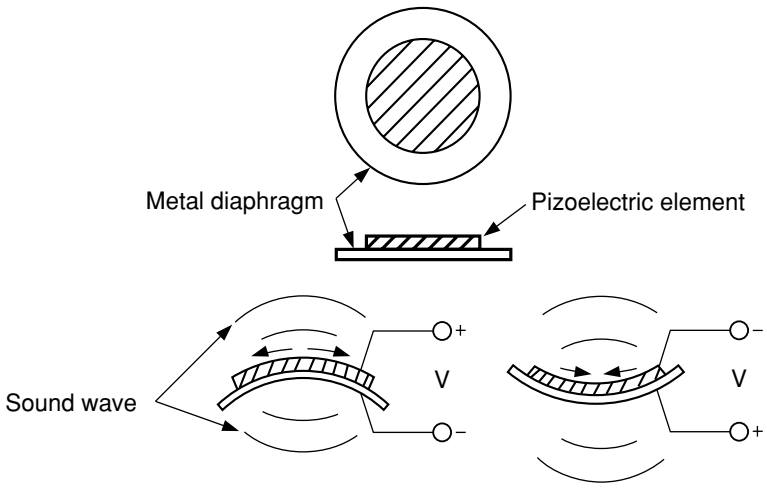


Fig. 3-2 Buzzer Operation

4. Auto Sweep Motor Circuit

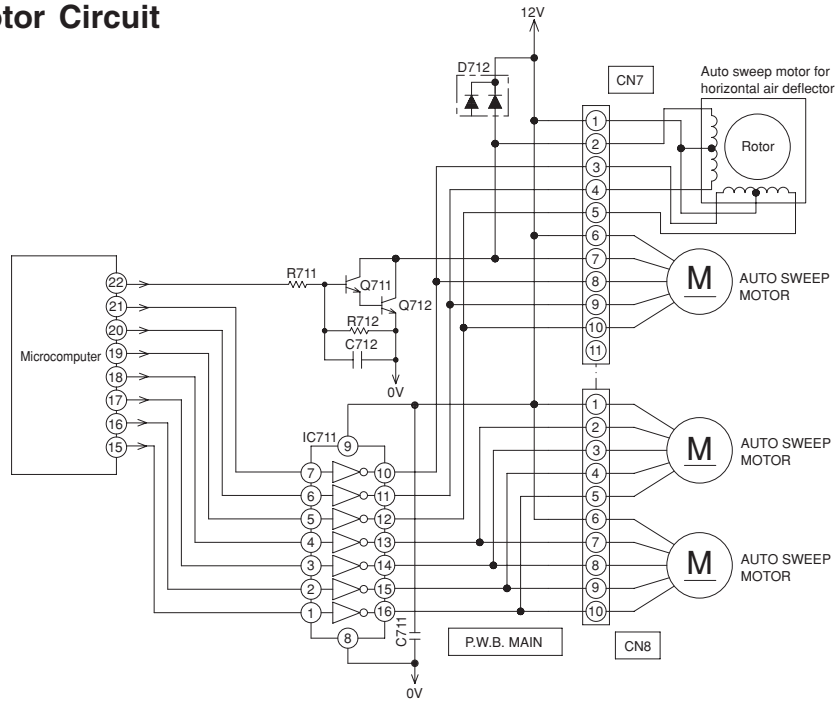


Fig.4-1

- Fig. 4-1 shows the Auto sweep motor drive circuit; the signals shown in Fig.4-2 are output from pins (15) – (22) of microcomputer.

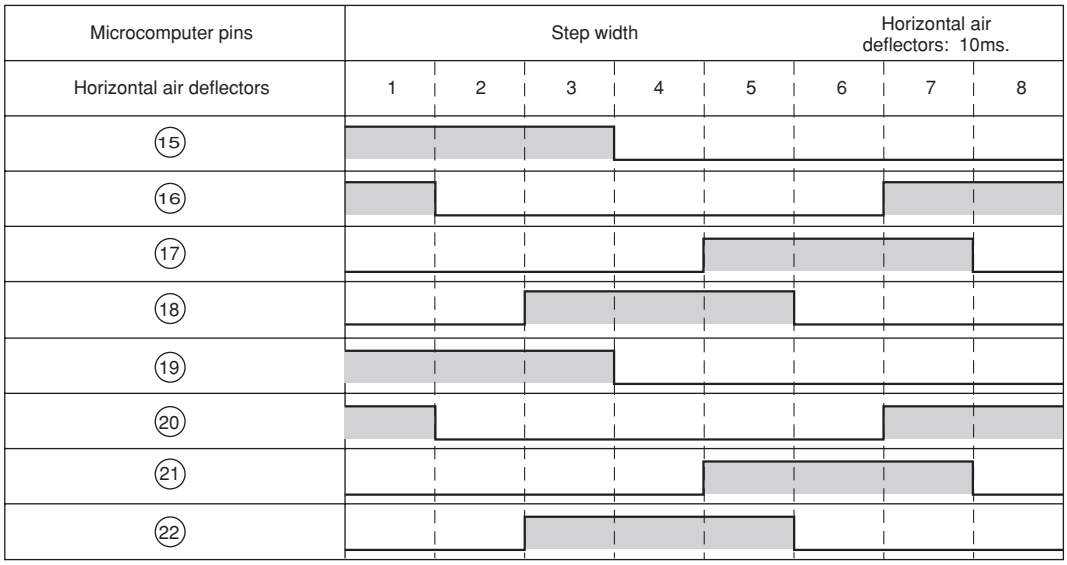


Fig.4-2 Microcomputer Output Signals

- As the microcomputer's outputs change as shown in Fig.4-2, the core of the auto sweep motor is excited to turn the rotor. Table 4-1 shows the rotation angle of horizontal air deflectors.

Table 4-1 Auto sweep Motor Rotation

	Rotation angle per step (˚)	Time per step (ms.)
Horizontal air deflectors	0.0882	10

- The air deflectors are driven by the stepping motors, which are instructed by the microcomputer.
- The air deflectors on the left and right are each driven by two stepping motors.
- The stepping motors and main unit are connected via relay connectors. The air deflectors will not operate unless the relay connectors are connected: Securely connect the relay connectors identified by colors when attaching the panel.
- Before removing the panel for servicing, be sure to disconnect the relay connector to protect the lead wires.

5. Room Temperature Thermistor Circuit

- Fig. 5-1 shows the room temperature thermistor circuit.

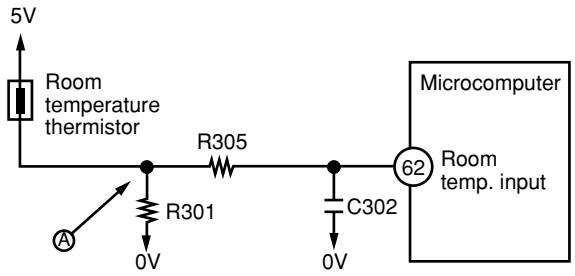


Fig. 5-1

- The voltage at Ⓐ depends on the room temperature as shown in Fig. 5-2.

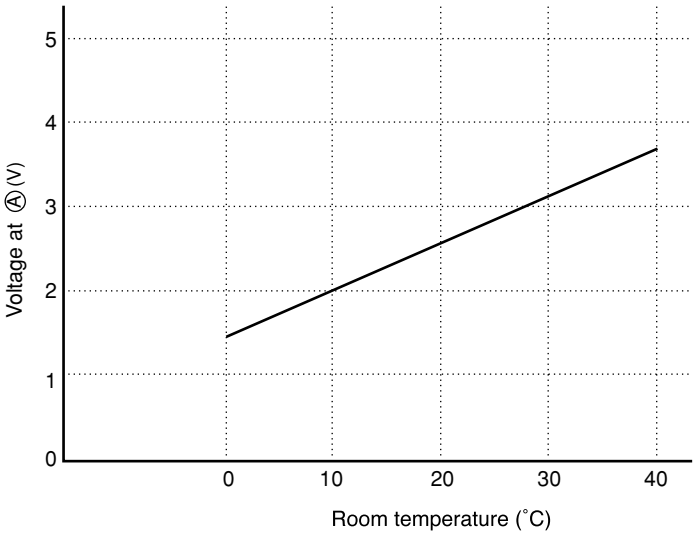


Fig. 5-2

6. Heat exchanger temperature thermistor circuit

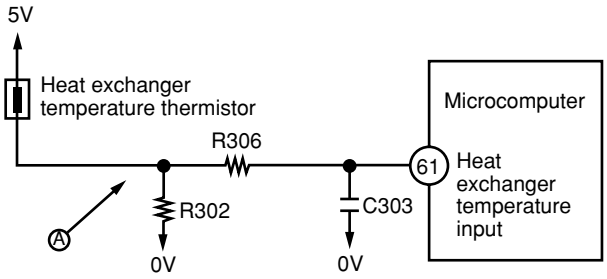


Fig. 6-1

- The circuit detects the indoor heat exchanger temperature and controls the following.

  (1) Preheating.

  (2) Low-temperature defrosting during cooling and dehumidifying operation.

  (3) Detection of the reversing valve non-operation or heat exchanger temperature thermistor open.

  The voltage at Ⓐ depends on the heat exchanger temperature as shown in Fig. 6-2.

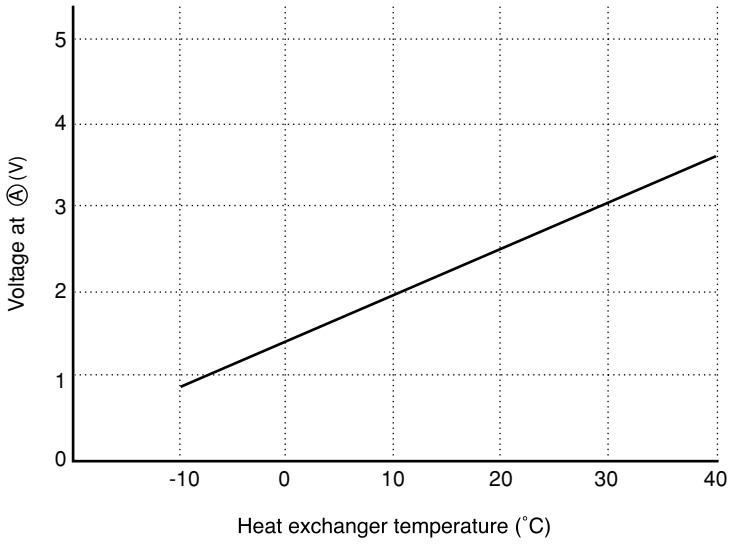


Fig. 6-2

7. Initial Setting Circuit (IC401)

- When power is supplied, the microcomputer reads the data in IC401 (E^2PROM) and sets the preheating activation value and the rating and maximum speed of the compressor, etc. to their initial values.
- Data of self-diagnosis mode is stored in IC401; data will not be erased even when power is turned off.

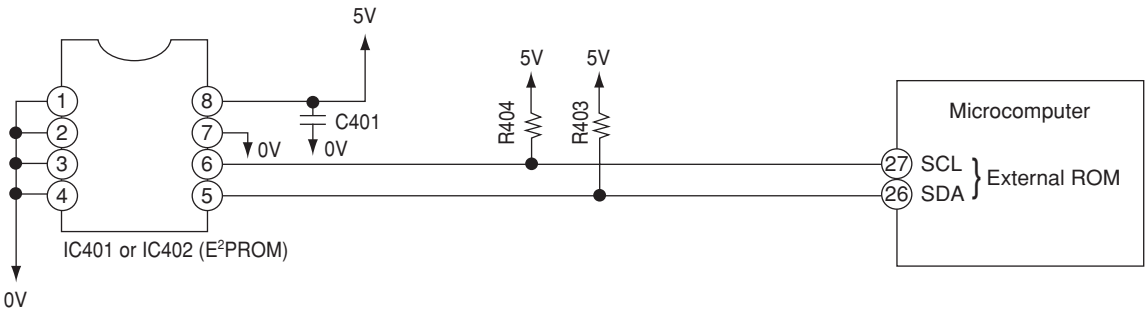


Fig. 7-1

SERVICE CALL Q & A

MODEL RAK-18NH5, RAK-25NH5, RAK-35NH5, RAK-50NH5

COOLING MODE

Q1 The compressor has stopped suddenly during cooling operation.

A1 Check if the indoor heat exchanger is frosted. Wait for 3-4 minutes until it is defrosted.

If the air conditioner operates in cooling mode when it is cold, the evaporator may get frosted.

DEHUMIDIFYING MODE

Q2 Sound of running water is heard from indoor unit during dehumidifying.

A2 Normal sound when refrigerant flows in pipe.

Q3 Compressor occasionally does not operate during dehumidifying.

A3 Compressor may not operate when room temperature is 10°C or less. It also stops when the humidity is preset humidity or less.

HEATING MODE

Q4 The circulation stops occasionally during Heating mode.

A4 It occurs during defrosting. Wait for 5-10 minutes until the condenser is defrosted.

Q5 When the fan speed is set at HIGH or MED, the flow is actually Weak.

A5 At the beginning of heating, the fan speed remains LOW for 30 seconds. If HIGH is selected, it switches to LOW and again to MED after additional 30 seconds.

Q6 Heating operation stops while the temperature is preset at "30".

A6 If temperature is high in the outdoor, heating operation may stop to protect internal devices.

AUTO FRESH DEFROSTING

Q7 After the ON/OFF button is pressed to stop heating, the outdoor unit is still working with the OPERATION lamp lighting.

A7 Auto Fresh Defrosting is carried out : the system checks the outdoor heat exchanger and defrosts it as necessary before stopping operation.

AUTO OPERATION

Q8 Fan speed does not change when fan speed selector is changed during auto operation.

A8 At this point fan speed is automatic.

NICE TEMPERATURE RESERVATION

Q9 When on-timer has been programmed, operation starts before the preset time has been reached.

A9 This is because “Nice temperature reservation” function is operating. This function starts operation earlier so the preset temperature is reached at the preset time. Operation may start maximum 60 minutes before the preset time.

Q10 Does “Nice temperature reservation” function operate during dehumidifying?

A10 It does not work. It works only during cooling and heating.

Q11 Even if the same time is preset, the operation start time varies.

A11 This is because “Nice temperature reservation” function is operating. The start time varies according to the load of room. Since load varies greatly during heating, the operation start time is corrected, so it will vary each day.

INFRARED REMOTE CONTROL

Q12 Timer cannot be set.

A12 Has the clock been set? Timer cannot be set unless the clock has been set.

Q13 The current time display disappears soon.

A13 The current time disappears in approx. 10 seconds. The time set display has priority.

When the current time is set the display flashes for approx 3 minutes.

Q14 The timer has been programmed, but the preset time disappears.

A14 Is the current time past the preset time? When the preset time reaches the current time, it disappears.

OTHERS

Q15 The indoor fan varies among high air flow, low air flow and breeze in the auto fan speed mode. (Heating operation)

A15 This is because the cool wind prevention function is operating, and does not indicate a fault.

The heat exchanger temperature is sensed in the auto speed mode. When the temperature is low, the fan speed varies among high air flow, low air flow and breeze.

Q16 Loud noise from the outdoor unit is heard when operation is started.

A16 When operation is started, the compressor rotation speed goes to maximum to increase the heating or cooling capability, so noise becomes slightly louder. This does not indicate a fault.

Q17 Noise from the outdoor unit occasionally changes.

A17 The compressor rotation speed changes according to the difference between the thermostat set temperature and room temperature. This does not indicate a fault.

Q18 There is a difference between the set temperature and room temperature.

A18 There may be a difference between the set temperature and room temperature because of construction of room, air current, etc. Set the temperature at a comfortable for the space.

Q19 Air does not flow immediately after operation is started.

A19 Preliminary operation is performed for one minute when the power switch on and heating or dehumidifying is set. The operation lamp blinks during this time for heating. This does not indicate a fault.

TROUBLESHOOTING WHEN TIMER LAMP BLINKS

Model RAK-18NH5, RAK-25NH5, RAK-35NH5, RAK-50NH5, RAK-65NH5
Perform troubleshooting according to the number of times the indoor timer lamp and outdoor LD301 blink.

SELF-DIAGNOSIS LIGHTING MODE
Model: RAK-18NH5, RAK-25NH5, RAK-35NH5, RAK-50NH5, RAK-65NH5

No.	Blinking of Timer lamp	Reason for indication	Possible cause
1	 1 time	Reversing valve defective When the indoor heat exchanger temperature is too low in the heating mode or it is too high in the cooling mode.	(1) Reversing valve defective (2) Heat exchanger thermistor disconnected (only in the heating mode) (Note) The malfunction mode is entered the 3rd time this abnormal indication appears (read every 3 minutes).
2	 2 times	Outdoor unit forced operation When the outdoor unit is in forced operation or balancing operation after forced operation	Electrical parts in the outdoor unit
3	 3 times	Indoor/outdoor interface defective When the interface signal from the outdoor unit is interrupted.	(1) Indoor interface circuit (2) Outdoor interface circuit
4	 4 times	Outdoor electrical assembly defective.	Please check at the outdoor electrical led lamp blinking (LD301) and refer to self diagnosis lighting mode for outdoor unit.
5	 9 times	Room thermistor or heat exchanger thermistor is faulty When room thermistor or heat exchanger thermistor is opened circuit or short circuit.	(1) Room thermistor (2) Heat exchanger thermistor
6	 10 times	Over-current detection at the DC fan motor when over-current is detected at the DC fan motor of the indoor unit.	(1) Indoor fan locked (2) Indoor fan motor (3) Indoor control P.W.B.
※1 7	 13 times	IC401 or IC402 data reading error When data read from IC401 or IC402 is incorrect.	IC401 or IC402 abnormal

(▮ – – Lights for 0.5 sec. at interval of 0.5 sec..)

<Cautions>

(1) If the interface circuit is faulty when power is supplied, the self-diagnosis display will not be displayed.

