

SERVICE MANUAL

SANYO

FILE NO. A-4735

SPW - V452GHE8 / SPW - C452GH8

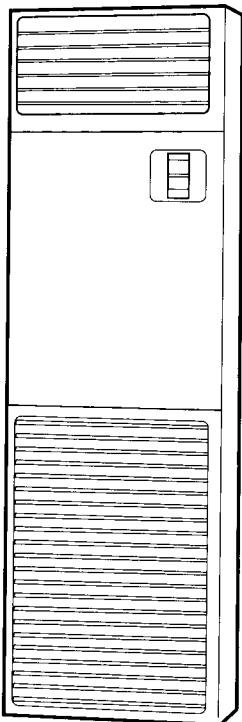
SPLIT SYSTEM AIR CONDITIONER

INDOOR MODEL No.	PRODUCT CODE No.	OUTDOOR MODEL No.	PRODUCT CODE No.
SPW - V452GHE8	1 854 009 33	SPW - C452GH8	1 854 009 18

Section

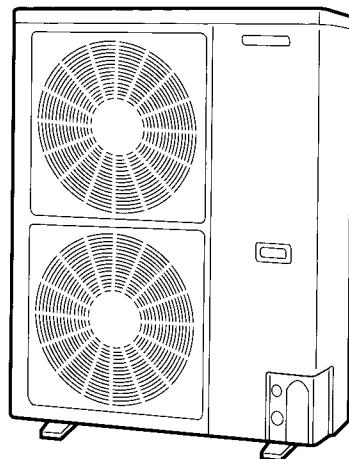
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Indoor Unit



SPW - V452GHE8

Outdoor Unit



SPW - C452GH8

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IMPORTANT!

Please Read Before Starting

This air conditioning system meets strict safety and operating standards. As the installer or service person, it is an important part of your job to install or service the system so it operates safely and efficiently.

For safe installation and trouble-free operation, you must:

- Carefully read this instruction booklet before beginning.
- Follow each installation or repair step exactly as shown.
- Observe all local, state, and national electrical codes.
- Pay close attention to all warning and caution notices given in this manual.



WARNING

This symbol refers to a hazard or unsafe practice which can result in severe personal injury or death.



CAUTION

This symbol refers to a hazard or unsafe practice which can result in personal injury or product or property damage.

If Necessary, Get Help

These instructions are all you need for most installation sites and maintenance conditions. If you require help for a special problem, contact our sales/service outlet or your certified dealer for additional instructions.

In Case of Improper Installation

The manufacturer shall in no way be responsible for improper installation or maintenance service, including failure to follow the instructions in this document.

SPECIAL PRECAUTIONS

When Wiring

ELECTRICAL SHOCK CAN CAUSE SEVERE PERSONAL INJURY OR DEATH. ONLY A QUALIFIED, EXPERIENCED ELECTRICIAN SHOULD ATTEMPT TO WIRE THIS SYSTEM.

- Do not supply power to the unit until all wiring and tubing are completed or reconnected and checked.
- Highly dangerous electrical voltages are used in this system. Carefully refer to the wiring diagram and these instructions when wiring. Improper connections and inadequate grounding can cause **accidentally injury or death**.
- **Ground the unit** following local electrical codes.
- Connect all wiring tightly. Loose wiring may cause overheating at connection points and a possible fire hazard.

When Transporting

Be careful when picking up and moving the indoor and outdoor units. Get a partner to help, and bend your knees when lifting to reduce strain on your back. Sharp edges or thin aluminum fins on the air conditioner can cut your fingers.

When Installing

...In a Room

Properly insulate any tubing run inside a room to prevent "sweating" that can cause dripping and water damage to walls and floors.

...In Moist or Uneven Locations

Use a raised concrete pad or concrete blocks to provide a solid, level foundation for the outdoor unit. This prevents water damage and abnormal vibration.

...In an area with High Winds

Securely anchor the outdoor unit down with bolts and a metal frame. Provide a suitable air baffle.

...In a Snowy Area (for Heat Pump-type Systems)

Install the outdoor unit on a raised platform that is higher than drifting snow. Provide snow vents.

When Connecting Refrigerant Tubing

- Keep all tubing runs as short as possible.
- Use the flare method for connecting tubing.
- Apply refrigerant lubricant to the matching surfaces of the flare and union tubes before connecting them, then tighten the nut with a torque wrench for a leak-free connection.
- Check carefully for leaks before starting the test run.

NOTE:

Depending on the system type, liquid and gas lines may be either narrow or wide. Therefore, to avoid confusion the refrigerant tubing for your particular model is specified as either "narrow" or "wide" rather than as "liquid" or "gas".

When Servicing

- Turn the power OFF at the main power box (mains) before opening the unit to check or repair electrical parts and wiring.
- Keep your fingers and clothing away from any moving parts.
- Clean up the site after you finish, remembering to check that no metal scraps or bits of wiring have been left inside the unit being serviced.

WHO SHOULD USE THIS MANUAL

This service manual is made to assist the service technician apply his knowledge and training to this model air conditioner. This manual is written both for **experienced service persons** and **those who are new** to air conditioning service. To help those with less experience or who are new to this kind of unit we have included more explanations of basic procedures in simple language than is usual in some service manuals. The **experienced technician** will of course find he knows many of these things already and can go directly to the procedures and information he needs; the less experienced technician will better understand what to do even before he arrives on the job, and therefore be better able to work by himself as well as assist the more experienced technician.

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Introduction: Read Me First!

This manual will help you understand and service the air conditioner. To help you find the information you need, we have divided it into 5 main sections. Each section is divided into chapters with charts, tables and explanations to help you find and repair problems.

- **Section 1: Specifications**, tells you about the physical and electrical make up of the unit, as well as its heating and cooling capacities. Look in this section to find the correct values for components and functions.
- **Section 2: Processes and Functions**, explains each different part of the cooling and heating cycle, and how each control function reacts to changing conditions to keep the room at the set temperature range.
- **Section 3: Electrical Data**, which has fold-out schematic and wiring diagrams so you can find the parts you need to check when something is wrong, and see how they should be connected.
- **Section 4: Service Procedures**, has two main parts, a *diagnostic* chapter to help you find the specific component to replace or adjust, and a chapter with specific procedures and values to guide you in checking the electrical components in the unit.
- **Section 5: Instruction Manual**, is the same manual the user will have, and it contains general information about how to set and use the features of this particular air conditioner. Knowing this information will help you tell the owner how to use and care for this air conditioner, and also help you install and set the unit correctly.

HOW TO USE THIS MANUAL

You can use this manual both as a *reference* to find specific information about the capacity, functions and construction of this unit, and as a source of information to help you set up and maintain the unit.

When this unit is not working properly, and the cause is not known, you can use the procedures in **Section 3: Servicing Procedures** to find the problem, fix it, and restore the unit to its proper functioning.

This air conditioner has many helpful self diagnostic features to help you identify problem areas quickly.

So you will be ready when a problem happens, we suggest you look this manual over and become familiar with it by following these steps:

1. **Look at the TABLE OF CONTENTS** to get an idea of what is in this manual and where to find it.
2. **Look at the chapter about TROUBLE SHOOTING**, so you are familiar with the way the flow charts work. They are designed to guide you quickly through the possible causes for each kind of problem that is likely to happen to the Unit. Particularly read the introduction to this section, and the parts about the self-diagnosis and error codes which show on the display.
3. **Look at the chapter about CHECKING ELECTRICAL COMPONENTS**. You already know about most of these procedures. This chapter gives you the specific values and methods for these components. If you don't know some of these procedures, you can easily learn them here.
4. **Read the Instruction Manual!** The Instruction Manual is included here because it helps you help the user to set the temperature controls properly and know how to take care of any simple problems that may happen, as well as know when to call for service. The Instruction Manual also has illustrations, care, and installation information not found in the rest of the service manual. It is short, and if you read it carefully, you will be able to answer the customers questions easily, and also know the most efficient ways for setting times and temperatures.

Please use this manual to make your work easier, keep the air conditioner functioning well, and keep your customers satisfied.

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1-1 Unit Specifications

MODEL NO.	Indoor Unit		SPW-V452GHE8						
	Outdoor Unit		SPW-C452GH8						
POWER SOURCE			380V - 3Ø - 50 Hz						
PERFORMANCE		Cooling	Heating						
Capacity	BTU / h kW	44,400 13.0	48,000 14.1						
Air circulation (Hi/Me/Lo)	m³ / h	1,980 / 1,740 / 1,500							
Moisture removal (High)	Liters / h	7.4	—						
ELECTRICAL RATINGS									
Voltage rating	V	380							
Available voltage range	V	342 - 418							
Running amperes	A	8.7	9.1						
Power input	W	4,980	4,970						
Power factor	%	87	83						
E.E.R	BTU / Wh	8.9	—						
Starting amperes	A	56							
FEATURES									
Controls / Temperature control	Microprocessor / I.C. thermostat								
Control unit	Indoor unit								
Timer	ON / OFF 24-hours & Program								
Fan speeds	Indoor / Outdoor								
Airflow direction (Indoor)	Horizontal Vertical	Automatic Manual							
Air filter	Washable, easy access								
Compressor	Rotary (Hermetic)								
Refrigerant / Amount charged at shipment	g	R22 / 5,900							
Refrigerant control	Electronic Refrigerant Control Valve								
Operation sound	Indoor – Hi/Me/Lo Outdoor – Hi	dB-A dB-A	52.0 / 48.0 / 44.0 55.0						
Refrigerant tubing connections	Flare type								
Max. allowable tubing length at shipment	m(ft)	50 (164)							
Limit of tubing length	m(ft)	50 (164)							
Refrigerant tube Diameter	Narrow tube Wide tube	mm(in) mm(in)	9.52 (3/8) 19.05 (3/4)						
Refrigerant tubing kit / Accessories	Optional / Mounting plates								
DIMENSIONS & WEIGHT			Unit dimensions	Package dimensions					
Indoor unit	Height Width Depth	mm(in) mm(in) mm(in)	1,750 (68-29/32) 540 (21- 9/32) 350 (13-25/32)	1,920 (75-19/32) 652 (25-21/32) 458 (18- 1/32)					
Outdoor unit	Height Width Depth	mm(in) mm(in) mm(in)	1,235 (48- 5/ 8) 940 (34- 1/32) 340 (13-13/32)	1,346 (53- 0) 1,016 (40- 0) 416 (16- 3/ 8)					
Net weight / Shipping weight	Indoor Outdoor	kg(lb) kg(lb)	60 (132.3) / 80 (176.4) 108 (238.1) / 132 (291.0)						
Shipping volume	Indoor / Outdoor	m³/(ft³)	0.57 (20.1) / 0.57 (20.1)						

DATA SUBJECT TO CHANGE WITHOUT NOTICE.

Rated conditions

Cooling: Indoor air temperature 27°C DB/19.5°C WB,
Heating: Indoor air temperature 21°C DB,Outdoor air temperature 35°C DB
Outdoor air temperature 7°C DB/6°C WB

1-2 Major Component Specifications

(A) Indoor Unit

Unit Model No.		SPW-V452GHE8	
Source		380V - 3Ø - 50Hz	
Control Panel		RCS-31BVSH	
Controls		Microprocessor	
Controller P.C.B. Ass'y		POW-30FH	
Controls		Microprocessor	
Control circuit fuse		250V - 5A	
Fan		Centrifugal	
Number...dia. (mm) x depth (mm)		1...Ø 380 x D180	
Fan Motor			
Model...number		KFC8Q-101E5P...1	
Source		220V - 1Ø - 50Hz	
No. of pole...rpm(220V, High)		8...490	
Nominal output	W	100	
Coil resistance (Ambient temp. 20°C)	Ω	BRN - WHT : 44.3 ORG - YEL : 37.5 WHT - VLT : 12.0 YEL - PNK : 13.5 VLT - ORG : 8.4	
Safety devices		Internal type	
Operating temp.	Open °C	130 ± 5	
	Close °C	79 ± 15	
Run capacitor	μF	7.0	
	VAC	480	
Electronic Refrigerant Control Valve			
Solenoid coil model		DKV-MOZS076B0	
Rated		DC 12V, 6.3W	
Coil resistance (Ambient temp. 20°C)		Ω	ORG - GRY : 46 YEL - GRY : 46 RED - GRY : 46 BLK - GRY : 46
Valve model		DKV-29D72	
Heat Exch.			
Coil		Aluminum plate fin / Copper tube	
Rows...fin pitch (mm)		3...2.0	
Face area	m²	0.399	
Air Discharge Grille			
Dew proof heater		240V, 10.2W	
Auto louver motor			
Model		M12B	
Rated		200 - 240VAC, 50Hz, 3W, 4.2rpm, 12p	
Coil resistance (at 25°C) Ω		Ω	11,150 ± 5%
Heater		AH-3.5-50FH	
Electric heater...number		220V - 0.1167kW...3	
Protector			
Termostat		CS-12L, OFF 65±3°C, ON 55±5°C	
Thermo fuse...number		113°C, 15A...2	
External Finish		Acrylic baked-on enamel finish	

(B) Outdoor Unit

Unit Model No.	SPW-C452GH8				
Source	380 V - 3 Ø - 50 Hz				
Controller P.C.B. Ass'y	POW-30CH				
Controls	Microprocessor				
Control circuit fuse	250 V - 5 A				
Compressor	Rotary (Hermetic)				
Model....number	C-5R373H8B 80837388				
Nominal output	W	3750			
Compressor oil	cc	1900			
Coil resistance (Ambient temp. 25°C)	Ω	C-R : 2.83 C-R : 2.78	R-S : 2.65		
Safety devices	Internal type				
Operating temp.	Open °C	120 ± 5			
	Close °C	98 ± 11			
Crank case heater	240 V, 32 W				
Refrigerant amount at shipment	g	(R-22) 5,900			
High pressure switch	ACB- JB22				
Set pressure	OFF kg/cm²	30 ^{+2.0} _{-0.5}			
	ON kg/cm²	24 ± 2.0			
Fan	Propeller (2.... Ø460)				
Fan speeds	3 (Auto)				
Fan motor					
Model	SFC6T-61B5P		SFC6T-71B5P		
Source	220 V - 1 Ø - 50 Hz				
No. of pole...rpm (230 V, High)	6.....719		6.....776		
Nominal output	W	6 0	7 0		
Coil resistance (Ambient temp. 20°C)	Ω	BRW - WHT : 111.8 WHT - VLT : 33.2 VLT - YEL : 12.4 YEL - PNK : 6.5	VLT - YEL : 80.4 YEL - PNK : 27.4 VLT - YEL : 10.5 YEL - PNK : 6.3		
Safety device	Internal type				
Operating temp.	Open °C	130 ± 8			
	Close °C	79 ± 15			
Run capacitor	VAC, µF	440V, 5 µF x 2			
Heat exchanger					
Coil	Aluminum plate fin / Copper tube				
Rows....fin pitch	2.....2.0				
Face area	m²	1.08			

1-3 Other Component Specifications

(A) Indoor Unit

Power transformer		ATR-III265Q			
Rated	Primary Secondary	AC 230V 50Hz	(RED - RED)	AC 11.2 ± 0.3V	2.0A
			(BRN - BRN)	AC 13.5 ± 0.3V	0.95A
			(YEL - YEL)	AC 10.8 ± 0.3V	0.32A
Coil resistance	Ω (at 20°C)	Primary Secondary	(WHT - WHT) (RED - RED) (BRN - BRN) (YEL - YEL)	: 44.8 : 0.28 : 0.67 : 1.44	
Thermal cutoff temp.		150°C	2A	250V	

1

Thermistor (Room sensor TH1)		SDT-500B6-2			
Resistance	kΩ	10°C	10.0 ± 5%	25°C	5.0 ± 5%
		15°C	7.9 ± 5%	30°C	4.0 ± 5%
		20°C	6.3 ± 5%	35°C	3.3 ± 5%

Thermistor (Indoor coil sensor TH2 TH3)		PBC-41E-S14			
Resistance	kΩ	-20°C	40.1 ± 5%	20°C	6.5 ± 5%
		-10°C	24.4 ± 5%	30°C	4.4 ± 5%
		0°C	15.3 ± 5%	40°C	3.0 ± 5%
		10°C	9.9 ± 5%	50°C	2.1 ± 5%

Relay		FMC-0Z16			
Coil rating		AC 220V			
Coil resistance	(kΩ 25°C)	1.5			
Contact rating		AC 440V 5.5A 50Hz			

(B) Outdoor Unit

Compressor motor magnetic contactor			FMCA-1S
Magnetic contactor			
Coil rating			AC 220 / 240V 50Hz
Coil resistance	Ω	(at 25°C)	662 ± 15%
Contact rated (Main)			AC 440V 13A
Auxiliary		(lb)	AC 220-240V 8A

Power transformer			ATR-II125
Rated	Primary		AC 230V 50Hz
	Secondary	10V-A	10V 1.0A
		10V-B	10V 0.2A
	Capacity		12VA
Coil resistance	Ω	(at 24.5°C)	Primary (WHT - WHT) : 167.0 Secondary (BRN - BRN) : 4.1
Thermal cutoff temp.			145°C

Current transmitter			CT422920S-03
Coil resistance	Ω	(at 25°C)	480-545

Thermistor (Outdoor temp. sensor TH5 and Outdoor coil sensor TH6 TH7)			PBC-41E-S4 or PBC-41E-S14					
Resistance	kΩ		-20°C	40.1 ± 5%	20°C	6.5 ± 5%		
			-10°C	24.4 ± 5%	30°C	4.4 ± 5%		
			0°C	15.3 ± 5%	40°C	3.0 ± 5%		
			10°C	9.9 ± 5%	50°C	2.1 ± 5%		

Thermistor (Discharge gas sensor TH4 TH8)			PTC-51H-S1					
Resistance	kΩ		60°C	13.8 ± 5%	90°C	5.1 ± 5%		
			70°C	9.7 ± 5%	100°C	3.8 ± 5%		
			75°C	8.2 ± 5%	110°C	2.8 ± 5%		
			80°C	7.0 ± 5%	120°C	2.2 ± 5%		
			85°C	5.9 ± 5%	130°C	1.7 ± 5%		

Relay			MY2F-T1					
Coil rating				DC 12V				
Coil resistance	(Ω 25°C)			160 ± 15%				
Contact rating				AC 240V 5A 50Hz				

Solenoid Coil (4-way valve)			LB60012					
Rated				AC220-240 50Hz 5W				
Coil resistance	kΩ	(at 20°C)		1.56				

1-4 Dimensional Data

(A) Indoor Unit : SPW-V452GHE8

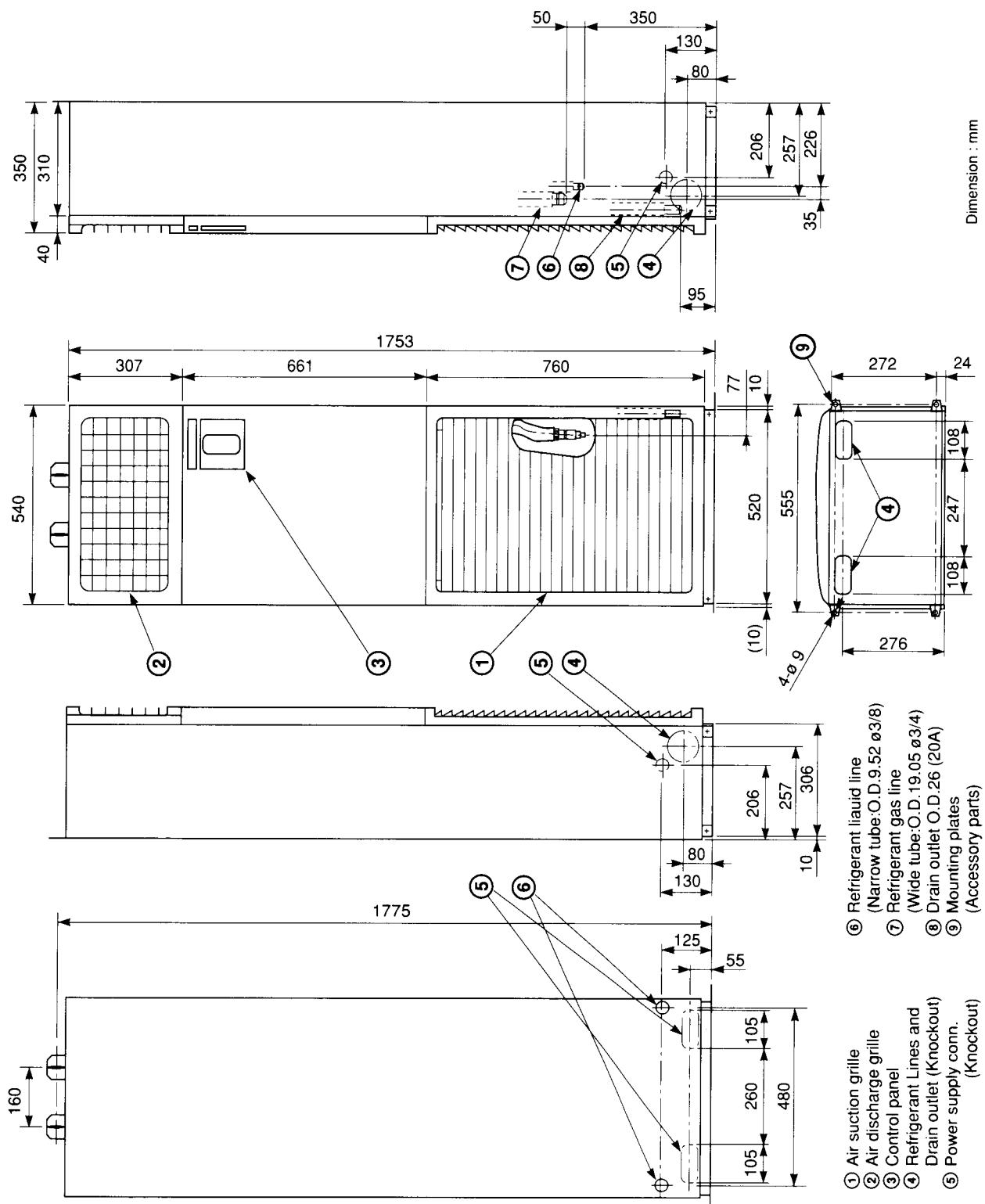


Fig. 1

(B) Outdoor Unit : SPW-C452GH8

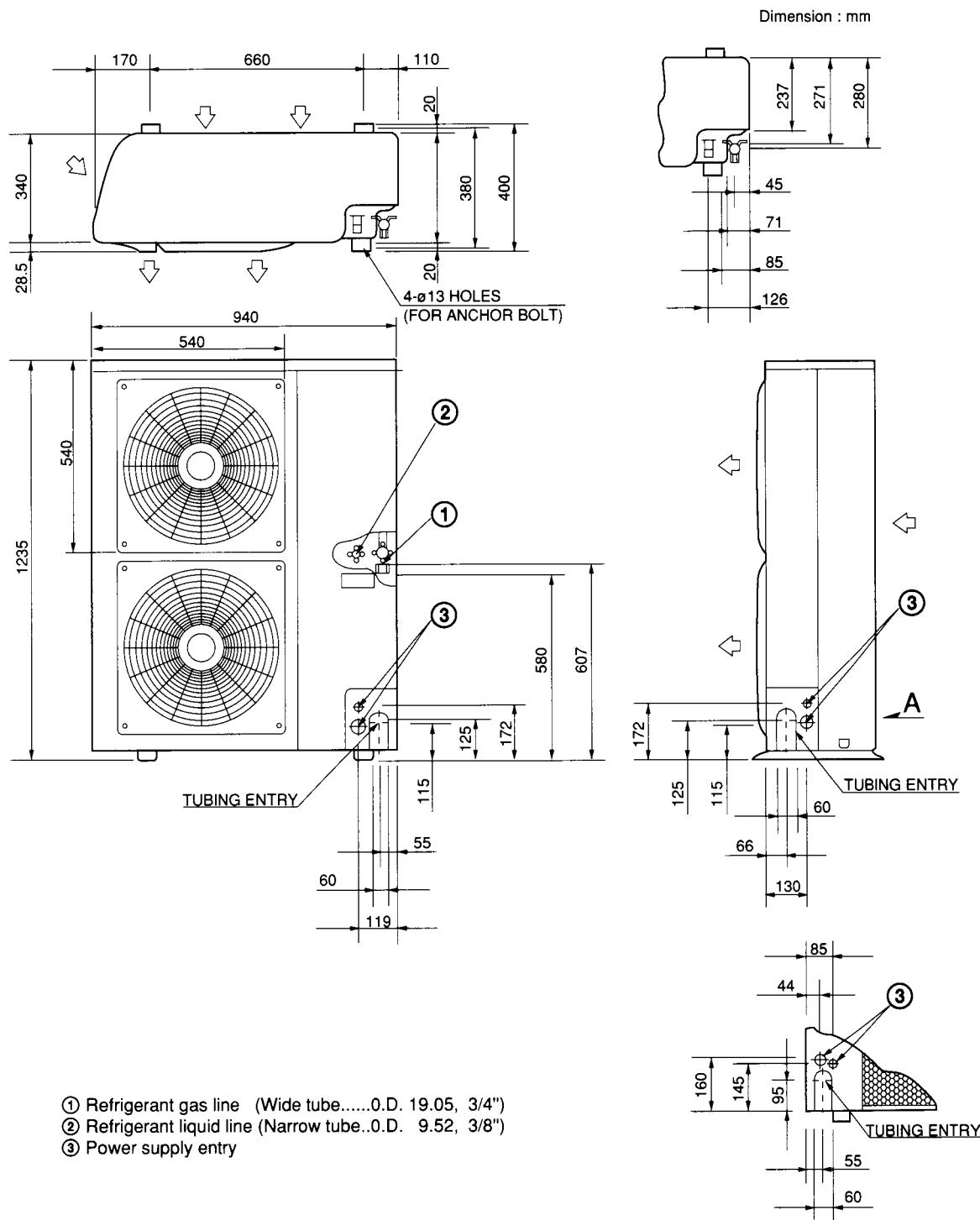
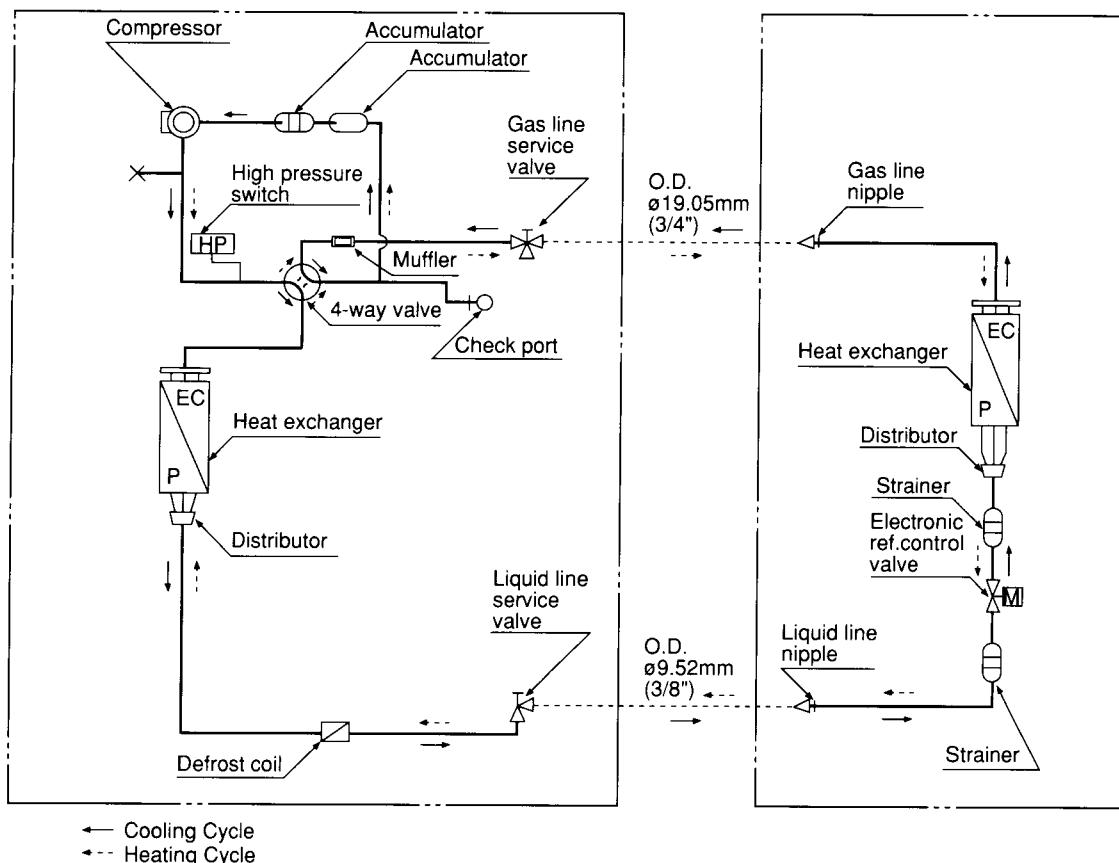


Fig. 2

1-5 Refrigerant Flow Diagram

Outdoor Unit : SPW-C452GH8

Indoor Unit : SPW-V452GHE8



1

Fig. 3

1-6 Operating Range

	Temperature	Indoor air intake temp.	Outdoor air intake temp.
Cooling	Maximum	35°C DB / 25°C WB	45°C DB
	Minimum	17°C DB / 14°C WB	-5°C DB
Heating	Maximum	27°C DB / — WB	24°C DB / 18°C WB
	Minimum	16°C DB / — WB	-15°C DB / — WB

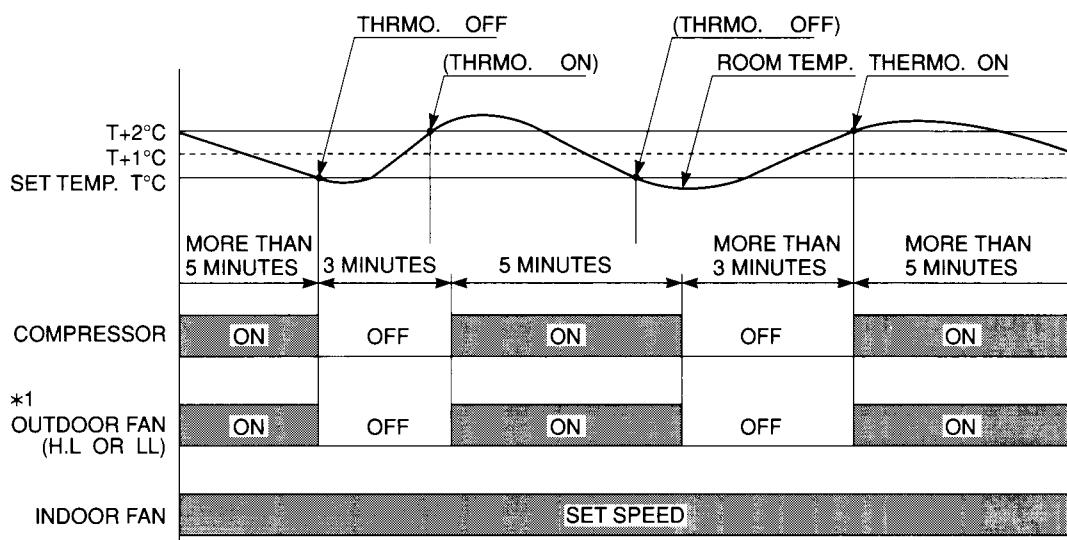
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2-1 Room Temperature Control

The Unit adjusts room temperature by cycling the compressor (in the outdoor unit) ON and OFF. This process is controlled by the **thermostat** located in the indoor unit. The diagrams on this and the next page show how each part of the system acts as the temperature of the room changes and the thermostat calls for the compressor to start (**thermo ON**) or stop (**thermo OFF**). Diagram A) tells about the cooling cycle, and Diagram B) tells about the heating cycle.