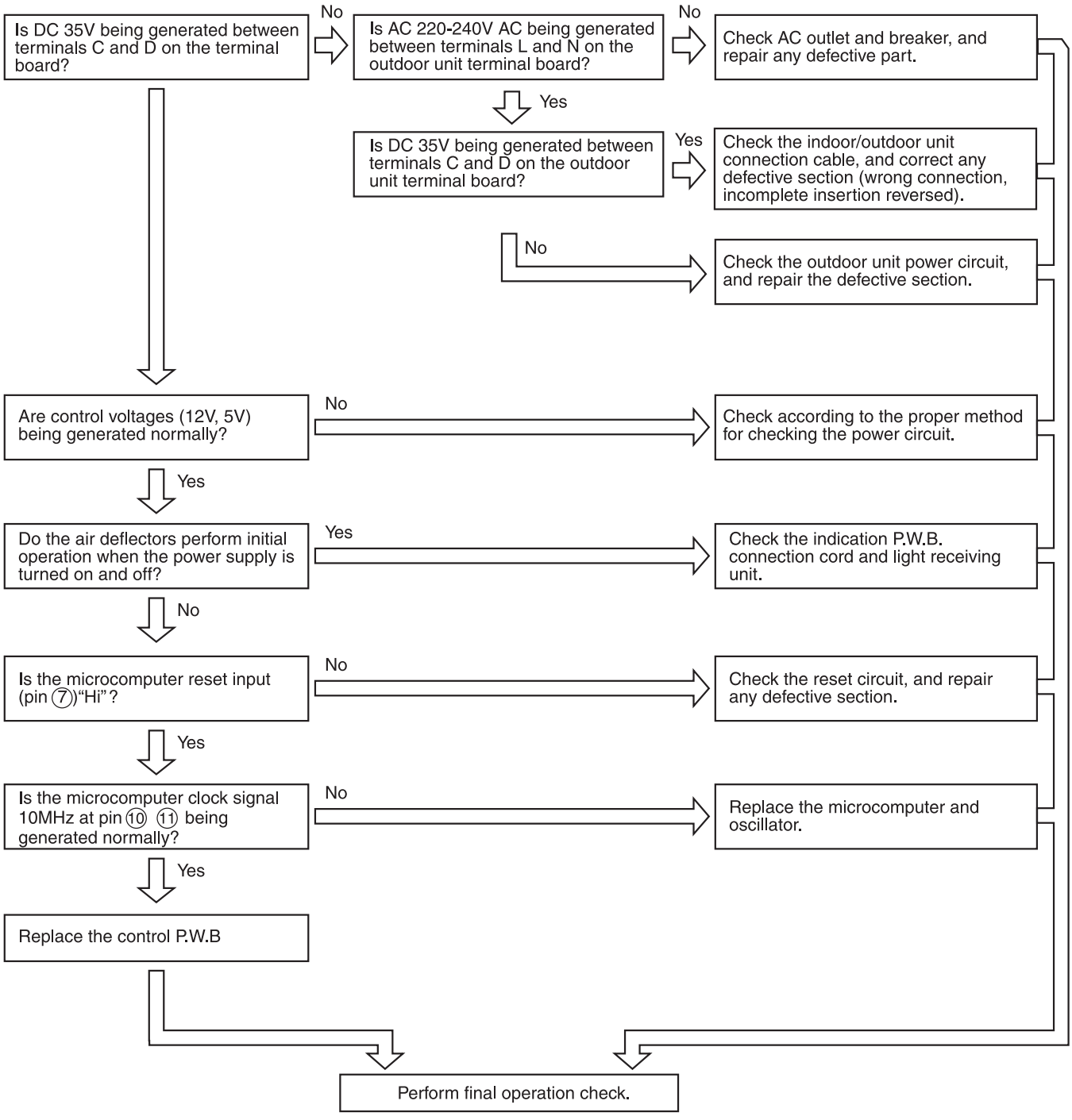
(2) If the indoor unit does not operate at all, check to see if the F-cable is connected or disconnected.

(3) To check operation again when the timer lamp is blinking, you can use the remote control for operation (except for mode mark ※1).

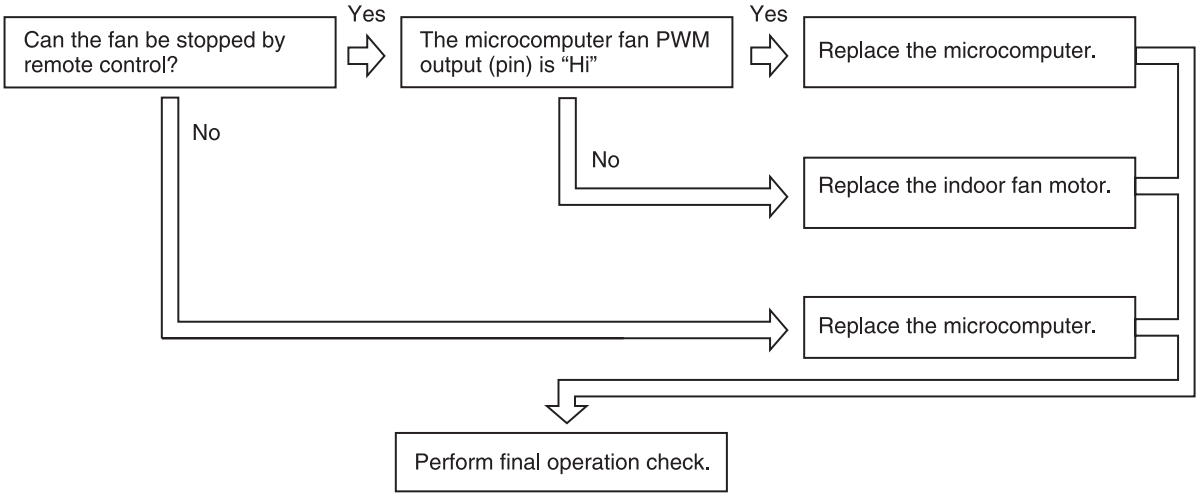
CHECKING INDOOR UNIT ELECTRICAL PARTS

MODEL RAK-18NH5, RAK-25NH5, RAK-35NH5, RAK-50NH5, RAK-65NH5

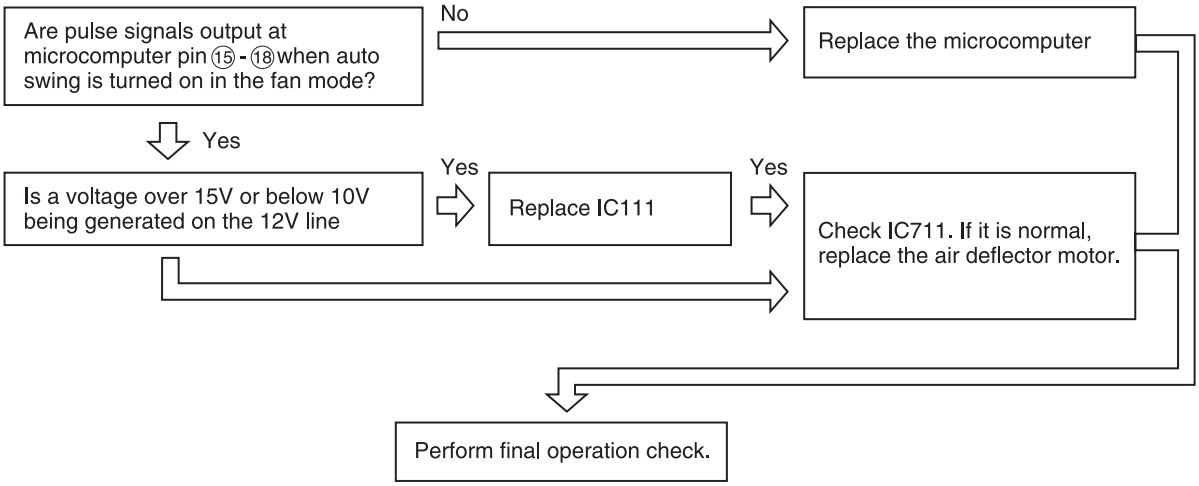
1. Power does not come on (no operation)



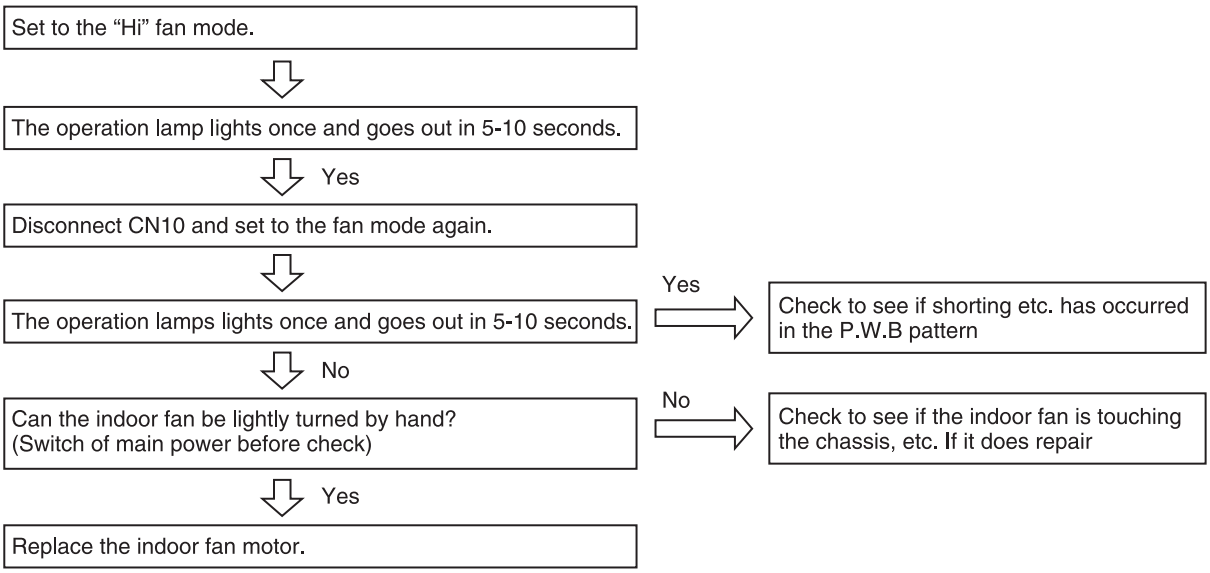
2. Only indoor fan does not operate (other is normal)



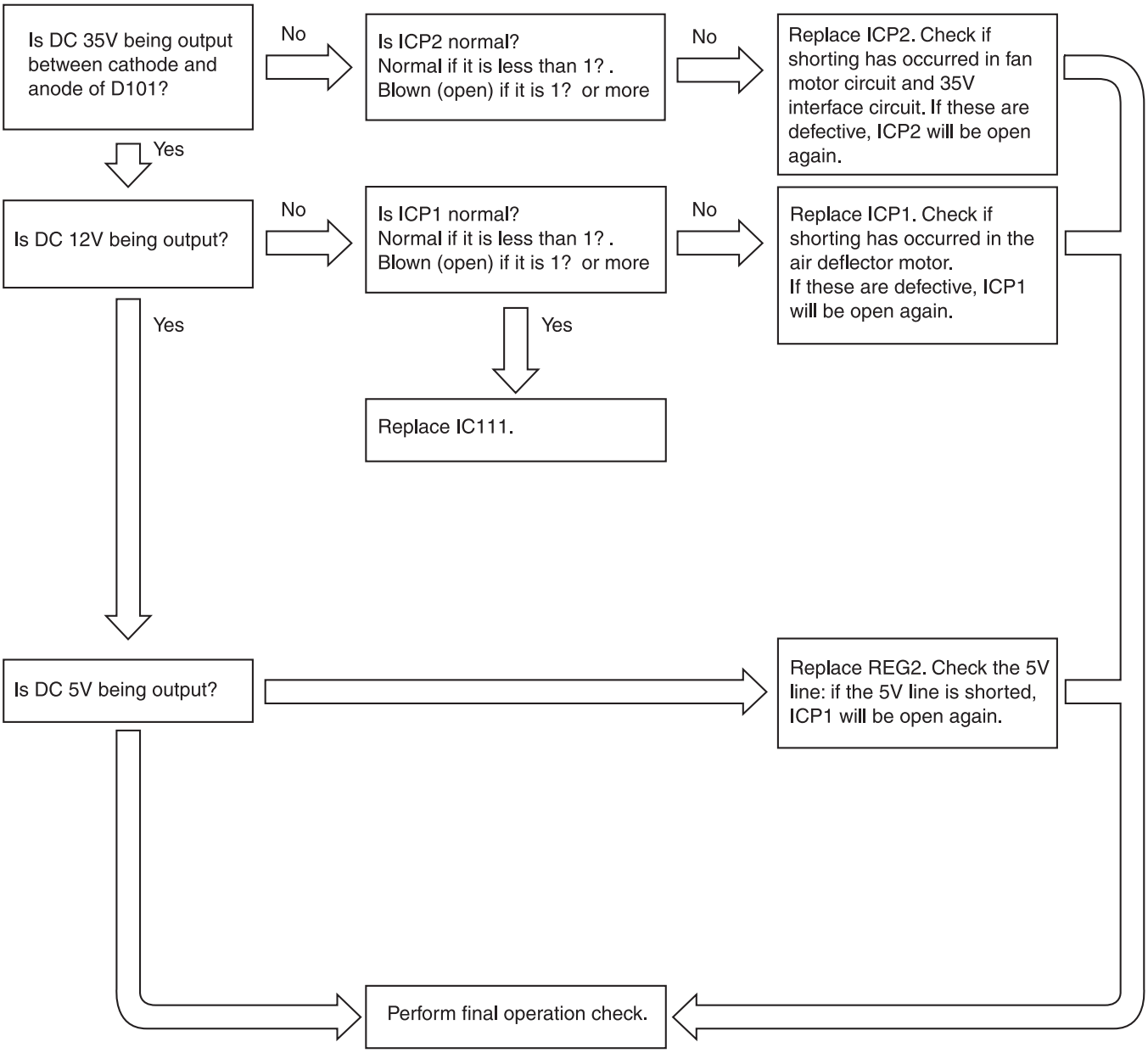
3. Air deflector does not move (others are normal)



4. All systems stop from several seconds to several minutes after operation is started (all indicators are also off)



5. Check the main P.W.B (power circuit)



TROUBLESHOOTING WHEN THE TIMER LAMP BLINKS

MODEL RAF-25NH5, RAF-35NH5, RAF-50NH5

Perform troubleshooting according to the number of times the timer lamp on the display of the indoor unit blinks.

Lamp blinking mode	Main defective
2 sec ---------- Once	Reversing valve defective
2 sec ---------- 2 Times	Forced operation of outdoor unit
2 sec ---------- 3 Times	Indoor/Outdoor interface defective
2 sec ---- 8 Times	Damper defective
2 sec ---- 9 Times	Indoor sensor defective
2 sec ---- 10 Times	Abnormal rotating numbers of DC fan motor
2 sec ---- 13 Times	IC401 defective

(---- Lights for 0.35 sec at interval of 0.35 sec.)

Lamp blinking mode	Main defective
2 sec ---------- 2 Times	Peak current cut
2 sec ---------- 3 Times	Abnormal low speed rotation
2 sec -------- 4 Times	Switching failure
2 sec ---- 5 Times	Overload lower limit cut
2 sec ---- 6 Times	OH thermistor temp. rise
2 sec ---- 7 Times	Outdoor thermistor abnormal
2 sec ---- 8 Times	Acceleration defective
2 sec ---- 9 Times	Comunications error
2 sec ---- 12 Times	Fan lock error
2 sec ---- 13 Times	Defective EEPROM of outdoor unit
2 sec ---- 14 Times	Defective active converter
2 sec ---- 15 Times	Discharge error

< Cautions >

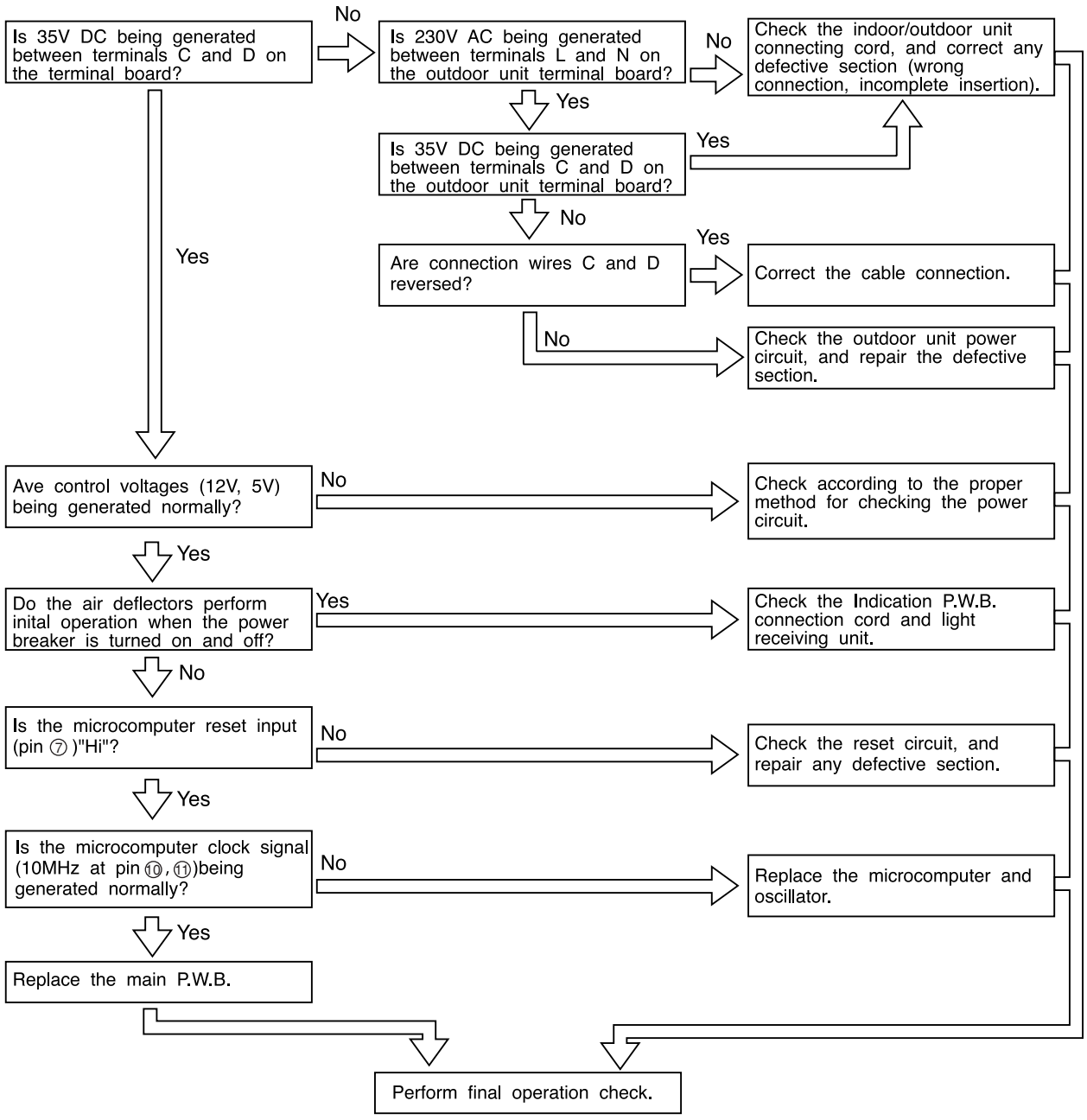
(1) If the interface circuit is faulty when power is supplied, self-diagnosis will not be displayed.

(2) If the indoor unit does not operate at all, check to see if the connecting cord is reversely connected or disconnected.

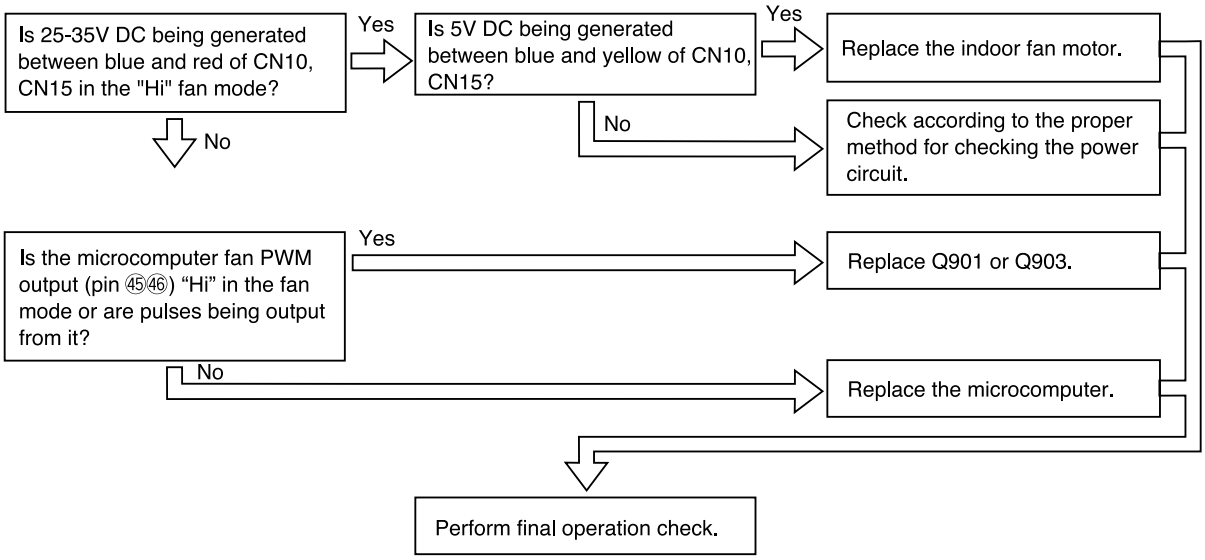
CHECKING THE INDOOR UNIT ELECTRICAL PARTS

[Model : RAF-25NH5, RAF-35NH5, RAF-50NH5]

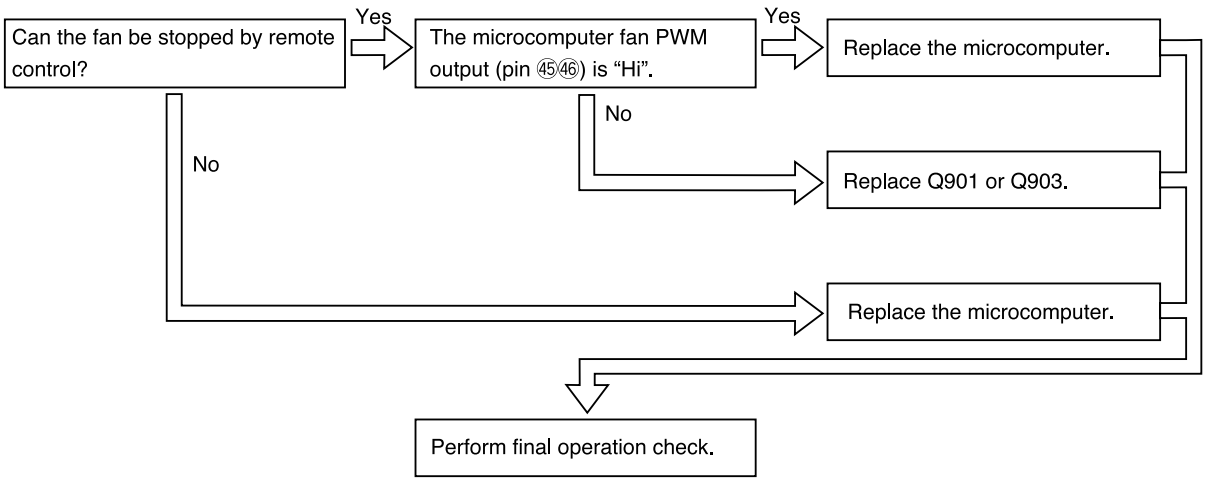
1. Power does not come on (no operation)



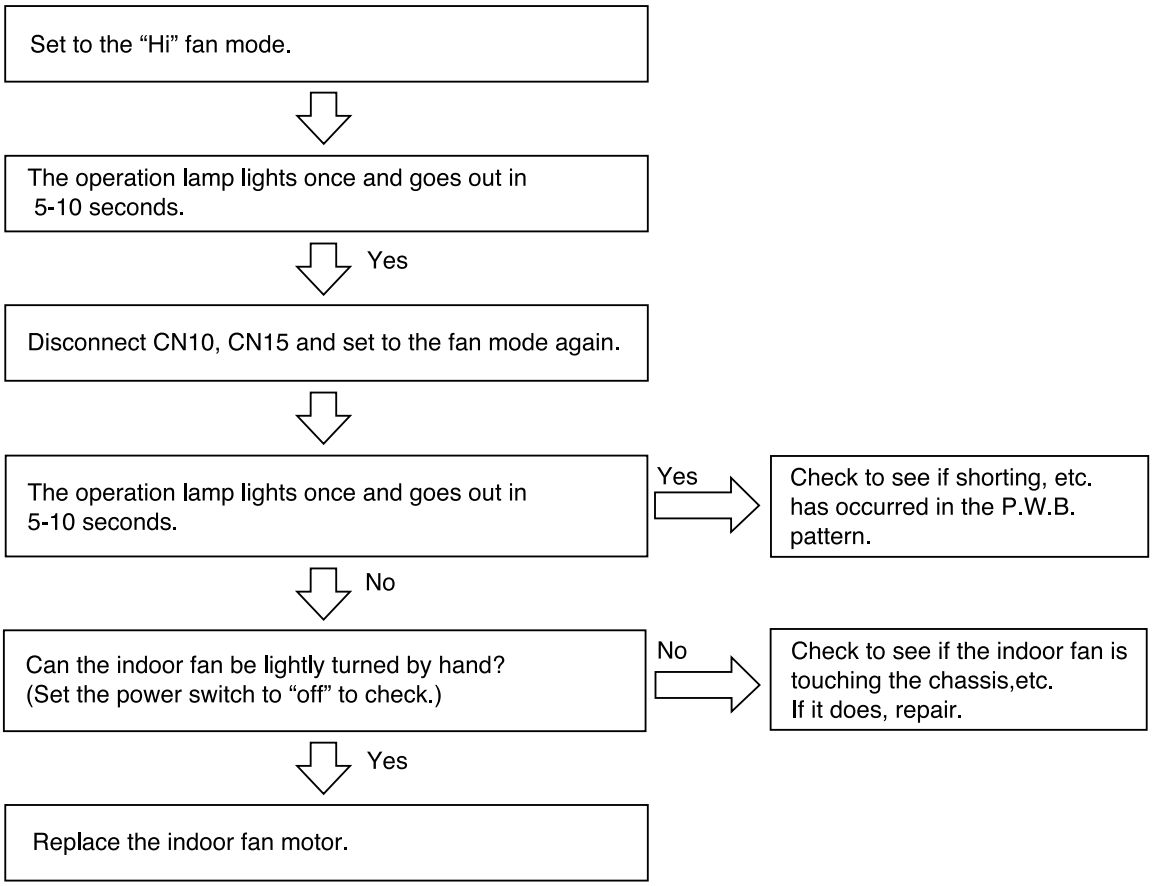
2. Only indoor fan does not operate (others are normal)



3. Indoor fan speed does not change (others are normal)



4. All systems stop from several seconds to several minutes after operation is started (all indicators are also off)



TROUBLESHOOTING WHEN THE TIMER LAMP BLINKS

MODEL RAD-25NH5, RAD-35NH5, RAI-25NH5, RAI-35NH5, RAI-50NH5

Perform troubleshooting according to the number of times the timer lamp on the display of the indoor unit blinks.

Lamp blinking mode	Main defective
2 sec ---------- Once	Reversing valve defective
2 sec ---------- 2 Times	Forced operation of outdoor unit
2 sec ---------- 3 Times	Indoor / outdoor interface defective
2 sec ---------- 4 Times	Outdoor electric assembly defective
2 sec ---------- 6 Times	Abnormal water level detection
2 sec ---------- 7 Times	During drain pump test drive
2 sec ---------- 9 Times	Indoor thermistor abnormal
2 sec ---------- 10 Times	Over current in DC fan moter
2 sec ---------- 13 Times	IC401 defective

Lamp blinking mode	Main defective
2 sec ---------- Once	Reversing valve defective
2 sec ---------- 2 Times	Forced operation of outdoor unit
2 sec ---------- 3 Times	Indoor / outdoor interface defective
2 sec ---------- 6 Times	Abnormal water level detection
2 sec ---------- 7 Times	During drain pump test drive
2 sec ---------- 9 Times	Indoor thermistor abnormal
2 sec ---------- 10 Times	Over current in DC fan moter
2 sec ---------- 13 Times	IC401 defective

(- - - Lights for 0.35 sec at interval of 0.35 sec.)

< Cautions >

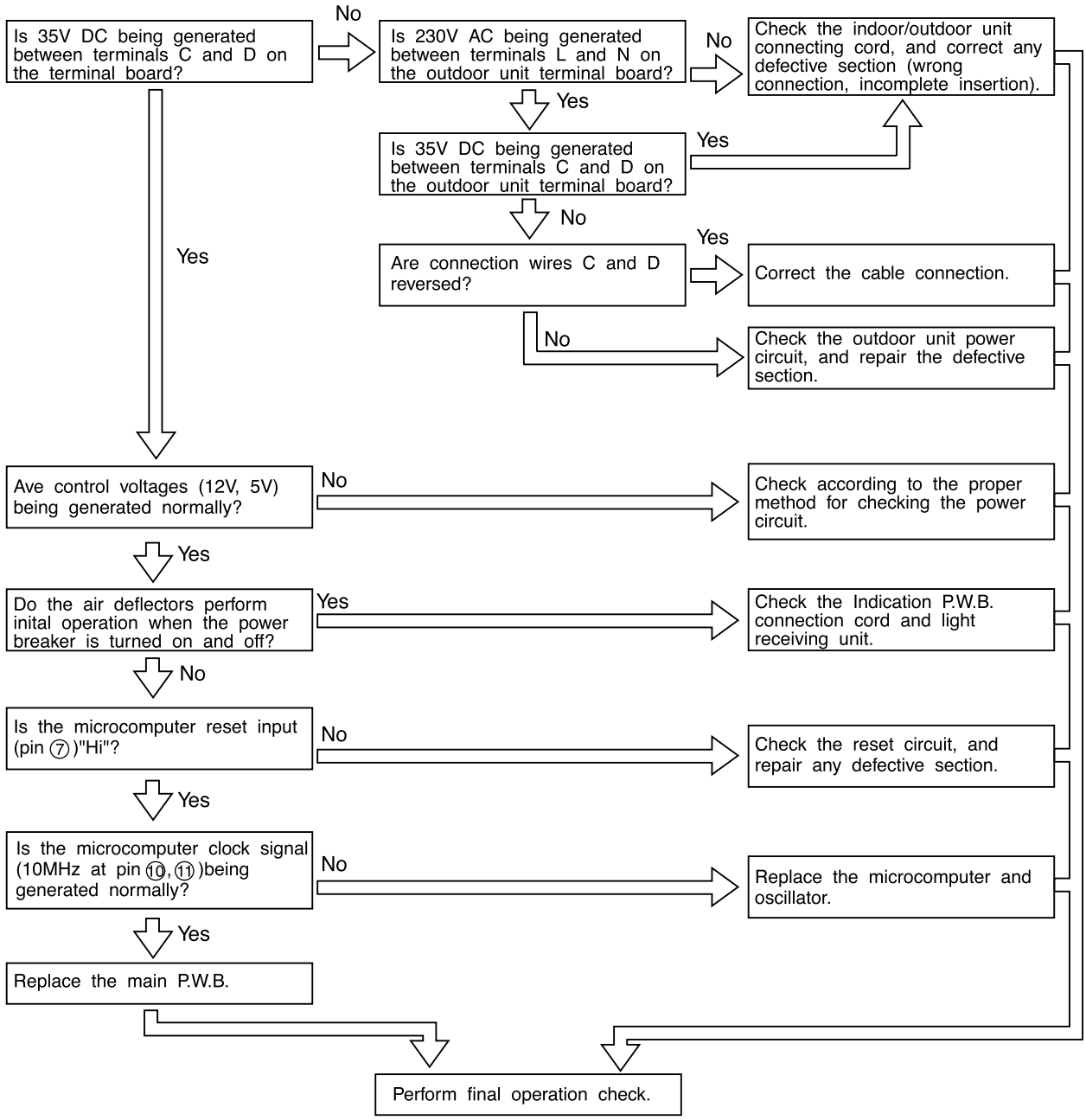
(1) If the interface circuit is faulty when power is supplied, self-diagnosis will not be displayed.

(2) If the indoor unit does not operate at all, check to see if the connecting cord is reversely connected or disconnected.

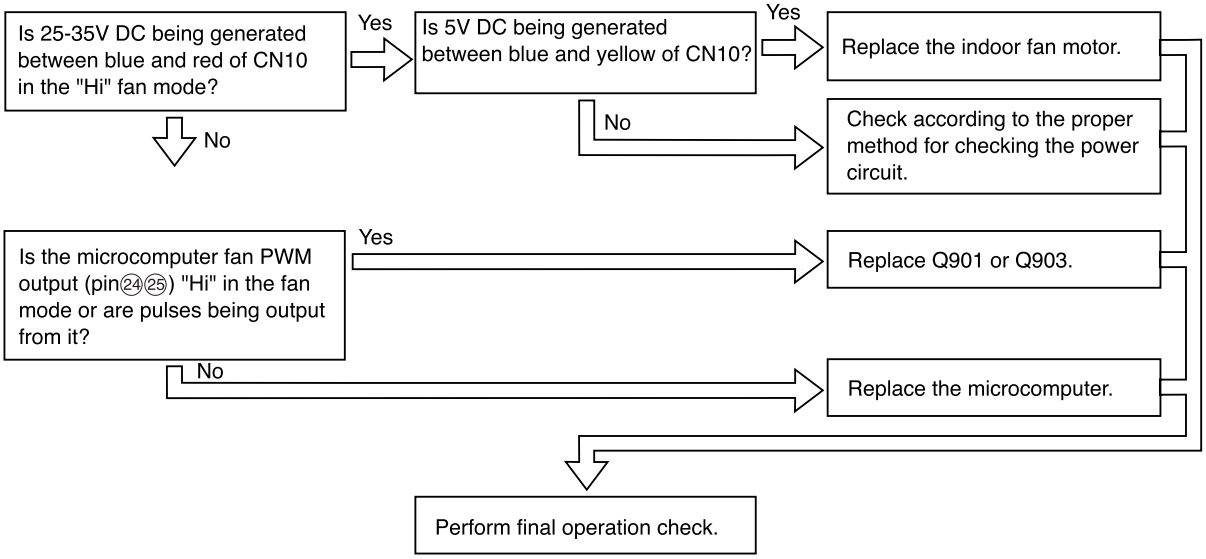
CHECKING THE INDOOR UNIT ELECTRICAL PARTS

MODEL RAD-25NH5, RAD-35NH5, RAI-25NH5, RAI-35NH5, RAI-50NH5

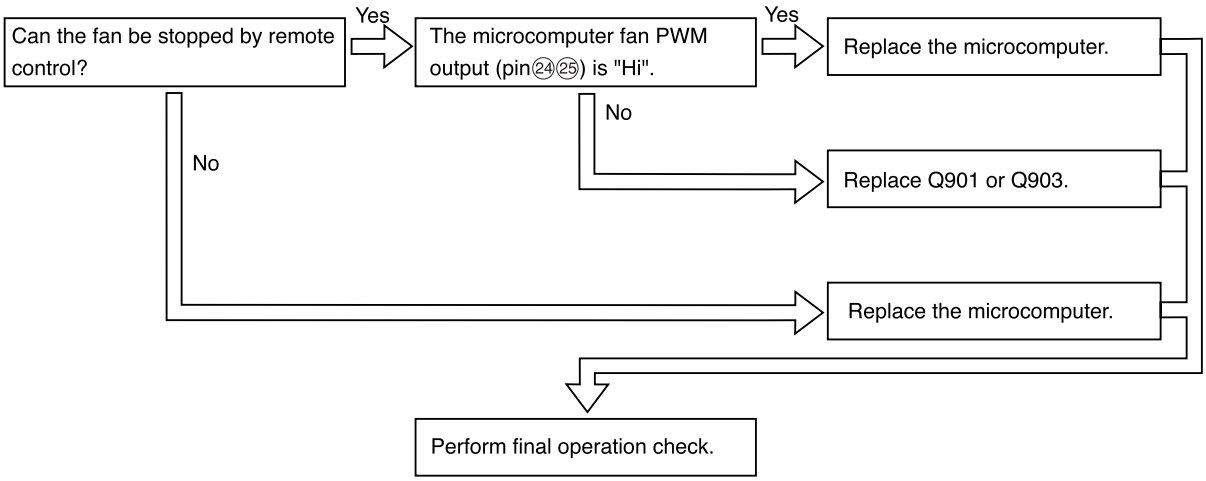
1. Power does not come on (no operation)



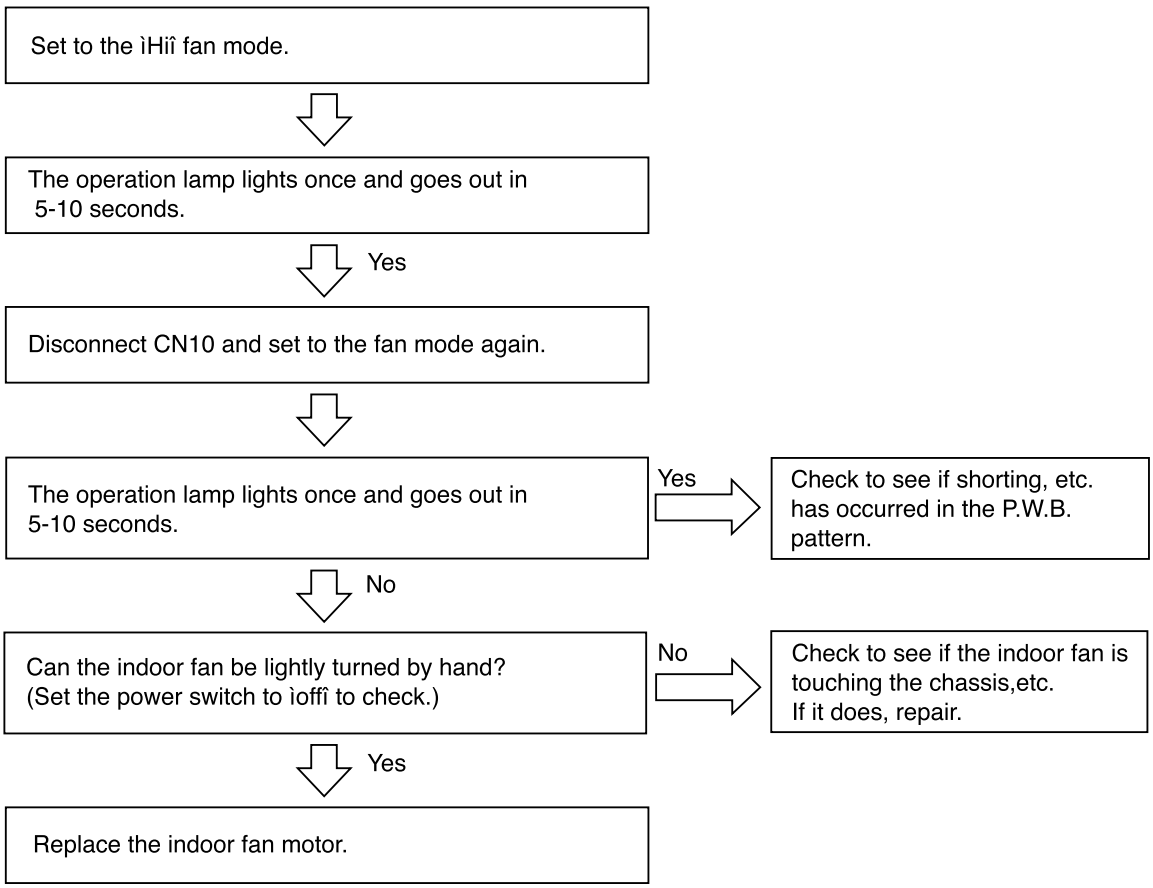
2. Only indoor fan does not operate (others are normal)



3. Indoor fan speed does not change (others are normal)



4. All systems stop from several seconds to several minutes after operation is started (all indicators are also off)



CHECKING THE REMOTE CONTROLLER

Is battery polarity correct?