(A) Cooling



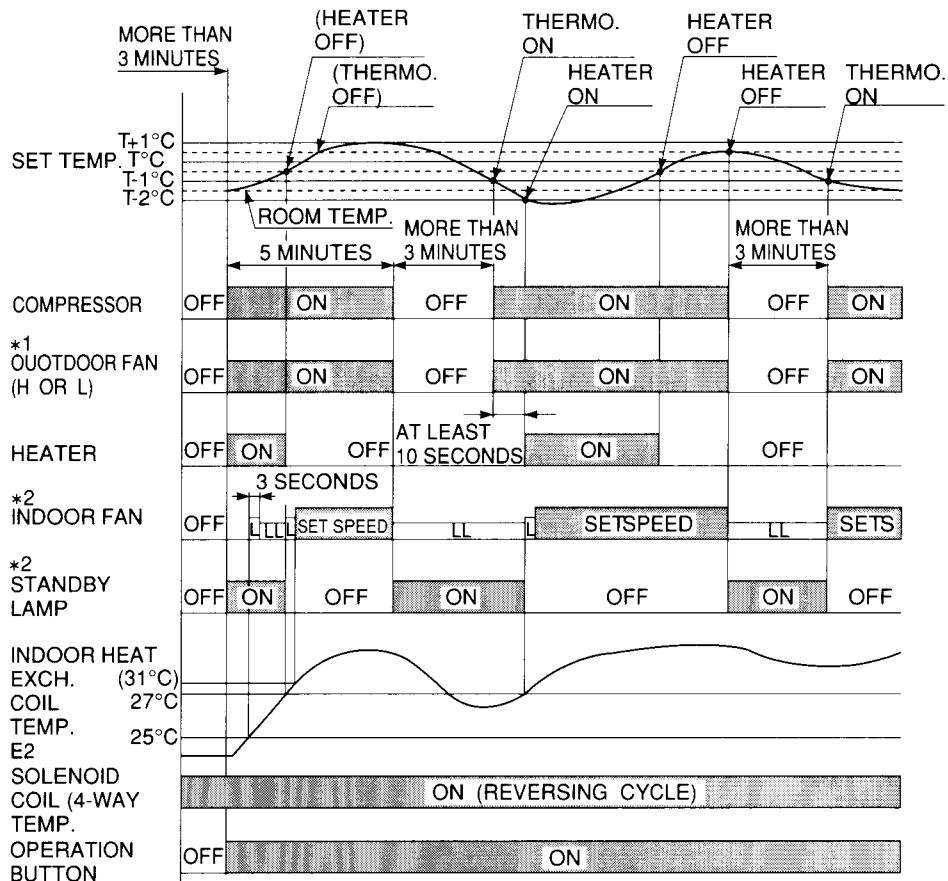
*1. Refer to 2-4 Outdoor Fan Speed Control

Fig. 4

Chart Summary and Explanations

- Once the compressor **starts**, it keeps running for 5 minutes.
- Once the compressor **stops**, it will not start running again for 3 minutes.
- If you **change** the operation mode (**HEAT**, **DRY**, **COOL**, or **FAN**) during the cooling cycle, the control circuit **stops** the compressor for 3 minutes.
- For 5 minutes after the compressor is first turned on, and for 3 minutes after it is turned off, the compressor is not controlled by the room sensor.
- Thermo ON:** When room temperature goes to 2°C above the set temperature T°, (T°+2°C):
Compressor → ON
- Thermo OFF:** When the room temperature is equal to or below the set temperature T°:
Compressor → OFF

(B) Heating



*1. Refer to 2-4 Outdoor Fan Motor Control
 *2. Refer to 2-2 Cold Draft Prevention (Heating)

Fig. 5

2

Chart Summary and Explanations

- Once the compressor starts, it keeps running for 5 minutes.
- Once the compressor stops, it will not start running again for 3 minutes.
- If you change the operation mode (**HEAT DRY COOL** or **FAN**) during the heating cycle, the control circuit **stops** the compressor for **3 minutes**.
- For 5 minutes after the compressor is first turned on, and for 3 minutes after it is turned off, the compressor is not controlled by the room sensor.
- **Thermo ON:** When room temperature drops 1°C below the set temperature T° , ($T^{\circ}-1^{\circ}\text{C}$).
 Compressor → ON
- **Thermo OFF:** When the room temperature is 0.5°C above the set temperature T° , ($T^{\circ}+5^{\circ}\text{C}$).
 Compressor → OFF
- Auxiliary Heater
 - **Auxiliary Heat ON:** When room temperature falls 2° below the set temperature, the control circuit starts the heating cycle **10 seconds after the compressor turns ON**.
 - **Heating operation OFF:** Under any of the following 4 conditions, the control circuit shuts off the auxiliary heat immediately:
 1. Room temperature rises to $T^{\circ}-0.5^{\circ}$.
 2. The indoor fan motor is stopped or its at LL (very low speed).
 3. The room temperature rises above 29°C .
 4. The indoor heat exchange coil temperature **E2** rises above 60°C .

2-2 Cold Draft Prevention (Heating Cycle)

The cold draft prevention function controls indoor fan speed so a strong draft of cold air will not blow out before the indoor heat exchange coils have warmed up.

- STANDBY shows on the control panel when the indoor fan speed is LL (very low) or OFF. This condition happens in the following 3 cases:
 - During Thermo OFF (refer to 2-1 B). Room Temperature Control, Heating)
 - During the defrosting operation (refer to 2-10 Defrosting Control, Heating)
 - Until either the coil temperature E2 reaches 27°C or when a maximum of 6 minutes has past.
- The indoor fan motor operates in L instead of LL for 3 seconds as it starts to give the fan an initial boost.

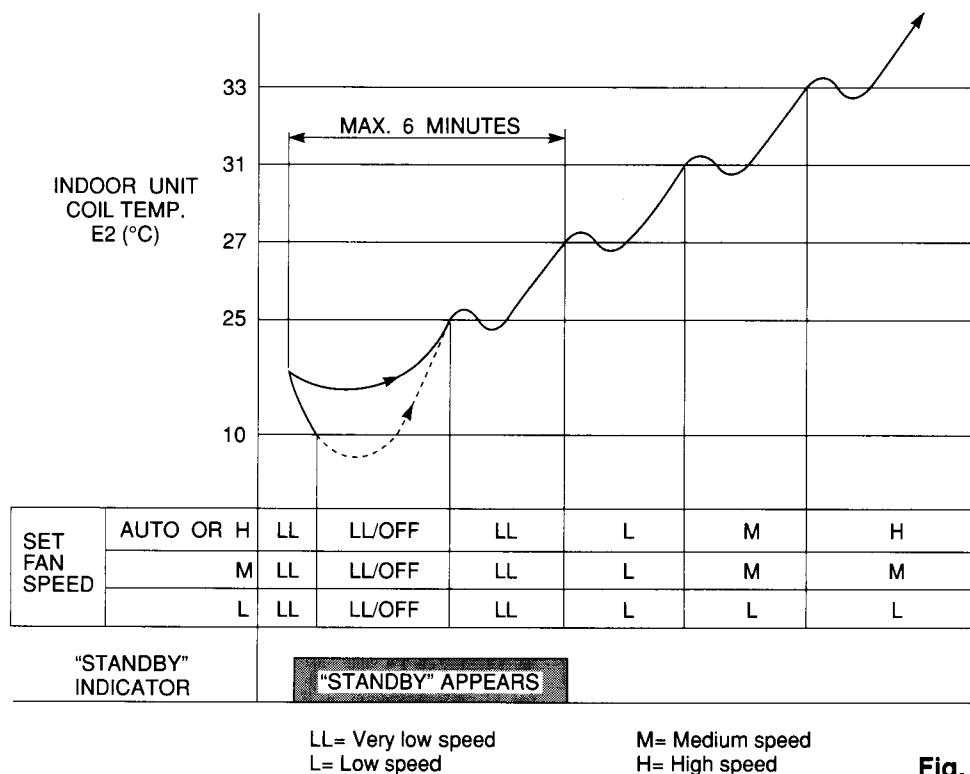


Fig. 6

Chart Summary and Explanations

- The main idea of this chart is to show that the indoor fan speed increases and gets closer to the set fan speed as the coil temperature **E2** rises.
- The indoor unit's coil temperature is taken from sensor **E2** located in the middle of the indoor heat exchange coil.
- The dotted line shows that the indoor fan motor is **OFF**. When the temperature at sensor **E2** falls below 10°C, the indoor fan motor stops running.

2-3 Fan Speed Auto (Indoor Unit)

Using the FAN SPEED button on the control panel, the fan speed can be set one of four values: AUTO, HI, MED or LO. When set to AUTO, the indoor unit fan speed will automatically adjust to the room temperature as the two charts below show.

(A) Cooling

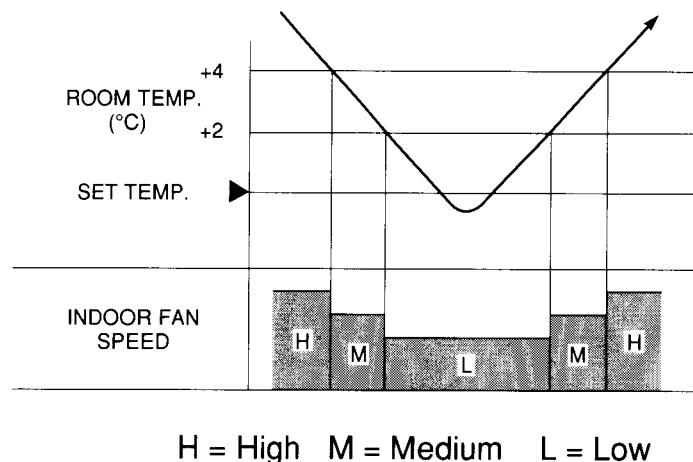


Fig. 7

2

Chart Explanations and notes

- Each time the fan speed changes, it stays at the speed it changes to (L, M, or H) for at least 3 minutes, even if during that time the temperature changes to another speed's range.

(B) Heating

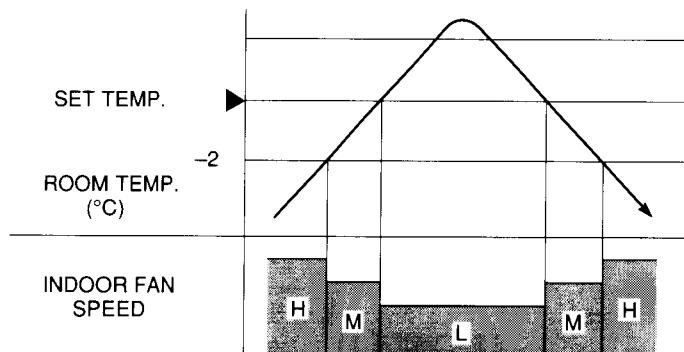


Fig. 8

Chart Explanations and notes

- Each time the fan speed changes, it stays at the speed it changes to (L, M, or H) for at least 1 minute, even if during that time the temperature changes to another speed's range.

2-4 Outdoor Fan speed Control

To optimize the performance of air conditioner, the outdoor fan speed is selected automatically according to the outside temperature.

- Note that in both **Cooling** and **Heating** modes, the fan comes on at first at high speed (H mode) for 5 seconds. Since outdoor conditions sometimes make it difficult for the fan to start, this sudden surge of power may be necessary.
- These charts show how the outdoor fan speed changes with the change in outdoor temperature.

(A) Cooling

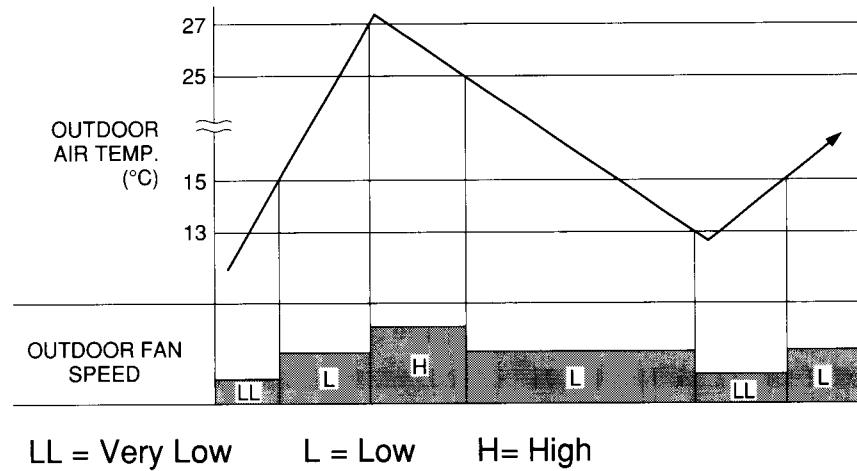


Fig. 9

(B) Heating

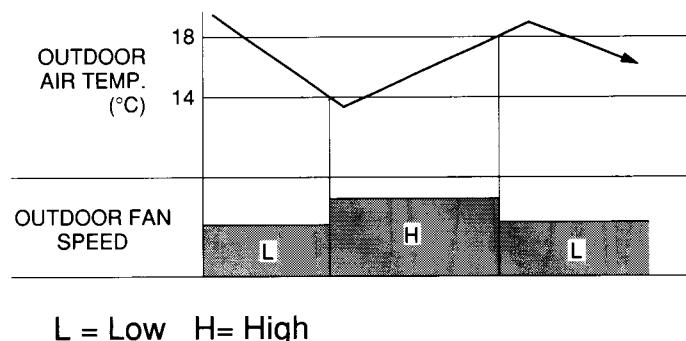


Fig. 10

2-5 Freeze Prevention (Cooling)

Freeze Prevention keeps the indoor heat exchange coil from freezing. Freezing reduces the efficiency of the unit, and frost buildup on the coil blocks cool air circulation from the indoor unit's fan.

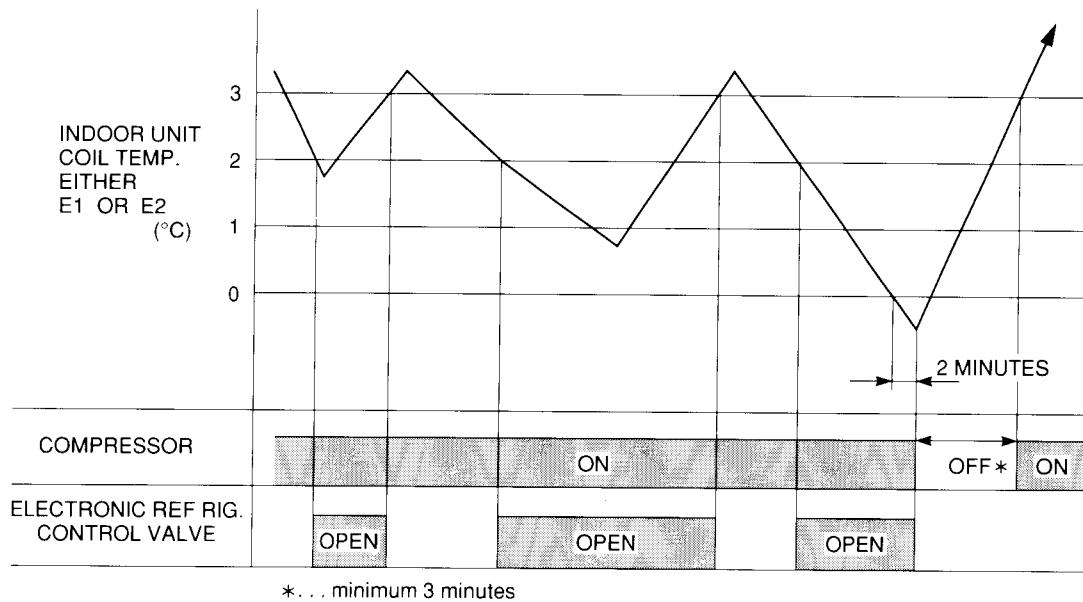


Fig. 11

2

Chart Explanations and notes

- ❑ This chart shows when the **electronic refrigerant control valve** opens to regulate the temperature of the indoor unit coil to prevent freezing.
- ❑ Freeze prevention is controlled by the temperature of the indoor heat exchanger coil as sensed by either sensor **E1** (located at the entrance of the coil) or sensor **E2** (located in the middle of the coil). Whichever sensor has the lower temperature controls the freeze prevention cycle.
- ❑ When the coil temperature falls below 2°C, the electronic refrigerant control valve opens in 5 intervals at 30 steps/30seconds until the temperature reaches 3°C.
- ❑ If the refrigerant control is not effective and the temperature continues to drop and stays below 0°C for 2 minutes consecutively, the control circuit stops the compressor. The compressor does not start again until the temperature rises above 3°C. The minimum time the compressor stops for is 3 minutes.
- ❑ The Freeze Prevention function does not become active until 8 minutes after the compressor starts.

2-6 Condensing Temperature Control (Cooling)

Condensing temperature is controlled by the outdoor heat exchanger coil temperature as reported by sensor **C2**.

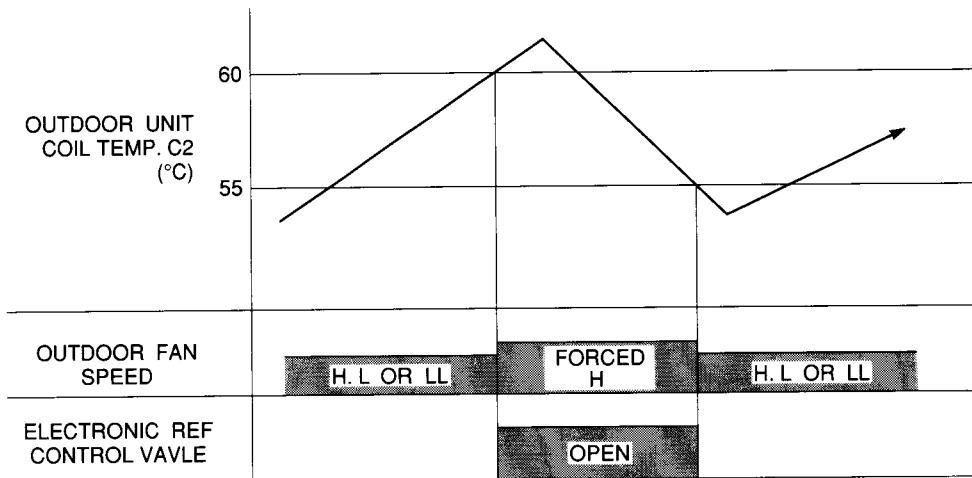


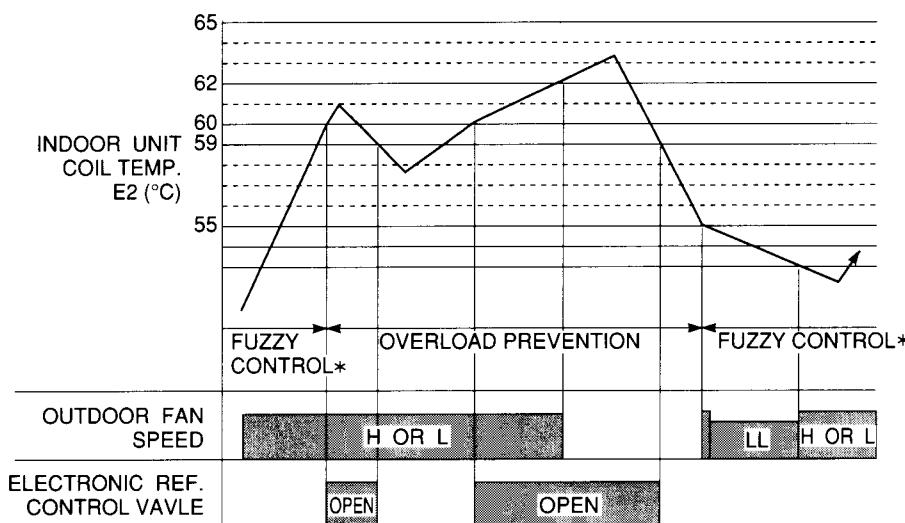
Fig. 12

Chart Explanations and notes

- This chart shows how the outdoor fan speed and the electronic refrigerant control valve react to coil temperature to control condensing temperature.
- Sensor **C2** is located in the middle of the outdoor unit heat exchange coil.
- When **C2** rises above 60°C the electronic refrigerant control valve opens at 50 steps/30 seconds, and the outdoor fan speed is forced to change to high (H) until **C2** falls below 55°C.

2-7 Overload Protection (Heating)

This function prevents overloading of the air conditioner.



* . . . REFER TO "2-13 Electronic Refrigerant Control Valve"

2

Fig. 13

Chart Explanations and notes

- This chart shows how the outdoor fan speed and the electronic refrigerant control valve react to coil temperature to keep the indoor heat exchanger coil from overloading.
- When sensor E2 rises above 60°C the electronic refrigerant control valve opens at 50 steps/30 seconds until E2 falls below 59°C.
- Sensor E2 is located in the middle of the indoor unit heat exchange unit.
- When sensor E2 rises above 62°C, the control circuit stops the outdoor fan motor.

2-8 Discharge Temperature Control (Cooling and Heating)

This function prevents the compressor motor from burnout by overheating.

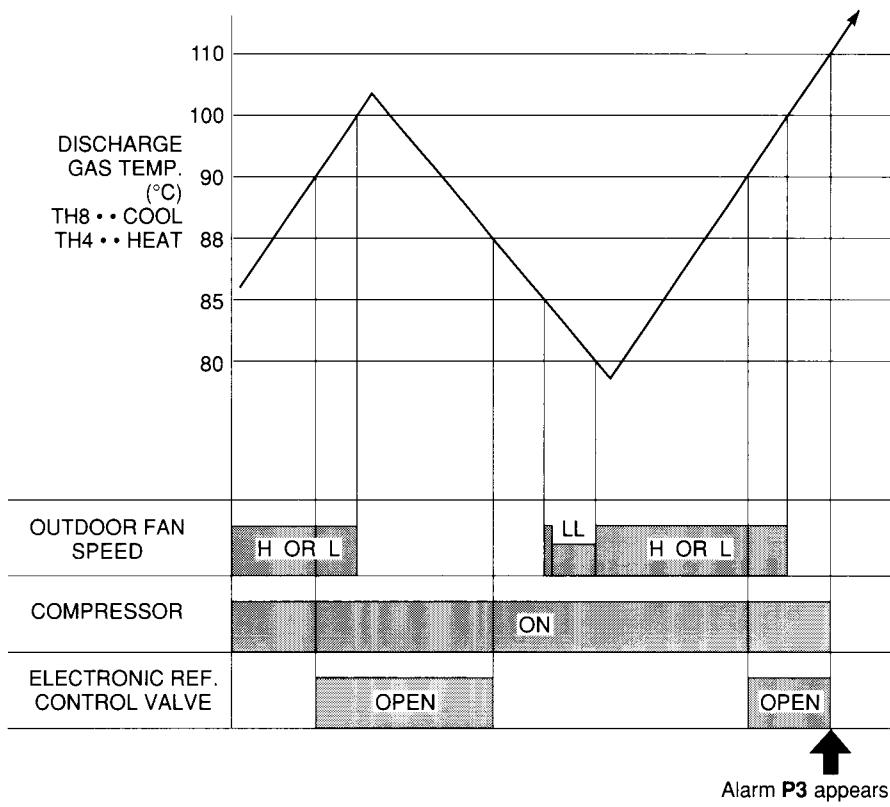


Fig. 14

Chart Summary and Explanations

- Discharge temperature is controlled by **TH8** (discharge gas sensor) in **COOLING** mode, and **TH4** (discharge gas sensor) in **HEATING** mode.
- When the temperature rises **above 90°C** the electronic refrigerant control valve opens at 50 steps/30 seconds until the temperature falls **below 88°C**.
- During **HEATING** operation, when the temperature rises **above 100°C**, the control circuit stops the outdoor fan motor until the temperature falls below 85°C. Note that this control does not function during **COOLING** operation.
- For both **COOLING** and **HEATING** modes, if the temperature reaches **110°C** the operation shuts down and alarm **P3** appears on the control panel.

2-9 Auto Mode for Automatic Heating/Cooling Switching

- When the AUTO mode is selected, the microprocessor calculates the difference between the set temperature and the room temperature, and automatically switches to the COOLING or HEATING mode to maintain the desired temperature.

Room temp. \geq Set temp. \rightarrow COOL
 Room temp. < Set temp. \rightarrow HEAT

This means that if the room temperature is **higher or equal to** the set temperature, **COOLING** operation begins. If the room temperature is **lower** than the set temperature, **HEATING** operation begins.

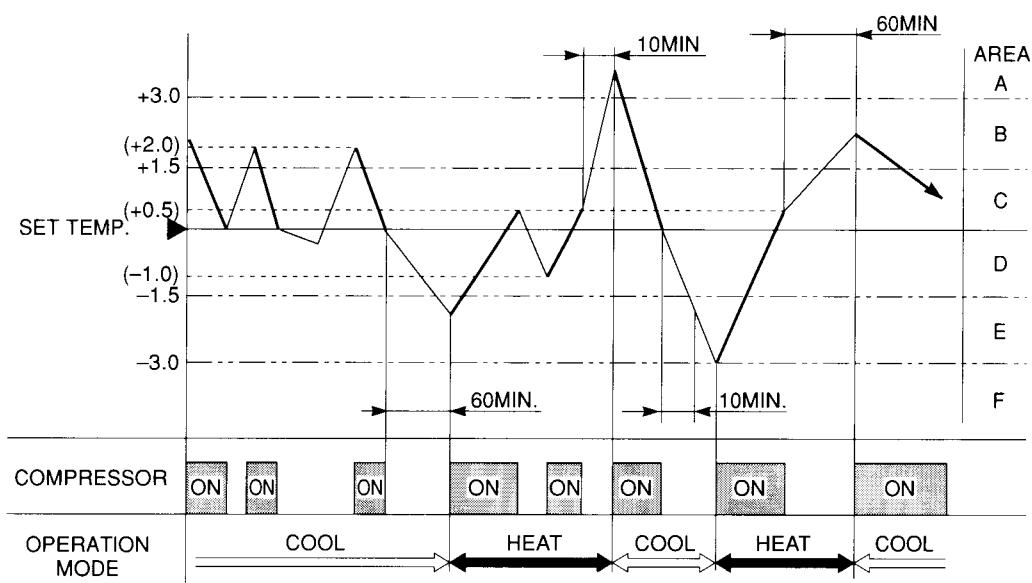


Fig. 15

Chart summary and explanations

- This chart shows how the Operation Mode (**COOLING** or **HEATING**) is determined by the microprocessor taking both the room temperature and the compressor ON time into consideration. It also shows the temperature points at which the cooling and heating modes switch, when the AUTO mode is selected.
- There is no mode change of COOL or HEAT within C and D area. Thus small changes from the set temperature will not cause the unit to switch back and forth erratically between heating and cooling.
- COOL mode is selected in B area and HEAT mode is selected in E area provided that the compressor has stopped for more than 60 minutes.
- COOL mode is selected in A area and HEAT mode is selected in F area provided that the compressor has stopped for more than 10 minutes.
- When the outdoor ambient temperature exceeds 25°C in HEAT mode, the indoor fan speed is set to "L" and stops the compressor.

2-10 Defrosting Control, Outdoor Heat Exchanger Coil (Heating)

When the outdoor temperature is low, frost may gather on the outdoor heat exchanger coil. When this happens, the defrosting system operates. The microprocessor in the outdoor unit monitors the relationship between the temperature of the outdoor heat exchanger coil and the outdoor temperature so it can defrost when necessary.

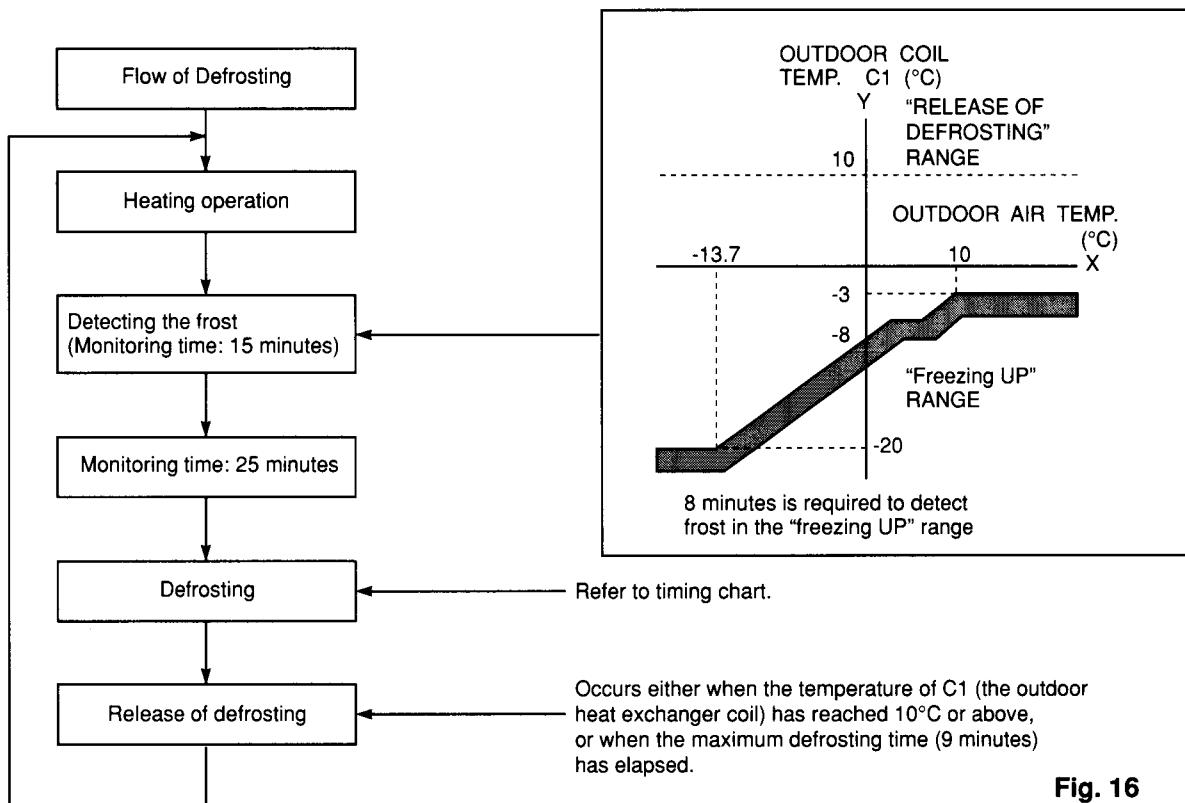


Fig. 16

Timing Chart for Defrosting

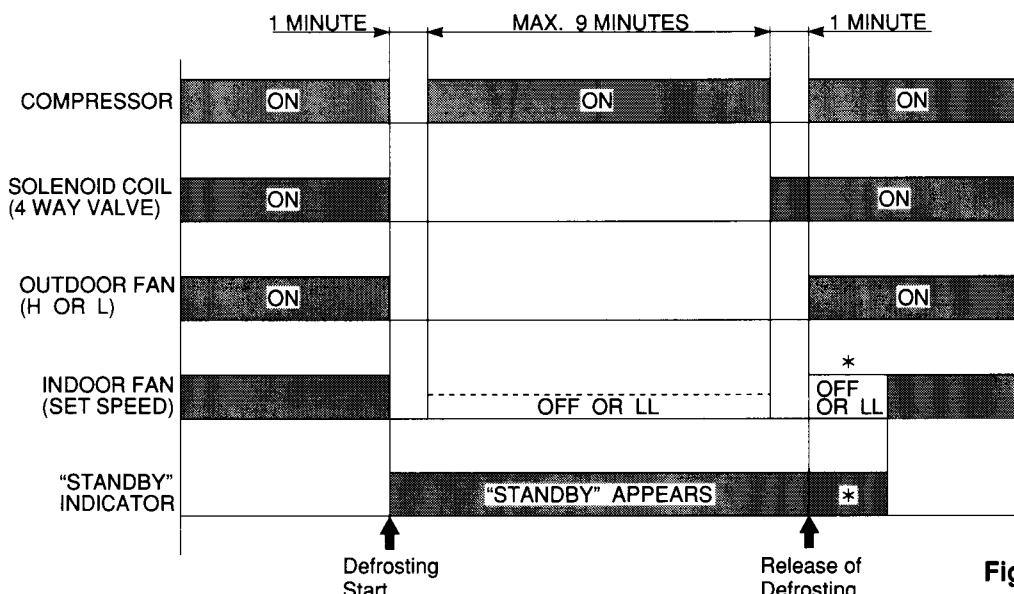


Fig. 17

- During the defrost cycle, **STANDBY** appears on the control panel.
- *.....**Cold Draft Prevention** may operate occasionally

2-11 4-Way Valve, Solenoid Control

The basic function of the 4-way valve is to direct the refrigerant in the correct direction according to the Operation Mode (**COOLING** or **HEATING**) selected. Refer to Section 1-5 **Refrigerant Flow Diagram**.