No

Install the battery in the correct polarity.

Yes

Is the battery check sign + − flashing?

Yes

Replace the battery.

No

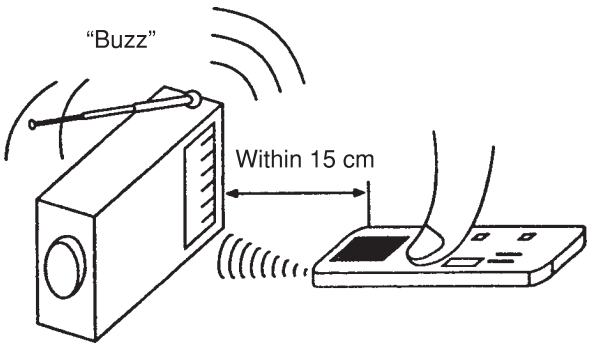
Turn on an AM radio, bring the remote control switch within 15 cm of the radio, and press the ON/OFF button.

Does the radio buzz noisily?

No

Check the LED (D1) with a multimeter.

Yes

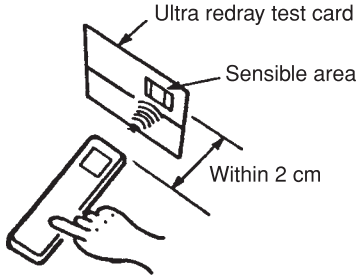


[AM radio]

Check the indoor unit signal receiving P. W. B..
If it is good, check the main P. W. B..

You can check the remote control switch by other methods as explained below.

Using the test card



The sensible area should flash in orange when you operate the remote control unit if it is good.

Check functions again.
If it does not work, replace the remote controller.

Procedure for Disassembly and Reassembly

INDOOR UNIT RAK-18NH5, RAK-25NH5, RAK-35NH5, RAK-50NH5

1. Front Panel

(1) Pull up the washable panel by holding it at both lower sides with both hands.

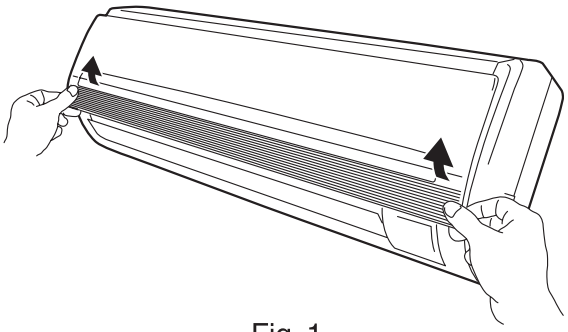


Fig. 1

(2) When the panel opens full, push the inner part of the right arm into the inside and pull the panel forward while closing it gradually.

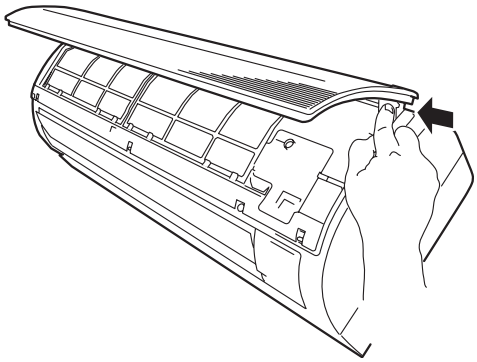


Fig. 2

2. Front cover

(1) After removing two screws, pull the center of the front cover forward and release the claws.

(2) Hold the front cover at both lower sides and pull them forward to remove.

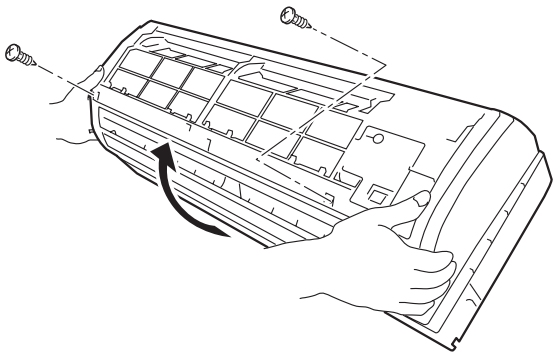


Fig. 3

3. Main P.W.B. and Reception/Indication P.W.B

(1) Remove each connector from the lead wire.

(2) Remove the four P.W.B supports from the main P.W.B..

(3) Pull the support hook at the upper side of the indication lamp of the reception/indication P.W.B and pull out the P.W.B forward.

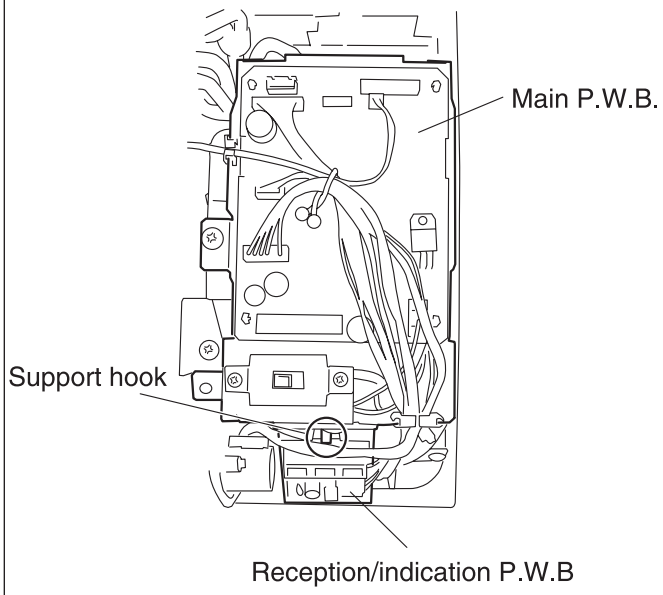


Fig. 4

4. Tangential air flow fan and fan motor

(1) Remove two screws locking the drain pan.

(2) Press to lower the hook at the center of the unit a little and pull the claw forward to remove the drain pan.

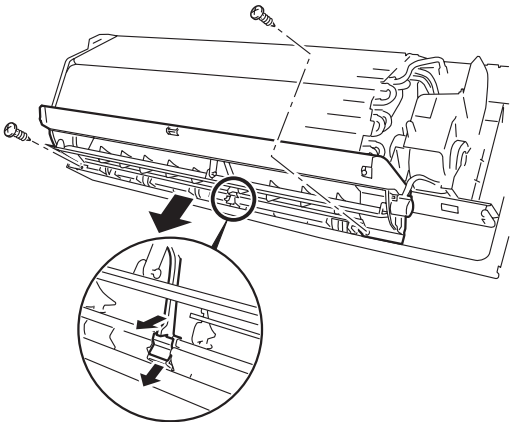


Fig. 5

(3) Remove the screws from the upper and lower bearing covers.

(4) Remove the locking hook of the lower bearing cover from the Cabinet.

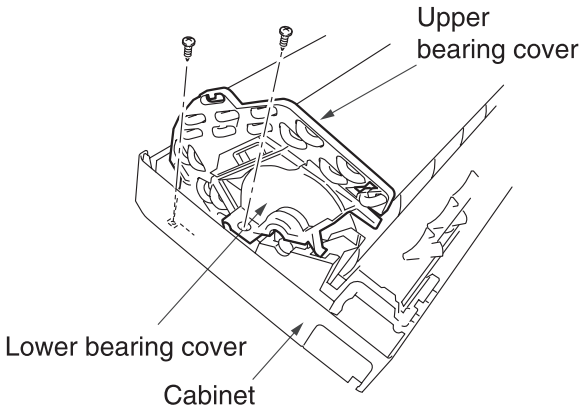


Fig. 6

(5) Remove two lock screws from the fan motor holder.

(6) Pull up the evaporator by holding it at the lower side. Insert a screwdriver through the space between the evaporator and drain chute and loosen the fan lock screw to remove the fan and fan motor.

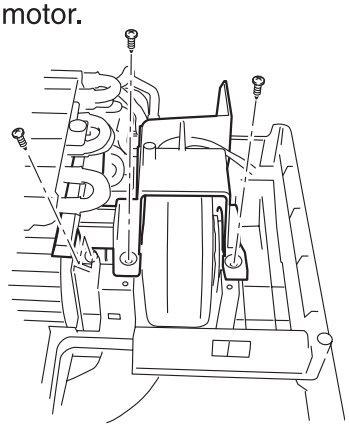


Fig. 7

DISASSEMBLY AND REASSEMBLY

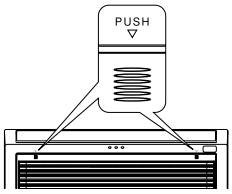
MODEL RAF-25NH5, RAF-50NH5

1. AIR FILTER

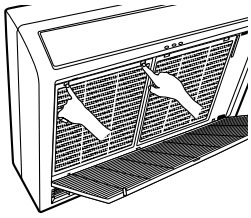
Clean the air filter, as it removes dust inside the room.
Be sure to clean the filter once every two weeks so as not to consume electricity unnecessarily.

PROCEDURE

1 **Open the front panel.**
- To open the front panel, use the remote controller to stop unit operation. Then press the two "▒" sections below PUSH at the top left and right corners of the front panel.
- Grasp the left and right sides of the front panel and open it toward you.



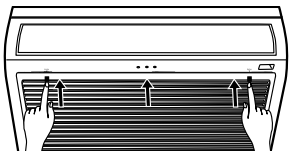
2 **Remove the filters.**



3 **Remove dust of the filters using a vacuum cleaner.**
- After using neutral detergent, wash with clean water and dry in shade.

4 **Attach the filters.**
- Attaching the filters which are placed the surface written "FRONT" up.

5 **Close the front panel.**
- To close the front panel, press the two "▒" sections below PUSH at the top left and right corners of the front panel.
- Press the upper center part of the front panel to close properly.

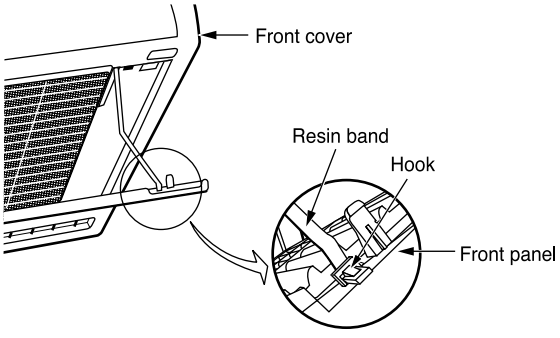


2. FRONT PANEL

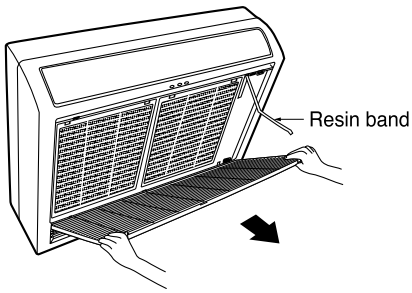
- Be sure to use both hands to grasp the front panel when removing it or attaching it.
- The front panel may be installed up or down to suit user preference.

Removing

① Press the hook found at the tip of the resin band installed inside the front panel's right section to remove the resin band.



② Pull the front panel down toward you and once fully open, pull it to remove.



Attaching

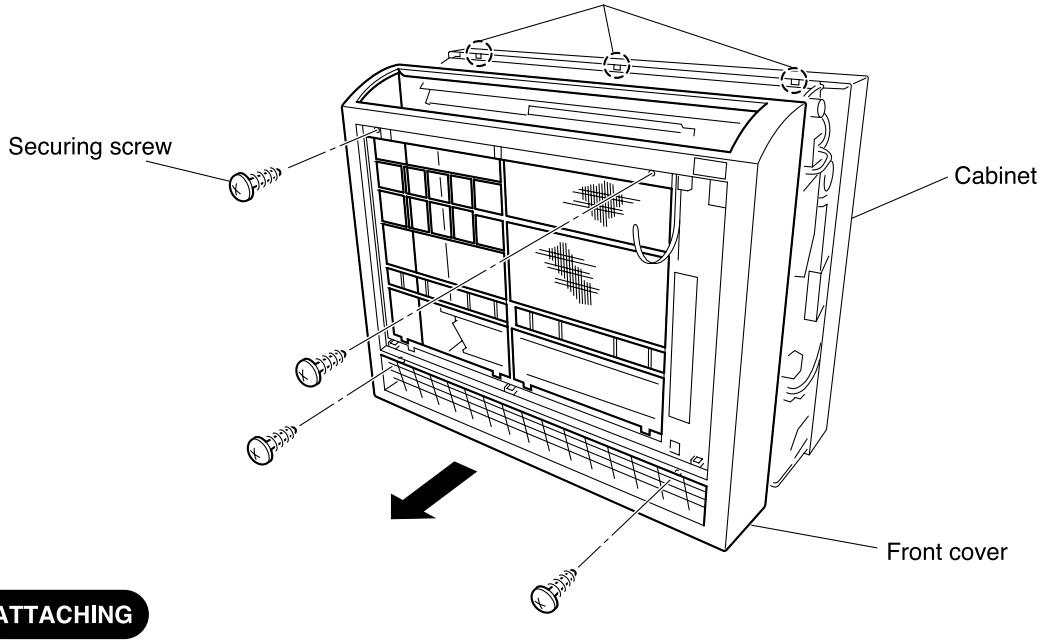
① Attach three front panel bearings to the axis of the front cover.

② Insert the tip of the resin band into the hole of the protrusion inside the right section of the front panel.

3. FRONT COVER

Remove the four securing screws of the front cover, and then pull the front cover towards you.

When attaching the front cover, insert the front cover tabs into these openings.

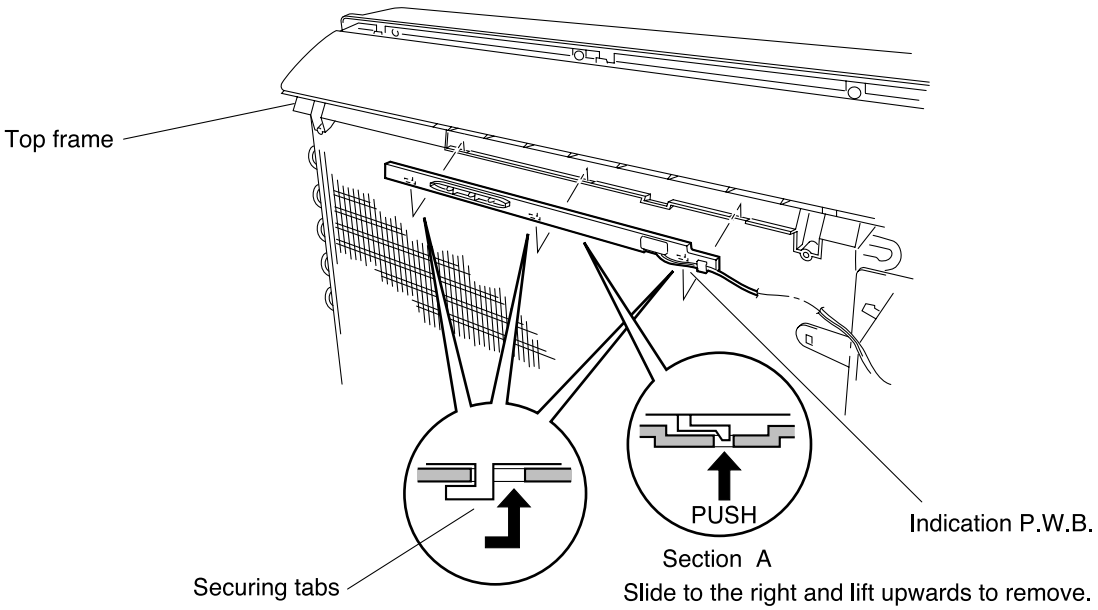


ATTACHING

When attaching the front cover, fit the three tabs on the top of the front cover so that they enter the openings on the top frame (insert from a slightly raised position). Be sure that the tabs are inserted correctly.

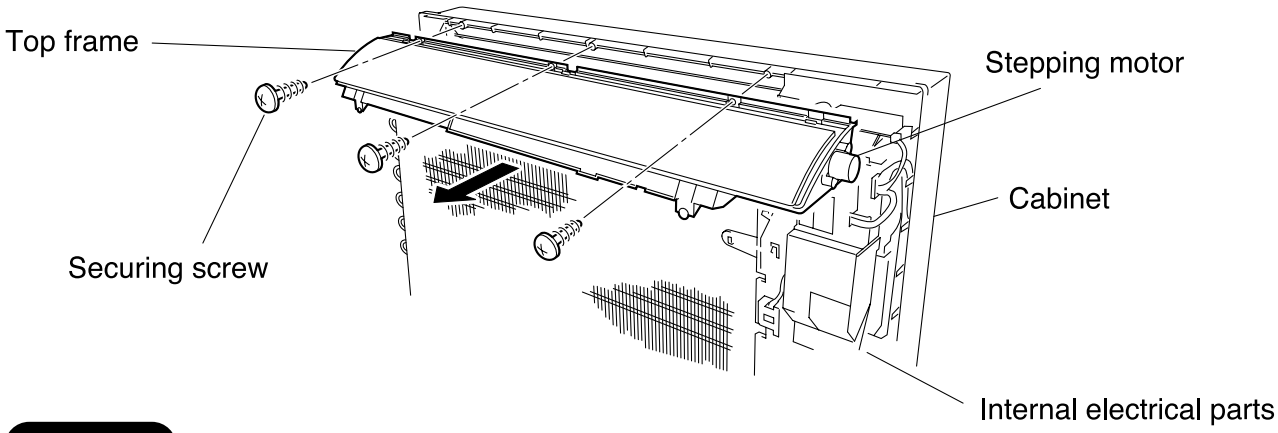
4. INDICATION P.W.B.

(1) Use a screwdriver or other such tool to push up the tabs of the section A from below, and remove.
(2) As shown in the following diagram, slide the L-shaped tab on the indication P.W.B. to the right so that it enters the hole in the top frame. You can then remove the indication P.W.B. by pulling upwards.



5. TOP FRAME

(1) Remove the front panel, and then remove the front cover.
(2) Remove the indication P.W.B..
(3) Remove the cord from the stepping motor of the air deflecfor.
(4) Remove the three securing screws of the top frame, and pull the frame towards you.

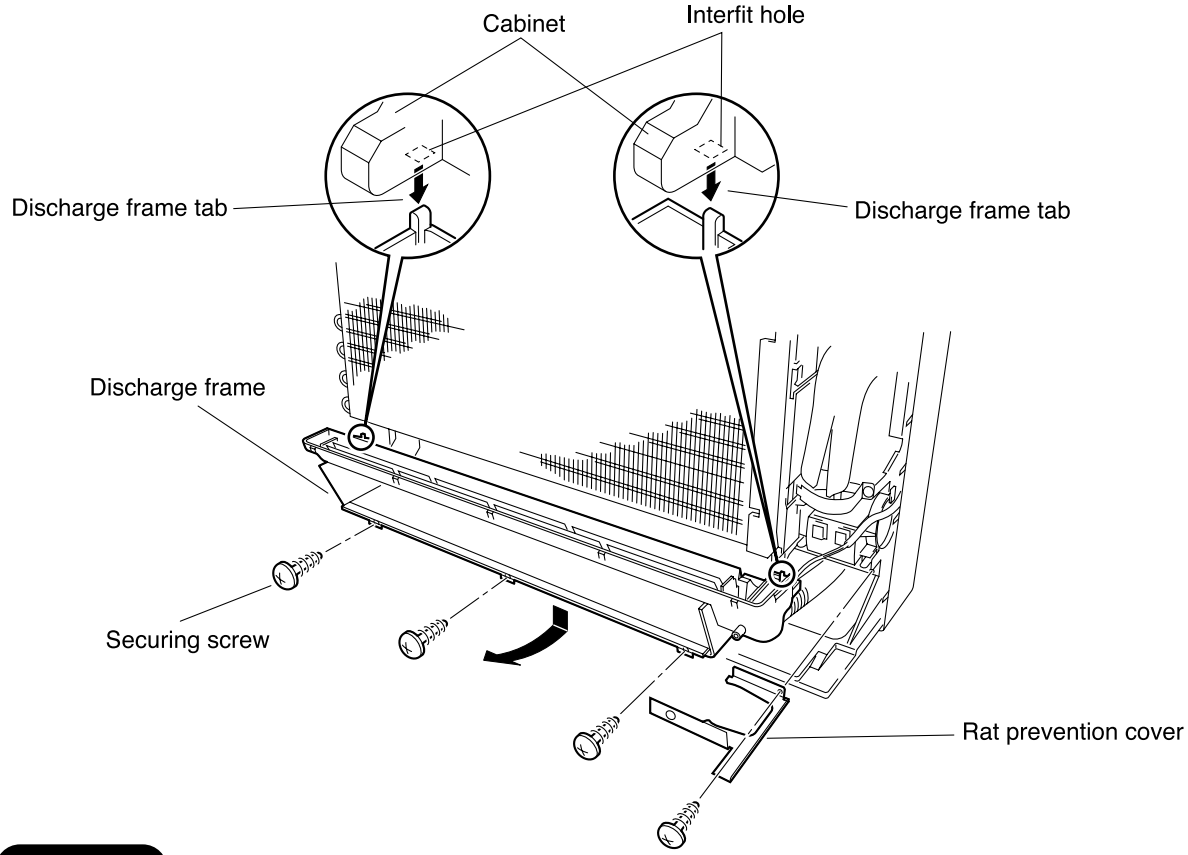


ATTACHING

(1) When attaching the top frame, align the left and right of the top frame with the inside of the guides on the cabinet, and then push the top frame straight to the back.
Note: Check to see that there is no space between the top frame and the cabinet.
(2) Fasten the three securing screws, and then check to see that the top frame does not slip to the side.

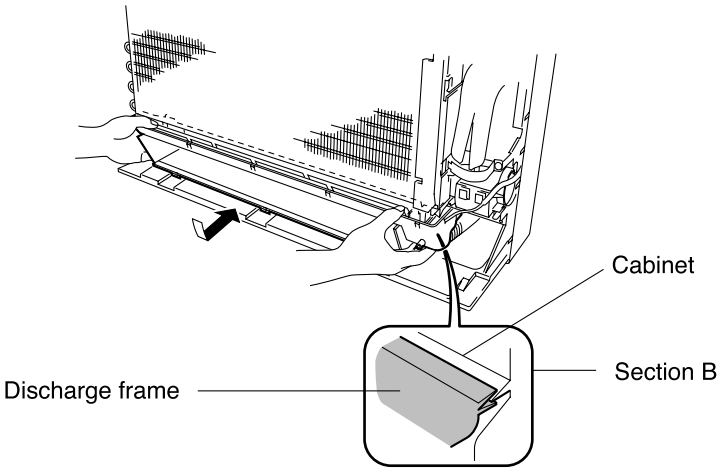
6. DISCHARGE FRAME

(1) Remove the three securing screws of the discharge frame.
(2) Remove the screw on the rat prevention cover.
(3) Lower the rear side of the discharge frame, remove the tab on the interfit section, and then pull out the discharge frame towards you.



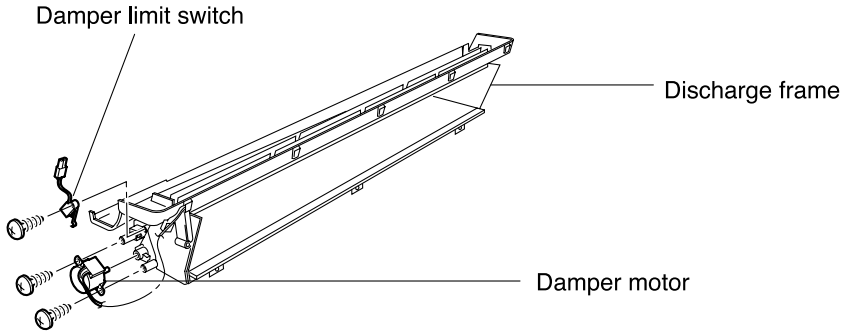
ATTACHING

(1) Align the tabs to the left and the right of the discharge frame with the holes in the cabinet, lift up the discharge frame while pushing it to the rear, and keep pushing until it clicks into place.
Note: After installing, check to see that the cabinet and the discharge frame are correctly fitted together, as shown in section B.



7. DAMPER MOTOR-DAMPER LIMIT SWITCH

(1) Remove the securing screw of the damper limit switch.
(2) Remove the two securing screws of the damper motor (stepping motor).
(3) Pull out the damper motor and the damper limit switch, and then remove them.

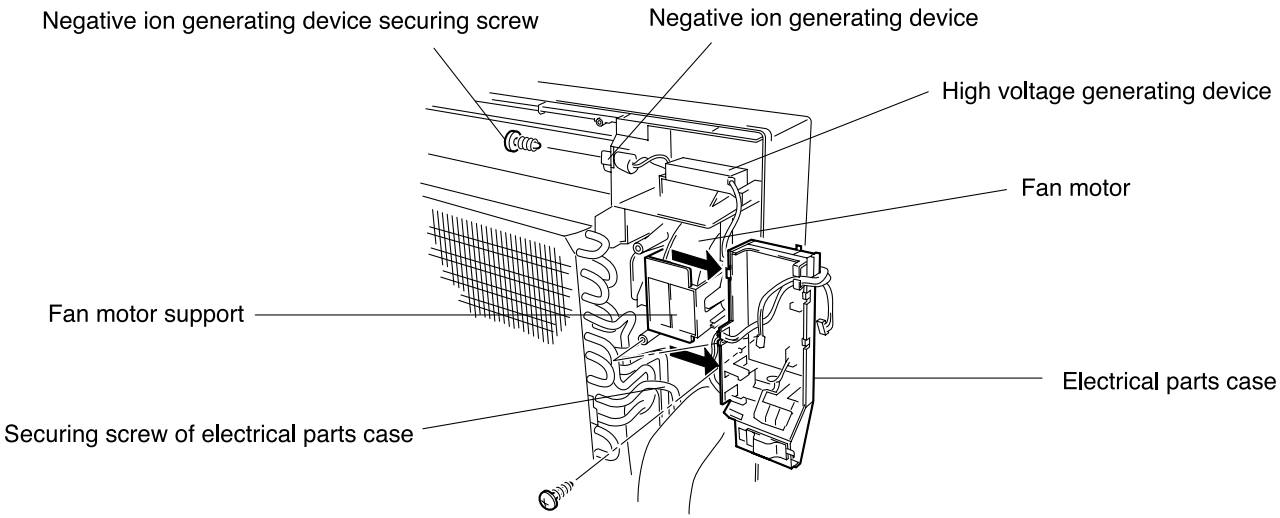


ATTACHING

Note: After removing the damper limit switch, check to see that the switch operates when the damper goes upwards.

8. NEGATIVE ION GENERATING DEVICE

(1) Remove the front panel, and then remove the front cover.
(2) Remove the display P.W.B..
(3) Remove the cord from the stepping motor of the air deflector.
(4) Remove the top frame.
(5) Use a flat-blade screwdriver to slightly lift the high voltage generating device, and then pull it towards you.
(6) Remove the securing screw, and remove the negative ion generating device.

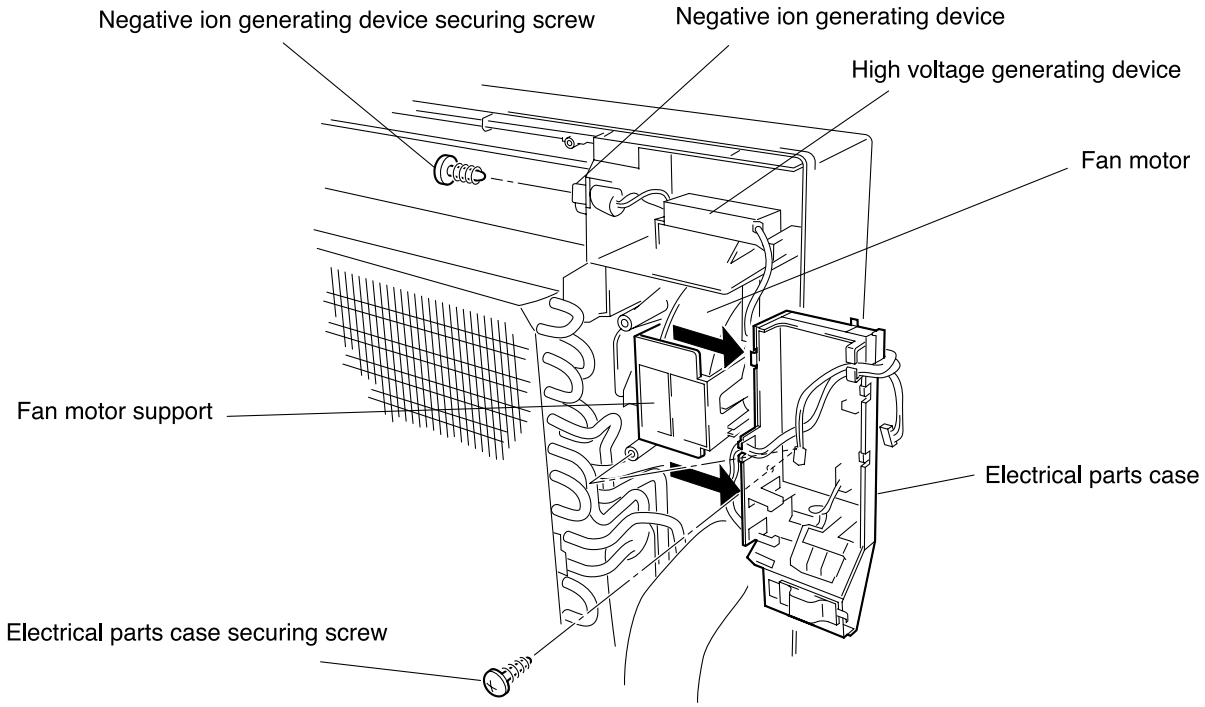


ATTACHING

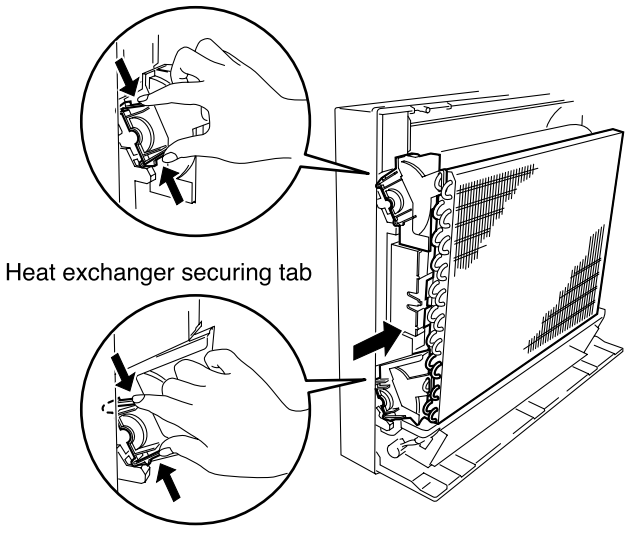
Note - Don't touch the ion generating tip when replacing the electrode.
- The ion generating tip must be replaced if it is bent.
- Clean the electrode with a toothbrush if dust gathers on the electrode. Even if this happens, be sure not to touch the ion generating tip.

9. FAN MOTOR – TANGENTIAL AIR FLOW FAN

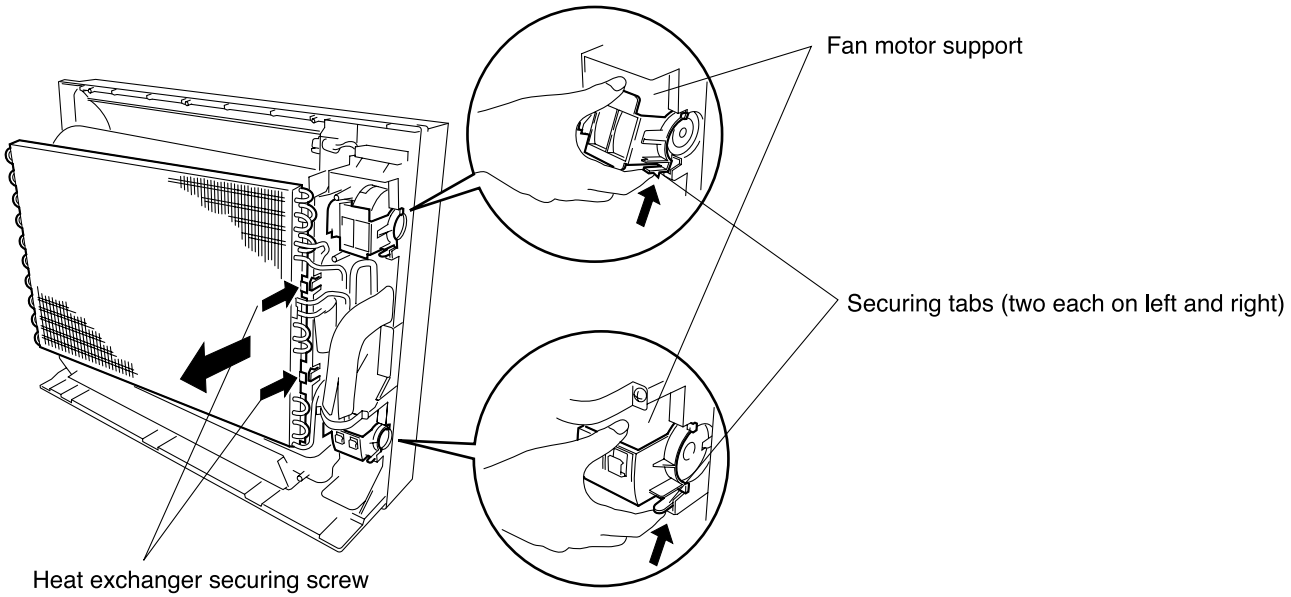
(1) Remove the front panel, and then remove the front cover.
(2) Remove the display P.W.B..
(3) Remove the cord from the stepping motor of the air deflector.
(4) Remove the top frame.
(5) Remove the electrical parts cover, the fan motor cord, the negative ion generating device cord, and the heat exchanger thermostat cord.
(6) Remove the pipe cover from the heat exchanger.
(7) Remove the securing screw of the electrical parts case, then slide the electrical parts case to the right while removing it from the fan motor support.



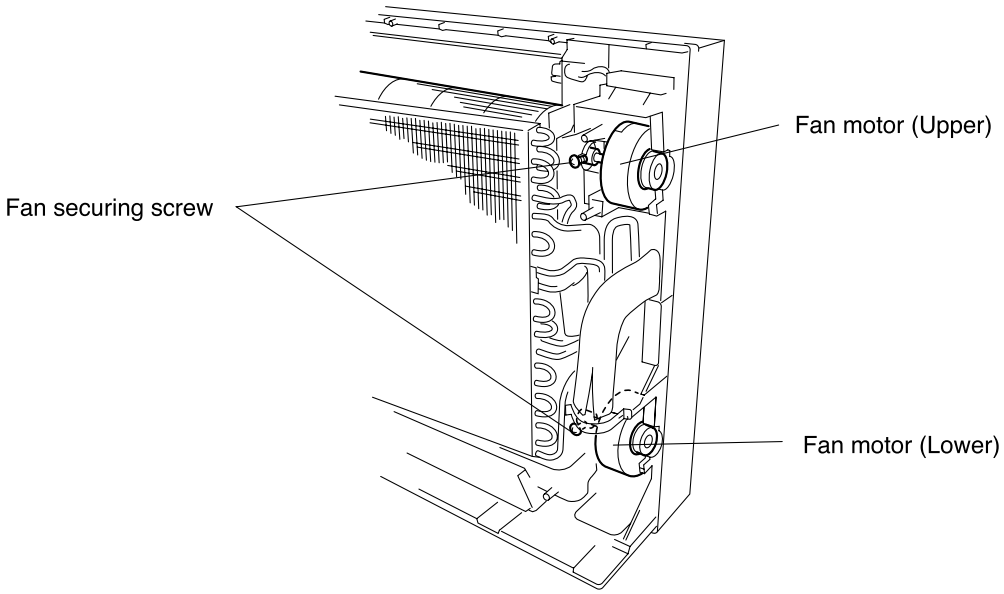
(8) Use a flat-blade screwdriver or other such tool to lift up the central securing tab and the left side of the heat exchanger.
(9) Remove the upper and lower fan covers.
- As shown in the diagram below, bend the lever (tab) securing the fan cover inwards while pulling out the heat exchanger towards you.
- Bend the lever (tab) of the lower fan cover inwards while pulling out the lower fan cover slightly upwards and towards you.



(10) Use a minus screwdriver or other such tool to raise the two tabs (see arrows in diagram below) securing the right side of the heat exchanger, then pull out the heat exchanger towards you.
(11) Pull the lower section of the fan motor support towards you while raising the two levers (tabs) on the left and right of the upper and lower sides of the fan motor support securing the fan motor, and then remove the fan motor support.



(12) Loosen the screws securing the tangential air flow fan and the fan motor, and then remove the tangential air flow fan and the fan motor.



ATTACHING

(1) When attaching the tangential air flow fan and the fan motor, insert the axis of the fan motor into the boss of the tangential air flow fan. Insert the fan support into the boss on the right side of the tangential air flow fan, and then insert into the fan support securing groove on the cabinet.
(2) Fasten the securing screws of the fan.
Note: Rotate the fan by hand, and check to see that it does not strike the inside section.

■ RAD-25NH5, RAD-35NH5

1. ELECTRICAL ITEM
   (1) Unscrew and remove from the top, those fixing screws from the electrical item.
   (2) Unscrew and remove those fixing screws from the cover of the electrical item.
   (3) Remove all connectors attached to each and every lead wire.
   (4) Remove the Printed Circuit Board [PCB] from its PCB support.