The following two charts show conditions of the controls and functions listed in the left hand column when the solenoid is **ON** or **OFF**. Chart (A) on this page shows the relationships when the temperature control is in **NORMAL** mode, and Chart (B) on the next page shows the relationships when the control panel is set to **AUTO** mode.

(A) Normal Control Mode

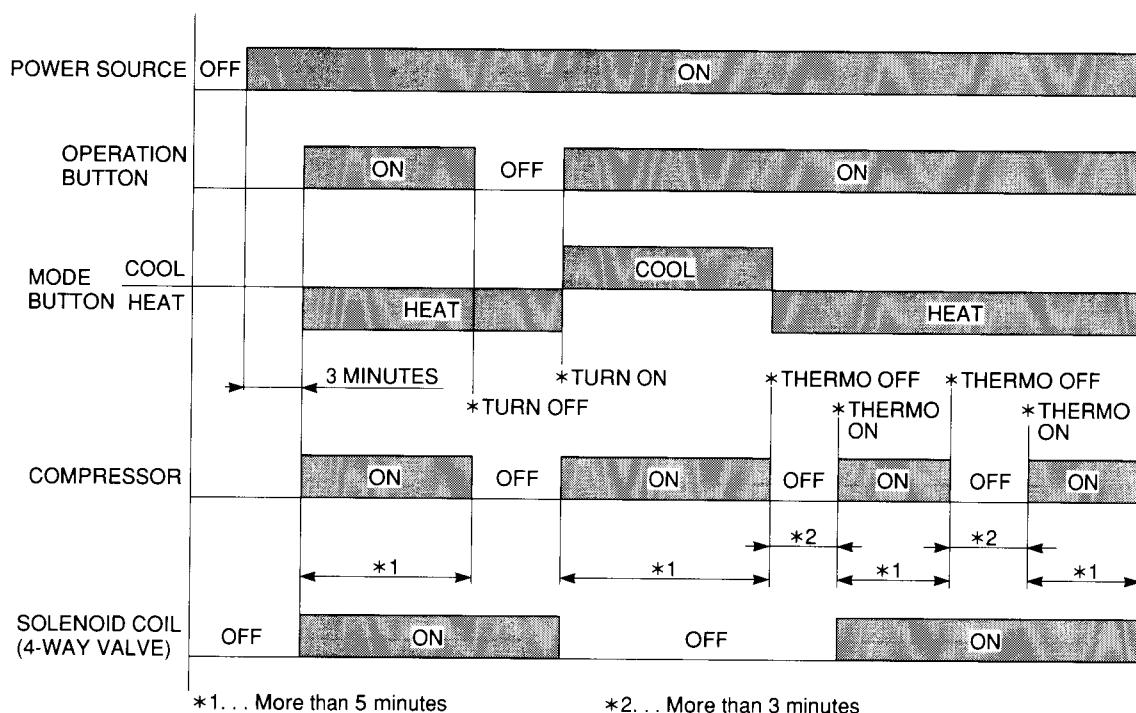


Fig. 18

Chart Summary and explanations

- ❑ For the first 3 minutes after power is first applied, the 4-way valve remains OFF and the compressor will not operate, even if the ON button is pushed.
- ❑ If the 4-way valve is turned OFF with the compressor operating, the air conditioner operates in COOLING mode. See Table below.
- ❑ If the 4-way valve is turned ON with the compressor operating, the air conditioner operates in HEATING mode. See Table below.

Operation Mode	4-way valve solenoid	Compressor
COOLING	OFF	ON
HEATING	ON	

(B) AUTO Control Mode

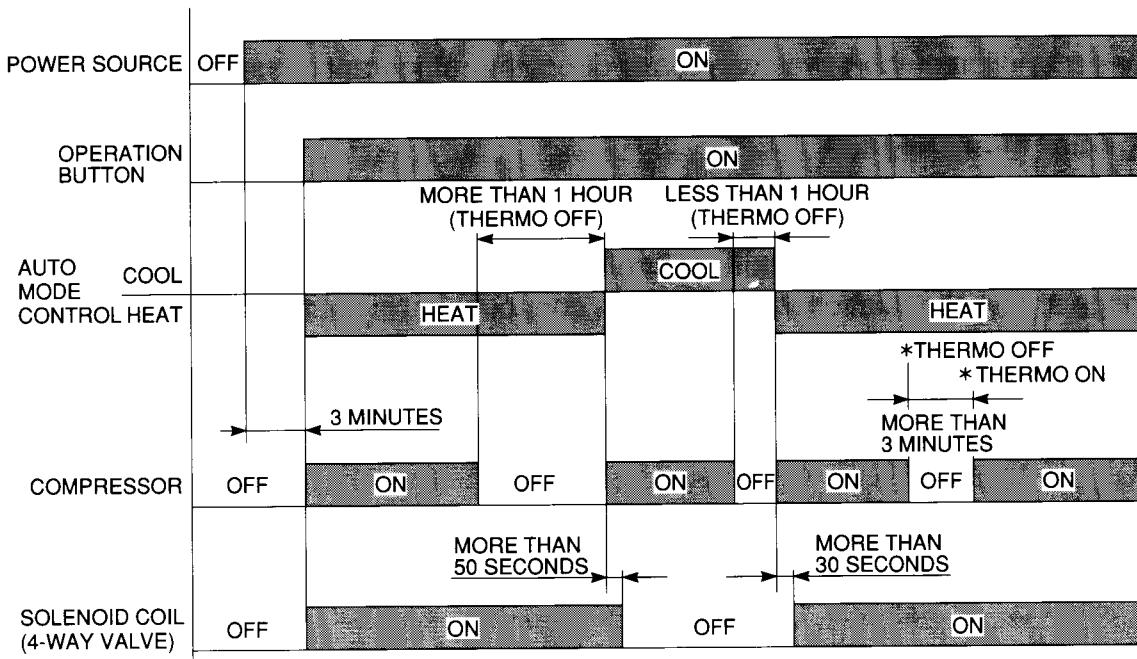


Fig. 19

When the Compressor has stopped while in **AUTO** mode, the 4-way valve switches with different delays according to the following conditions:

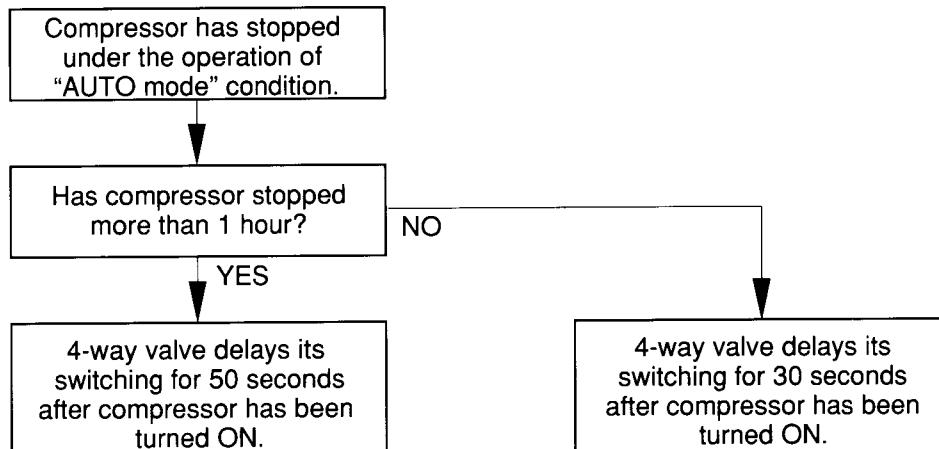


Fig. 20

2-12 Automatic Restart After Power Interruption

When the power comes back on after a power failure, the air conditioner will start again automatically at the same settings as before the failure. In order for the settings to be saved, the battery back-up switch must be set to **ON**, as described below.

- Set the battery back-up switch to ON.
 - The battery back-up switch is located on the back of the P.C.B. Ass'y on the reverse side of the control panel. See Fig. 21.

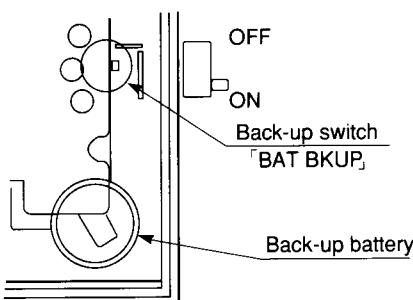


Fig. 21

2-13 Electronic Refrigerant Control Valve

- This valve allows very precise and smooth control of the amount of refrigerant flowing in the system. Since the valve is operated by a step motor, the control circuits can open or close it in very exact amounts, so the degree of heating or cooling can be changed by just a little, or changed very quickly or slowly.

(Completely close 0 step)

(Full open 500 ± 20 step)

Model	Min. open		Max. open
	HEAT	COOL	
SPW-V452GHE8	100 step	125 step	480 step

Fuzzy Control

Fuzzy Control is a special kind of decision making built into the control system. It regulates the functions of heating and cooling, as well as some of the processes inside the unit, by taking account of many different conditions of temperature, fan speed, etc. These control circuits work automatically to send just the right amount of refrigerant through the **Electronic Refrigerant Control Valve**.

2-14 Compressor Discharge Gas Temperature

(A) Cooling

Indoor temp. (°C)	20 – 25		26 – 28	29 – 32
Outdoor temp. (°C)	13 or less	14 – 16	27 – 35	36 – 43
Compressor discharge gas temp. (°C)	40 – 80	40 – 90	60 – 100	70 – 105

(B) Heating (Except During Defrosting)

Indoor temp. (°C)	18 – 21		22 – 25			26 – 30		
Outdoor temp. (°C)	0 or less	1 – 10	0 or less	1 – 10	11 – 21	0 or less	1 – 10	11 – 21
Compressor discharge gas temp. (°C)	40 – 80	50 – 90	40 – 90	50 – 100	60 – 105	50 – 90	60 – 100	70 – 105

- Operate the unit at least 30 minutes to stabilize the discharge temperature.
- The above discharge temperature was measured with a 15m tubing length.
The temperature may vary with tubing length.

2-15 Compressor Current Detection Circuit

- The Compressor Current Detection Circuit detects the compressor current and, depending on the current range, can shut down the compressor motor so it will not be damaged from too much current.
- Too much current can be caused by several factors, particularly mechanical seizing of the compressor or liquid backflow. Either of these conditions can hold the compressor to run, and thus drawing so much current that the motor can burn out.

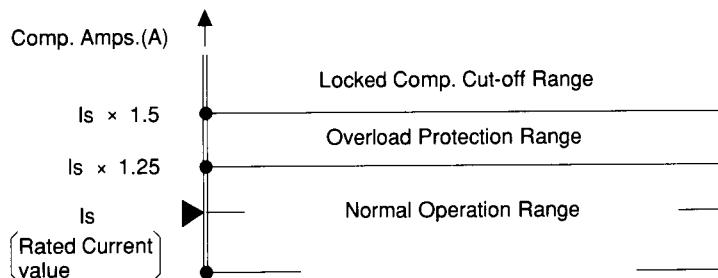


Fig. 22

Outdoor Model	Rated Current Value Is (A)	Overload Protection Is x 1.25 (A)	Locked Compressor Cut-off Is x 1.5 (A)
SPW-C452GH8	6	7.8	9.4

Chart Summary and Explanations

- Overload Protection**
 - When the detected current is 1.25 – 1.5 times greater than the rated current value (Is) and continues for 30 seconds, both compressor and outdoor fan stop (Thermostat OFF).
 - After 3-minute pause, if the air conditioner is ready for Thermostat ON, it starts again. However, if the function mentioned above repeats **twice within 30 minutes**, the control panel displays the alarm message **H1, compressor overload**.
- Locked Compressor Cut-off**
 - When the detected current is **1.5 times greater** than the rated current value (Is) and **continues for 2 seconds**, both compressor and outdoor fan stop (Thermostat OFF).
 - After 3-minute pause, if the air conditioner is ready for Thermostat ON, it starts again. However, if the function mentioned above repeats **twice**, the control panel displays the alarm message **H2, compressor load**.
- Failure of Compressor Current Detection Circuit**
 - When the Compressor Current Detection Circuit fails to detect the compressor current **within 2 seconds of compressor start-up**, both compressor and outdoor fan stop (Thermostat OFF).
 - After 3-minute pause, if the air conditioner is ready for Thermostat ON, it starts again. However, when the circuit fails to detect the current twice in a row, the control panel displays alarm message **H3, Failure of compressor Current Detection Circuit**.

2-16 Dry Operation (Dehumidification)

DRY operation uses the ability of the cooling cycle to remove moisture from the air, but by running at a low level, to dehumidify without greatly reducing room temperature. In this mode, the microprocessor automatically controls the ON-OFF operation between +2 and -2 of the set temperature.

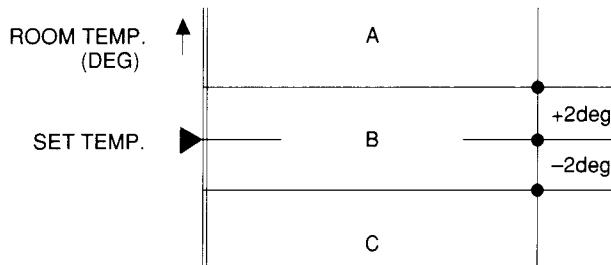


Fig. 23

2

- A range:** When the room temperature is in this range, cooling operation starts. However, when the temperature is below 18°C, the cooling operation does not start.
- B range:** When the room temperature is in this range, the air conditioner automatically repeats the DRY cycle of 5 minutes **ON**, 4 minutes **OFF** – see Fig. 24 for details.
- C range:** When the room temperature is in this range, the control circuit shuts off the air conditioner entirely.

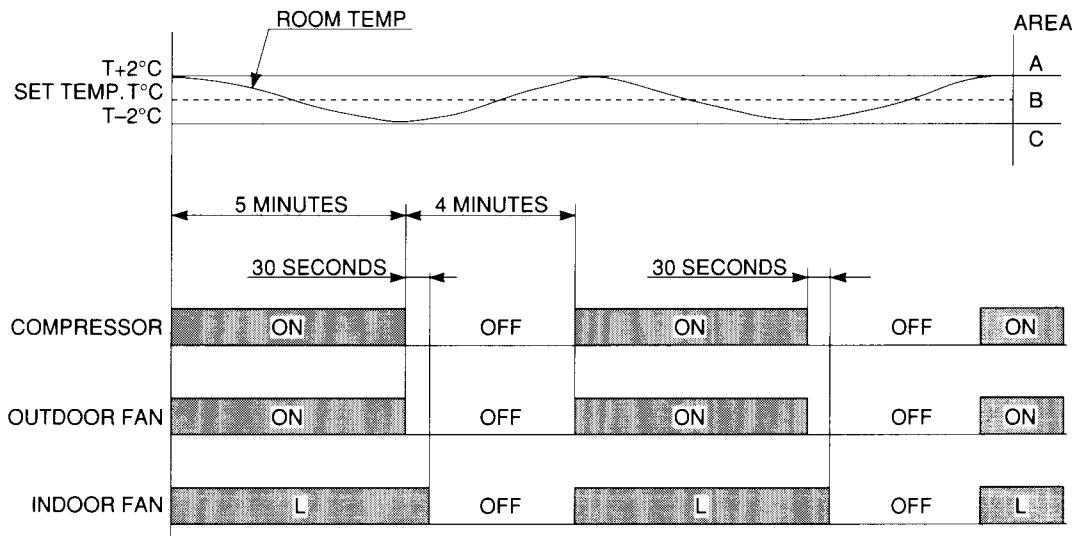


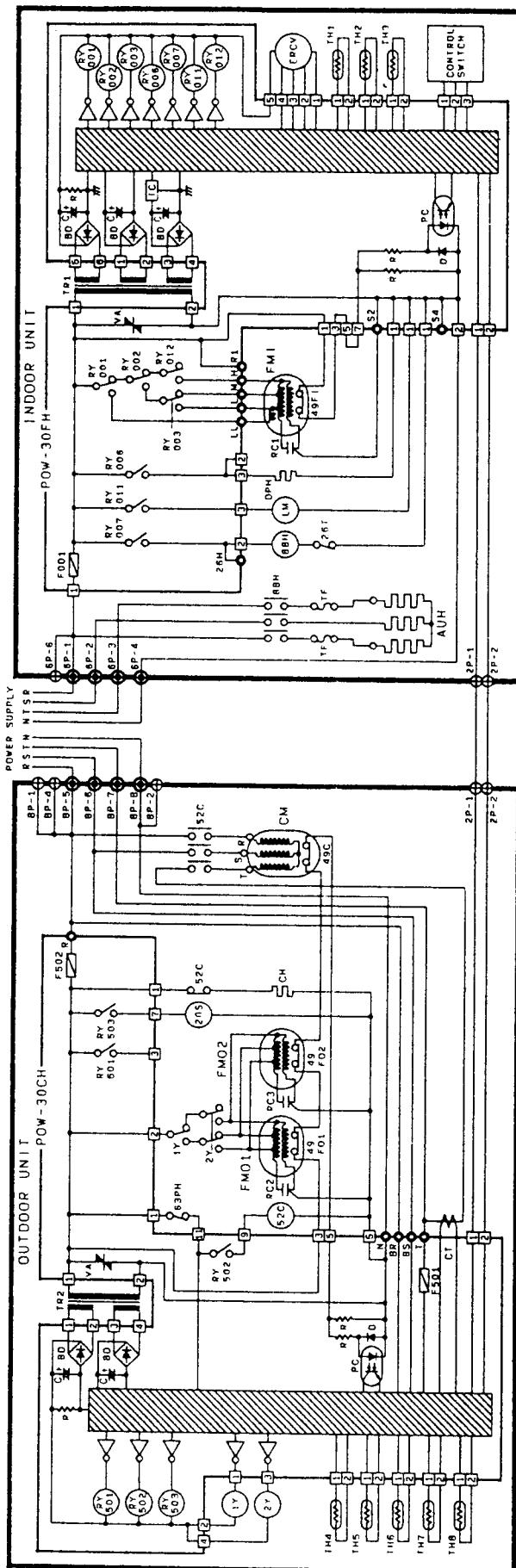
Fig. 24

- The indoor fan speed is automatically set to L and cannot be adjusted.
- When the outdoor temperature falls below 15°C, the control circuit stops the **DRY** operation regardless of room temperature.
- When the set temperature is either 18 or 19°C, the set temperature is considered the same as 20°C.
- Room temperature is monitored every 9 minutes when it is in the **B** range to select the best operation mode.

3. ELECTRICAL DATA

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3-1 Schematic Diagram, Indoor and Outdoor Units

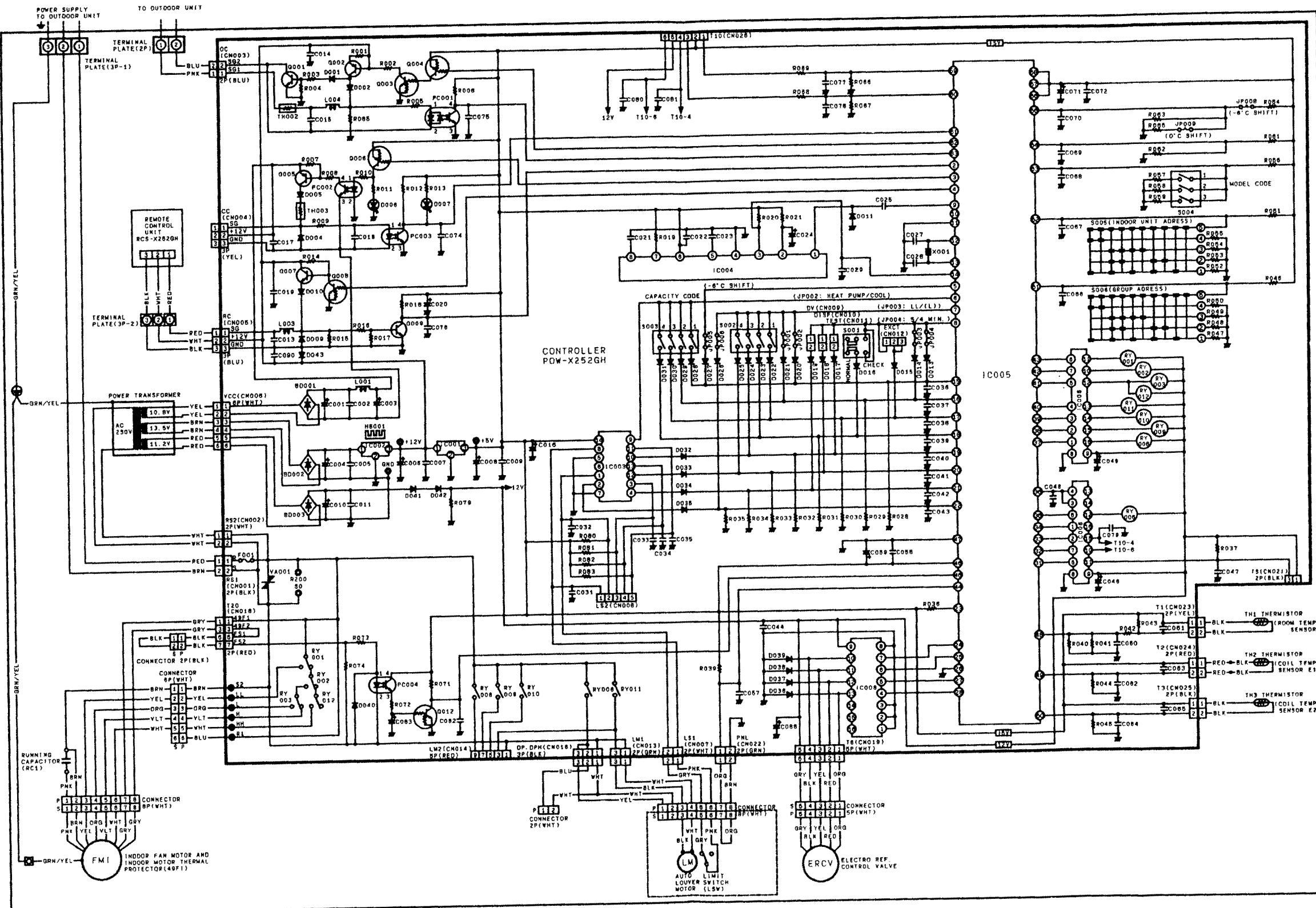


SYMBOLS	DESCRIPTION
I	INDOOR UNIT
T	THERMO FUSE
TF	AUXILIARY HEATER
BBH	AUX MAGNETIC CONTACTOR
DPH	OVER HEAT PROTECTOR
LH	AUTO LOUVER MOTOR
DPH	DEW PROOF HEATER
IM1	INDOOR FAN MOTOR
OSFI	COMPRESSOR MOTOR THERMAL PROTECTOR
AC	BURNING CAPACITOR
TR1	POWER TRANSFORMER
ERCY	ELECTRO REF. CONTROL VALVE
-TH1	THERMISTOR (ROOM THERMISTOR)
-TH2	THERMISTOR (INDOOR COIL E1)
-TH3	THERMISTOR (INDOOR COIL E2)
POW-30FH	FUSE
F001	RY001: 002: 003
RY006: 007: 011	AUXILIARY RELAY
RY012	AUXILIARY RELAY

SYMBOLS	DESCRIPTION
OUTDOOR UNIT	
IY-2Y	AUXILIARY RELAY
Td4	TERMINATOR (DISCHARGE GAS)
THS	TERMINATOR (OUTDOOR TEMPERATURE)
TH6	TERMINATOR (OUTDOOR COIL C1)
TH7	TERMINATOR (OUTDOOR COIL C2)
T1B	TERMINATOR (DISCHARGE GAS)
TR2	OVER TRANSFORMER
CW	COMPRESSOR MOTOR
JBC	COMPRESSOR MOTOR THERMAL PROTECTOR
CH	CRANK CASE HEATER
ZIV5	FOUR WAY VALVE
FMO1, 2	OUTDOOR FAN MOTOR
49F01, 2	OUTDOOR FAN MOTOR THERMAL PROTECTOR
R02, 3	BURNING CAPACITOR
S1PH	HIGH PRESSURE SWITCH
S2C	COMPRESSOR MOTOR MAGNETIC CONTACTOR
POW-30CH	OUTDOOR CONTROLLER
E01, 502	FUSE
CT	CURRENT TRANSMITTER
RY011-302: 503	AUXILIARY RELAY

Fig. 25

3-2 Electric Wiring Diagram, Indoor Unit



3-3 Indoor Unit P.C.B. Ass'y Component List (POW-30FH)

SYMBOLS	DESCRIPTION	SPECIFICATIONS
B004	CAPACITOR	0.0250AC103100
C001	CAPACITOR	2200 μ F 20% 50V
C002	CAPACITOR	0.022 μ F 50V
C003	CAPACITOR	100 μ F 20% 25V
C004	CAPACITOR	2200 μ F 20% 25V
C005	CAPACITOR	0.022 μ F 50V
C006	CAPACITOR	100 μ F 20% 25V
C007	CAPACITOR	0.022 μ F 50V
C008	CAPACITOR	100 μ F 20% 16V
C009	CAPACITOR	0.022 μ F 50V
C010	CAPACITOR	2200 μ F 20% 25V
C011	CAPACITOR	0.022 μ F 50V
C013	CAPACITOR	0.01 μ F 10% 50V
C014	CAPACITOR	0.022 μ F 50V
C015	CAPACITOR	0.01 μ F 250V
C016	CAPACITOR	47 μ F 20% 16V
C017	CAPACITOR	0.022 μ F 50V
C018	CAPACITOR	0.001 μ F 10% 50V
C019	CAPACITOR	0.022 μ F 50V
C020	CAPACITOR	47 μ F 20% 16V
C021	CAPACITOR	0.001 μ F 10% 50V
C022	CAPACITOR	0.01 μ F 10% 50V
C023	CAPACITOR	0.001 μ F 10% 50V
C024	CAPACITOR	22 μ F 20% 50V
C025	CAPACITOR	0.047 μ F 10% 50V
C027	CAPACITOR	15PF 5% 50V
C028	CAPACITOR	15PF 5% 50V
C029	CAPACITOR	0.001 μ F 10% 50V
C031	CAPACITOR	0.01 μ F 10% 50V
C032	CAPACITOR	0.01 μ F 10% 50V
C033	CAPACITOR	0.01 μ F 10% 50V
C034	CAPACITOR	0.01 μ F 10% 50V
C035	CAPACITOR	0.01 μ F 10% 50V
C036	CAPACITOR	0.001 μ F 10% 50V
C037	CAPACITOR	0.001 μ F 10% 50V
C038	CAPACITOR	0.001 μ F 10% 50V
C039	CAPACITOR	0.001 μ F 10% 50V
C040	CAPACITOR	0.001 μ F 10% 50V
C041	CAPACITOR	0.001 μ F 10% 50V
C042	CAPACITOR	0.001 μ F 10% 50V
C043	CAPACITOR	0.001 μ F 10% 50V
C044	CAPACITOR	0.022 μ F 50V
C045	CAPACITOR	0.001 μ F 10% 50V
C046	CAPACITOR	47 μ F 20% 25V
C047	CAPACITOR	0.001 μ F 10% 50V
C048	CAPACITOR	0.01 μ F 10% 50V
C049	CAPACITOR	47 μ F 20% 25V
C057	CAPACITOR	0.022 μ F 50V
C058	CAPACITOR	0.022 μ F 50V
C059	CAPACITOR	100 μ F 20% 16V
C060	CAPACITOR	0.047 μ F 10% 50V
C061	CAPACITOR	0.022 μ F 10% 50V
C062	CAPACITOR	0.047 μ F 10% 50V
C063	CAPACITOR	0.022 μ F 10% 50V
C064	CAPACITOR	0.047 μ F 10% 50V
C065	CAPACITOR	0.022 μ F 10% 50V
C066	CAPACITOR	0.01 μ F 50V
C067	CAPACITOR	0.01 μ F 50V
C068	CAPACITOR	0.01 μ F 50V
C069	CAPACITOR	0.01 μ F 50V
C070	CAPACITOR	0.01 μ F 50V
C071	CAPACITOR	100 μ F 20% 16V
C072	CAPACITOR	0.022 μ F 50V
C074	CAPACITOR	0.001 μ F 10% 50V
C075	CAPACITOR	0.001 μ F 10% 50V
C076	CAPACITOR	0.001 μ F 10% 50V
C077	CAPACITOR	0.001 μ F 10% 50V
C078	CAPACITOR	0.001 μ F 10% 50V
C079	CAPACITOR	0.001 μ F 10% 50V
C080	CAPACITOR	0.001 μ F 10% 50V

SYMBOLS	DESCRIPTION	SPECIFICATIONS
C081	CAPACITOR	0.001 μ F 10% 50V
C082	CAPACITOR	0.01 μ F 50V
C083	CAPACITOR	10 μ F 20% 50V
C088	CAPACITOR	47 μ F 20% 25V
C089	CAPACITOR	0.022 μ F 50V
C090	CAPACITOR	0.047 μ F 10% 50V
CN001	CONNECTOR	J5289-2A-BL
CN002	CONNECTOR	J5289-2A-WH
CN003	CONNECTOR	J8263B-0202-B
CN004	CONNECTOR	J8263B-0302-Y
CN005	CONNECTOR	J8263B-0302-B
CN006	CONNECTOR	J8263-0612-0
CN007	CONNECTOR	J8263B-0202-W
CN008	CONNECTOR	J8263-0512
CN009	CONNECTOR	JSB2P-HVQ-CA. -E
CN010	CONNECTOR	JSB2P-HVQ-CA.
CN011	CONNECTOR	JSB2P-HVQ-CA. -R
CN012	CONNECTOR	J8263-0312-2
CN013	CONNECTOR	J8263B-0205-G
CN015	CONNECTOR	J5289-2A-RE
CN016	CONNECTOR	J5289-3A-BL
CN018	CONNECTOR	J8263-0414-2
CN019	CONNECTOR	JB5P-SHF-1WH
CN020	CONNECTOR	J8263-0512-2
CN021	CONNECTOR	J8263-0214-1
CN022	CONNECTOR	J8263B-0202-G
CN023	CONNECTOR	J8263B-0202-Y
CN024	CONNECTOR	J8263B-0202-R
CN025	CONNECTOR	J8263B-0202-K
CN028	CONNECTOR	J8180-6P
D001	DIODE	DSK10E-BT
D002	DIODE	DSK10E-BT
D004	DIODE	DSB010-TA
D005	DIODE	DSK10E-BT
D006	DIODE	SLP-2818
D007	DIODE	SLP-181B
D009	DIODE	DSB010-TE
D010	DIODE	DSK10E-BT
D011	DIODE	DSB010-TA
D013	DIODE	DSB010-TA
D040	DIODE	DSB010-TA
D041	DIODE	DSK10C-BT
D042	DIODE	DSK10C-BT
D043	DIODE	DSB010-TA
BD001	BRIDGE DIODE	DBA10C
BD002	BRIDGE DIODE	DBA10C
BD003	BRIDGE DIODE	DBF20C
F001	FUSE	250V 5A
HS001	HEAT SINK	
IC001	IC	L7805ML
IC002	IC	L7812-HS
IC003	IC	MLC74HC14AM
IC004	IC	M5295L
IC005	IC	UPD78328GF
IC006	IC	LB1234
IC007	IC	LB1234
IC008	IC	TD62003AP
JP001	JUMPER	JP05B
JP002	JUMPER	JP05B
JP003	JUMPER	JP05B
JP004	JUMPER	JP05B
JP005	JUMPER	JP05B
JP006	JUMPER	JP05B
JP008	JUMPER	JP05B
JP009	JUMPER	JP05B
L001	COIL	LEL0909-101K
L003	COIL	LEL0909-101K
L004	COIL	LEL0909-101K
PC001	PHOTOCOUPLER	PC814A

SYMBOLS	DESCRIPTION	SPECIFICATIONS
PC002	PHOTOCOUPLER	PC817B
PC003	PHOTOCOUPLER	PC817B
PC004	PHOTOCOUPLER	PC817B
Q001	TRANSISTOR	2SC3117-T
Q002	TRANSISTOR	2SA1249-T
Q003	TRANSISTOR	2SC3398-TA
Q004	TRANSISTOR	2SA1344-TA
Q005	TRANSISTOR	2SA1249-T
Q006	TRANSISTOR	2SA1344-TA
Q007	TRANSISTOR	2SC3117-T
Q008	TRANSISTOR	2SC3398-TA
Q009	TRANSISTOR	2SC2812-L7-TA
Q012	TRANSISTOR	2SC3398-TA
R001	RESISTOR(CERMET)	4.7k Ω 5% 1/8W
R002	RESISTOR(CERMET)	1k Ω 5% 1/8W
R003	RESISTOR(CERMET)	4.7k Ω 5% 1/8W
R004	RESISTOR(CERMET)	4.7k Ω 5% 1/8W
R005	RESISTOR(OXIDE)	820 Ω 5% 2W
R006	RESISTOR(CERMET)	4.7k Ω 5% 1/8W
R007	RESISTOR(CERMET)	4.7k Ω 5% 1/8W
R008	RESISTOR(CERMET)	1k Ω 5% 1/8W
R009	RESISTOR(CERMET)	1.5k Ω 5% 1/4W
R010	RESISTOR(CERMET)	560 Ω 5% 1/8W
R011	RESISTOR(CERMET)	560 Ω 5% 1/8W
R012	RESISTOR(CERMET)	4.7k Ω 5% 1/8W
R013	RESISTOR(CERMET)	1k Ω 5% 1/8W
R014	RESISTOR(CERMET)	4.7k Ω 5% 1/8W
R015	RESISTOR(CERMET)	1.8k Ω 5% 1/4W
R016	RESISTOR(CERMET)	5.6k Ω 5% 1/4W
R017	RESISTOR(CERMET)	1k Ω 5% 1/4W
R018	RESISTOR(CERMET)	4.7k Ω 5% 1/8W
R019	RESISTOR(CERMET)	4.7k Ω 5% 1/8W
R020	RESISTOR(CERMET)	4.7k Ω 5% 1/8W
R021	RESISTOR(CERMET)	15k Ω 1% 1/10W
R028	RESISTOR(CERMET)	47k Ω 5% 1/8W
R029	RESISTOR(CERMET)	47k Ω 5% 1/8W
R030	RESISTOR(CERMET)	47k Ω 5% 1/8W
R031		

3-4 Electric Wiring Diagram, Outdoor Unit

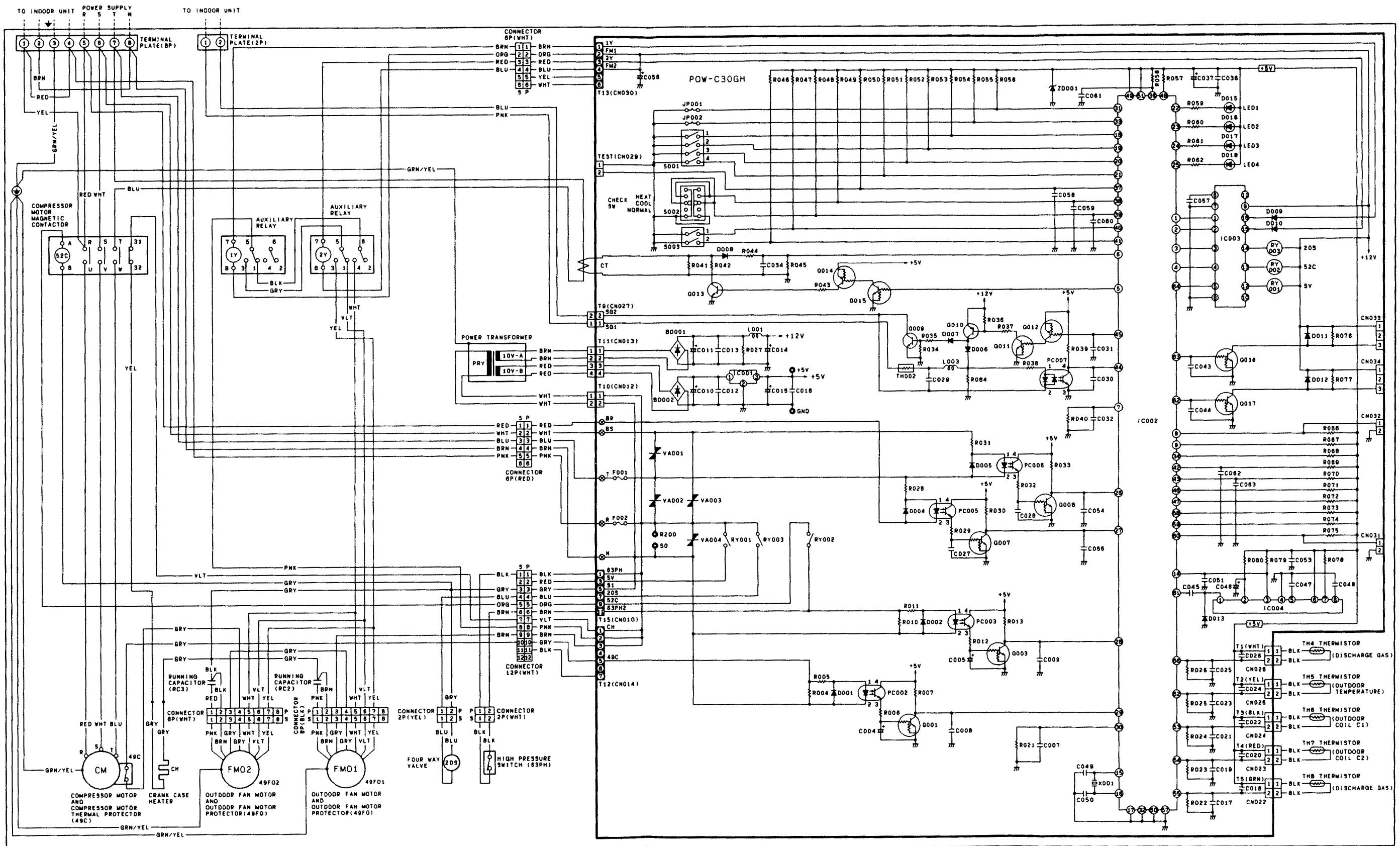


Fig. 27

3-5 Outdoor P.C.B. Ass'y Component List (POW-30CH)

SYMBOLS	DESCRIPTION	SPECIFICATIONS
B006	CAPACITOR	COMPOSITE P. 8250AC103100
C004	CAPACITOR	4.7μF 20% 50V
C005	CAPACITOR	4.7μF 20% 50V
C007	CAPACITOR	0.01μF 25V
C008	CAPACITOR	0.01μF 25V
C009	CAPACITOR	0.01μF 25V
C010	CAPACITOR	1000μF 20% 25V
C011	CAPACITOR	2200μF 20% 25V
C012	CAPACITOR	0.022μF 25V
C013	CAPACITOR	0.022μF 25V
C014	CAPACITOR	100μF 20% 25V
C015	CAPACITOR	220μF 20% 16V
C016	CAPACITOR	0.022μF 25V
C017	CAPACITOR	0.047μF 50V
C018	CAPACITOR	0.022μF 25V
C019	CAPACITOR	0.047μF 50V
C020	CAPACITOR	0.022μF 25V
C021	CAPACITOR	0.047μF 50V
C022	CAPACITOR	0.022μF 25V
C023	CAPACITOR	0.047μF 50V
C024	CAPACITOR	0.022μF 25V
C025	CAPACITOR	0.047μF 50V
C026	CAPACITOR	0.022μF 25V
C027	CAPACITOR	0.01μF 25V
C028	CAPACITOR	0.01μF 25V
C029	CAPACITOR	0.01μF 250V
C030	CAPACITOR	0.001μF 10% 50V
C031	CAPACITOR	0.001μF 10% 50V
C032	CAPACITOR	0.047μF 50V
C034	CAPACITOR	100μF 20% 16V
C035	CAPACITOR	0.01μF 25V
C036	CAPACITOR	0.022μF 25V
C037	CAPACITOR	100μF 20% 16V
C043	CAPACITOR	0.01μF 25V
C044	CAPACITOR	0.01μF 25V
C045	CAPACITOR	0.047μF 50V
C046	CAPACITOR	10μF 20% 50V
C047	CAPACITOR	0.001μF 10% 50V
C048	CAPACITOR	0.001μF 10% 50V
C049	CAPACITOR	15PF 5% 50V
C050	CAPACITOR	15PF 5% 50V
C051	CAPACITOR	0.01μF 25V
C053	CAPACITOR	0.01μF 25V
C054	CAPACITOR	0.01μF 25V
C055	CAPACITOR	0.01μF 25V
C056	CAPACITOR	4.7μF 20% 25V
C057	CAPACITOR	0.01μF 50V
C058	CAPACITOR	0.047μF 50V
C059	CAPACITOR	0.047μF 50V
C060	CAPACITOR	0.047μF 50V
C061	CAPACITOR	0.047μF 50V
C062	CAPACITOR	0.047μF 50V
C063	CAPACITOR	0.047μF 50V
CN002	CONNECTOR	JBP-B
CN003	CONNECTOR	JBP-B
CN012	CONNECTOR	J5289-2A-WH
CN013	CONNECTOR	J8263B-0402-W
CN015	CONNECTOR	JBP-B
CN021	CONNECTOR	JBP-B
CN022	CONNECTOR	J8263B-0202-G
CN023	CONNECTOR	J8263B-0202-R
CN024	CONNECTOR	J8263B-0202-W
CN025	CONNECTOR	J8263B-0202-Y
CN026	CONNECTOR	J8263B-0202-W
CN027	CONNECTOR	J8263B-0202-B
CN029	CONNECTOR	JSB2P-HVQ-CA.-R
CN031	CONNECTOR	JSB2P-HVQ-CA.-B
CN032	CONNECTOR	JSB2P-HVQ-CA.-
CN033	CONNECTOR	J8263B-0302-K
CN034	CONNECTOR	J8263B-0302-R

SYMBOLS	DESCRIPTION	SPECIFICATIONS
D001	DIODE	GMA01
D002	DIODE	GMA01
D004	DIODE	GMA01
D005	DIODE	GMA01
D006	DIODE	DSK10E-BT
D007	DIODE	DSK10E-BT
D008	DIODE	S8007-03SPA
D009	DIODE	GMA01
D010	DIODE	GMA01
D011	DIODE	GMA01
D012	DIODE	GMA01
D013	DIODE	GMA01
D015	DIODE	SLP-181B
D016	DIODE	SLP-181B
D017	DIODE	SLP-181B
D018	DIODE	SLP-181B
BD001	BRIDGE DIODE	DBA10C
BD002	BRIDGE DIODE	DBA20C
F001	FUSE	250V 5A
F002	FUSE	250V 5A
IC001	IC	L7805ML
IC002	IC	UD78214CW
IC003	IC	LB1233
IC004	IC	M5295L
JP001	JUMPER	JP05B
JP002	JUMPER	JP05B
L001	COIL	LEL0909-101K
L003	COIL	LEL0909-101K
PC002	PHOTOCOUPLER	PC817B
PC003	PHOTOCOUPLER	PC817B
PC005	PHOTOCOUPLER	PC817B
PC006	PHOTOCOUPLER	PC817B
PC007	PHOTOCOUPLER	PC814A
Q001	TRANSISTOR	2SC3402
Q003	TRANSISTOR	2SC3402
Q007	TRANSISTOR	2SC3402
Q008	TRANSISTOR	2SC3402
Q009	TRANSISTOR	2SC3117-T
Q010	TRANSISTOR	2SA1249-T
Q011	TRANSISTOR	2SC3402
Q012	TRANSISTOR	2SA1423
Q013	TRANSISTOR	2SC536F
Q014	TRANSISTOR	2SA1423
Q015	TRANSISTOR	2SC3402
Q016	TRANSISTOR	2SC3402
Q017	TRANSISTOR	2SC3402
R004	RESISTOR(OXIDE)	120kΩ 5% 2W
R005	RESISTOR(OXIDE)	120kΩ 5% 2W
R006	RESISTOR(CARBON)	560Ω 5% 1/4W
R007	RESISTOR(CARBON)	10kΩ 5% 1/4W
R010	RESISTOR(OXIDE)	120kΩ 5% 2W
R011	RESISTOR(OXIDE)	120kΩ 5% 2W
R012	RESISTOR(CARBON)	560Ω 5% 1/4W
R013	RESISTOR(CARBON)	10kΩ 5% 1/4W
R021	RESISTOR(CARBON)	39kΩ 5% 1/4W
R022	RESISTOR(METAL)	4.3kΩ 1% 1/4W
R023	RESISTOR(METAL)	4.7kΩ 1% 1/4W
R024	RESISTOR(METAL)	4.7kΩ 1% 1/4W
R025	RESISTOR(METAL)	4.7kΩ 1% 1/4W
R026	RESISTOR(METAL)	4.3kΩ 1% 1/4W
R027	RESISTOR(CARBON)	10kΩ 5% 1/4W
R028	RESISTOR(OXIDE)	300kΩ 5% 2W
R029	RESISTOR(CARBON)	560Ω 5% 1/4W
R030	RESISTOR(CARBON)	10kΩ 5% 1/4W
R031	RESISTOR(OXIDE)	300kΩ 5% 2W
R032	RESISTOR(CARBON)	560Ω 5% 1/4W
R033	RESISTOR(CARBON)	10kΩ 5% 1/4W
R034	RESISTOR(CARBON)	1kΩ 5% 1/4W
R035	RESISTOR(CARBON)	2.2kΩ 5% 1/4W
R036	RESISTOR(CARBON)	2.2kΩ 5% 1/4W

SYMBOLS	DESCRIPTION	SPECIFICATIONS
R037	RESISTOR(CARBON)	2.2kΩ 5% 1/4W
R038	RESISTOR(OXIDE)	1kΩ 5% 2W
R039	RESISTOR(CARBON)	10kΩ 5% 1/4W
R040	RESISTOR(METAL)	4.3kΩ 1% 1/4W
R041	RESISTOR(METAL)	1.6kΩ 1% 1/4W
R042	RESISTOR(METAL)	560Ω 1% 1/4W
R043	RESISTOR(CARBON)	1kΩ 5% 1/4W
R044	RESISTOR(CARBON)	1kΩ 5% 1/4W
R045	RESISTOR(CARBON)	47kΩ 5% 1/4W
R046	RESISTOR(CARBON)	10kΩ 5% 1/4W
R047	RESISTOR(CARBON)	10kΩ 5% 1/4W
R048	RESISTOR(CARBON)	10kΩ 5% 1/4W
R049	RESISTOR(CARBON)	10kΩ 5% 1/4W
R050	RESISTOR(CARBON)	10kΩ 5% 1/4W
R051	RESISTOR(CARBON)	10kΩ 5% 1/4W
R052	RESISTOR(CARBON)	10kΩ 5% 1/4W
R053	RESISTOR(CARBON)	10kΩ 5% 1/4W
R054	RESISTOR(CARBON)	10kΩ 5% 1/4W
R055	RESISTOR(CARBON)	10kΩ 5% 1/4W
R056	RESISTOR(CARBON)	10kΩ 5% 1/4W
R057	RESISTOR(CARBON)	10kΩ 5% 1/4W
R058	RESISTOR(CARBON)	10kΩ 5% 1/4W
R059	RESISTOR(CARBON)	560Ω 5% 1/4W
R060	RESISTOR(CARBON)	560Ω 5% 1/4W
R061	RESISTOR(CARBON)	560Ω 5% 1/4W
R062	RESISTOR(CARBON)	560Ω 5% 1/4W
R066	RESISTOR(CARBON)	10kΩ 5% 1/4W
R067	RESISTOR(CARBON)	10kΩ 5% 1/4W
R068	RESISTOR(CARBON)	10kΩ 5% 1/4W
R069	RESISTOR(CARBON)	10kΩ 5% 1/4W
R070	RESISTOR(CARBON)	10kΩ 5% 1/4W
R071	RESISTOR(CARBON)	10kΩ 5% 1/4W
R072	RESISTOR(CARBON)	10kΩ 5% 1/4W
R073	RESISTOR(CARBON)	10kΩ 5% 1/4W
R074	RESISTOR(CARBON)	10kΩ 5% 1/4W
R075	RESISTOR(CARBON)	10kΩ 5% 1/4W
R076	RESISTOR(CARBON)	10kΩ 5% 1/4W
R077	RESISTOR(CARBON)	10kΩ 5% 1/4W
R078	RESISTOR(CARBON)	4.7kΩ 5% 1/4W
R079	RESISTOR(CARBON)	4.7kΩ 5% 1/4W
R080	RESISTOR(CARBON)	15kΩ 5% 1/4W
RY001	RELAY	GVE-12HME-K
RY002	RELAY	GVE-12HME-K
RY003	RELAY	GVE-12HME-K
S001	SWITCH	SJKS1120-4-4
S002	SWITCH	SSSSU12-3
S003	SWITCH	SSSGM22
T001	TRANS	CT422920S-30
TH002	THERMISTOR	HPTH59H02AR1.8
VA001	VARISTOR	ERZC14DK821W
VA002	VARISTOR	ERZC14DK821W
VA003		

4. SERVICE PROCEDURES

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NOTE

As for the above 3 items preceded by *, refer to Electric Wiring Diagrams in Fig. 27 and Fig. 28.

4-1 Troubleshooting

This section explains:

- What the LED codes mean
- What the control panel display screen messages mean
- How to use the flow charts to find and solve problems
- How to use the self-diagnostic tests to find parts that aren't working right

This unit is made to be trouble free, and not need much service. However, with time, moving parts wear out, electronic components break down, and sometimes misuse damages the unit.

The purpose of this section is to help you when the unit is not working properly.

Sometimes your experience will tell you right away where to look for a problem, and when you find it you will know how to fix it at once.

Often, however, all you have is a *symptom* like "poor cooling" or "outside fan doesn't come on." Now you must find out the cause of the problem, and then how to fix it. This section provides several ways to help you go from the symptom to the cause and then the solution.

The first chart, **General Troubleshooting Flow Chart** is divided into two sections: Poor heating and Poor Cooling. Under each heading you will find the main things that can go wrong and cause either of these problems. Sometimes you can start with this chart and find the problem right away, but often you will come here for more suggestions after you have looked at the error code on the control unit display. This chart gives you the "big picture" of problems and solutions.

The other main tool we explain here is the use of the **Alarm Messages**. When a certain part fails or a safety device has shut the unit down, any alpha-numeric codes appears on the display to guide you to the problem.

By understanding the code you can often go right to the problem area and then, with this manual and your knowledge of air conditioning, find the solution.

Sections (3) and (4) explain what each the code means. **Section (5)** explains in detail on how to deal with the problem when the Alarm Message appeared on the display. Read this section together with either "3-2 Electric Wiring Diagram, Indoor Unit" or "3-4 Electric Wiring Diagram, Outdoor Unit". Once you know this information, you go to Section (6), where flow charts take you from the *general* problem to a *specific* solution. For each step the flow chart gives you a *specific* procedure, and then depending on the results of the procedure, directs you to the next step until the *exact* problem is found and solved. **You will use these three sections often.**

Section (6) Procedures for When a Specific Component Does Not Work at all gives you specific procedures to find and solve Problems when you have found a part not working either from direct observation or from the Alarm Message. **This section is also used often.**

Finally, **Section (7)** tells you how to use the control panel to find out what the past 4 problems have been with this unit, and how to use the panel to check the temperature of each main area where a thermistor is located.

(1) Check before and after Troubleshooting

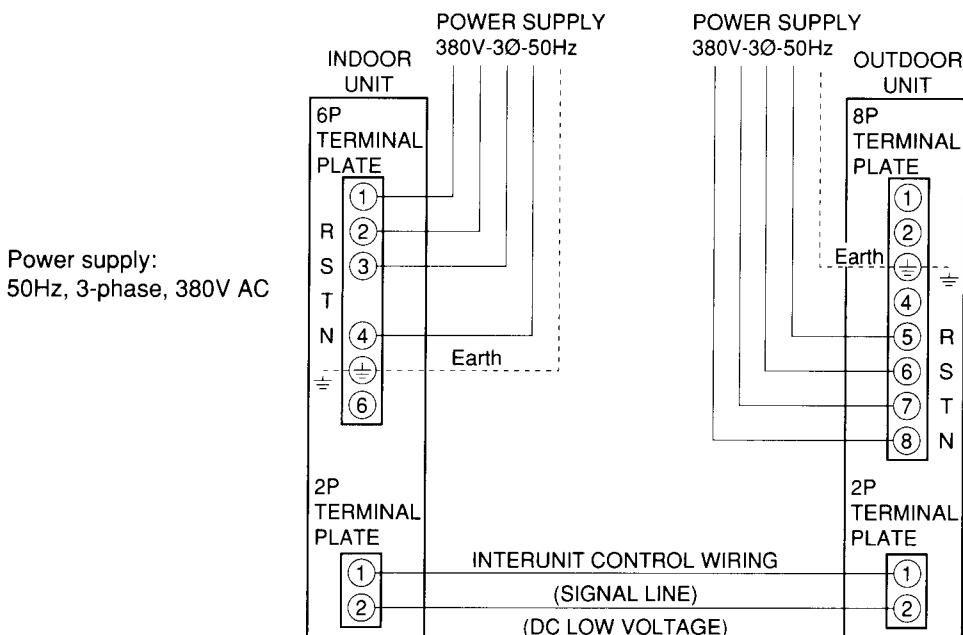
Many problems may happen because of wiring or power supply problems, so you should check these areas first. Problems here can cause false results in some of the other tests, and so should be corrected first.

①. Check power supply wiring

- Check that power supply wires are correctly connected to terminal No. 1 through No. 4 on the 6P terminal plate in the indoor unit and No.5 through No.8 on the 8P terminal in the outdoor unit.

②. Check inter-unit wiring

- Check that inter-unit control wiring (DC low voltage) is correctly connected between the indoor unit and outdoor unit.



4

Fig. 28

③. Check power supply

- Check that voltage is within the specified range ($\pm 10\%$ of the rating).
- Check that power is being supplied.



WARNING

If the following troubleshooting must be done with power being supplied,
be careful about any uninsulated live part that can cause ELECTRIC
SHOCK.

④. Check the lead wires and connectors in indoor and outdoor units.

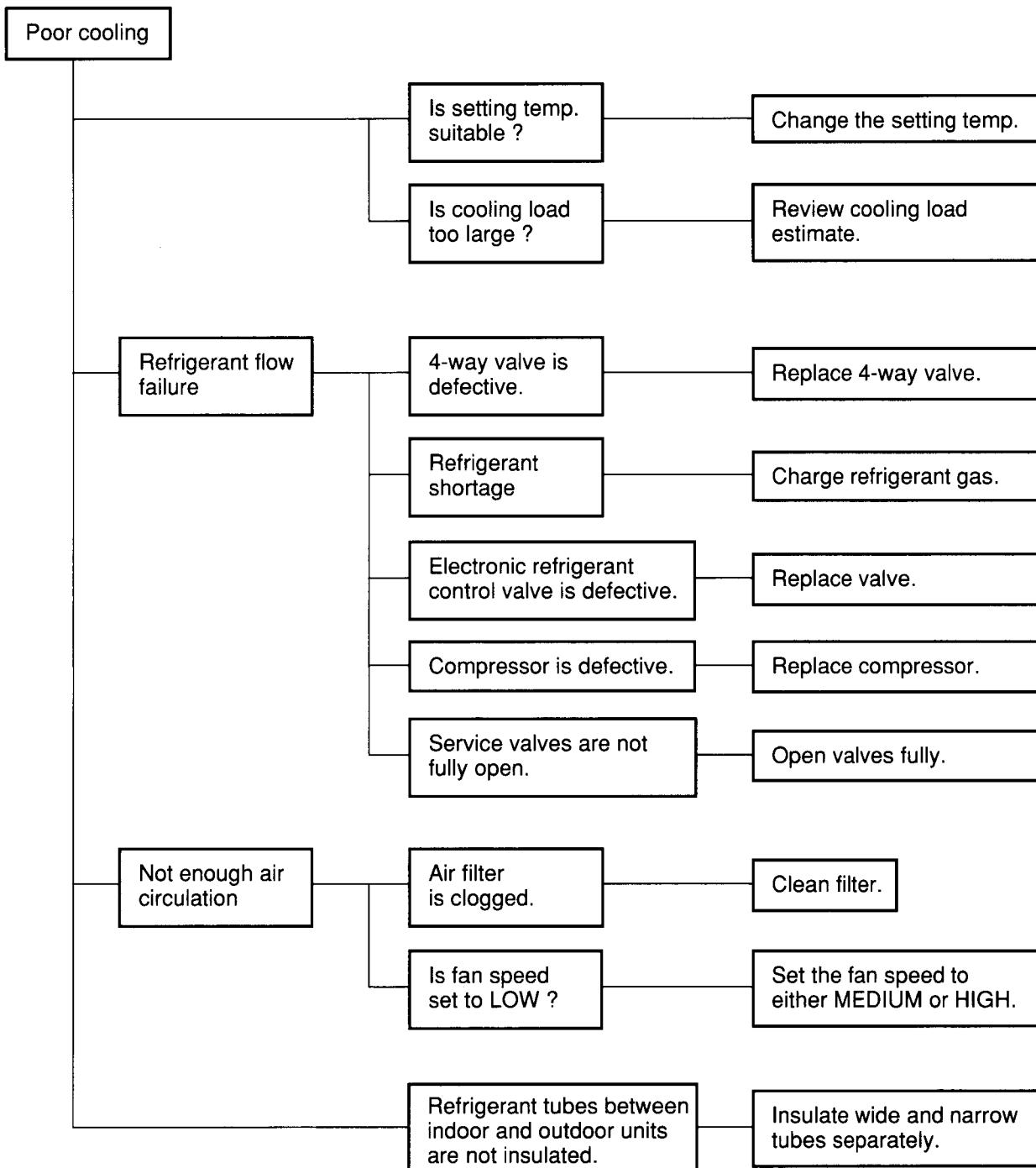
- Check that the coating of lead wires is not damaged.
- Check that lead wires are firmly connected at the terminal plate.
- Check that wiring is correct.

(2) General Troubleshooting Flow Chart: Diagnosis and Remedy

When you have found a major problem, such as refrigerant not flowing in the system or reduced air circulation, come to this section and find the box listing the problem. Connected to the box are the main causes of the problem and their remedies. To find out which malfunction is happening in your case, check the control panel for an Alarm Message, and follow the steps in section (4).

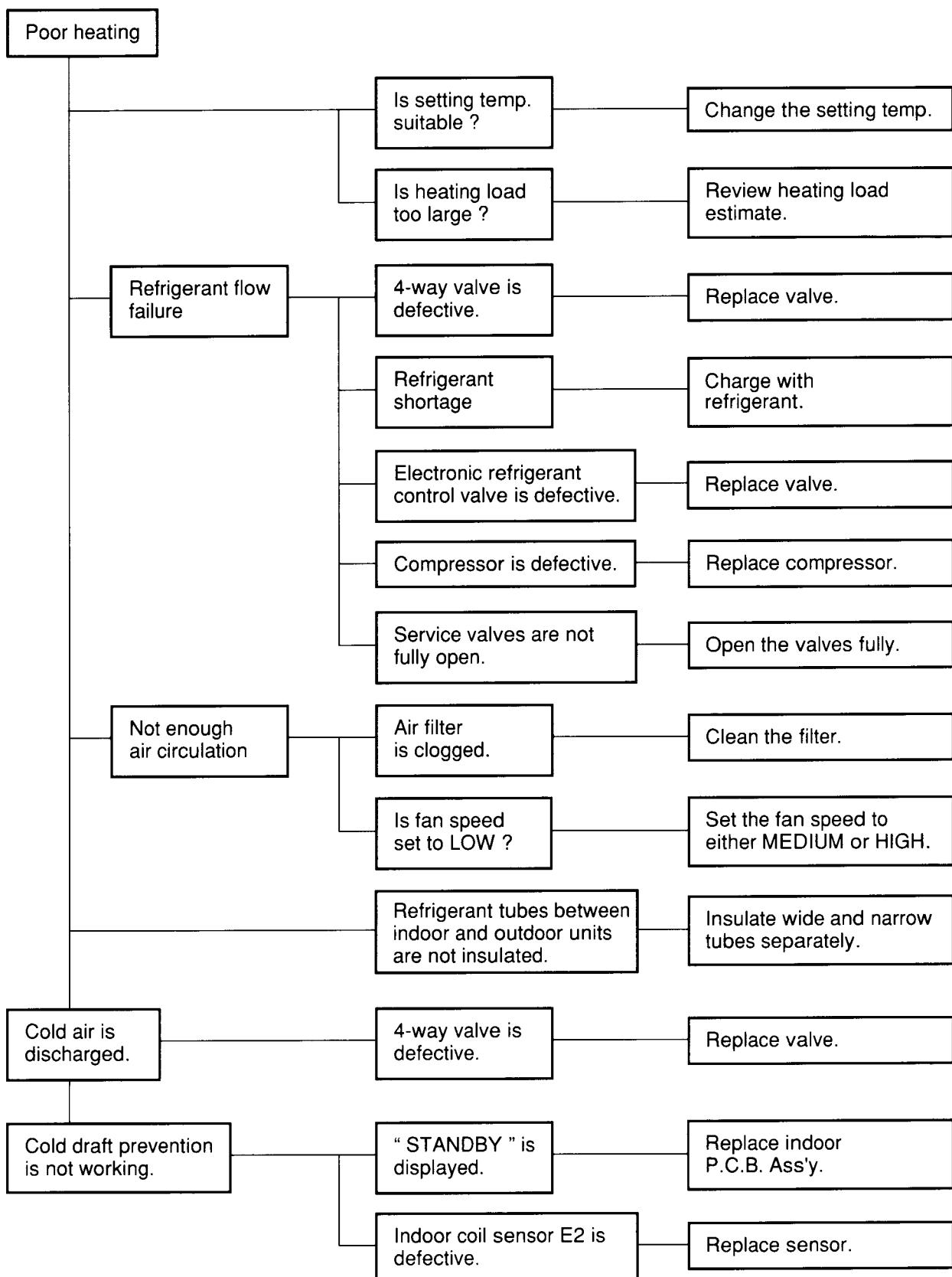
(A) Cooling

a. Cooling



(B) Heating

b. Heating



(3) LED Indication on the Outdoor Unit's P.C.B. Ass'y

If something goes wrong with the outdoor unit, **LED** lamps on the **outdoor P.C.B. Ass'y** light up to show the cause of the trouble, in addition to the Alarm message on the indoor control panel.

LED 4	LED 3	LED 2	LED 1	Alarm (*) message	Possible cause of trouble
●	●	●	●	-	Normal operation.
●	●	●	○	No Display	Refrigerant shortage.*
●	●	○	●	E6	Receiving fault of serial signal.
●	●	○	○	E7	Transmitting fault of serial signal.
●	○	●	●	P2	Thermal protector either in outdoor fan motor or compressor is working.
●	○	●	○	P3	Discharge gas temperature is abnormal.
●	○	○	●	P4	High pressure switch is working.
●	○	○	○	P5	Negative phase protector is working.
○	●	●	●	P6	Wrong model combination between indoor and outdoor unit.
○	●	●	○	H1	Compressor motor is overloaded.
○	●	○	●	H2	Compressor motor is locked.
○	●	○	○	H3	Compressor current detection circuit is abnormal.
○	○	○	○	F4 - F9	Thermistor in outdoor unit is either open-circuited or short-circuited.