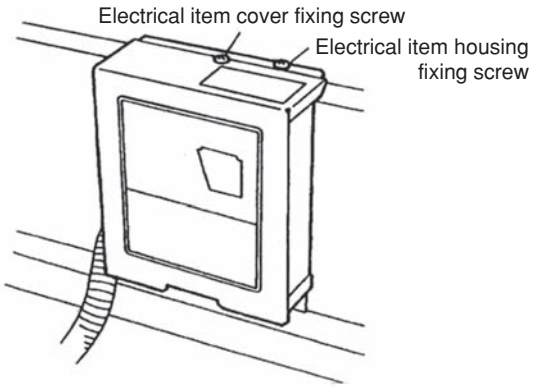


Fig. 1

2. FAN MOTOR, FAN
   (1) Remove the air intake inlet screen.
   (2) Unscrew and remove all screws located at both left-hand side [LHS] and right side [RHS] on the top portion of the casing.

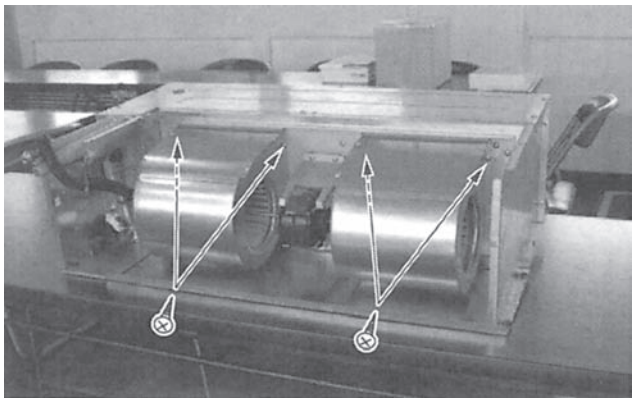


Fig. 2

   (3) Release the fan motor's guard pawls and remove the fan motor by rotating it towards your direction.
   (4) Pull the upper portion of the casing a bit towards your direction and while holding it upwards, remove it from the suspended housing.

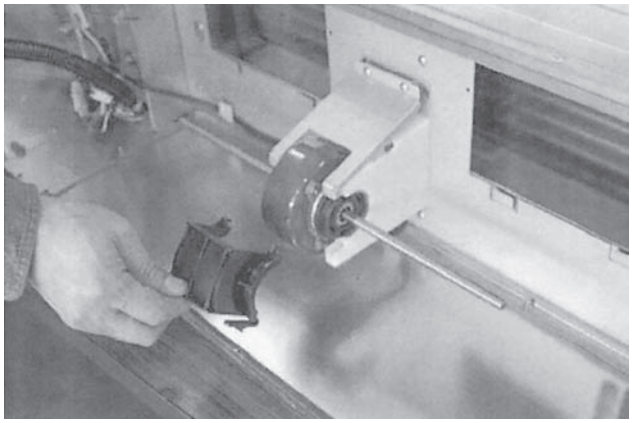


Fig. 3

   (5) Unscrew and remove the 4 fixing screws from the casing's top cover, after which remove the top cover.
   (6) Loosen the fixing screws of the fan, after which detach and remove the casing and fan sideways. (Use a hexagonal head spanner: 5 mm)

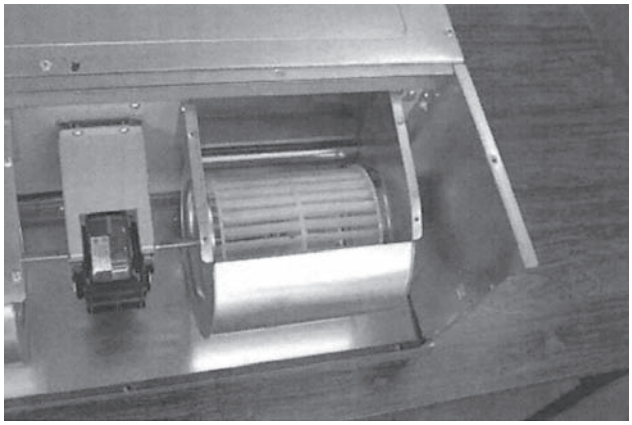


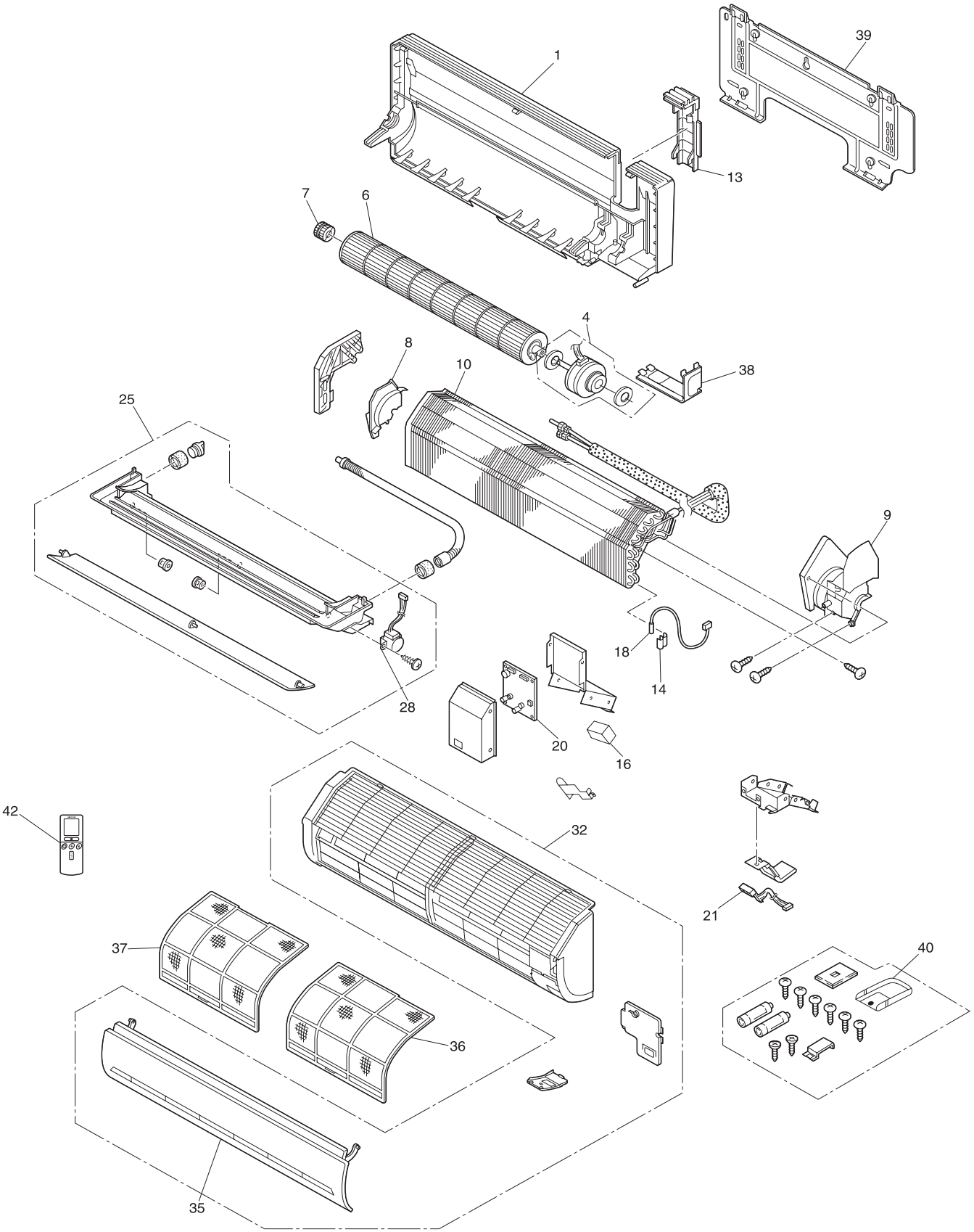
Fig. 4

POINTS TO NOTE DURING ASSEMBLY:
- When installing the fan motor guard, confirm that the upper portion has been totally inserted, then only clamp it with the pawls at the lower portion.
- Make sure that the fan position is adjusted and fixed by keeping a gap between the casing and the fan with an equal distance on both the left hand side and the right hand side (4 ~ 6 mm).

PARTS LIST AND DIAGRAM

INDOOR UNIT

MODEL: RAK-18NH5, RAK-25NH5, RAK-35NH5, RAK-50NH5



MODEL RAK-18NH5

NO.	PART N0.	Q'TY / UNIT	PARTS NAME
1	PMRAS-25YH4 901	1	CABINET
4	PMRAS-25YH4 904	1	FAN MOTOR
6	PMRAS-260GA 001	1	TANGENTIAL AIR FLOW FAN
7	PMRAS-25YH4 908	1	FAN SUPPORT ASSEMBLY
8	PMRAS-25YH4 909	1	FAN COVER
9	PMRAS-25YH4 910	1	FAN MOTOR SUPPORT
10	PMRAS-07GH4 002	1	CYCLE ASSY
13	PMRAS-25YH4 914	1	UPPER COVER
14	PMRAS-25YH4 915	1	SPRING
16	PMRAS-25YH4 917	1	TERMINAL BOARD (2P)
18	PMRAS-260GHA 001	1	THERMISTOR ASSEMBLY
20	PMRAK-18NH5 001	1	P.W.B (MAIN)
21	PMRAS-25YH4 922	1	P.W.B (RECEIVER)
25	PMRAS-25YH4 926	1	DRAIN PAN
28	PMRAS-25YH4 929	1	AUTO SWEEP MOTOR
32	PMRAS-25YH4 933	1	FRONT COVER ASSEMBLY
35	PMRAS-25YH4 936	1	FRONT PANEL
36	PMRAS-25YH4 937	1	AIR FILTER (R)
37	PMRAS-25YH4 938	1	AIR FILTER (L)
38	PMRAS-25YH4 939	1	LOWER COVER
39	PMRAS-25YH4 940	1	MOUNTING PLATE
40	PMRAS-10C3M 003	1	REMOTE CONTROL SUPPORT
42	PMRAS-51CHA1 011	1	REMOTE CONTROL ASSEMBLY

MODEL RAK-25NH5

NO.	PART N0.	Q'TY / UNIT	PARTS NAME
1	PMRAS-25YH4 901	1	CABINET
4	PMRAS-25YH4 904	1	FAN MOTOR
6	PMRAS-260GA 001	1	TANGENTIAL AIR FLOW FAN
7	PMRAS-25YH4 908	1	FAN SUPPORT ASSEMBLY
8	PMRAS-25YH4 909	1	FAN COVER
9	PMRAS-25YH4 910	1	FAN MOTOR SUPPORT
10	PMRAK-25NH5 002	1	CYCLE ASSY
13	PMRAS-25YH4 914	1	UPPER COVER
14	PMRAS-25YH4 915	1	SPRING
16	PMRAS-25YH4 917	1	TERMINAL BOARD (2P)
18	PMRAS-260GHA 001	1	THERMISTOR ASSEMBLY
20	PMRAK-25NH5 001	1	P.W.B (MAIN)
21	PMRAS-25YH4 922	1	P.W.B (RECEIVER)
25	PMRAS-25YH4 926	1	DRAIN PAN
28	PMRAS-25YH4 929	1	AUTO SWEEP MOTOR
32	PMRAS-25YH4 933	1	FRONT COVER ASSEMBLY
35	PMRAS-25YH4 936	1	FRONT PANEL
36	PMRAS-25YH4 937	1	AIR FILTER (R)
37	PMRAS-25YH4 938	1	AIR FILTER (L)
38	PMRAS-25YH4 939	1	LOWER COVER
39	PMRAS-25YH4 940	1	MOUNTING PLATE
40	PMRAS-10C3M 003	1	REMOTE CONTROL SUPPORT
42	PMRAS-51CHA1 011	1	REMOTE CONTROL ASSEMBLY

MODEL RAK-35NH5

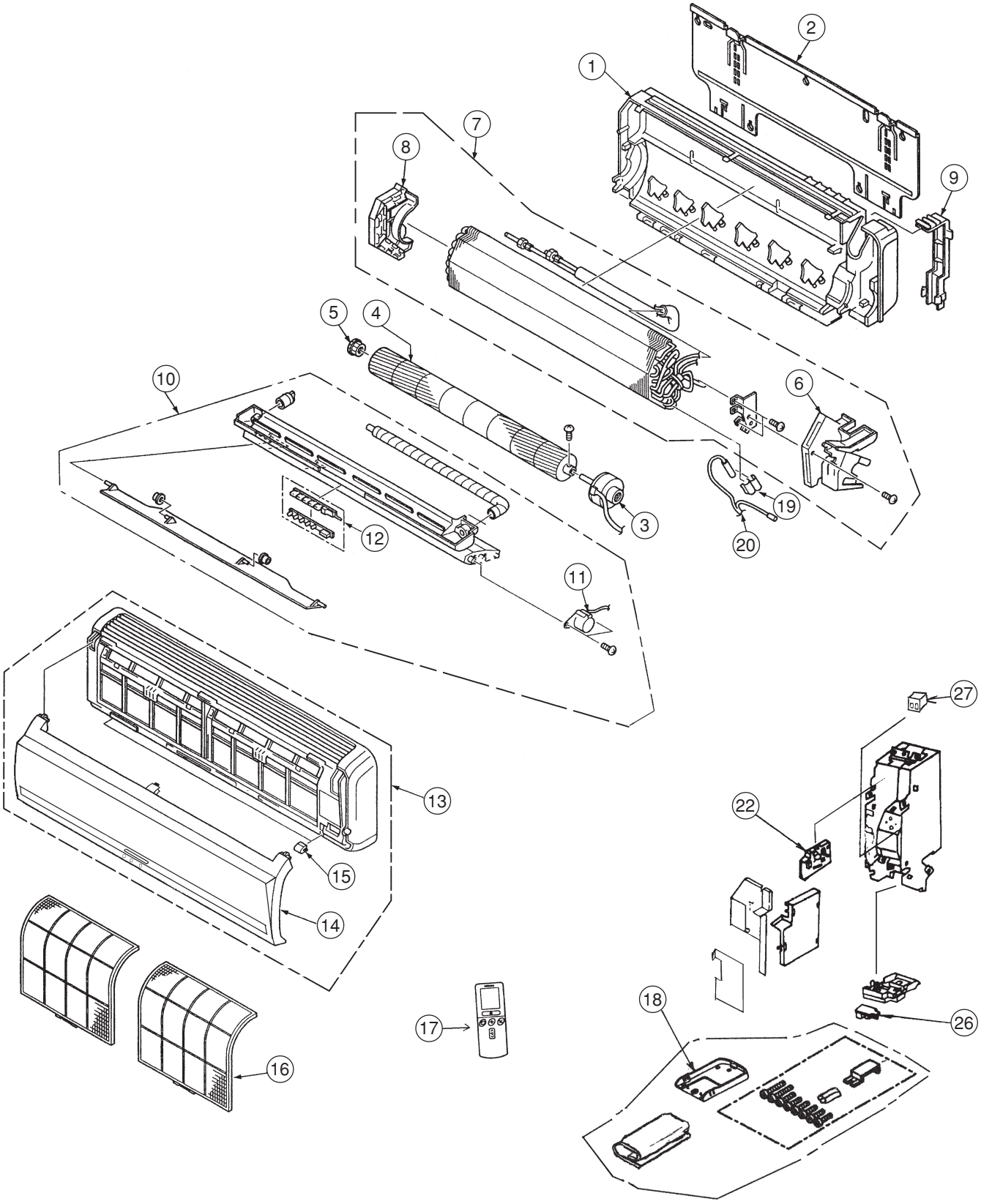
NO.	PART N0.	Q'TY / UNIT	PARTS NAME
1	PMRAS-25YH4 901	1	CABINET
4	PMRAS-25YH4 904	1	FAN MOTOR
6	PMRAS-260GA 001	1	TANGENTIAL AIR FLOW FAN
7	PMRAS-25YH4 908	1	FAN SUPPORT ASSEMBLY
8	PMRAS-25YH4 909	1	FAN COVER
9	PMRAS-25YH4 910	1	FAN MOTOR SUPPORT
10	PMRAK-25NH5 002	1	CYCLE ASSY
13	PMRAS-25YH4 914	1	UPPER COVER
14	PMRAS-25YH4 915	1	SPRING
16	PMRAS-25YH4 917	1	TERMINAL BOARD (2P)
18	PMRAS-260GHA 001	1	THERMISTOR ASSEMBLY
20	PMRAK-35NH5 001	1	P.W.B (MAIN)
21	PMRAS-25YH4 922	1	P.W.B (RECEIVER)
25	PMRAS-25YH4 926	1	DRAIN PAN
28	PMRAS-25YH4 929	1	AUTO SWEEP MOTOR
32	PMRAS-25YH4 933	1	FRONT COVER ASSEMBLY
35	PMRAS-25YH4 936	1	FRONT PANEL
36	PMRAS-25YH4 937	1	AIR FILTER (R)
37	PMRAS-25YH4 938	1	AIR FILTER (L)
38	PMRAS-25YH4 939	1	LOWER COVER
39	PMRAS-25YH4 940	1	MOUNTING PLATE
40	PMRAS-10C3M 003	1	REMOTE CONTROL SUPPORT
42	PMRAS-51CHA1 011	1	REMOTE CONTROL ASSEMBLY

MODEL RAK-50NH5

NO.	PART N0.	Q'TY / UNIT	PARTS NAME
1	PMRAS-25YH4 901	1	CABINET
4	PMRAS-25YH4 904	1	FAN MOTOR
6	PMRAS-260GA 001	1	TANGENTIAL AIR FLOW FAN
7	PMRAS-25YH4 908	1	FAN SUPPORT ASSEMBLY
8	PMRAS-25YH4 909	1	FAN COVER
9	PMRAS-25YH4 910	1	FAN MOTOR SUPPORT
10	PMRAK-25NH5 002	1	CYCLE ASSY
13	PMRAS-25YH4 914	1	UPPER COVER
14	PMRAS-25YH4 915	1	SPRING
16	PMRAS-25YH4 917	1	TERMINAL BOARD (2P)
18	PMRAS-260GHA 001	1	THERMISTOR ASSEMBLY
20	PMRAK-50NH5 001	1	P.W.B (MAIN)
21	PMRAS-25YH4 922	1	P.W.B (RECEIVER)
25	PMRAS-25YH4 926	1	DRAIN PAN
28	PMRAS-25YH4 929	1	AUTO SWEEP MOTOR
32	PMRAS-25YH4 933	1	FRONT COVER ASSEMBLY
35	PMRAS-25YH4 936	1	FRONT PANEL
36	PMRAS-25YH4 937	1	AIR FILTER (R)
37	PMRAS-25YH4 938	1	AIR FILTER (L)
38	PMRAS-25YH4 939	1	LOWER COVER
39	PMRAS-25YH4 940	1	MOUNTING PLATE
40	PMRAS-10C3M 003	1	REMOTE CONTROL SUPPORT
42	PMRAS-51CHA1 011	1	REMOTE CONTROL ASSEMBLY