NOTE ○ . . . LED lamps ON (lights up) ● . . . LED lamps OFF

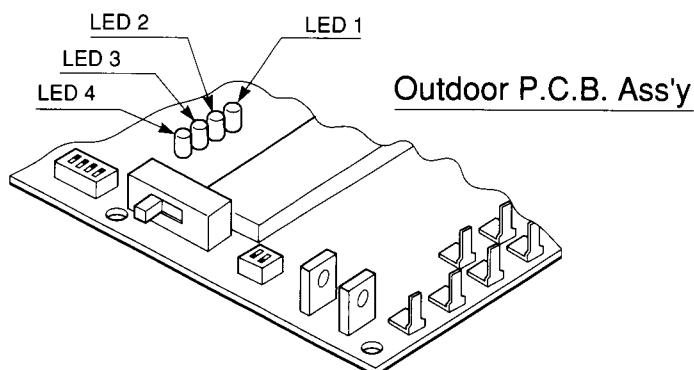


Fig. 29



* REFRIGERANT SHORTAGE

Note particularly that a **shortage of refrigerant** is only shown by the **outdoor P.C.B. Ass'y LEDs** and the Alarm Message does not appear on the Indoor Control Panel. The compressor keeps running even when the refrigerant is less, so when you find the LED indication on the **outdoor P.C.B. Ass'y**, stop the air conditioner immediately to avoid the compressor damage.

(4) Meanings of the Control Panel Alarm Messages

This table gives each Alarm Message, its meaning and the specific cause. To find the exact repair procedure go to section 6), find the page with the Alarm Message, and follow the diagnosis procedure.

Possible cause of trouble		Alarm message
When there is no alarm message.		E0
*Serial Communication Errors (SCR)	Control panel is detecting abnormal signal from indoor unit.	Error receiving of serial communications signal. E1
		Error transmitting serial communications signal. E2
	Indoor unit is detecting abnormal signal from the control panel.	Error receiving serial communications signal. E3
	Indoor unit is detecting abnormal signal from outdoor unit.(outdoor unit is abnormal)	Error receiving serial communications signal. E4 Error transmitting serial communications signal. E5
	Outdoor unit is detecting abnormal signal from indoor unit.(indoor unit is abnormal)	Error receiving serial communications signal. E6 Error transmitting serial communications signal. E7
Activation of Protective device	Protective device in indoor unit is activated.	<ul style="list-style-type: none"> • Thermal protector in indoor fan motor is activated. P1
		<ul style="list-style-type: none"> • Thermal protector in outdoor fan motor is activated. P2
	Protective device in outdoor unit is activated.	<ul style="list-style-type: none"> • Compressor thermal protector is activated. P3
		<ul style="list-style-type: none"> • Discharge gas temperature is abnormal. P4
		<ul style="list-style-type: none"> • High pressure switch is activated. P5
		<ul style="list-style-type: none"> • Negative phase protector is activated. P6
		<ul style="list-style-type: none"> • Wrong model combination between indoor and outdoor unit.
Thermistor failure	Indoor thermistor is either open-circuited or damaged.	<ul style="list-style-type: none"> • Indoor coil temp. (E1 = TH1) cannot be detected. F1
		<ul style="list-style-type: none"> • Indoor coil temp. (E1 = TH2) cannot be detected. F2
	Outdoor thermistor is either open-circuited or damaged.	<ul style="list-style-type: none"> • Discharge gas temp. (TH8) cannot be detected during COOLING operation. F4
		<ul style="list-style-type: none"> • Discharge gas temp. (TH4) cannot be detected during HEATING operation. F5
		<ul style="list-style-type: none"> • Outdoor coil temp. (C1 = TH6) cannot be detected. F6
		<ul style="list-style-type: none"> • Outdoor coil temp. (C2 = TH7) cannot be detected. F7
		<ul style="list-style-type: none"> • Outdoor air temp. (TH5) cannot be detected. F8
Fault with Compressor and its Circuit	Protective device for compressor is activated.	<ul style="list-style-type: none"> • Compressor motor is overloaded. H1
		<ul style="list-style-type: none"> • Compressor motor is locked. H2
		<ul style="list-style-type: none"> • Compressor current detection circuit is abnormal. H3
<ul style="list-style-type: none"> • Either a crossed wiring or tubing between the indoor and outdoor unit is detected. 		H7

NOTE

The serial communication errors (*) are errors in the control signal which goes between the outdoor and indoor units or between the Control Panel and Indoor unit.

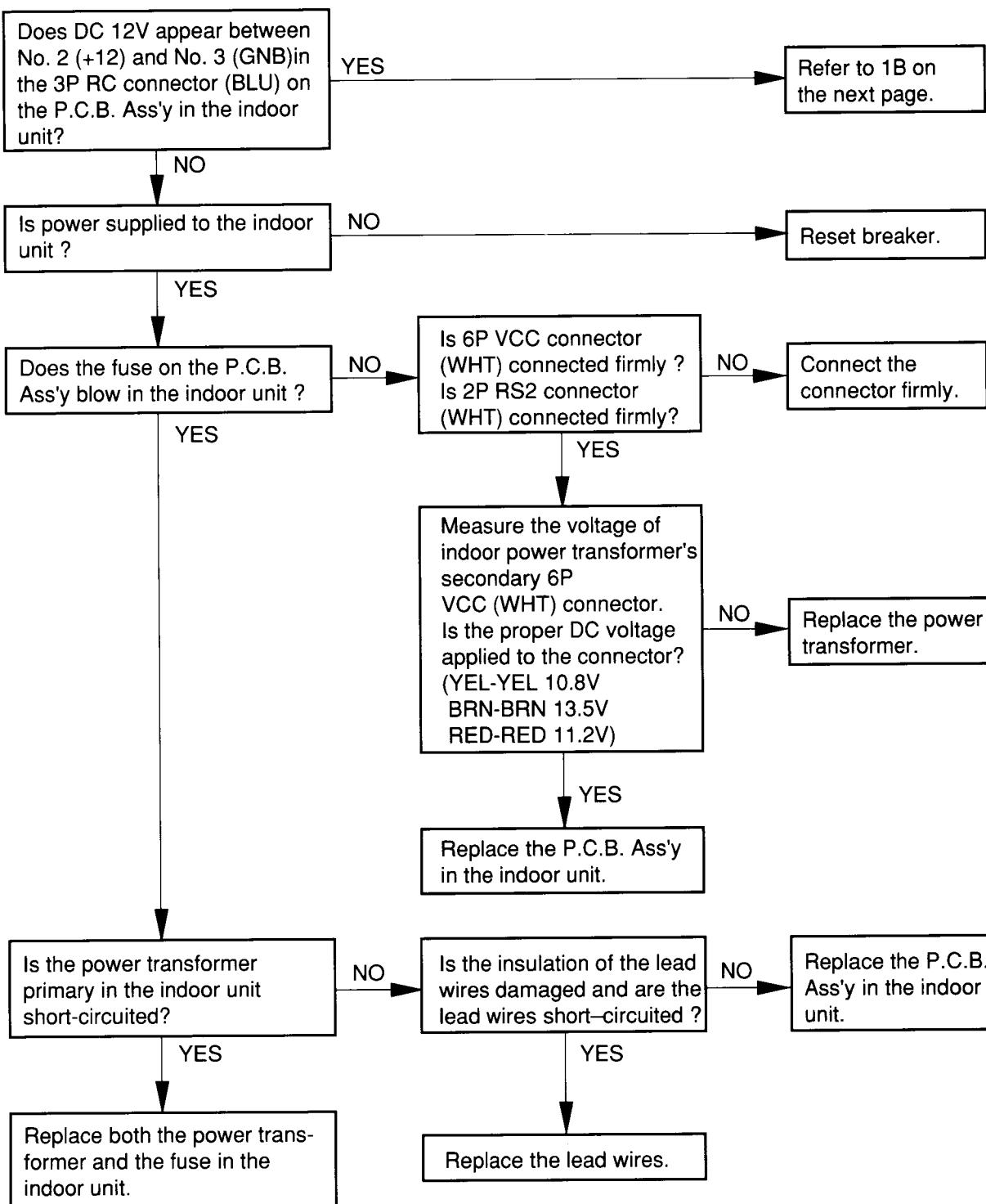
(5) What to Do for Each Alarm Message

This section gives a procedure to track down and fix most air conditioner problems. For each Alarm Message that might appear on the control panel when a problem happens, you have a specific procedure to follow.

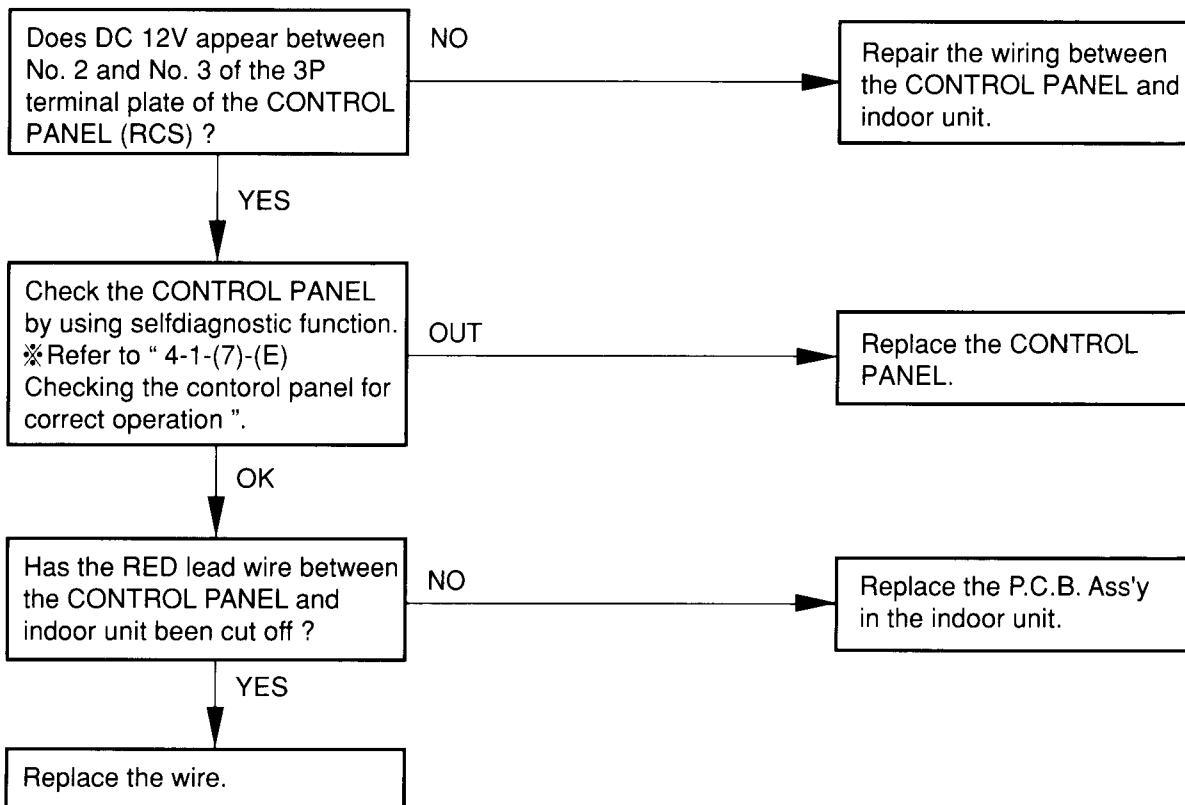
There are 13 Alarm categories explained, and some have two sets of procedures, (A) and (B), which may take up two different pages.

- ①. Nothing is displayed on the control panel and the air conditioner does not operate.

1 - (A)

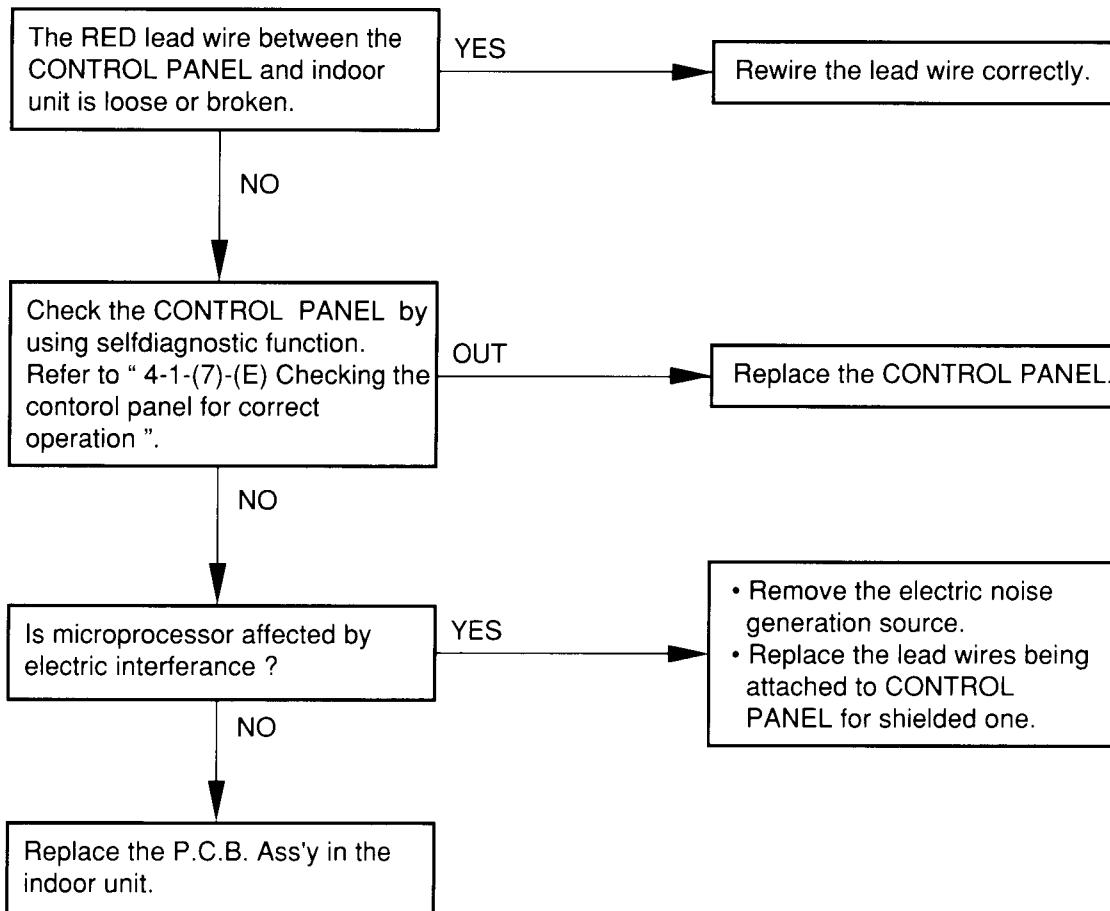


1 - (B)

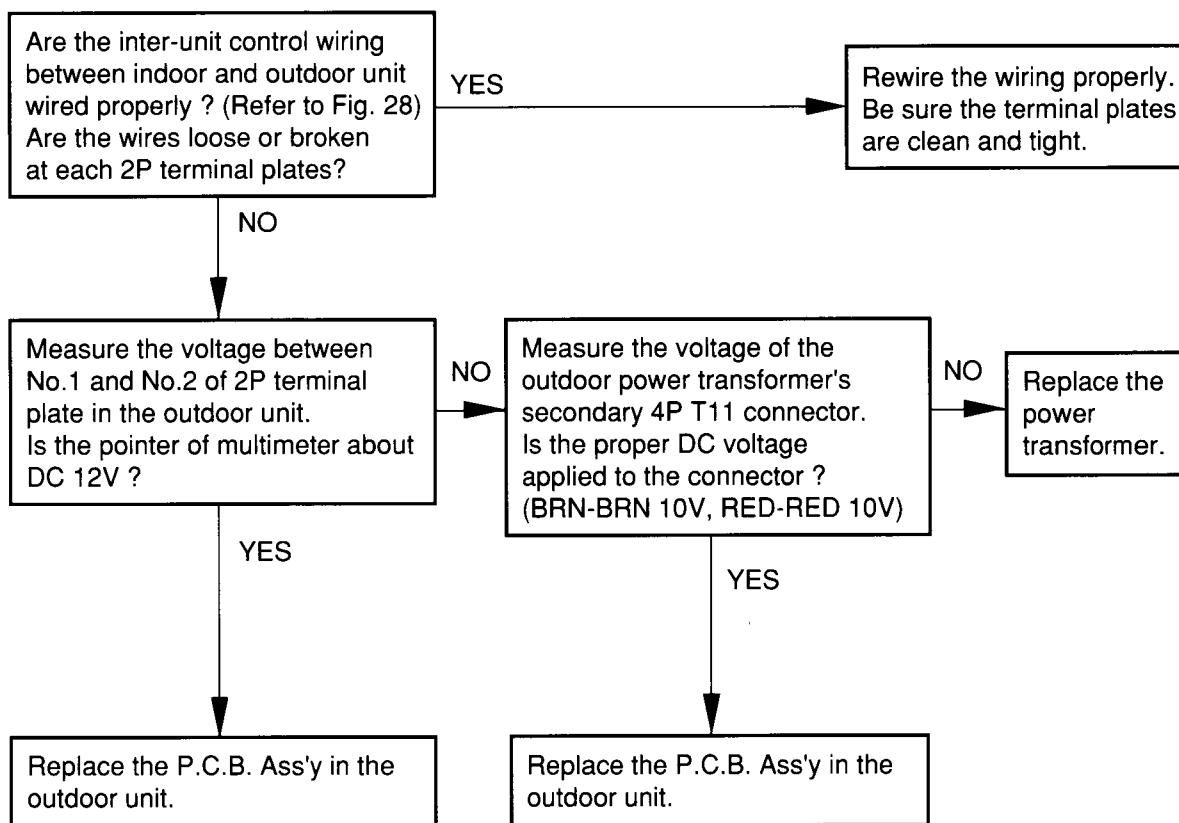


4

②. "CHECK" and "E1", "E2" or "E3" are displayed on the CONTROL PANEL.



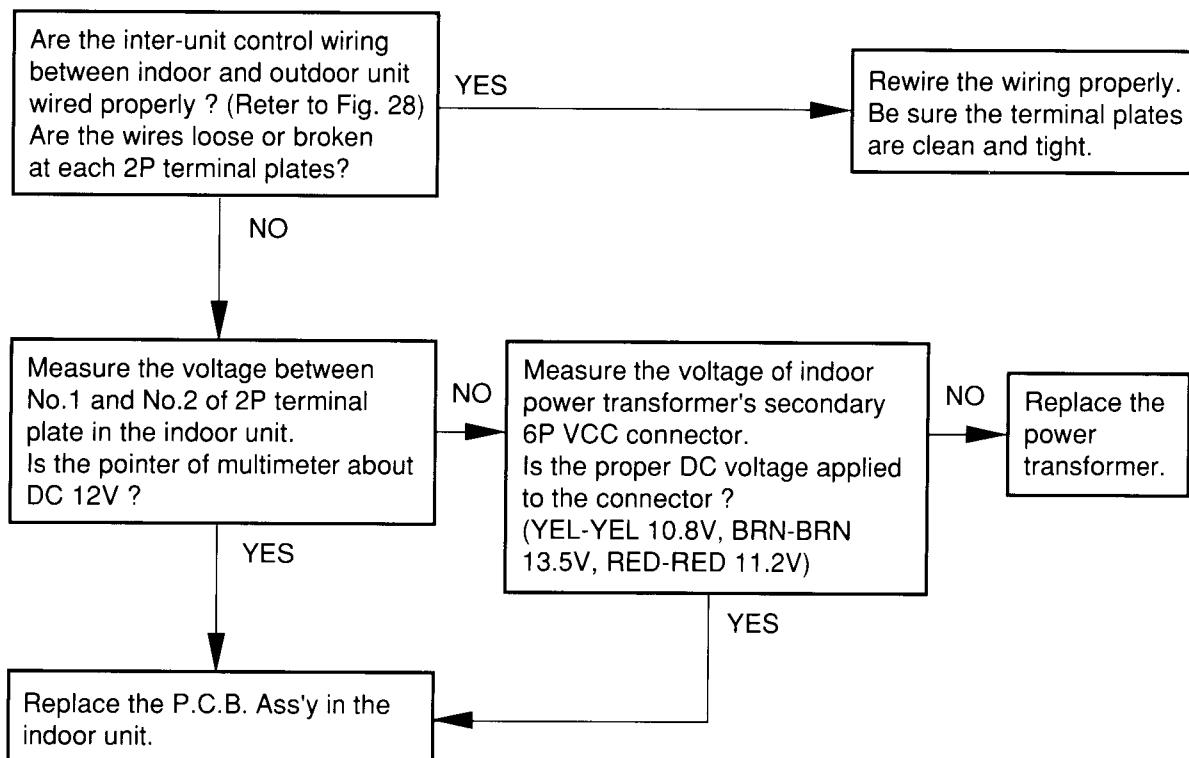
③. CHECK and E4 are displayed on the control panel.



④. CHECK and E5 are displayed on the control panel.

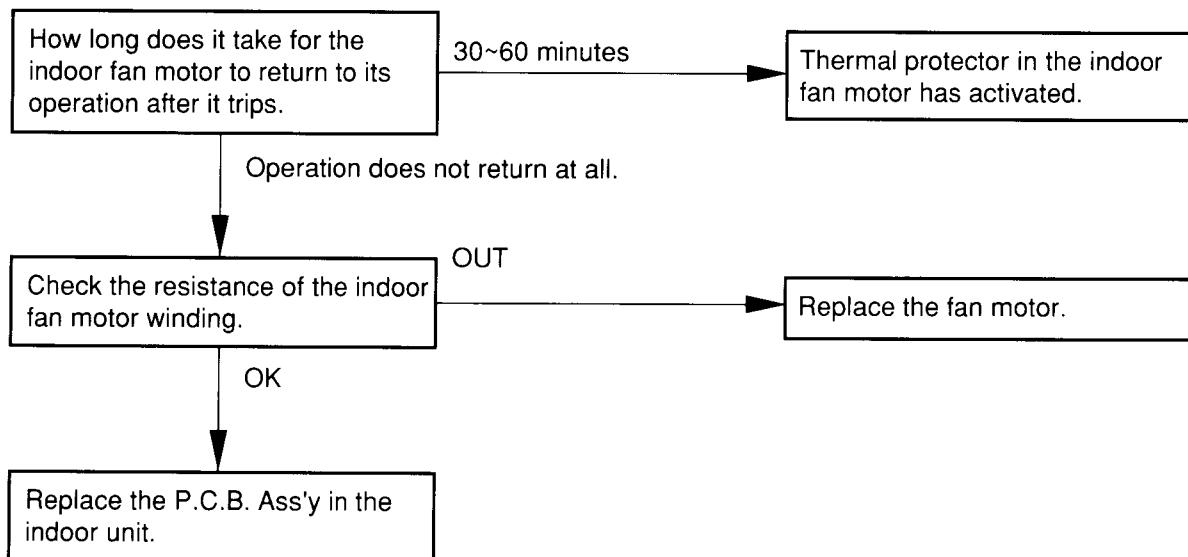
- Powerful electric noise biased in the inter-unit control wiring, or there is a possibility of signal interruption, or loose or corroded connections in the inter-unit control wiring.
 - To fix this problem, try to remove the source of electrical noise, and /or clean the connections. Make sure the terminal connections are securely tightened.
- Broken and nearly broken control wires can also cause this Alarm Message, so carefully check the wires for physical damage, and replace as necessary.

⑤. CHECK and E6 are displayed on the control panel.



4

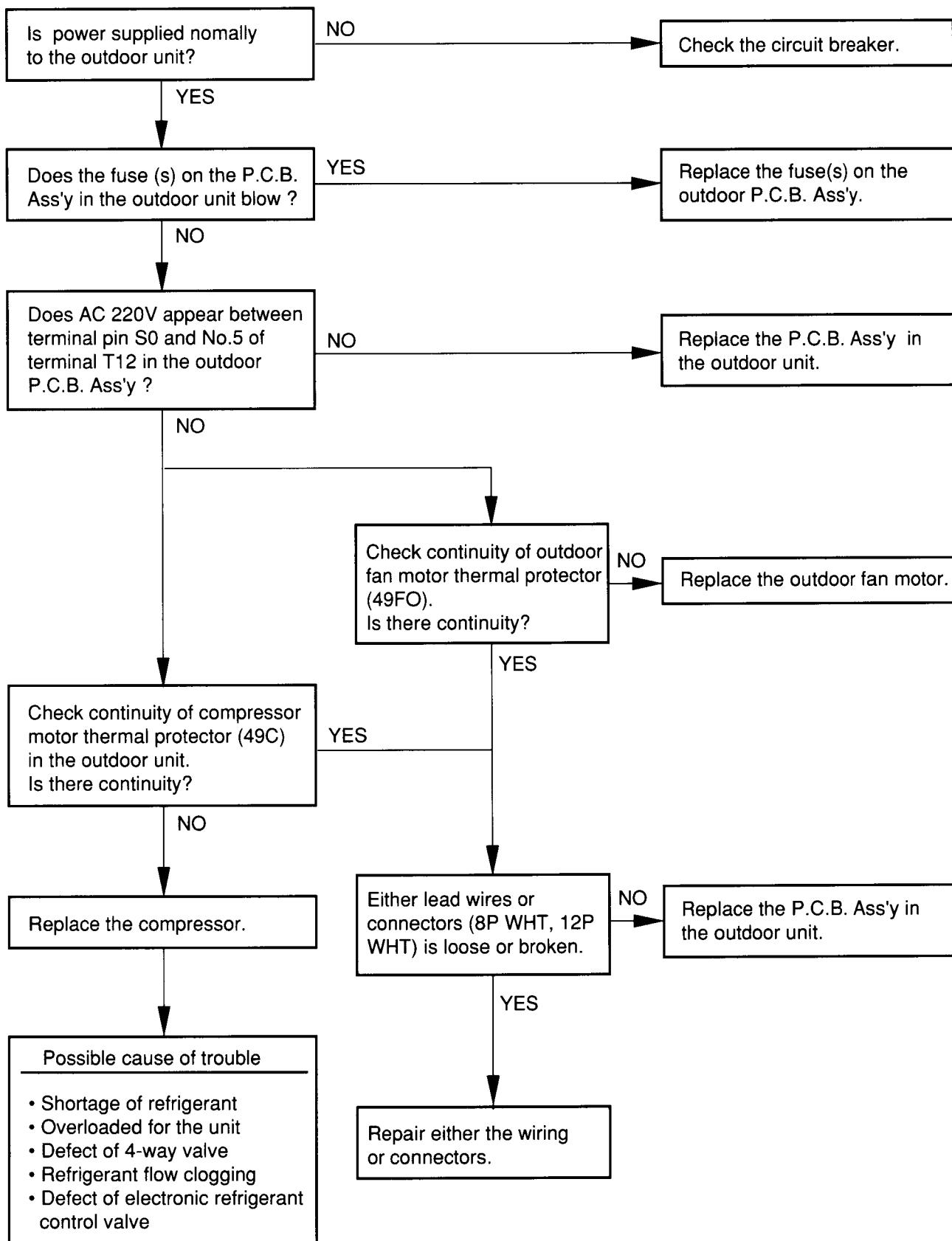
⑥. CHECK and P1 are displayed on the control panel.



- A Protective device in the indoor unit has opened the circuit.
 - Indoor fan motor thermal protector (49 FI).

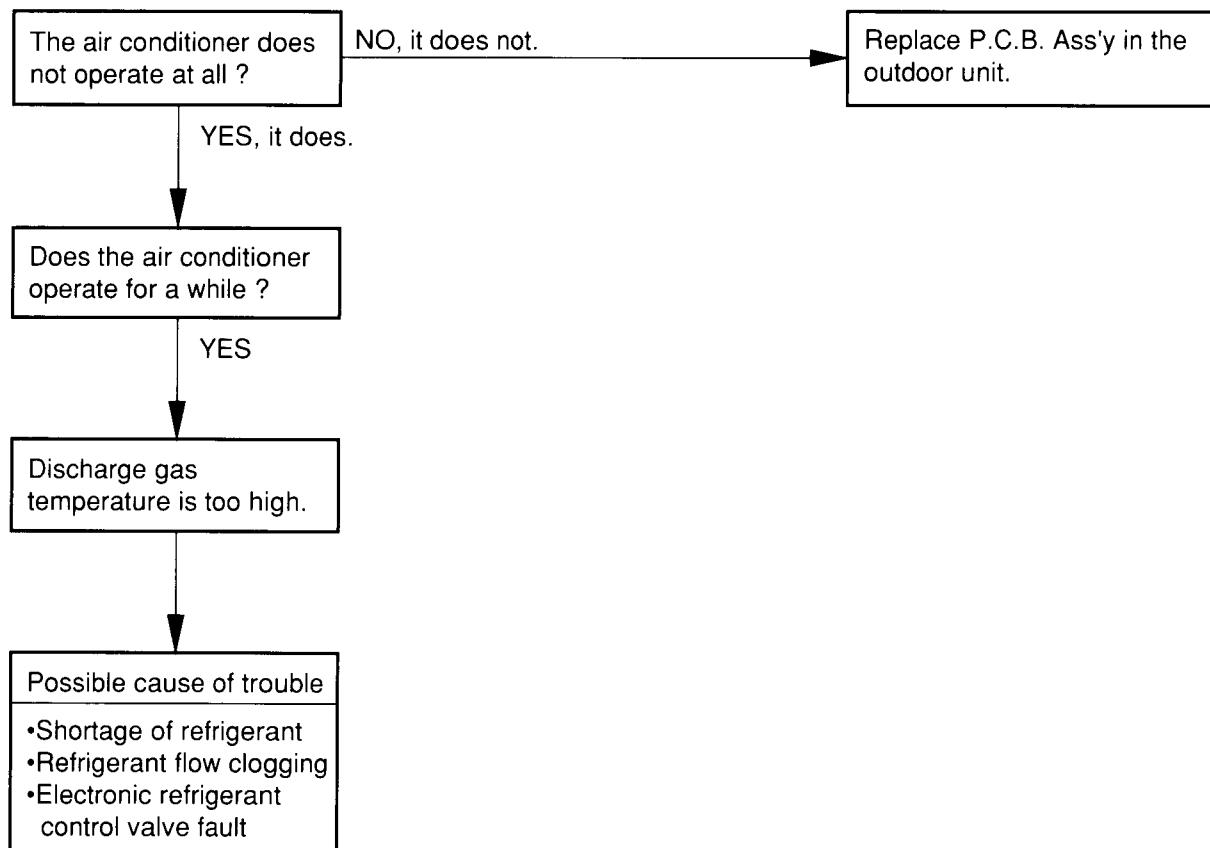
⑦. CHECK and P2 are displayed on the control panel.

- Protective device(s) in the outdoor unit has opened the circuit. The two devices are:
 - Compressor motor thermal protector (49C).
 - Outdoor fan motor thermal protector (49FO).



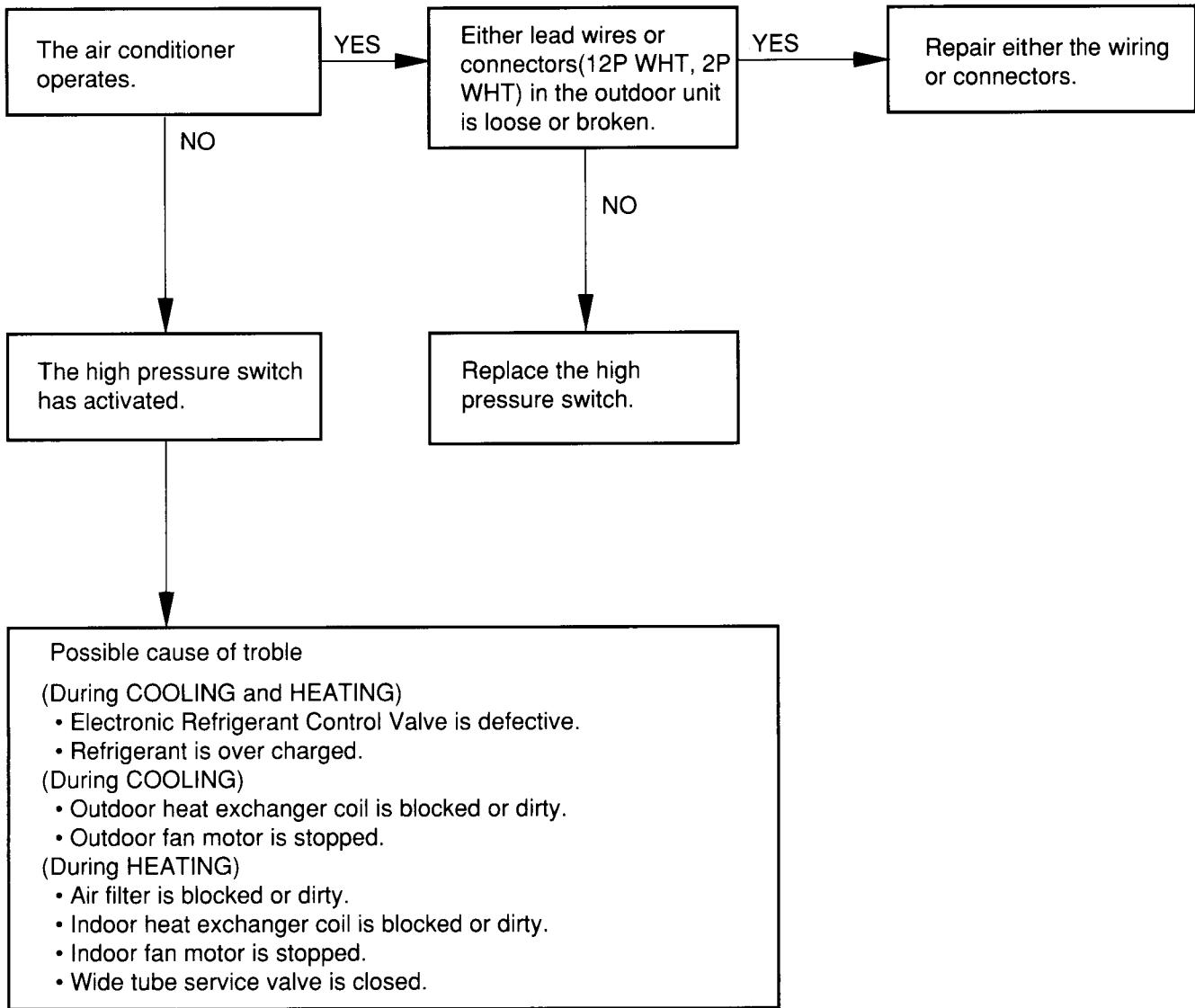
⑧. CHECK and P3 are displayed on the control panel.

- The discharge gas temperature is too high. When the high pressure in the system rises the discharge temperature will increase also. Under normal conditions, when the discharge temperature (as measured by sensors **TH8** or **TH4**) rises above **110°C**, the air conditioner shuts down and **P3** appears on the display. Refer to "2 – 8 Discharge Temperature Control".



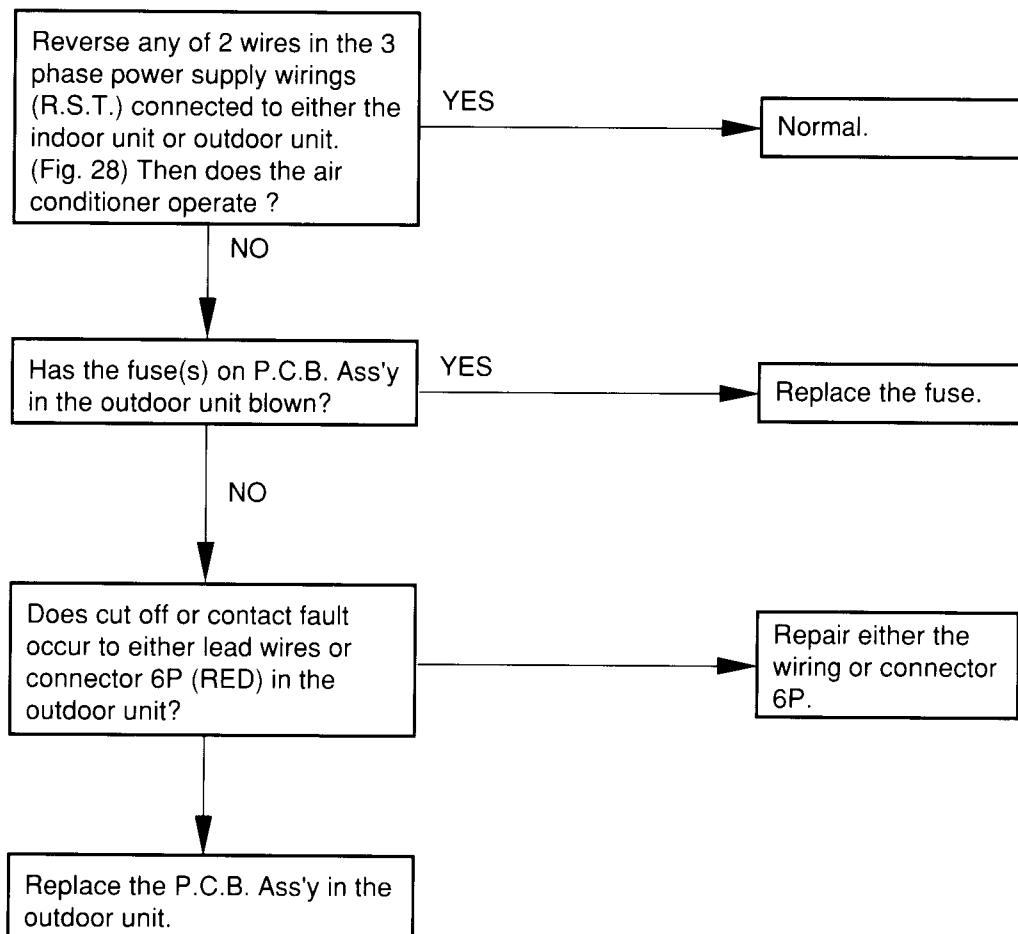
⑨. CHECK and P4 are displayed on the control panel.

- High pressure switch 63PH has cut out.



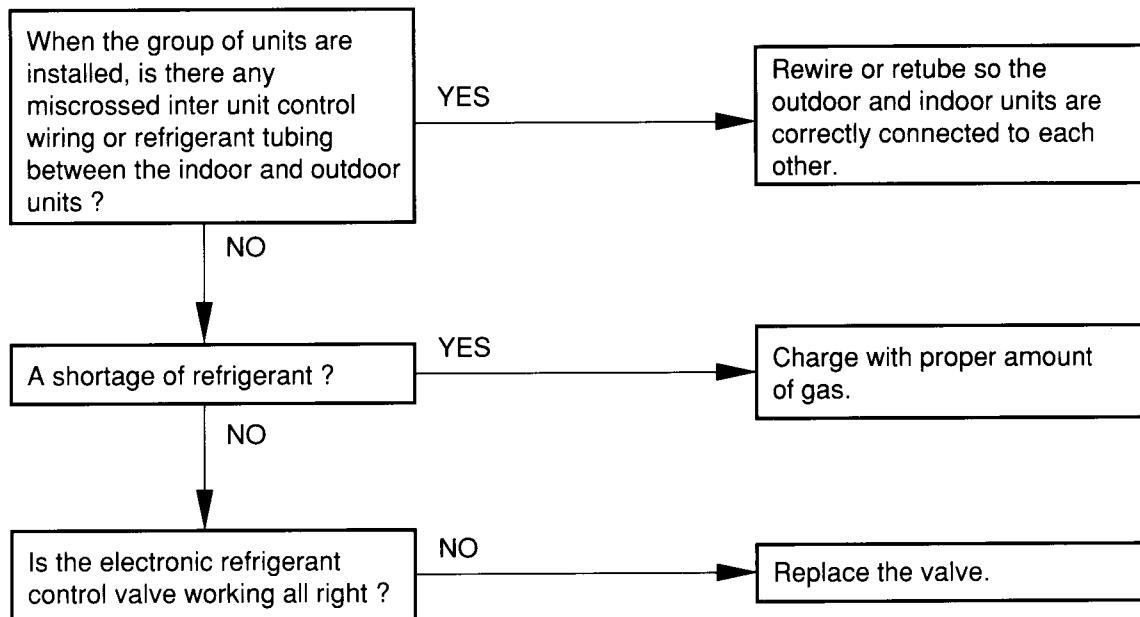
⑩. CHECK and P5 are displayed on the control panel.

- The control panel has detected negative phase (reversed phase) in the power supply.

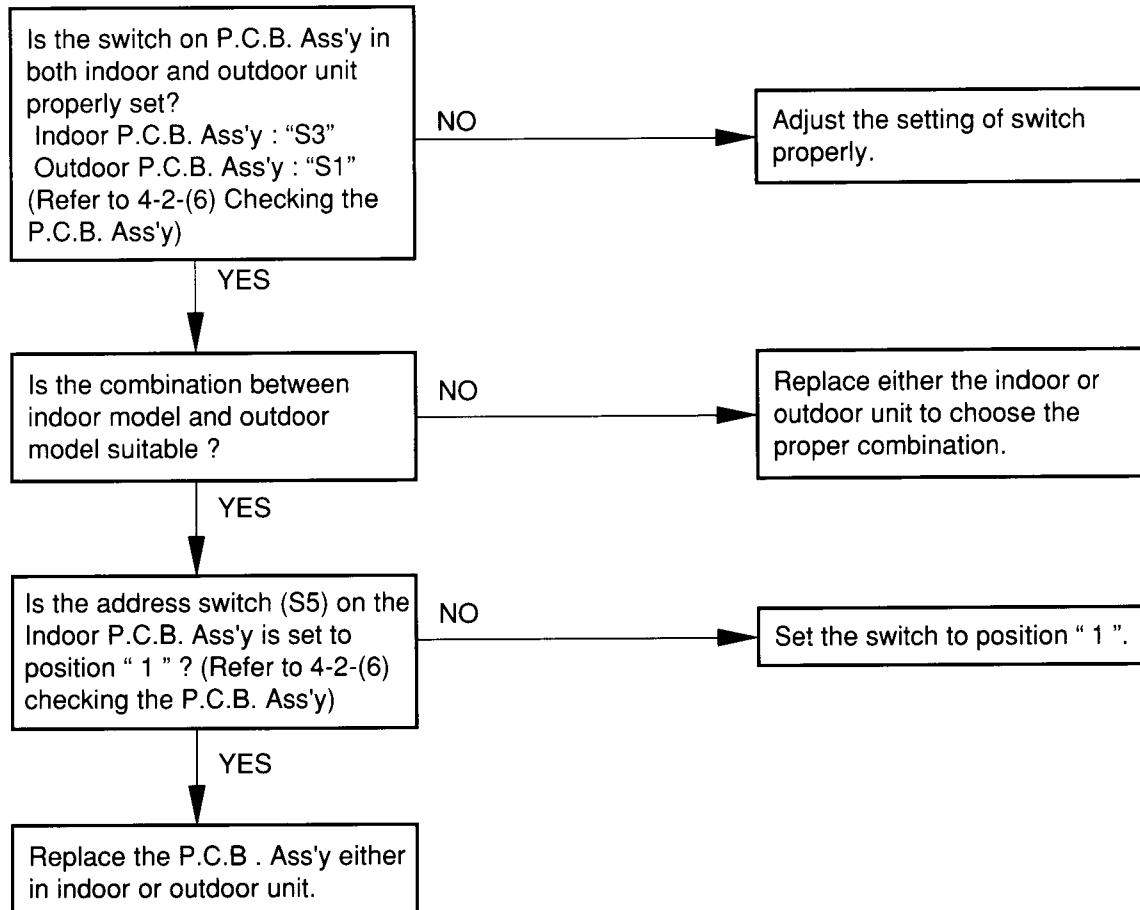


⑪. CHECK and H7 are displayed on the control panel.

- Crossed wires or refrigerant supply tubes between indoor and outdoor units.

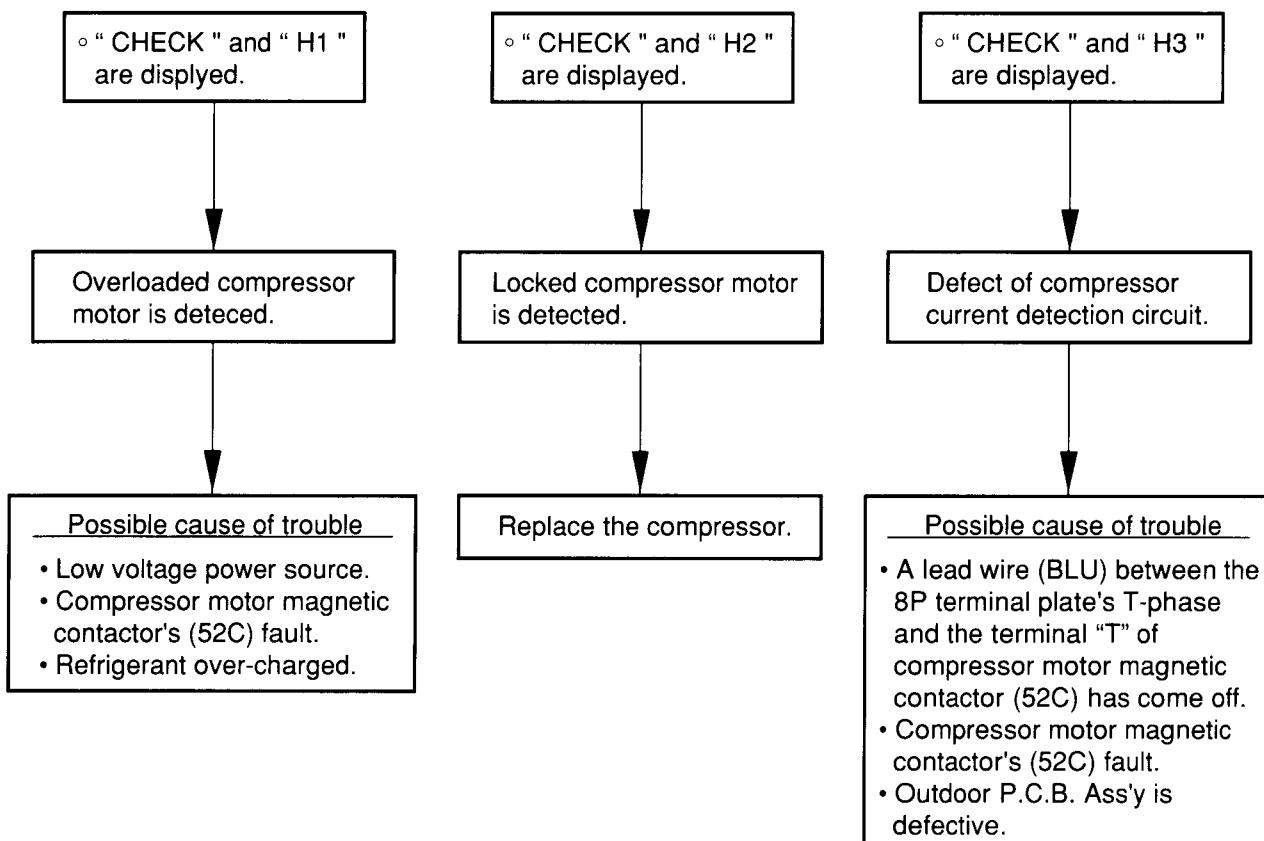
**⑫. CHECK and P6 are displayed on the control panel.**

- Incorrect capacity matching.



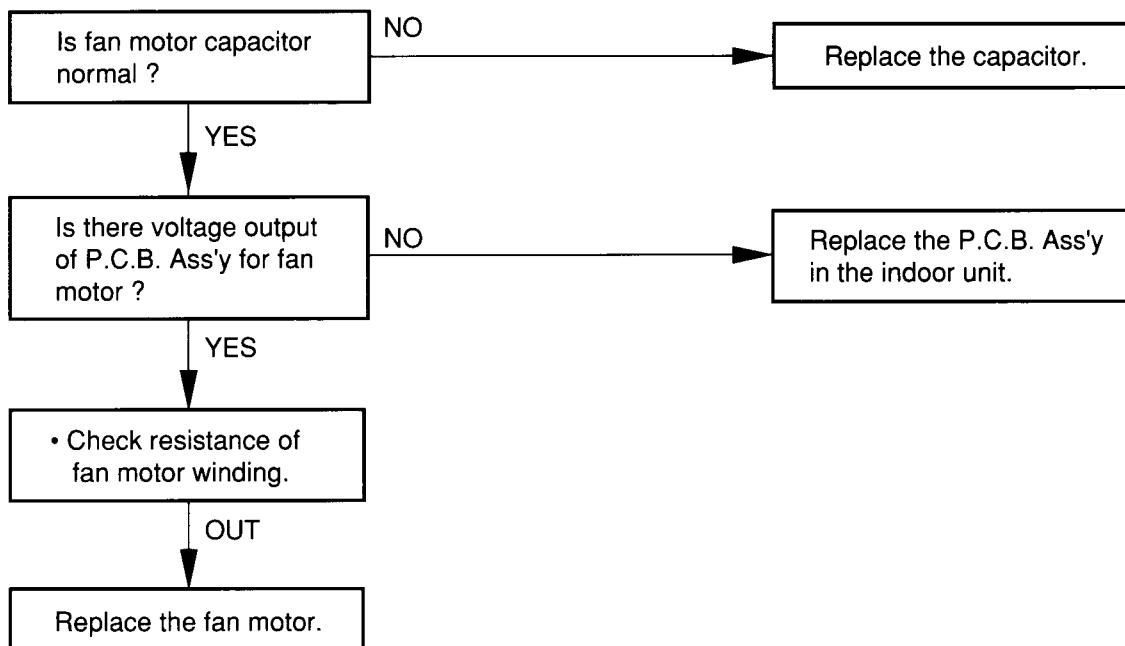
⑬. CHECK and either H1, H2 or H3 is displayed on the control panel.

- Protective device for the compressor has opened and shut off the current.
Refer to "2 – 15 Compressor Current Detection Circuit".

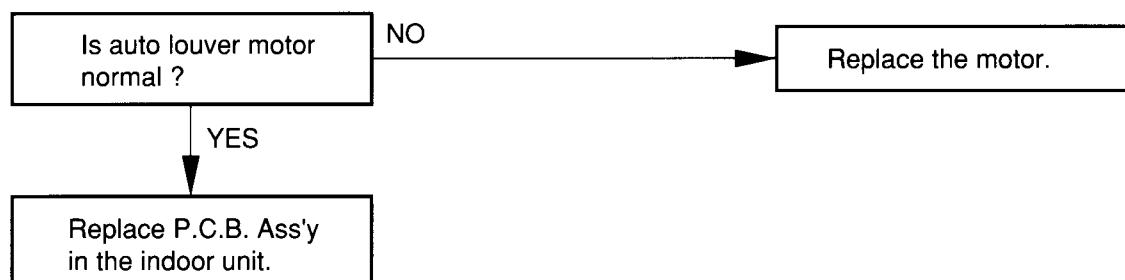


(6) Procedures for When a Specific Component Does Not Work at All

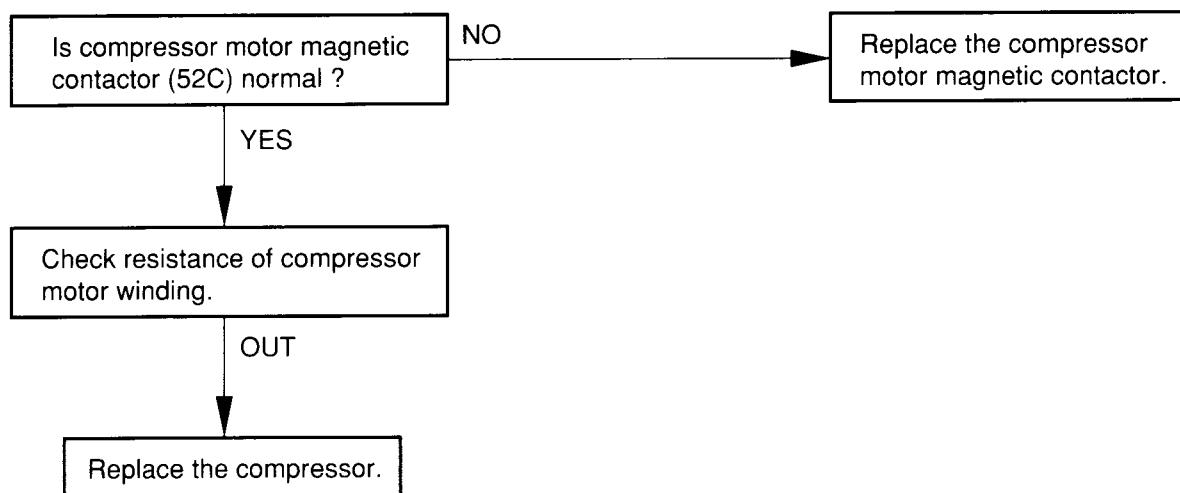
- ①. Indoor fan is not running at all.



- ②. Vertical vane in indoor unit's air outlet does not operate, even if you press SWEEP button.

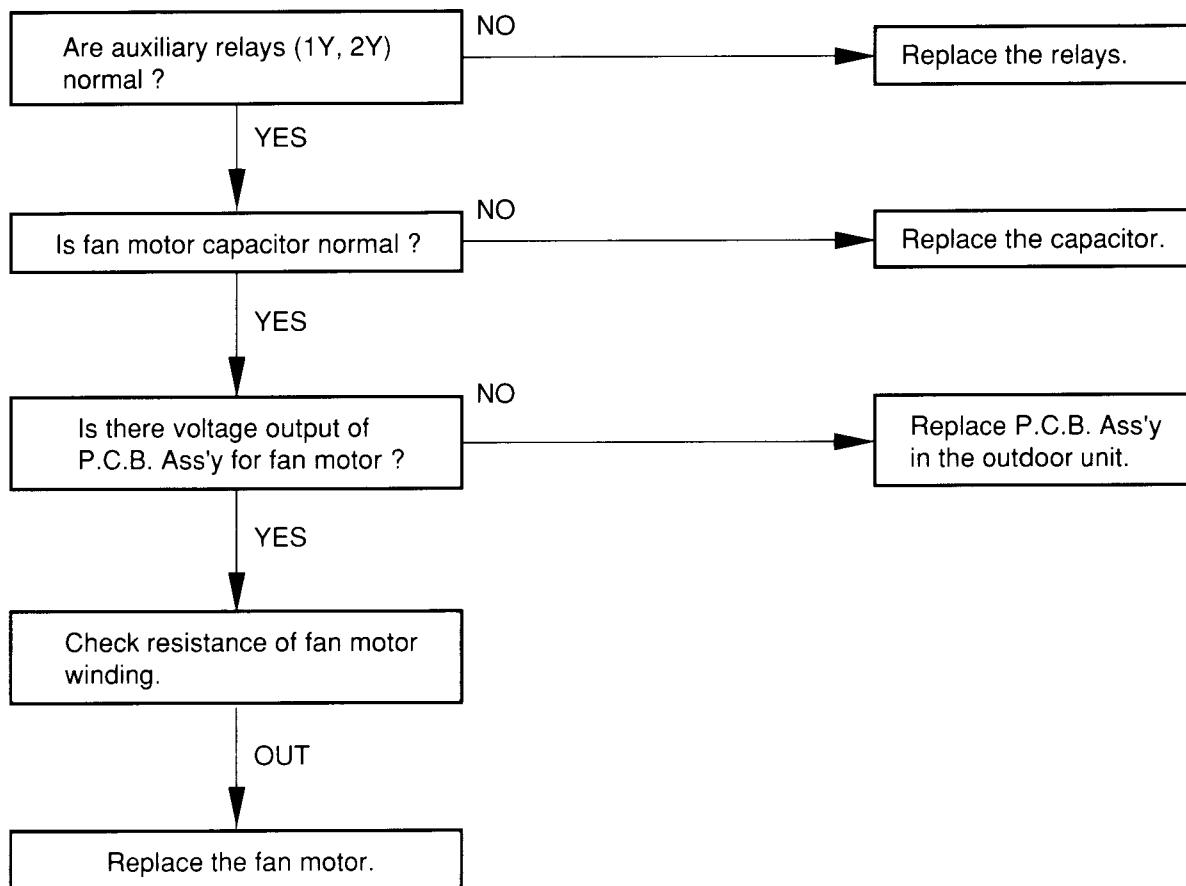


③. Compressor motor is not running at all.



④. Outdoor fan is not running at all.

4



(7) Using the Control Panel

From the control panel you can control both the operation and settings of the unit as well as perform several useful service checks. This section explains how to use the control panel to:

- Set service check switches.
- Use the test run procedure.
- Check the sensor temperature readings.
- Find out about past service problems.
- Check the control panel itself for correct operation.

For operation and temperature setting instructions, see the Instruction Manual (included as section 5. of this service manual).

(A). Service Check Switches

The service check switches are located on the back of the control panel's P.C.B. Ass'y. To access the Control Panel, refer to 4-1-(7)-(F) "How to access the control panel inside".

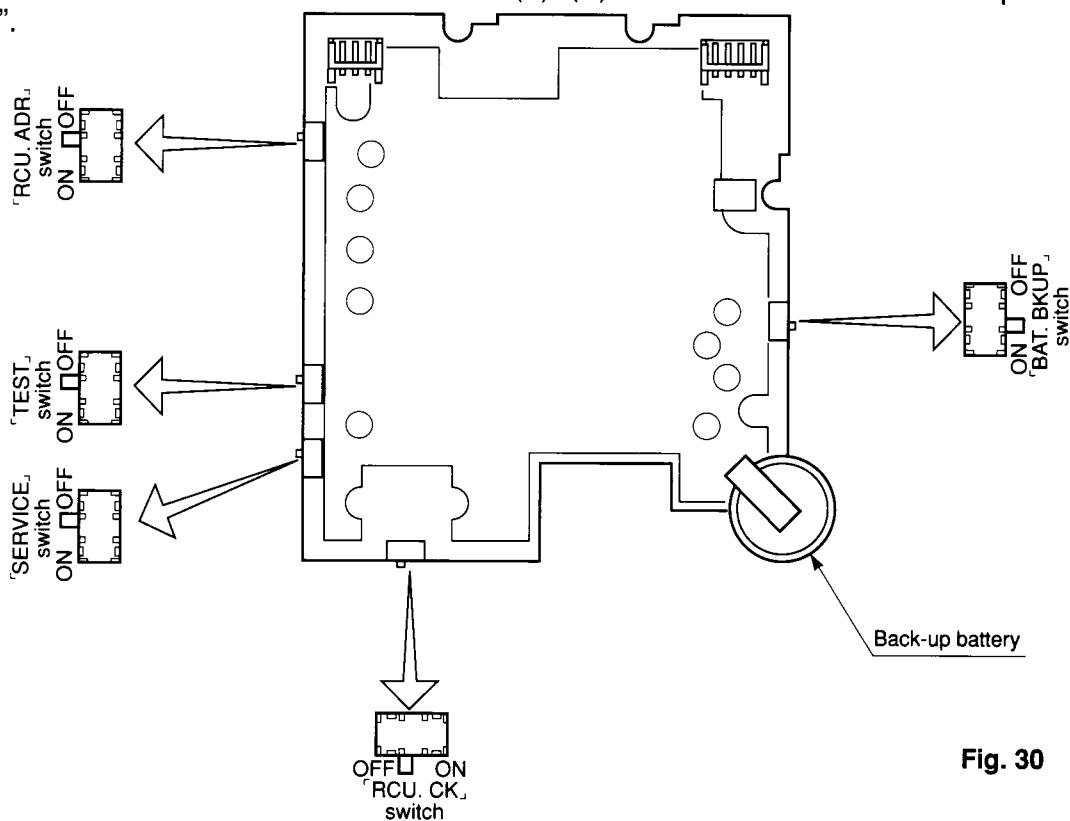


Fig. 30

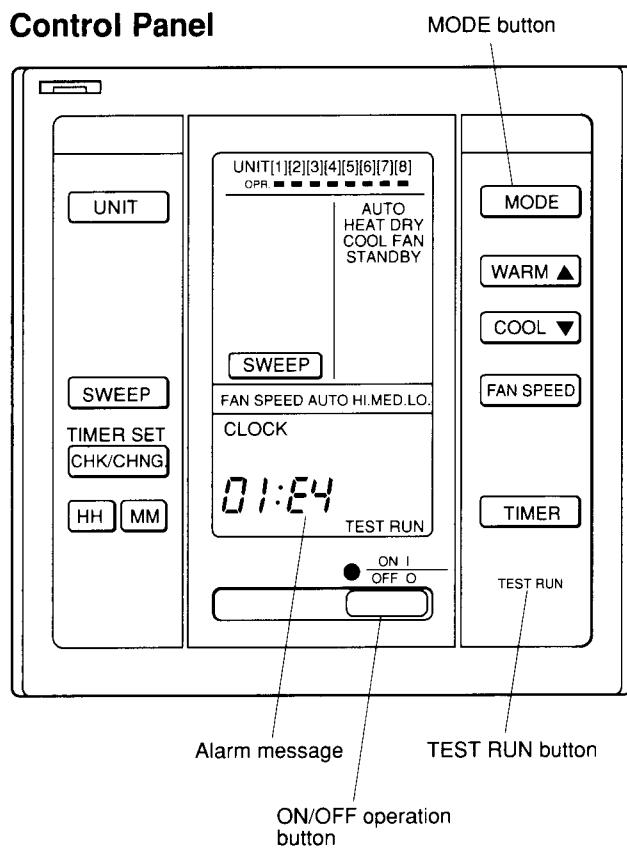
The following are the correct switch settings for normal use of the unit. Only change the settings temporarily for making service checks. When you have changed the settings, **be sure to return them to the standard settings** shown here.

- SERVICE** switch – Refer to section 4-1-(7)-(D) “Past service history display”
- RCU.CK** switch – Refer to section 4-1-(7)-(E) “Checking the control panel for correct operation”
- TEST** switch – Keep the switch **OFF** all the time
- RCU.ADR** switch – Keep the switch **OFF** all the time
- BAT.BKUP** switch – Keep the switch **ON** all the time

(B). Test Run Procedure

- The purpose of the test run function is to let you control the operation of the unit directly without the thermostat turning the unit on or off. As indicated in the following procedure, be sure to switch out of **TEST RUN** when you are finished, or the air conditioner can be damaged because it won't cycle on and off normally.
- To protect the air conditioner from overloading, the outdoor unit will not start running for 3 minutes after power is applied or the unit is turned **OFF**.

- a. Press the TEST RUN button at the bottom right on the control panel.
- b. Press the ON/OFF operation button to start the test run.
- c. Press the MODE button to select either COOL or HEAT mode.
- d. When the test run has started, "TEST RUN" shows on the control panel's display.
- e. During the test run, the air conditioner runs continuously and the thermostat does not control the system.
- f. After the test run, be sure to press the TEST RUN button once again to cancel this mode and be sure "TEST RUN" is not shown on the display.



4

Fig. 31



The **TEST RUN** button is used **only for servicing** the air conditioner. **Do not** press this button for normal operation, or the system may be damaged.

(C). Sensor temperature display

The air conditioner has temperature sensors placed in areas where temperature levels control the heating or cooling process.

- Each sensor has an address which is made up of the unit address, the multi address, and the **sensor number**. The unit address and multi address are used only when several units are hooked up to one control panel. If there is only **one unit**, made up of **one** indoor and **one** outdoor component, then only the sensor number must be put in, as shown in the procedure below.

Follow this procedure to display the temperature of each sensor:

- a. On the control panel, press both **HH** and **MM** buttons at the same time for 3 seconds.