PARTS LIST AND DIAGRAM

INDOOR UNIT
MODEL : RAK-65NH5

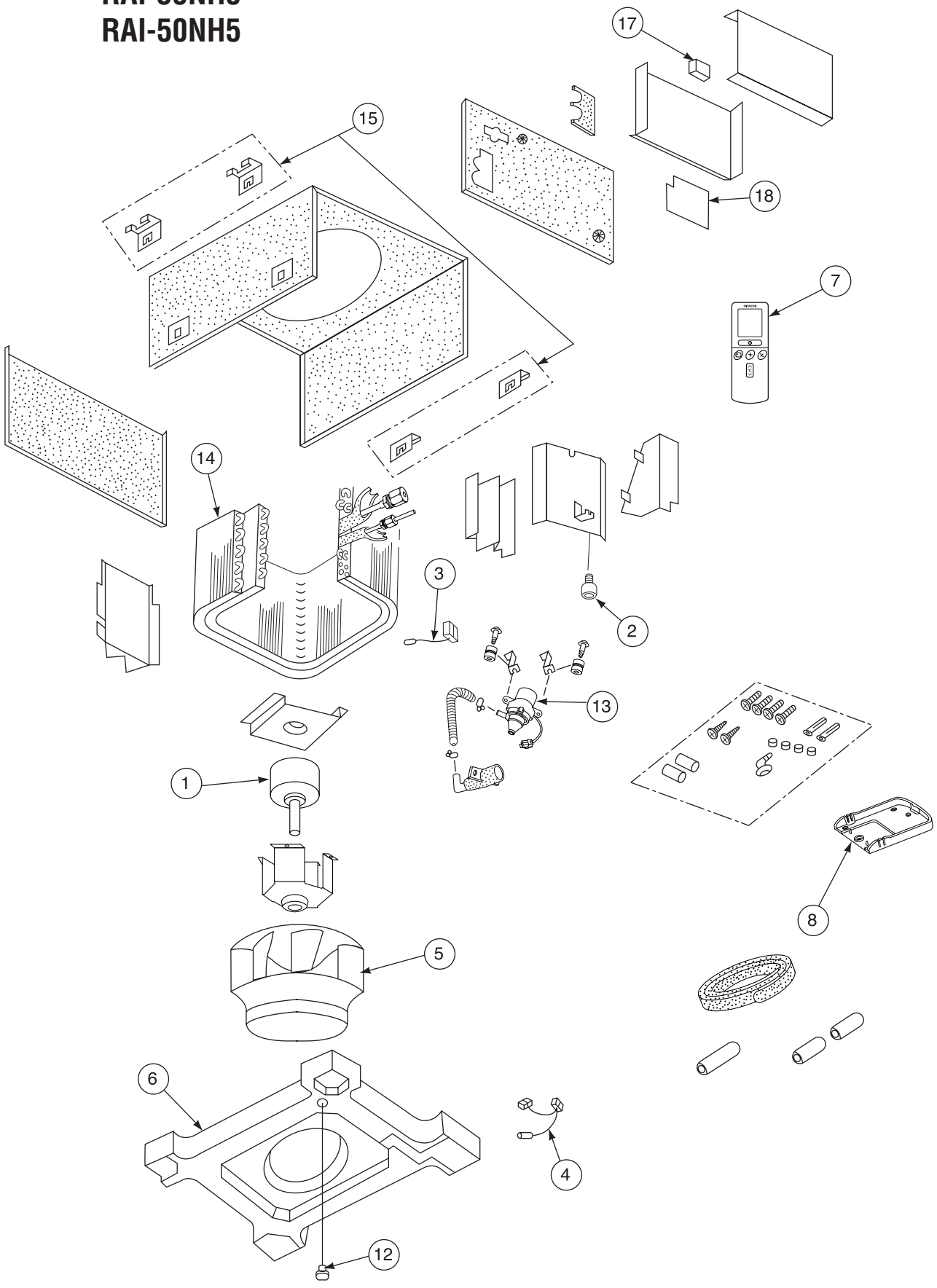


MODEL RAK-65NH5

NO.	PART N0.	Q'TY / UNIT	PARTS NAME
1	PMRAK-60NHA 003	1	CABINET
2	PMRAS-40CNH2 023	1	MOUNTING PLATE
3	PMRAK-25NHA 001	1	FAN MOTOR
4	PMRAS-60YHA 004	1	TANGENTIAL FAN
5	PMRAS-25CNH2 005	1	P-BEARING ASSY
6	PMRAS-51CHA1 004	1	FAN MOTOR BASE
7	PMRAS-24GH4 001	1	CYCLE ASSY
8	PMRAS-51CHA1 020	1	FAN COVER
9	PMRAS-18CP5 003	1	PIPE SUPPORT
10	PMRAK-60NHA 006	1	DRAIN PAN ASSY
11	PMRAK-60NHA 009	1	AUTO SWEEP MOTOR
12	PMRAS-18CH1 001	1	P.W.B (LED)
13	PMRAS-60YH5 001	1	FRONT COVER ASSEMBLY
14	PMRAS-60YH5 002	1	FRONT PANEL
15	PMRAS-10C7M 008	3	CAP
16	PMRAS-51CHA1 010	2	AIR FILTER
17	PMRAS-51CHA1 011	1	REMOTE CONTROL ASSEMBLY
18	PMRAS-10C3M 003	1	REMOTE CONTROL SUPPORT
19	PMRAS-40CNH2 026	1	THERMISTOR SUPPORT
20	PMRAS-07CH2 012	1	THERMISTOR
22	PMRAK-65NH5 001	1	P.W.B (MAIN)
26	PMRAK-60NHA 001	1	P.W.B (RECEIVER)
27	PMRAS-10C6M 002	1	TERMINAL BOARD (2P)

PARTS LIST AND DIAGRAM

INDOOR UNIT
MODEL : RAI-25NH5
RAI-35NH5
RAI-50NH5



MODEL RAI-25NH5

NO.	PART N0.	Q'TY / UNIT	PARTS NAME
1	PMRAI-25NH4R 001	1	25W MOTOR
2	RAMD-350BW 011	1	FLOAT SWITCH
3	PMRAI-32CNH2 002	1	THERMISTOR (HEAT EXCHANGER)
4	PMRAI-32CNH2 003	1	THERMISTOR (ROOM TEMPERATURE)
5	PMRAI-32CNH2 004	1	TURBO FAN
6	PMRAI-32CNH2 005	1	DRAIN PAN ASSEMBLY
7	PMRAS-51CHA1 011	1	REMOTE CONTROL ASSEMBLY
8	PMRAS-10C3M 003	1	REMOTE CONTROL SUPPORT
12	PMRAI-32CNH2 010	1	DRAIN CAP
13	PMRAI-25NH4 004	1	DRAIN PUMP ASSEMBLY
14	PMRAI-25NH4 003	1	CYCLE ASSEMBLY
15	PMRAI-25NH4 007	4	SUSP. CLAMP
17	PMRAS-10C6M 002	1	TERMINAL BOARD (2P)
18	PMRAI-25NH5 001	1	P.W.B. (MAIN)

MODEL RAI-35NH5

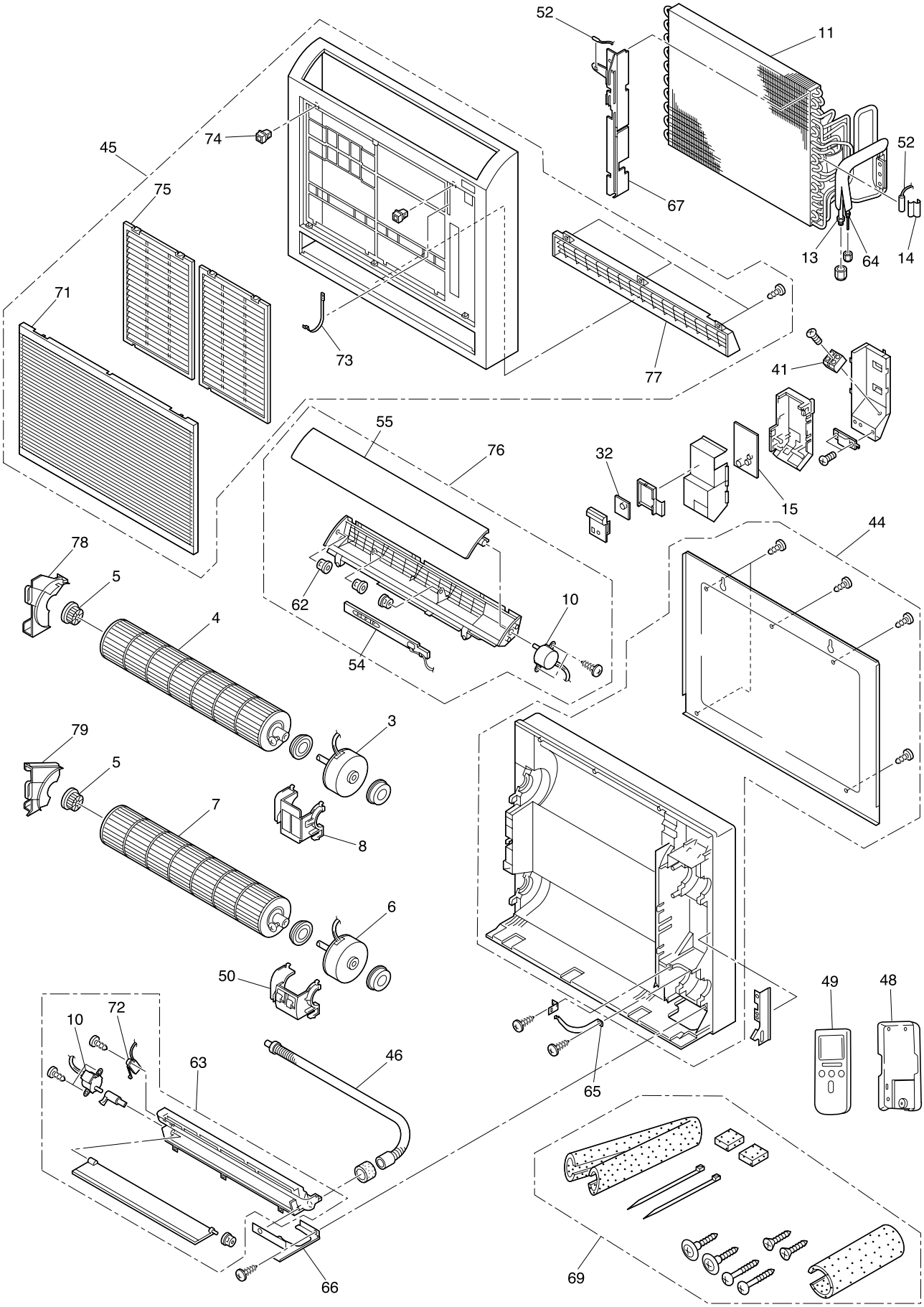
NO.	PART N0.	Q'TY / UNIT	PARTS NAME
1	PMRAI-25NH4R 001	1	25W MOTOR
2	RAMD-350BW 011	1	FLOAT SWITCH
3	PMRAI-32CNH2 002	1	THERMISTOR (HEAT EXCHANGER)
4	PMRAI-32CNH2 003	1	THERMISTOR (ROOM TEMPERATURE)
5	PMRAI-32CNH2 004	1	TURBO FAN
6	PMRAI-32CNH2 005	1	DRAIN PAN ASSEMBLY
7	PMRAS-51CHA1 011	1	REMOTE CONTROL ASSEMBLY
8	PMRAS-10C3M 003	1	REMOTE CONTROL SUPPORT
12	PMRAI-32CNH2 010	1	DRAIN CAP
13	PMRAI-25NH4 004	1	DRAIN PUMP ASSEMBLY
14	PMRAI-25NH4 003	1	CYCLE ASSEMBLY
15	PMRAI-25NH4 007	4	SUSP. CLAMP
17	PMRAS-10C6M 002	1	TERMINAL BOARD (2P)
18	PMRAI-35NH5 001	1	P.W.B. (MAIN)

MODEL RAI-50NH5

NO.	PART N0.	Q'TY / UNIT	PARTS NAME
1	PMRAI-25NH4R 001	1	25W MOTOR
2	RAMD-350BW 011	1	FLOAT SWITCH
3	PMRAI-32CNH2 002	1	THERMISTOR (HEAT EXCHANGER)
4	PMRAI-32CNH2 003	1	THERMISTOR (ROOM TEMPERATURE)
5	PMRAI-32CNH2 004	1	TURBO FAN
6	PMRAI-32CNH2 005	1	DRAIN PAN ASSEMBLY
7	PMRAS-51CHA1 011	1	REMOTE CONTROL ASSEMBLY
8	PMRAS-10C3M 003	1	REMOTE CONTROL SUPPORT
12	PMRAI-32CNH2 010	1	DRAIN CAP
13	PMRAI-25NH4 004	1	DRAIN PUMP ASSEMBLY
14	PMRAI-50NH5 002	1	CYCLE ASSEMBLY
17	PMRAS-10C6M 002	1	TERMINAL BOARD (2P)
18	PMRAI-50NH5 001	1	P.W.B. (MAIN)

PARTS LIST AND DIAGRAM

MODEL RAF-25NH5, RAF-35NH5, RAF-50NH5



MODEL RAF-25NH5

NO.	PARTS NO.		QUANTITY UNIT	PARTS NAME
3	ATI-0972B	902	1	FAN MOTOR (UPPER) 25W,1kg
4	ATI-0972B	903	1	TANGENTIAL FAN (UPPER)
5	RAS4010LX2	010	2	FAN SUPPORT ASSEMBLY
6	ATI-0972B	905	1	FAN MOTOR (LOWER) 25W, 1kg
7	ATI-0972B	906	1	TANGENTIAL FAN (LOWER)
8	ATI-0972B	904	1	FAN MOTOR SUPPORT (UPPER)
10	RAS-2810NX	045	1	AUTO SWEEP MOTOR
11	RAF-25NH4	902	1	HEAT EXCHANGER ASSEMBLY
13	RAS-287AX	802	1	UNION (3)
14	ATI-0972B	935	1	BULB SUPPORT
15	RAF-25NH5	901	1	P.W.B. (MAIN)
32	ATI-0972B	914	1	P.W.B. (SWITCH)
41	ATI-0972B	936	1	TERMINAL BORD (2P)
44	RAF-35NH5	902	1	CABINET
45	RAF-25NH4	906	1	FRONT COVER ASSEMBLY
46	RAF-2210MX	039	1	DRAIN HOSE
48	RAS-258JX	004	1	REMOTE CONTROL SUPPORT
49	RAD-25QH4	905	1	REMOTE CONTROL ASSEMBLY
50	ATI-0972B	912	1	FAN MOTOR SUPPORT (LOWER)
52	ATI-0972B	915	1	THERMISTOR
54	RAF-25NH4	905	1	P.W.B. (INDICATION)
55	RAF-35NH5	903	1	WIDE DEFLECTOR
62	RAS-3610LX	003	3	DEFLECTOR SUPPORT
63	ATI-0972B	917	1	DISCHARGE FRAME
64	RAS-2810KX	009	1	UNION (2)
65	ATI-0972B	925	1	PIPE BAND
66	ATI-0972B	926	1	RAT PREVENTION COVER
67	ATI-0972B	927	1	PIPE COVER

NO.	PARTS NO. RAF-25NH5		QUANTITY UNIT	PARTS NAME
69	RAF-35NH5	904	1	ACCESSARIES ASSEMBLY
71	RAF-25NH4	907	1	FRONT PANEL
72	ATI-0972B	932	1	DAMPER LIMIT SWITCH
73	ATI-0972B	933	1	BAND (FOR FRONT PANEL)
74	RAP-5CPJ	004	2	LATCH 1 (FRONT COVER)
75	ATI-0972B	934	2	AIR FILTER
76	RAF-35NH5	905	1	TOP FRAME
77	RAF-25NH4	908	1	DISCHARGE GRILL
78	ATI-0972B	922	1	FAN COVER (UPPER)
79	ATI-0972B	923	1	FAN COVER (LOWER)

MODEL RAF-35NH5

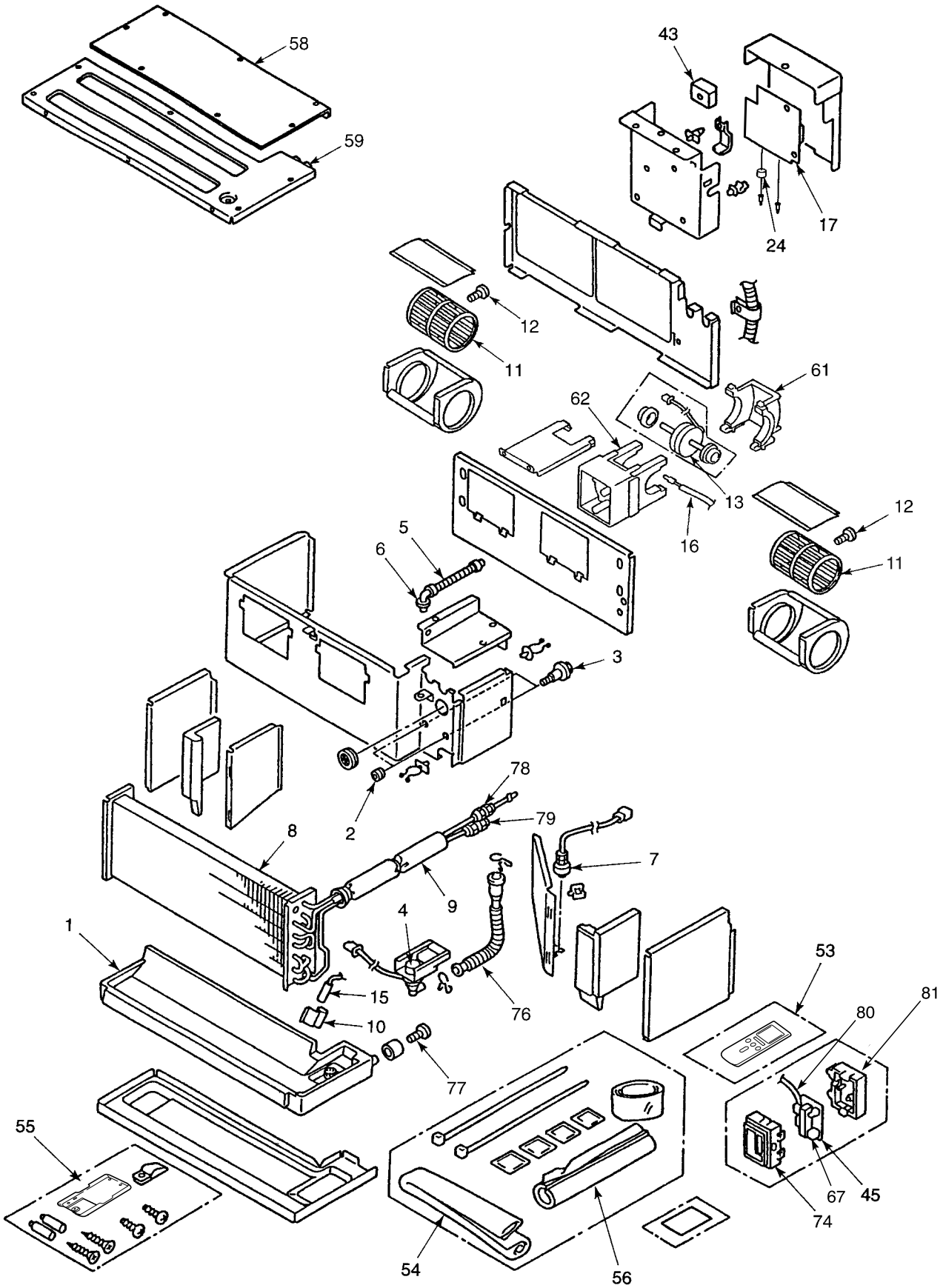
NO.	PARTS NO.		QUANTITY UNIT	PARTS NAME
3	ATI-0972B	902	1	FAN MOTOR (UPPER) 25W,1kg
4	ATI-0972B	903	1	TANGENTIAL FAN (UPPER)
5	RAS4010LX2	010	2	FAN SUPPORT ASSEMBLY
6	ATI-0972B	905	1	FAN MOTOR (LOWER) 25W,1kg
7	ATI-0972B	906	1	TANGENTIAL FAN (LOWER)
8	ATI-0972B	904	1	FAN MOTOR SUPPORT (UPPER)
10	RAS-2810NX	045	2	AUTO SWEEP MOTOR
11	RAF-25NH4	902	1	HEAT EXCHANGER ASSEMBLY
13	RAS-287AX	802	1	UNION (3)
14	ATI-0972B	935	1	BULB SUPPORT
15	RAF-35NH5	901	1	P.W.B. (MAIN)
32	ATI-0972B	914	1	P.W.B. (SWITCH)
41	ATI-0972B	936	1	TERMINAL BORD (2P)
44	RAF-35NH5	902	1	CABINET
45	RAF-25NH4	906	1	FRONT COVER ASSEMBLY
46	RAS-2210MX	039	1	DRAIN HOSE
48	RAS-258JX	004	1	REMOTE CONTROL SUPPORT
49	RAD-25QH4	905	1	REMOTE CONTROL ASSEMBLY
50	ATI-0972B	912	1	FAN MOTOR SUPPORT (LOWER)
52	ATI-0972B	915	1	THERMISTOR
54	RAF-25NH4	905	1	P.W.B. (INDICATION)
55	RAF-35NH5	903	1	WIDE DEFLECTOR
62	RAS-3610LX	003	3	DEFLECTOR SUPPORT
63	ATI-0972B	917	1	DISCHARGE FRAME
64	RAS-2810KX	009	1	UNION (2)
65	ATI-0972B	925	1	PIPE BAND
66	ATI-0972B	926	1	RAT PREVENTION COVER
67	ATI-0972B	927	1	PIPE COVER