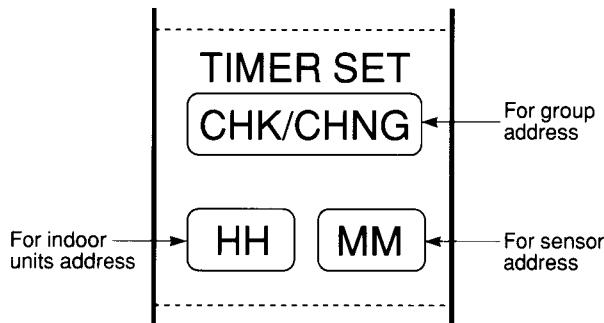


Fig. 32

- b. Once in this mode, the display will show the address and temperature of the sensors instead of its usual information.

NOTE

Do not press **CHK/CHNG** or **HH** buttons during checking.

- For this model the unit address and multi address are fixed at **01**.
- Each time you press the **MM** button you select a different sensor, and the display shows the sensor number and temperature as shown below.

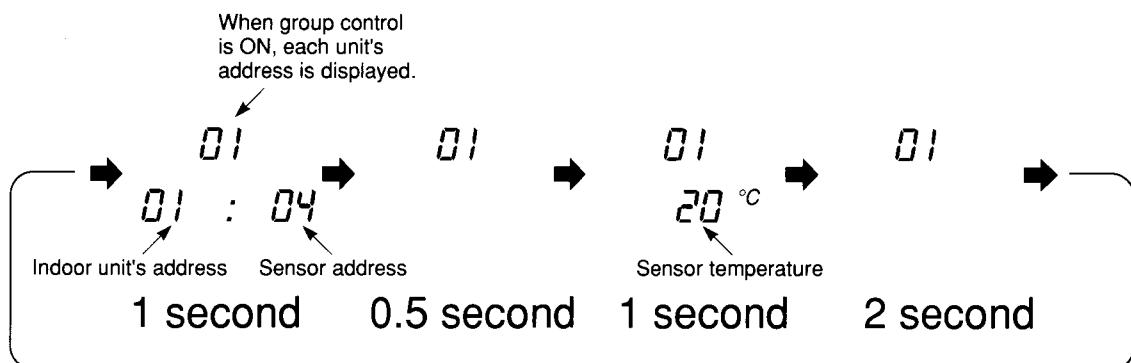


Fig. 33

NOTE

After sensor address displayed for 1 second, wait for 0.5 second to display the sensor temperature reading.

- c. Each time you press the **MM** button the display changes from one sensor to the next in numerical order from **01** to **16**, and then back to **01** again.



Fig. 34

Refer to the table below for the relationship between the sensor number and the location of the sensor.

	Sensor Address	Location of Sensor (Thermistor)	
Indoor Unit	01	TH1	Room Temp.
	02	TH2	Indoor coil Temp. E1 (ent.)
	03	TH3	Indoor coil Temp. E2 (mid.)
	04		—
Outdoor Unit	05	TH8	Discharge gas Temp. (Cooling)
	06	TH5	Outdoor air Temp.
	07	TH6	Outdoor coil Temp. C1
	08	TH7	Outdoor coil Temp. C2
	09	TH4	Discharge gas Temp. (Heating)
	10		—
	11		—
	12		—
	13		—
	14		—
	15		—
	16		—

NOTE

In case there are no sensor equipped with the unit, - - - - °C is shown on the display.

④. Resetting the control panel display back to normal.

- To reset the display when you are finished, press both HH and MM buttons at the same time for 3 seconds, then the control panel will return to clock display mode and show the present time.

4

(D). Past service history display

The control panel can store the **4 most recent alarm codes**, so you can see what kind of problems the unit has had, if any. Knowing what has already happened and been fixed helps you know what to check at present.

- This function is usable even if the unit is not working.
- To display the past error codes, follow the procedure below.

Procedure:

- ⓐ Turn **ON** the **SERVICE** switch on the **back** of the P.C.B. Ass'y in the control panel. See Section 4-1-(7)-(A) in this chapter for exact location.
- ⓑ When the switch is turned **ON** a change from the normal display to service check display takes place, as shown in the table below:

NORMAL DISPLAY	Display Change (→)	SERVICE CHECK DISPLAY
Set temp. XX°C	→	Group address (Unit Number)
Hours	→	Indoor unit's address
Minutes	→	Alarm Message

The panel now shows this display, and cycles automatically as shown below.

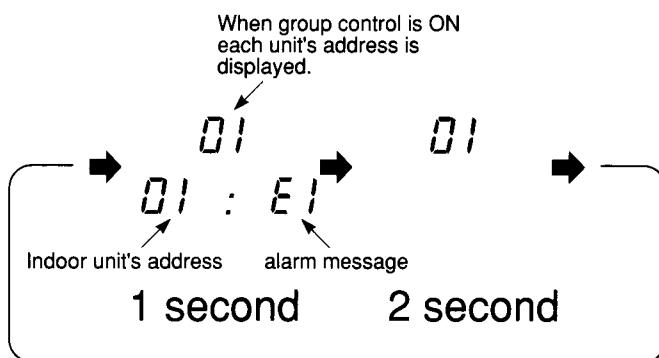


Fig. 35

- ④. A maximum of **4** alarm messages can be accessed by pressing either **HH** or **MM** as follows:

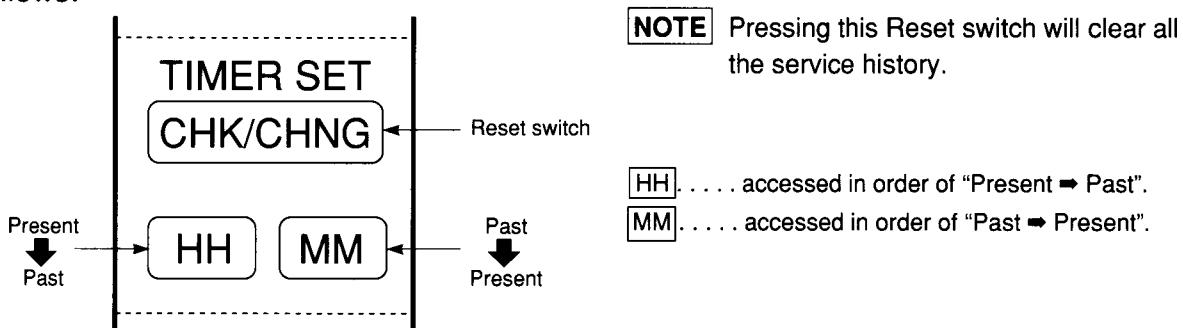


Fig. 36

For example, if the last four alarm messages were, in order of occurrence from oldest to most recent, **P1**, **P9**, **P4**, and most recently **E1**, then the display would look as shown below as you pressed **HH** four times. The 5th time you pressed **HH** you would start the display cycle over, and the first message would be shown again.

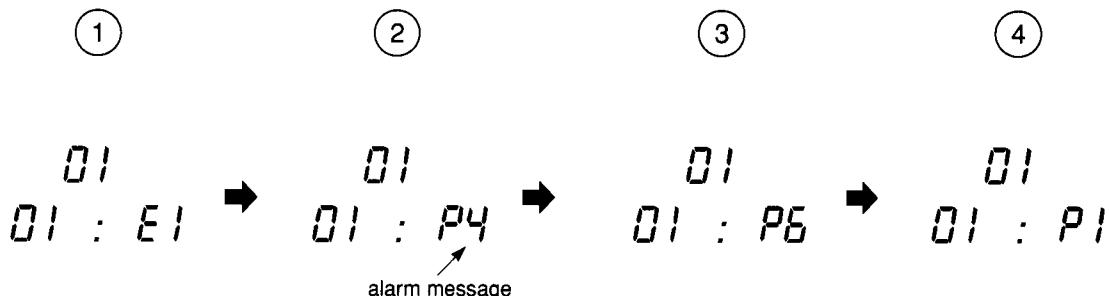


Fig. 37

If there are no alarm messages, the display shows:

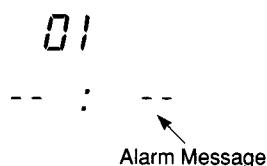


Fig. 38

IMPORTANT

Never press CHK/CHNG button unless you want to erase the accessed data in memory. Follow the procedure below only when erasing is necessary.

- To erase accessed data, press the **CHK/CHNG** button.
- When erasing is finished, **-- : --** shows on the panel's display.



CAUTION

After checking the **alarm messages** be sure to set the **SERVICE** switch back to its **original position**.

(E). Checking the control panel for correct operation

The control panel has a **self-diagnostic** function to check if it works properly. Use this procedure to find out if the panel itself is defective:

- a. Turn **ON** the **RCU.CK** switch on the back of the **P.C.B. Ass'y** in the control panel. See section **4-1-(7)-(A)** for exact location.
- b. The appearance of the display will tell you whether or not the control panel is working correctly or not.
 - Normal condition** – All displays appear for 10 seconds, then disappear.
 - Abnormal condition** – All displays flash ON and OFF for 10 seconds, then disappear.

4



CAUTION

After checking the panel, be sure to set the RCU.CK switch to this original OFF position.

(F). How to access the control panel inside

- ① Opening the Air intake grille
 - a. Pull both edges of the top of the air intake grille up and then pull the grille out. The upper part of the air intake grille can then open slightly. (Fig. 39)
 - b. Remove the 2 short straps holding the grille by small hooks to remove the grille from the cabinet. (Fig. 39)

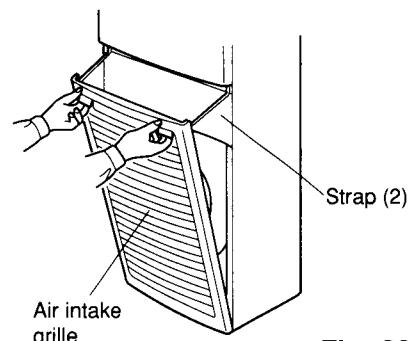


Fig. 39

- ② Removing the Front panel
 - a. Using a phillips head screw driver, remove the 2 screws and straps securing the front panel. (Fig. 40)
 - b. Place your hands on both side of the front panel, slide it downwards and pull it toward you. The panel will detach easily from the unit. (Fig. 40)

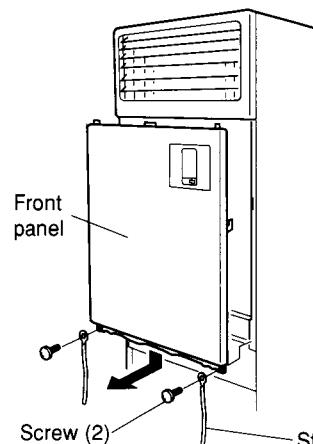


Fig. 40

- ③ Detaching the Control panel from the Front panel
 - a. Unscrew the control panel attached to the front panel. (Fig. 41)
 - b. Put your right hand on the right rear of the control panel, and push it toward you. The control panel will detach easily from the front panel. (Fig. 41)

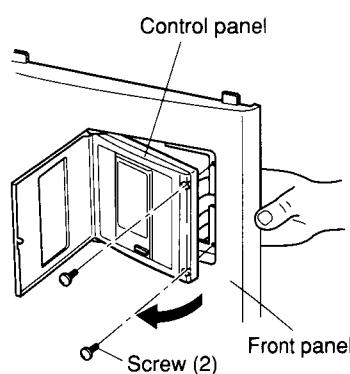


Fig. 41

- ④ Removing the Control panel from the Back case
 - a. Open up the decorative cover, and you will see 2 gaps at the bottom of the control panel. Insert a coin into these gaps and twist it to open the control panel. (Fig. 42)
 - b. Back of the control panel's P.C.B. Ass'y can now be accessed. (Fig. 43)

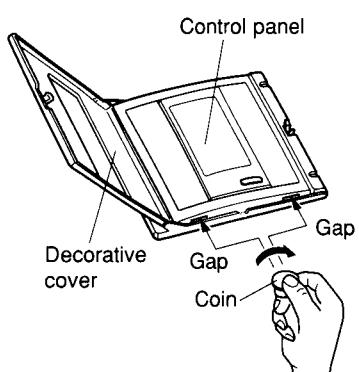


Fig. 42

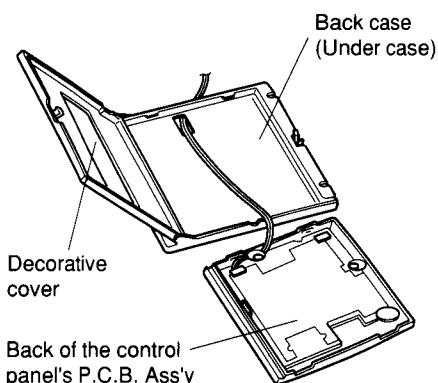


Fig. 43

4-2 Checking the Electrical Components

(1) Measurement of Insulation Resistance

- The insulation is in good condition if the resistance exceeds 1 MΩ.

① Power Supply Wires

Clamp the earthed wire of the Power Supply wires with a lead clip of the insulation resistance tester and measure the resistance by placing a probe on either of the power wires. (Fig. 44)

Then measure the resistance between the earthed wire and the other power wires. (Fig. 44)

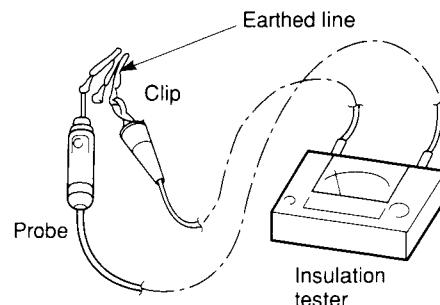


Fig. 44

4

② Indoor Unit

Clamp an aluminum plate fin or copper tube with the lead clip of the insulation resistance tester and measure the resistance by placing a probe on ①, and then ②, and then ③ on the 6P terminal plate (Fig. 45)

See Fig. 28.

③ Outdoor Unit

Measure the resistance on ⑤ and then ⑥, and then ⑦ on the 8P terminal plate in the same manner as explained above (2). (Fig. 45)

See Fig. 28.

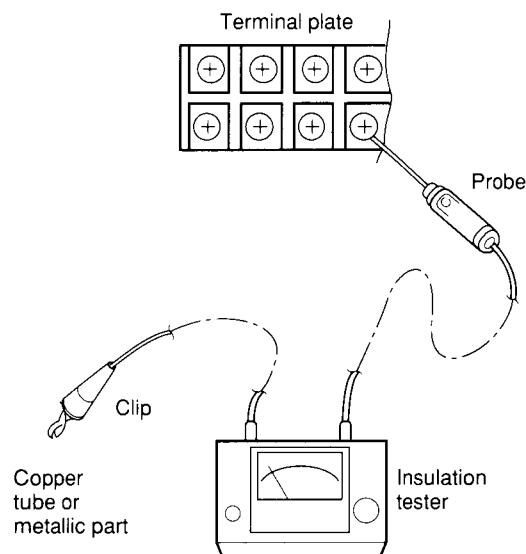


Fig. 45

④ Measurement of Insulation Resistance for Electrical parts

- Disconnect the connector of the desired electric part from terminal plate, P.C.B. A'ssy, etc. (Fig. 46)
- Similarly, disconnect the lead wires from compressor, capacitor, etc. (Fig. 47)
- Measure the resistance in the same manner as illustrated on the right.

Refer to Electrical Wiring Diagram.

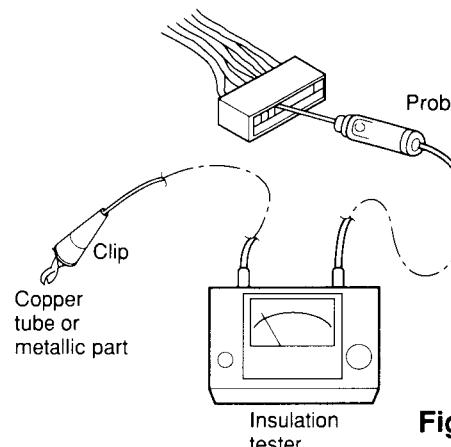


Fig. 46

NOTE

If the probe does not enter the hole because the hole is too narrow, use a probe with a thinner pin.

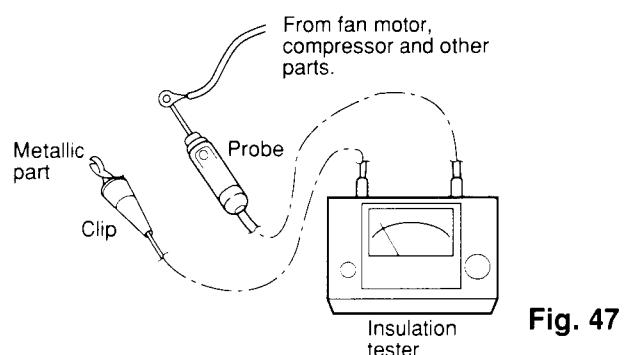


Fig. 47

(2) Checking of Protective Devices

- Disengage the connector, which consists of P (plug) and S (socket) when you want to check the protective device.
- Then check continuity among plug's (and/or socket's) terminal as in **Fig. 48**.
- Normality of the protective device can be judged by the following table.
The Protective Device is proved normal if there is a continuity between terminals.

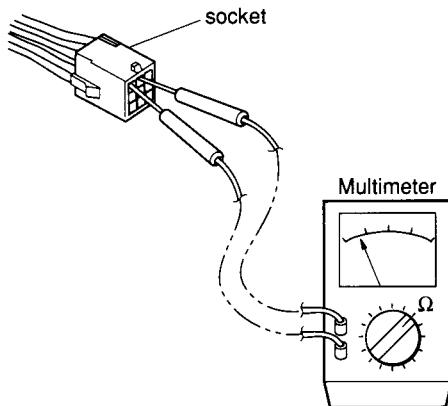


Fig. 48

① Indoor fan motor thermal protector (49FI) Indoor unit

- Disconnect 8P connector (WHT) which leads to the indoor fan motor (FMI).
- Check the socket's terminals between No. 3 (GRY lead wire) and No. 4 (GRY lead wire).

② Over heat protector (26T) for the auxiliary heater Indoor unit

- Disconnect 2P connector (WHT) which leads to the over heat protector (26T).
- Check the socket's terminal between No. 1 (WHT lead wire) and No. 2 (WHT lead wire).

③ Compressor motor thermal protector (49C) Outdoor unit

- Disconnect both 8P connector (WHT) and 12P connector (WHT) in the outdoor unit.
- Check terminal between 8P plug's No. 3 (GRY lead wire) and 12P socket's No. 10 (GRY lead wire).

④ Outdoor fan motor thermal protector (49FO) Outdoor unit

- Disconnect both 8P connector (WHT) which leads to the outdoor fan motor (FMO).
- Check socket's terminal between No. 3 (GRY lead wire) and No. 4 (GRY lead wire).

⑤ High pressure switch (63PH) Outdoor unit

- Disconnect 2P connector (WHT) which leads to the high pressure switch (63PH).
- Check the socket's terminal between No. 1 (BLK lead wire) and No. 2 (BLK lead wire).

(3) Checking of Electrical Parts

① **Power transformer (TR1)** Indoor unit *Measure the coil resistance.

- Primary ; Measure the resistance between No.1 and No.2 (WHT lead wires) terminals of 2P (WHT) socket jointed to power transformer.
- Secondary 10.8V ; Measure the resistance between No.1 and No.2 (YEL lead wires).
- 13.5V ; Measure the resistance between No.3 and No.4 (BRN lead wires).
- 11.2V ; Measure the resistance between No.5 and No.6 (RED lead wires).

Refer to "1-3-(A) Other component specifications".

② **Power transformer (TR2)** Outdoor unit *Measure the coil resistance.

- Primary ; Measure the resistance between No.1 and No.2 (WHT lead wires) terminals of 2P(WHT) socket jointed to power transformer.
- Secondary 10V-A ; Measure the resistance between No.1 and No.2 (BRN lead wires).
- 10V-B ; Measure the resistance between No.3 and No.4 (RED lead wires).

Refer to "1-3-(B) Other component specifications".

③ **Indoor fan motor (FMI)** Indoor unit *Measure the coil resistance.

- Measure the resistance between each terminal of 8P (WHT) socket jointed to the indoor fan motor.

Refer to "1-2-(A) Major component specifications".

④ **Outdoor fan motor (FMO)** Outdoor unit *Measure the coil resistance.

- Measure the resistance in the same manner as explained above (3).

Refer to "1-2-(B) Major component specifications".

⑤ **Fan motor capacitor** Both in indoor and outdoor unit

- Remove the lead wires from the capacitor terminals, and then place a probe on the capacitor terminals as shown in Fig. 49. Observe the deflection of the pointer, setting the resistance measuring range of the multimeter to the maximum value.
- The capacitor is "good" if the pointer bounces to a great extent and then gradually returns to its original position.

NOTE

The range of deflection and the deflection time differ according to the capacity of the capacitor.

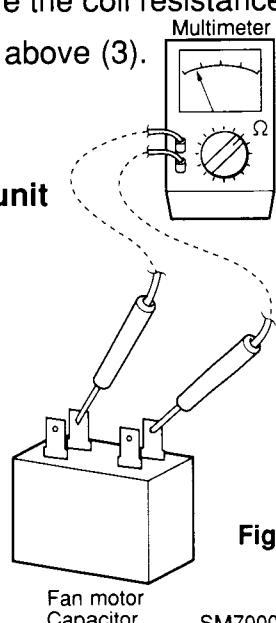


Fig. 49

Fan motor
Capacitor

SM700058

- ⑥ **Solenoid coil of the electronic refrigerant control valve (ERCV) Indoor unit** *Measure the coil resistance.
- Measure the resistance between No. 5 (GRY lead wire) and other terminals (another color of lead wires) of 5P (WHT) plug jointed to the solenoid coil.
Refer to "1-2-(A) Major component specifications".
- ⑦ **Compressor motor (CM) Outdoor unit** *Measure the coil resistance.
- Measure the resistance between "U" (RED lead wire) and "V" (WHT lead wire) terminals, "U" and "W" (BLU lead wire) terminals and "V" and "W" terminals on the compressor motor magnetic contactor.
Refer to "1-2-(B) Major component specifications".
- ⑧ **Compressor motor magnetic contactor (52C) Outdoor unit**
- Measure the resistance between A (ORG lead wire) and B (GRY lead wire) terminals on the compressor motor magnetic contactor.
Refer to "1-3-(B) Other component specifications".
 - Check the continuity between contactors.

MODEL	FMCA-1S			
Push button on the magnetic contactor	Pair of terminals			
	R – U	S – V	T – W	31 – 32
no press	—	—	—	YES
press	YES	YES	YES	—

- ⑨ **Auxiliary relay (1Y, 2Y) Outdoor unit** *Measure the coil resistance.
- Measure the resistance between No. 1 (BRN lead wire) and No. 2 (ORG lead wire) terminals and No. 3 (RED lead wire) and No. 4 (BLU lead wire) terminals of 6P (WHT) socket connected to auxiliary relays.
Refer to "1-3-(B) Other component specifications".
- ⑩ **Solenoid coil of 4-way valve (20S) ... Outdoor unit** *Measure the coil resistance.
- Measure the resistance between No.1 (BLK lead wire) and No.2 (BLK lead wire) terminals of 2P (YEL) socket jointed to the solenoid coil.
Refer to "1-3-(B) Other component specifications".

⑪ **Fuse on indoor and outdoor P.C.B. A'ssy Both in indoor and outdoor unit**
 *Check the continuity.

- Remove the P.C.B. A'ssy from the electrical component box. Then pull out the fuse from the P.C.B. A'ssy. (Fig. 50)

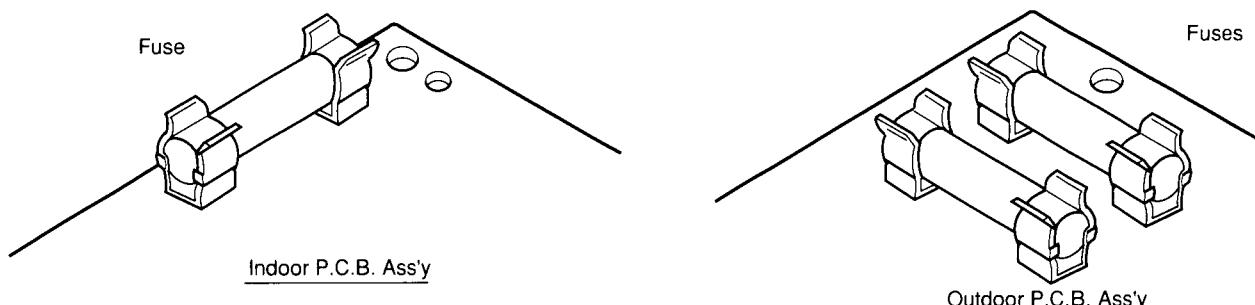
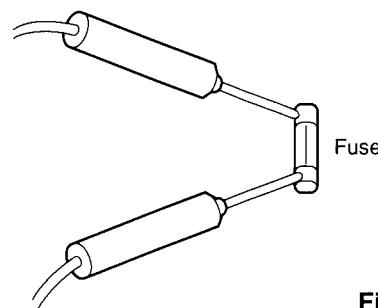


Fig. 50

- Then check for continuity of the fuse by using the multimeter. (Fig.51)



4

Fig. 51

(4) Arrangement of Electrical Parts and Thermistor Location

① Indoor unit : SPW-V452GHE8

- Electrical parts

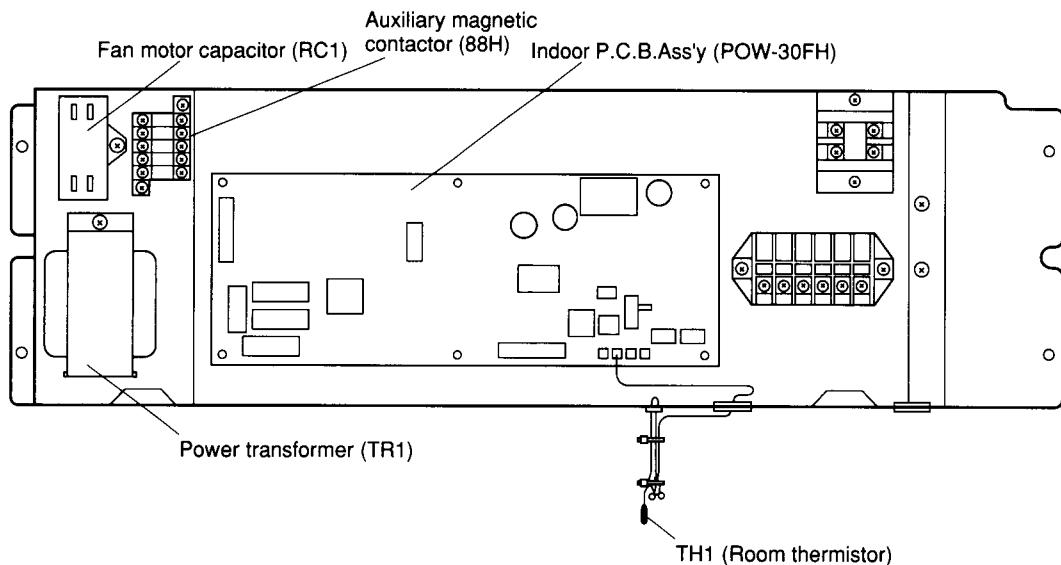
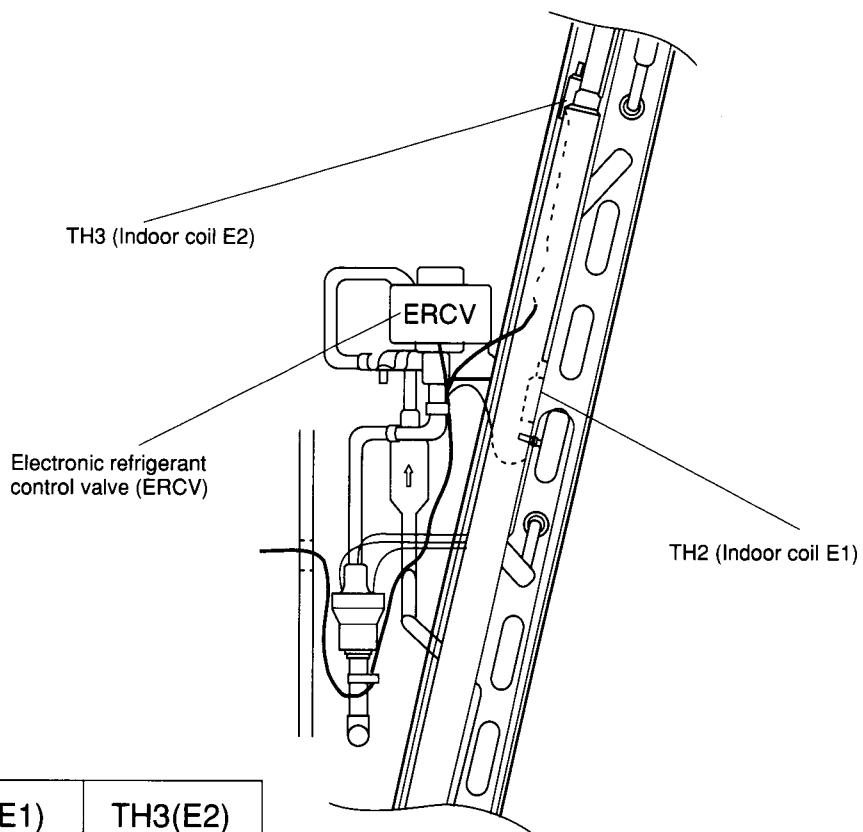


Fig. 52

- Thermistor location



	TH2(E1)	TH3(E2)
Cool	Entrance	Middle
Heat	Exit	Middle

Fig. 53

② **Outdoor unit : SPW-C452GH8**

- Electrical parts

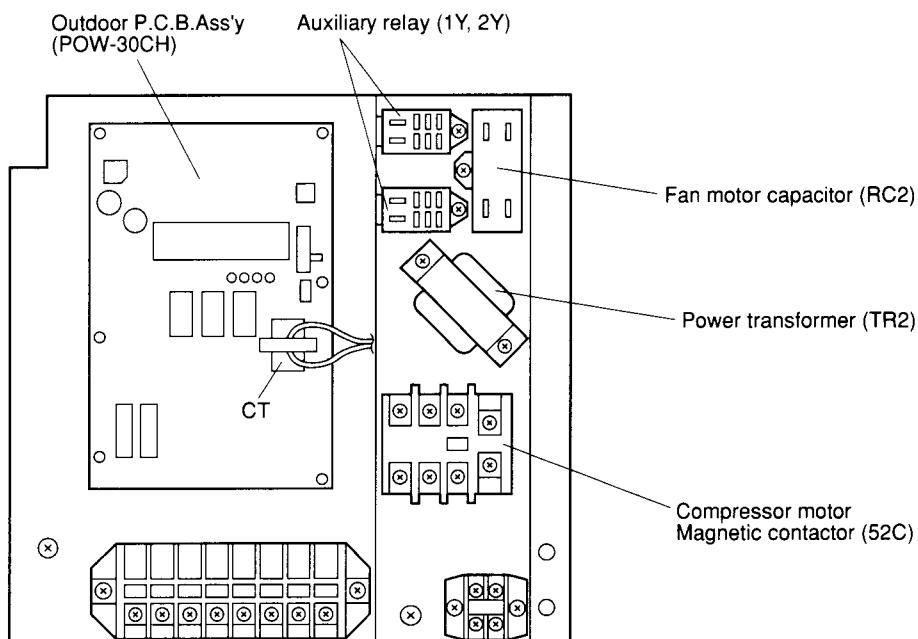
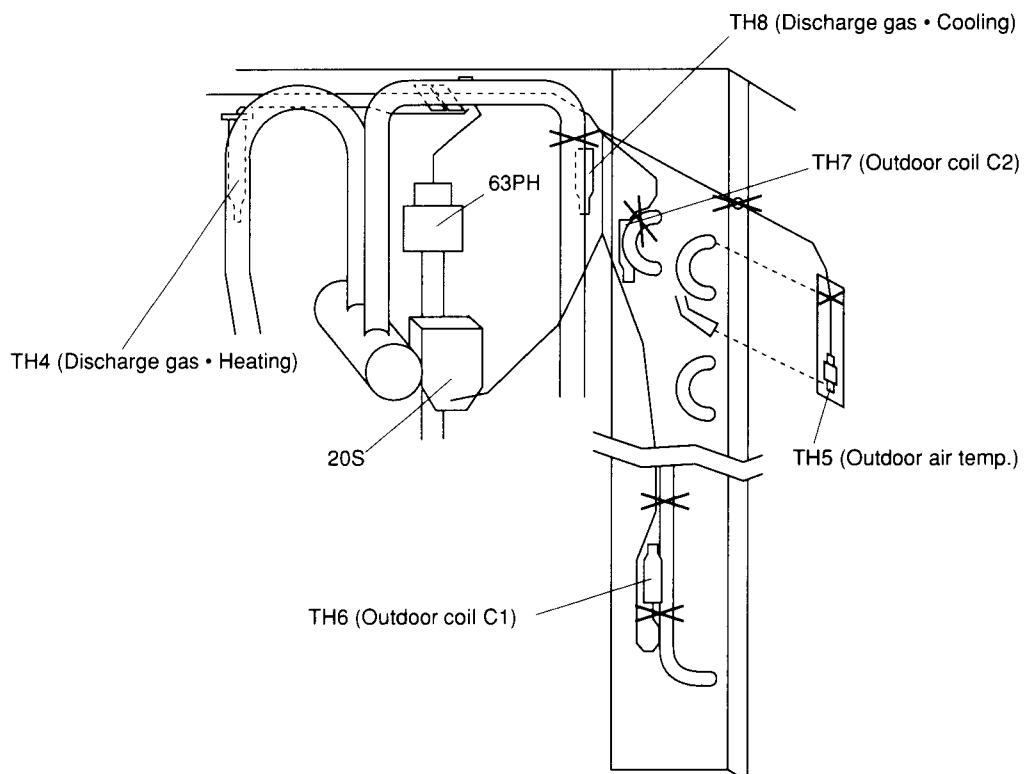