NO.	PARTS NO. RAF-35NH5		QUANTITY UNIT	PARTS NAME
69	RAF-35NH5	904	1	ACCESSARIES ASSEMBLY
71	RAF-25NH4	907	1	FRONT PANEL
72	ATI-0972B	932	1	DAMPER LIMIT SWITCH
73	ATI-0972B	933	1	BAND (FOR FRONT PANEL)
74	RAP-5CPJ	004	2	LATCH 1 (FRONT COVER)
75	ATI-0972B	934	2	AIR FILTER
76	RAF-35NH5	905	1	TOP FRAME
77	RAF-25NH4	908	1	DISCHARGE GRILL
78	ATI-0972B	922	1	FAN COVER (UPPER)
79	ATI-0972B	923	1	FAN COVER (LOWER)

MODEL RAF-50NH5

NO.	PARTS NO.		QUANTITY UNIT	PARTS NAME
3	ATI-0972B	902	1	FAN MOTOR (UPPER) 25W, 1kg
4	ATI-0972B	903	1	TANGENTIAL FAN (UPPER)
5	RAS4010LX2	010	2	FAN SUPPORT ASSEMBLY
6	ATI-0972B	905	1	FAN MOTOR (LOWER) 25W,1kg
7	ATI-0972B	906	1	TANGENTIAL FAN (LOWER)
8	ATI-0972B	904	1	FAN MOTOR SUPPORT (UPPER)
10	RAS-2810NX	045	1	AUTO SWEEP MOTOR
11	ATI-50NH4	902	1	HEAT EXCHANGER ASSEMBLY
13	RAS4545TWU	004	1	UNION (4)
14	ATI-0972B	935	1	BULB SUPPORT
15	RAF-50NH5	901	1	P.W.B. (MAIN)
32	ATI-0972B	914	1	P.W.B. (SWITCH)
41	ATI-0972B	936	1	TERMINAL BORD (2P)
44	RAF-35NH5	902	1	CABINET
45	RAF-25NH4	906	1	FRONT COVER ASSEMBLY
46	RAS-2210MX	039	1	DRAIN HOSE
48	RAS-258JX	004	1	REMOTE CONTROL SUPPORT
49	RAD-25QH4	905	1	REMOTE CONTROL ASSEMBLY
50	ATI-0972B	912	1	FAN MOTOR SUPPORT (LOWER)
52	ATI-0972B	915	1	THERMISTOR
54	RAF-25NH4	905	1	P.W.B. (INDICATION)
55	RAF-35NH5	903	1	WIDE DEFLECTOR
62	RAS-3610LX	003	1	DEFLECTOR SUPPORT
63	ATI-0972B	917	1	DISCHARGE FRAME
64	RAS-5202CP	912	1	UNION (2)
65	ATI-0972B	925	1	PIPE BAND
66	ATI-0972B	926	1	RAT PREVENTION COVER
67	ATI-0972B	927	1	PIPE COVER

NO.	PARTS NO. RAF-50NH5		QUANTITY UNIT	PARTS NAME
69	RAF-35NH5	904	1	ACCESSARIES ASSEMBLY
71	RAF-25NH4	907	1	FRONT PANEL
72	ATI-0972B	932	1	DAMPER LIMIT SWITCH
73	ATI-0972B	933	1	BAND (FOR FRONT PANEL)
74	RAP-5CPJ	004	2	LATCH 1 (FRONT COVER)
75	ATI-0972B	934	2	AIR FILTER
76	RAF-35NH5	905	1	TOP FRAME
77	RAF-25NH4	908	1	DISCHARGE GRILL
78	ATI-0972B	922	1	FAN COVER (UPPER)
79	ATI-0972B	923	1	FAN COVER (LOWER)



MODEL RAD-25NH5

NO.	PARTS NO.		QUANTITY UNIT	PARTS NAME
1	RAD-28MX	001	1	DRAIN PAN
2	RAMD-350BW	003	2	FAN MOTOR SUPPORT RUBBER
3	RAMD-350BW	004	2	SPECIAL SCREW
4	RAD-28MX	002	1	PUMP ASSEMBLY
5	RAMD-350BW	010	1	DRAIN HOSE
6	RAMD-350BW	009	1	PUMP HOSE
7	RAMD-350BW	011	1	FLOAT SWITCH
8	RAD-28MX	801	1	EVAPORATOR ASSEMBLY
9	RAD-28MX	802	1	PIPE SET
10	ATI-0972B	935	1	BULB SUPPORT
11	RAD-32CNH2	906	2	SIROCCO FAN
12	RA-353B	004	1	FAN BOLT
13	RAD-32CNH2	905	1	FAN MOTOR 20W, 1kg
15	RAMD-40GX	002	1	THERMISTOR (HEAT)
16	RAD-28MX	005	1	THERMISTOR (TEMPERATURE)
17	RAD-25NH5	901	1	P.W.B. (MAIN)
24	RAC4010KX2	008	1	FERITE CORE (935)
31	RAD-35NH5	902	1	SLIDE SWITCH
43	ATI-0972B	936	1	TERMINAL BOARD (2P)
45	RAD-25NH4	902	1	P.W.B. (INDICATION)
53	RAD-25QH4	905	1	REMOTE CONTROL ASSEMBLY
54	RAMJ-250BW	009	1	INSULATOR PIPE
55	RAS-258JX	004	1	REMOCON SUPPORT
56	RAD-28MX	009	1	INSULATOR PIPE (236L)
58	RAD-28QH1	904	1	UPPER PLATE (2)
59	RAD-25QH4	904	1	UPPER PLATE (1)
61	RAD-28QH1	907	1	FAN MOTOR SUPPORT

NO.	PARTS NO. RAD-25NH5		QUANTITY UNIT	PARTS NAME
62	RAD-25QH4	901	1	BASE (FAN MOTOR)
66	RAS-2236W	025	1	LED-YELLOW (SEL2713K)
67	RAS-25DXD	002	1	LIGHT RECEIVING UNIT
68	RAS-2553W	020	1	LED-GREEN (SEL2413E)
69	RAS-2810KX	043	1	CURRENT PROTECTOR (0.8A)
70	RAS-2810KX	044	1	CURRENT PROTECTOR (2.0A)
74	RAD-25NH4	903	1	LED COVER
76	RAD-28MX	003	1	DRAIN PIPE
77	RAS5645TWU	008	1	DRAIN CAP
78	RAS-287AX	801	1	UNION (2)
79	RAS-287AX	802	1	UNION (3)
80	RAD-35NH5	903	1	CORD ASSEMBLY
81	RAD-35NH5	904	1	LED COVER (B)

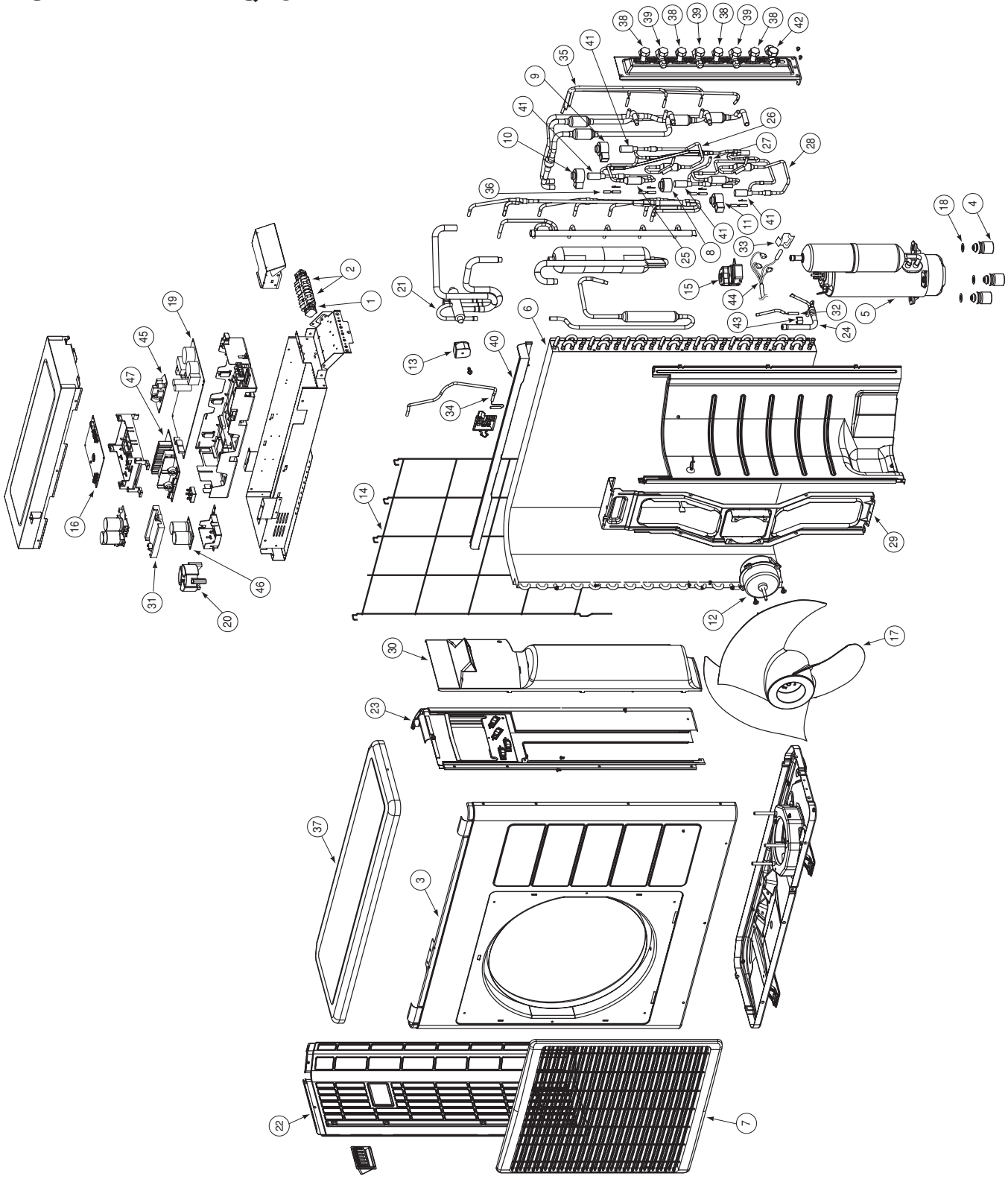
MODEL RAD-35NH5

NO.	PARTS NO.		QUANTITY UNIT	PARTS NAME
1	RAD-28MX	001	1	DRAIN PAN
2	RAMD-350BW	003	2	FAN MOTOR SUPPORT RUBBER
3	RAMD-350BW	004	2	SPECIAL SCREW
4	RAD-28MX	002	1	PUMP ASSEMBLY
5	RAMD-350BW	010	1	DRAIN HOSE
6	RAMD-350BW	009	1	PUMP HOSE
7	RAMD-350BW	011	1	FLOAT SWITCH
8	RAD-28MX	801	1	EVAPORATOR ASSEMBLY
9	RAD-28MX	802	1	PIPE SET
10	ATI-0972B	935	1	BULB SUPPORT
11	RAD-32CNH2	906	2	SIROCCO FAN
12	RA-353B	004	1	FAN BOLT
13	RAD-32CNH2	905	1	FAN MOTOR 20W, 1kg
15	RAMD-40GX	002	1	THERMISTOR (HEAT)
16	RAD-28MX	005	1	THERMISTOR (TEMPERATURE)
17	RAD-35NH5	901	1	P.W.B. (MAIN)
24	RAC4010KX2	008	1	FERITE CORE (935)
31	RAD-35NH5	902	1	SLIDE SWITCH
43	ATI-0972B	936	1	TERMINAL BOARD (2P)
45	RAD-25NH4	902	1	P.W.B. (INDICATION)
53	RAD-25QH4	905	1	REMOTE CONTROL ASSEMBLY
54	RAMJ-250BW	009	1	INSULATOR PIPE
55	RAS-258JX	004	1	REMOCON SUPPORT
56	RAD-28MX	009	1	INSULATOR PIPE (236L)
58	RAD-28QH1	904	1	UPPER PLATE (2)
59	RAD-25QH4	904	1	UPPER PLATE (1)
61	RAD-28QH1	907	1	FAN MOTOR SUPPORT

NO.	PARTS NO. RAD-35NH5		QUANTITY UNIT	PARTS NAME
62	RAD-25QH4	901	1	BASE (FAN MOTOR)
66	RAS-2236W	025	1	LED-YELLOW (SEL2713K)
67	RAS-25DXD	002	1	LIGHT RECEIVING UNIT
68	RAS-2553W	020	1	LED-GREEN (SEL2413E)
69	RAS-2810KX	043	1	CURRENT PROTECTOR (0.8A)
70	RAS-2810KX	044	1	CURRENT PROTECTOR (2.0A)
74	RAD-25NH4	903	1	LED COVER
76	RAD-28MX	003	1	DRAIN PIPE
77	RAS5645TWU	008	1	DRAIN CAP
78	RAS-287AX	801	1	UNION (2)
79	RAS-287AX	802	1	UNION (3)
80	RAD-35NH5	903	1	CORD ASSEMBLY
81	RAD-35NH5	904	1	LED COVER (B)

PARTS LIST AND DIAGRAM

OUTDOOR UNIT
MODEL : RAM-72QH5



MODEL RAM-72QH5

NO.	PART N0.	Q'TY / UNIT	PARTS NAME
1	PMRAS-10C6M 002	2	2P TERMINAL FOR C-D LINE
2	PMRAC-51CHA1 903	2	4P TERMINAL
3	PMRAC-70YHA 901	1	CABINET
4	RAC-2226HV 805	3	COMPRESSOR RUBBER
5	PMRAM-72QH5 903	1	COMPRESSOR
6	PMRAM-72QH5 904	1	CONDENSER
7	PMRAC-70YHA 905	1	D-GRILL-AS (INCL. MOUTH RING)
8	PMRAM-72QH5 905	1	EXPANSION VALVE COIL (B)
9	PMRAM-72QH5 906	1	EXPANSION VALVE COIL (R)
10	PMRAM-72QH5 907	1	EXPANSION VALVE COIL (W)
11	PMRAM-72QH5 908	1	EXPANSION VALVE COIL (BLK)
12	PMRAC-70YHA 904	1	FAN MOTOR (80W)
13	PMRAM-22NHZ4 902	1	MG-COIL (REVERSING VALVE)
14	PMRAC-70YHA 906	1	NET
15	PMRAC-25NH4 910	1	OLR COVER
16	PMRAM-72QH5 901	1	P.W.B (MAIN)
17	PMRAC-70YHA 907	1	PROPELLER FAN
18	KPNT1 001	3	PUSH NUT
19	PMRAM-72QH5 902	1	PWB (POWER)
20	PMRAC-18SH4 901	1	REACTOR
21	PMRAM-22NHZ4 901	1	REVERSING VALVE
22	PMRAC-70YHA 908	1	SIDE PLATE L
23	PMRAM-72QH5 914	1	SIDE PLATE R
24	PMRAM-65QH4 920	1	STRAINER (CO-PIPE-AS 1)
25	PMRAM-72QH5 909	1	STRAINER (ST-PIPE-AS 1)
26	PMRAM-72QH5 910	1	STRAINER (ST-PIPE-AS 2)
27	PMRAM-72QH5 911	1	STRAINER (ST-PIPE-AS 3)
28	PMRAM-72QH5 912	1	STRAINER (ST-PIPE-AS 4)
29	PMRAC-70YHA 912	1	SUPPORT (FAN MOTOR)
30	PMRAM-72QH5 913	1	SV-COVER
31	PMRAC-80YHA 910	1	SYSTEM POWER MODULE
32	PMRAC-70YHA 913	1	THERMISTOR (DEFROST)

NO.	PART N0. RAM-72QH5	Q'TY / UNIT	PARTS NAME
33	PMRAC-80YHA 914	1	THERMISTOR (OH)
34	PMRAM-65QH4 910	1	THERMISTOR (OUTSIDE TEMPERATURE)
35	PMRAM-72QH5 915	1	THERMISTOR-PIPE (W)
36	PMRAM-72QH5 916	1	THERMISTOR-PIPE (R)
37	PMRAC-24CP5 905	1	TOP COVER
38	PMRAM-65QH4 915	4	VALVE (2S)
39	PMRAM-65QH4 916	3	VALVE (3S)
40	PMRAC-70YHA 916	1	NET COVER
41	PMRAM-72QH5 917	4	EXPANSION VALVE
42	PMRAM-72QH5 918	1	VALVE (4S)
43	PMRAM-72QH5 920	1	SUPPORT (DEF-THERMISTOR)
44	PMRAC-25NH4 909	1	SUPPORT (OH-THERMISTOR)
45	PMRAC-70YHA 918	1	PWB (NF)
46	PMRAC-80YHA 912	1	PWB (CAPA)
47	PMRAM-72QH5 919	1	PWB (SWITCHING)

HITACHI

RAK-18NH5, RAK-25NH5, RAK-35NH5,
RAK-50NH5, RAK-65NH5,
RAI-25NH5, RAI-35NH5, RAI-50NH5,
RAF-25NH5, RAF-35NH5, RAF-50NH5,
RAD-25NH5, RAD-35NH5

RAM-72QH5

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