Fig. 54

- Thermistor location

4



63PH : High pressure switch

20S : Solenoid coil of 4-way valve

Fig. 55

(5) Thermistor Characteristic Curve

- ① Room temp. sensor : TH1 (SDT-500B) ② Indoor heat exch.
 coil sensor : TH2(E1), TH3(E2)
 Outdoor air temp.
 sensor : TH5
 Outdoor heat
 exch. coil sensor : TH6(C1), TH7(C2)
 (PCB-41E)

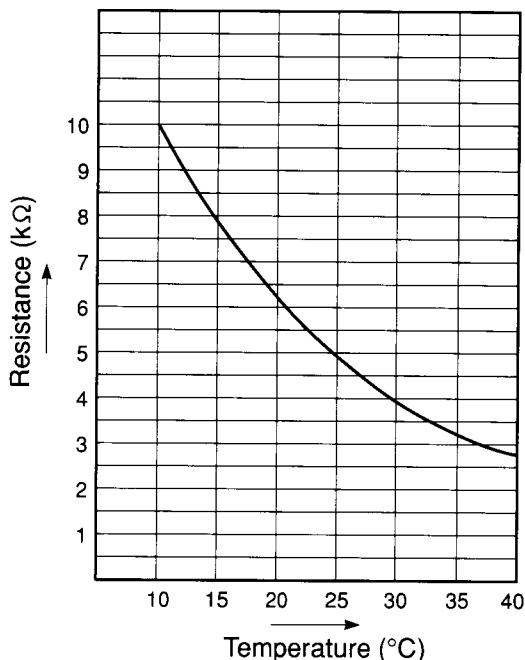


Fig. 56

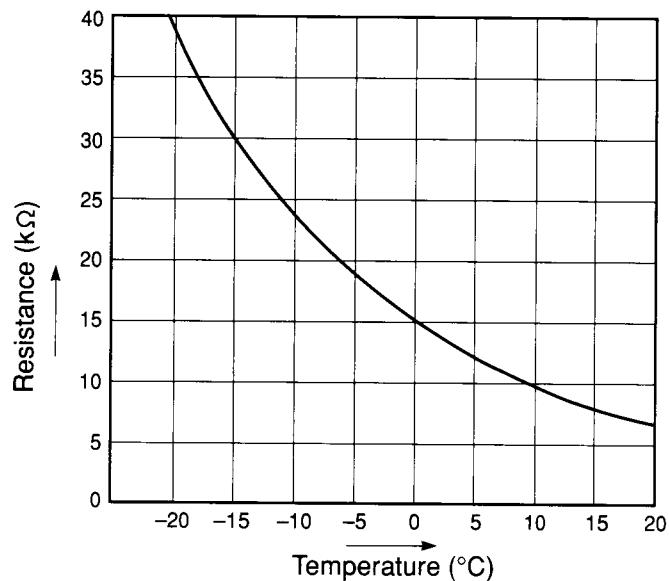


Fig. 57

- ③ Compressor discharge gas temp sensor : TH8 (Cooling)
 Compressor discharge gas temp sensor : TH4 (Heating)
 (PTC-51H)

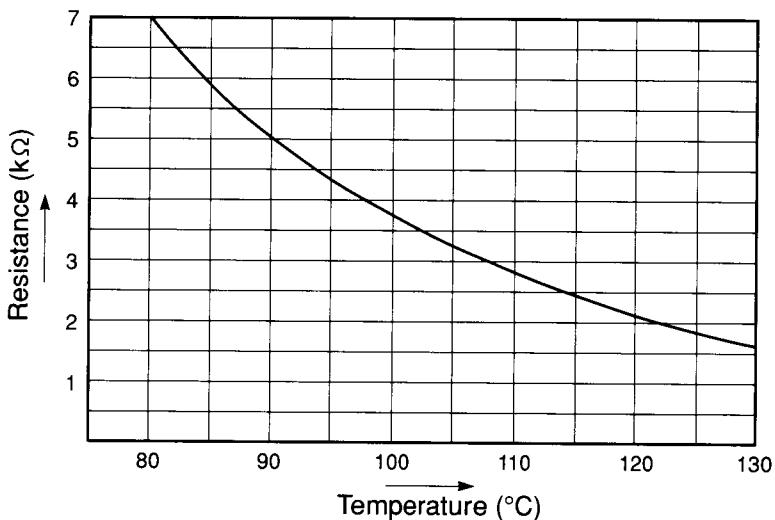


Fig. 58

(6) Checking the P.C.B. Ass'y

Make sure that the setting of switches (S) on P. C. B. Ass'y is positioned (ON and OFF) as follows.

Indoor P. C. B. Ass'y

- S1 (SLV) Set to "NORMAL".
- S2 (BLK) Set to "OFF" 1 through 4.
- S3 (GRN) ... Set to as the table below.

Table

Model No.	1	2	3	4
SPW-V452GHE8	OFF	ON	OFF	ON

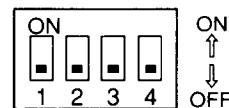


Fig. 59

4

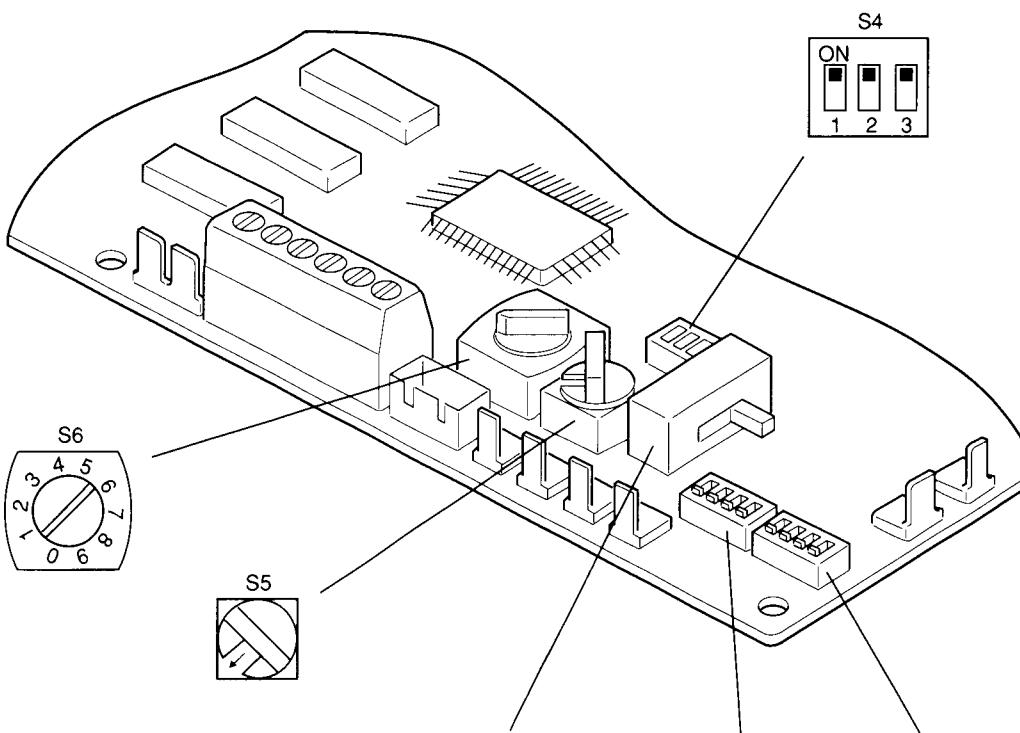
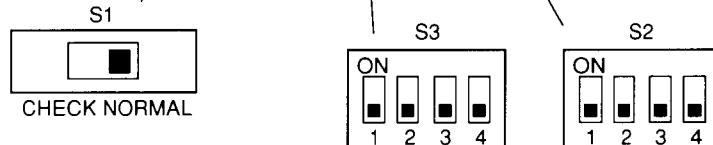


Fig. 60

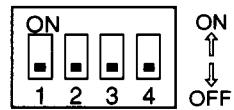


Indoor P.C.B. Ass'y (POW-30FH)

Outdoor P.C.B. Ass'y

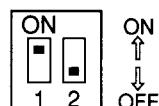
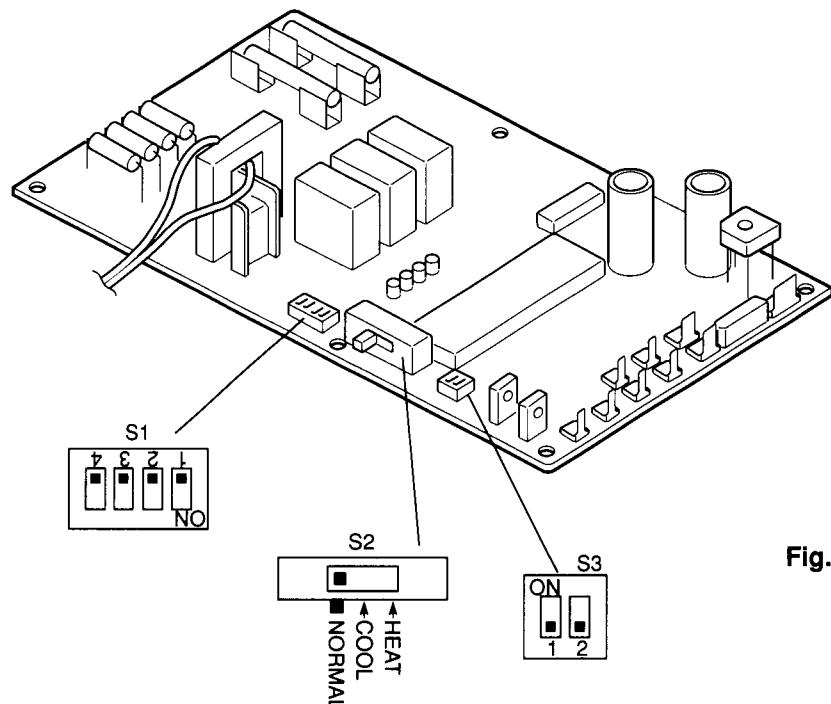
- S1 (GRN) Set to as the table below.

Model No.	1	2	3	4
SPW-C452GH8	OFF	ON	OFF	ON

**Fig. 61**

- S2 (SLV) Set to "NORMAL".
- S3 (BLK) Set as the table below.

Model No.	1	2
SPW-C452GH8	ON	OFF

**Fig. 62****Fig. 63**

Outdoor P.C.B. Ass'y (POW-30CH)

5. INSTRUCTION MANUAL

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Product Information

If you have problems or questions concerning your Air Conditioner, you will need the following information. Model and serial numbers are on the name plate.

Model No. _____ Serial No. _____

Date of purchase _____

Dealer's address _____

Phone number _____

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Alert Symbols

The following symbols used in this manual alert you to potentially dangerous conditions to users, service personnel or the appliance:



WARNING

This symbol refers to a hazardous or unsafe practice which can result in severe personal injury or death.



CAUTION

This symbol refers to a hazardous or unsafe practice which can result in personal injury or product or property damage.

Installation Location

- We recommend that this air conditioner be installed properly by qualified installation technicians in accordance with the Installation Instructions provided with the unit.
- Before installation, check that the voltage of the electric supply in your home or office is the same as the voltage shown on the name plate.



WARNING

- Do not install this air conditioner where there are fumes or flammable gases, or in an extremely humid space such as a greenhouse.
- Do not install the air conditioner where excessively hot heat-generating objects are located.

Avoid:

To protect the air conditioner from heavy corrosion, avoid installing the outdoor unit where salty sea water can splash directly onto it or in sulphurous air near a spa.

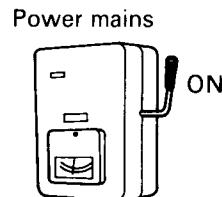
Electrical Requirements

1. All wiring must conform to local electrical codes. Consult your dealer or a qualified electrician for details.
2. Each unit must be properly grounded with a ground (or earth) wire or through the supply wiring.
3. Wiring must be done by a qualified electrician.



CAUTION

To warm up the system, the power mains must be turned on at least five (5) hours before operation. Leave the power mains ON unless you will not be using this appliance for an extended period.



Safety Instructions

- Read this booklet carefully before using this air conditioner. If you still have any difficulties or problems, consult your dealer for help.
- This air conditioner is designed to give you comfortable room conditions. Use this air conditioner only for its intended purpose as described in this Instruction Manual.



WARNING

- Never use or store gasoline or other flammable vapors or liquids near the air conditioner — doing so is very dangerous.
- This air conditioner has no ventilator for taking in fresh air from outdoors. You must open doors or windows frequently when you use gas or oil heating appliances in the same room, which consume a lot of oxygen from the air. Otherwise there is a risk of suffocation in an extreme case.

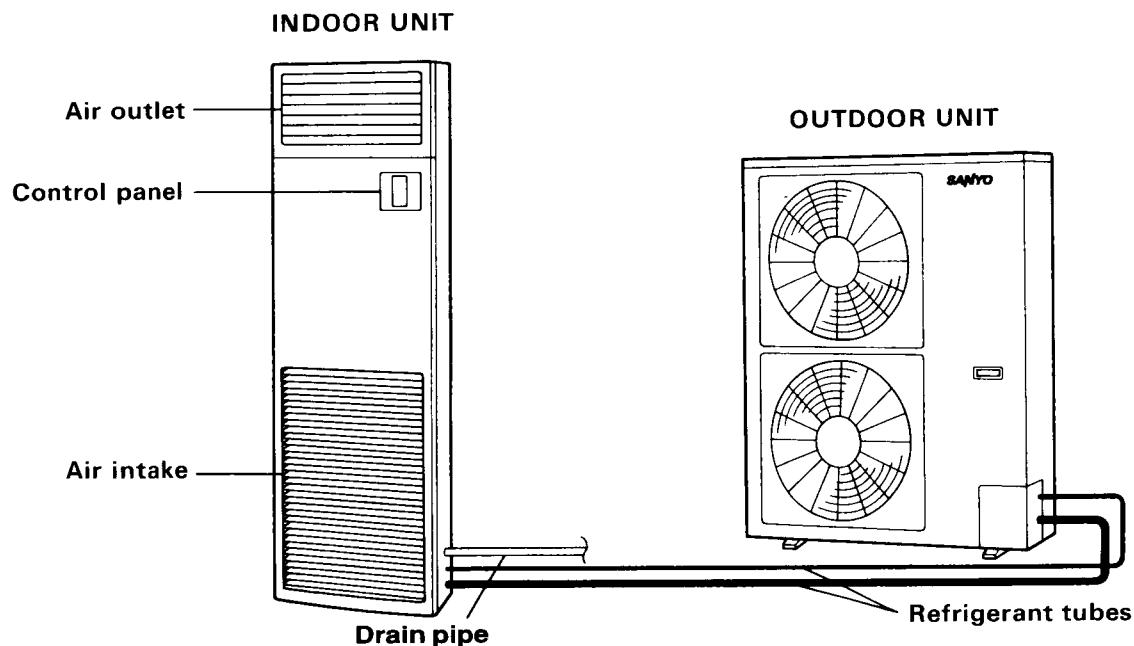


CAUTION

- Do not turn the air conditioner on and off from the power mains switch. Use the operation ON/OFF button.
- Do not stick anything into the air outlet of the air conditioner. Doing so is dangerous because the fan is rotating at high speed.
- Do not let children play with the air conditioner.
- Do not cool or heat the room too much if babies or invalids are present.

Names of Parts

This air conditioner consists of an indoor unit and an outdoor unit.



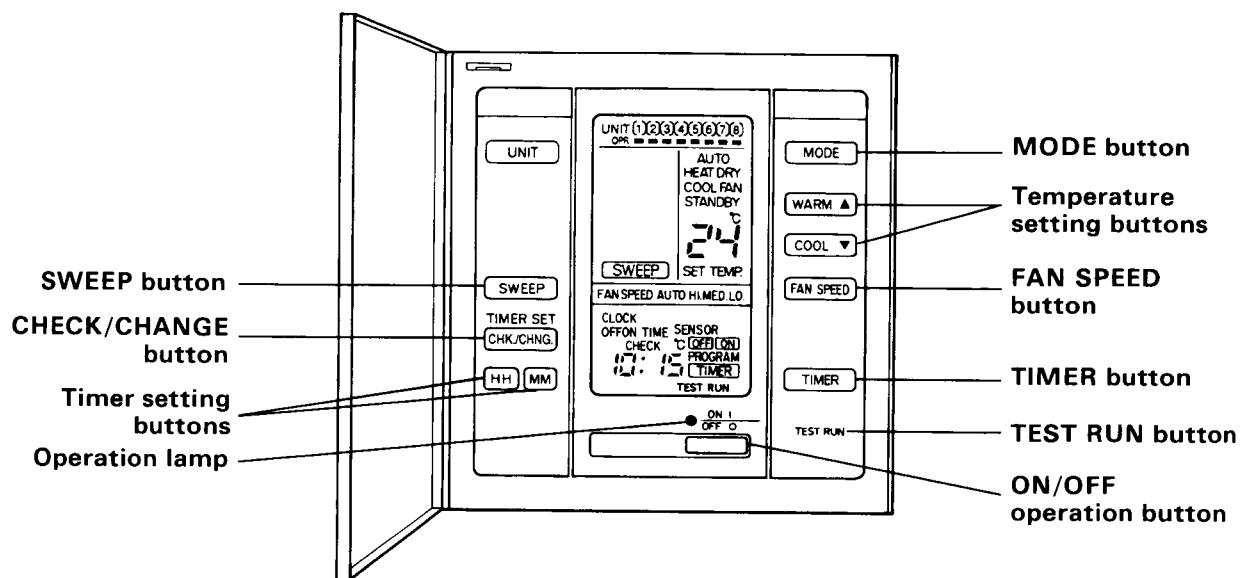
5

NOTE

This illustration is based on the external view of a standard model. Consequently, the appearance may differ from that of the air conditioner which you have selected.

Air outlet	Conditioned air is blown out of the air conditioner through the air outlet.
Control panel (built-in)	This panel consists of indicator lamps and various control switches.
Air intake	The air from the room is drawn into this section and passed through the air filters which remove dust.
Drain pipe	Moisture in the room condenses and drains off through this hose.
Refrigerant tubes	The indoor and outdoor units are connected by copper tubes through which refrigerant gas flows.
Outdoor (condensing) unit	The outdoor unit contains the compressor, fan motor, heat exchanger coil, and other electrical components.

Control Panel

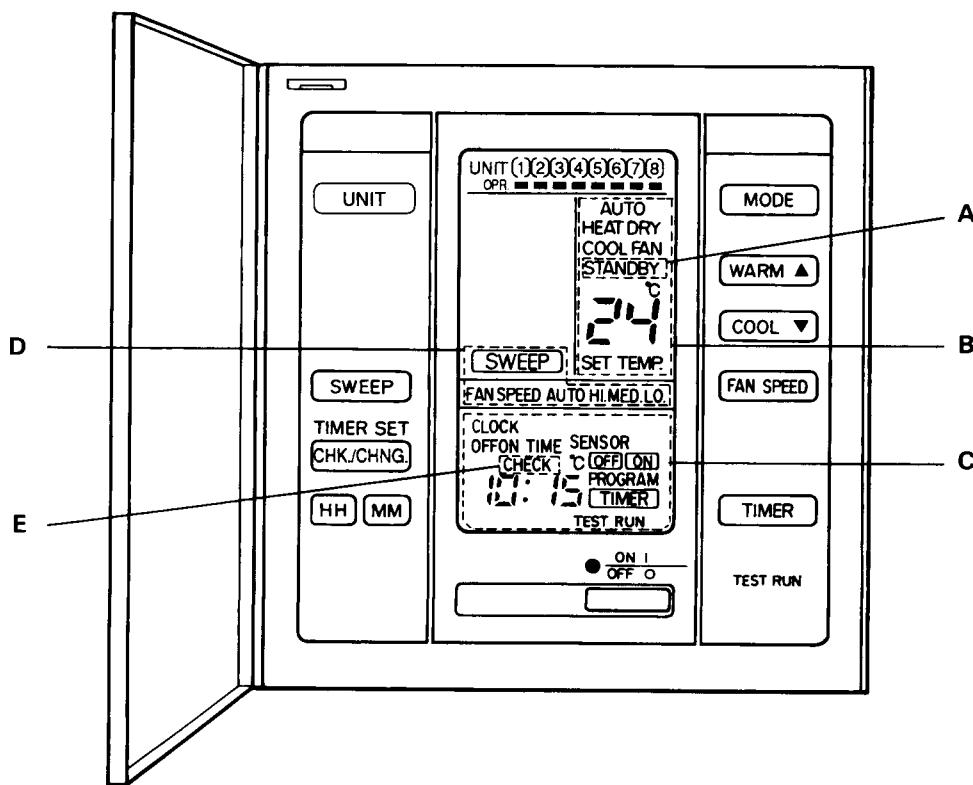


ON/OFF operation button	This button is for turning the air conditioner on and off.
Operation lamp	This lamp lights when the appliance is turned on.
MODE button	Use this button to select one of the following five operations: AUTO: Used to automatically set cooling or heating operation. (temperature range: 17 ~ 27°C) HEAT: Used for normal heating operation. (temperature range: 16 ~ 26°C) DRY: Used for dehumidifying without changing the room temperature. (temperature range: 18 ~ 30°C) COOL: Used for normal cooling operation. (temperature range: 18 ~ 30°C) FAN: Used to run the fan only, without the heating or cooling operation.
Temperature setting buttons	WARM ▲ : Press this button to increase the set temperature. COOL ▼ : Press this button to decrease the set temperature.
FAN SPEED button	AUTO: The air conditioner automatically decides the fan speed. HI. : High fan speed MED. : Medium fan speed LO. : Low fan speed
TIMER button	Use this button while the unit is operating to switch between timer settings. TIMER OFF: The air conditioner stops at the set time. TIMER ON: The air conditioner starts at the set time. PROGRAM TIMER: The air conditioner stops and starts, or starts and stops, at the set times every day.

Control Panel (continued)

TEST RUN button  CAUTION	This button is used only when servicing the air conditioner. Do not use the TEST RUN button for normal operation.
SWEEP button	Use this button to make the airflow direction sweep to the left and right automatically.
CHECK/CHANGE button	Use this button to change the time indication for the timer or real time clock. This button works regardless of whether the unit is turned on or off.
Timer setting buttons	HH: Press this button to set the "hours" indication for the timer or real time clock. MM: Press this button to set the "minutes" indication for the timer or real time clock.

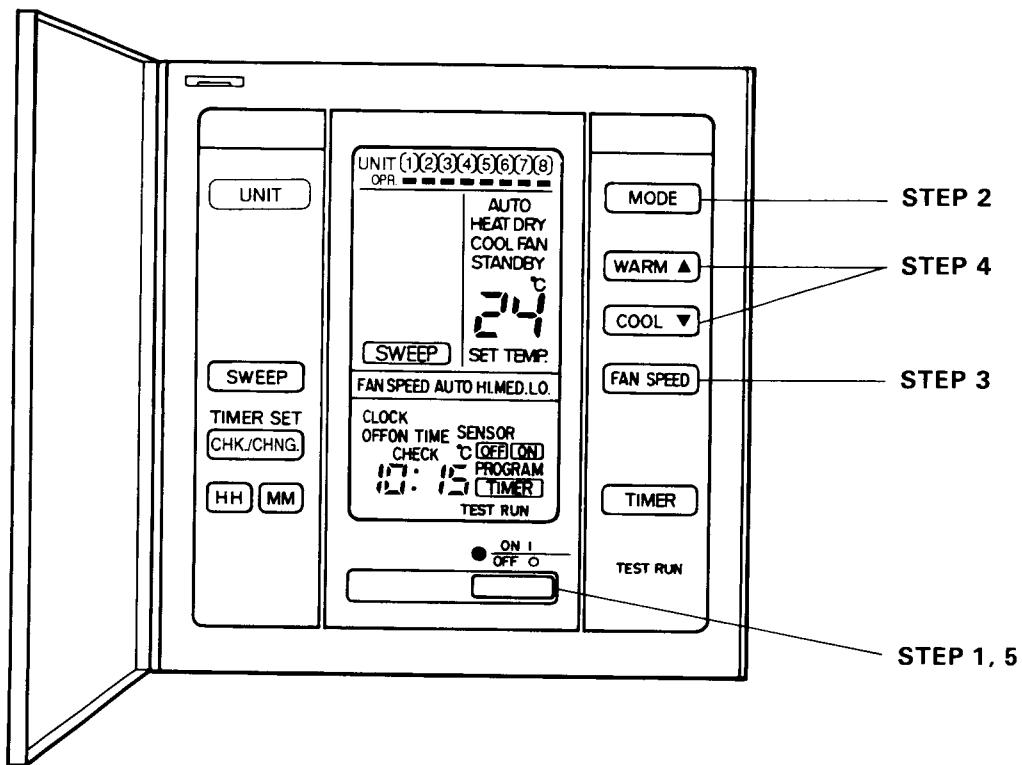
Display (Control Panel)



Description

- A: When the unit is in the heating standby mode, the STANDBY indicator appears.
- B: The currently selected operation mode is displayed.
- C: When the unit is turned off, the current time is displayed.
When the unit is turned on, the current time and selected timer mode are displayed.
- D: The currently selected fan speed and sweep are displayed.
- E: This is displayed only if an abnormality occurs within a unit.

Operation



5

NOTE

To warm up the system, the power mains must be turned on at least five (5) hours before operation.

STEP 1. To start the air conditioner

Press the operation button. (ON/OFF button)

STEP 2. Setting the mode

Press the MODE button to select the mode of your choice.
(AUTO, HEAT, DRY, COOL or FAN)

STEP 3. Setting the fan speed

Press the FAN SPEED button to select the fan speed of your choice. (AUTO*, HI., MED. or LO.)
*If AUTO is selected, the fan speed switches automatically.

STEP 4. Setting the temperature

Use the COOL or WARM button as appropriate to change the temperature setting as desired.
(COOL reduces the temperature, and WARM increases the temperature.)

STEP 5. To stop the air conditioner

Press the operation button (ON/OFF button) again.

Special remarks

"DRY" Operation

How it works?

- Once the room temperature reaches the level that was set, the unit repeats the cycle of turning on and off automatically.
- In order to prevent the humidity in the room from rising again, the indoor fan also turns off when the unit stops operating.
- The fan speed is set to "LOW" automatically, and cannot be adjusted.
- "DRY" operation is not possible if the outdoor temperature is 15°C or less.

Heating Operation

Heating performance

- Because this appliance heats a room by utilizing the heat of the outside air (heat pump system), the heating efficiency will fall off when the outdoor temperature is very low. If sufficient heat cannot be obtained with this heat pump, use another heating appliance in conjunction with this unit.

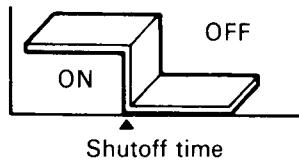
Defrosting

- When the outdoor temperature is low, frost or ice may form on the outdoor heat exchanger coil, reducing the heating performance. When this happens, a microcomputer-controlled defrosting system operates. At the same time, the fan on the indoor unit stops (or runs at very low speed in some cases) and the "STANDBY" indicator appears on the display until defrosting is completed. Heating operation then restarts after several minutes. (This interval will vary slightly depending upon the outdoor temperature and the way in which frost forms.)

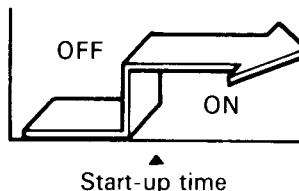
"STANDBY" on the display

- For several minutes after the start of heating operation, the indoor fan will not start running (or it will run at very low speed in some cases) until the indoor heat exchanger coil has warmed up sufficiently. This is because a cold draft prevention system is operating. During this period, the "STANDBY" indicator remains displayed.
- "STANDBY" remains displayed during defrosting or when the compressor has been turned off (or when the unit is running at very low speed) by the thermostat when the system is in the heating mode.
- Upon completion of defrosting and when the compressor is turned on again, "STANDBY" will turn off automatically as the heating operation resumes.

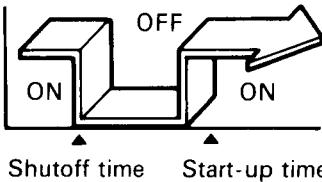
Setting the Timer

TIMER OFF


Use this mode to turn off the appliance automatically at the desired time.

TIMER ON


Use this mode to start the appliance automatically at the desired time.

PROGRAM TIMER


Use this mode to turn the appliance on and off automatically at the same set times every day.

NOTE

Because this timer uses the actual time of day, be sure that the clock is set to the correct time.

How to set the present time

(Example) To set the time to 21:10

5


Operation

1. Press the CHK./CHNG. button to select CLOCK mode.
2.
 - Press the HH button until 21 is displayed.
 - Press the MM button until 10 is displayed.

Indication

The time indication alone flashes.



The display will automatically stop flashing (except for the ":" symbol) after 10 sec.



How to set the OFF timer

(Example) To stop the air conditioner at 23:30



- | Operation | Indication |
|--|--|
| 1. Press the ON/OFF button to start the air conditioner. | |
| 2. Press the CHK./CHNG. button to select OFF TIME mode. | ➡ The timer OFF and time indications flash. |
| 3. | |
| • Press the HH button until 23 is displayed.
• Press the MM button until 30 is displayed. | ➡ The display will automatically change back to the present time after 10 sec. |
| 4. Press the TIMER button to set the OFF timer. | |

How to set the ON timer

(Example) To start the air conditioner at 7:10



- | Operation | Indication |
|---|--|
| 1. Press the ON/OFF button to start the air conditioner. | |
| 2. Press the CHK./CHNG. button to select ON TIME mode. | ➡ The timer ON and time indications flash. |
| 3. | |
| • Press the HH button until 7 is displayed.
• Press the MM button until 10 is displayed. | ➡ The display will automatically change back to the present time after 10 sec. |
| 4. Press the TIMER button to set the ON timer. | |

How to set the PROGRAM timer

(Example) To start operation at 7:10 and stop at 23:30



- | Operation |
|---|
| 1. Set the TIMER ON/OFF times as shown in the above procedures. |
| 2. Press the TIMER button to set PROGRAM (ON/OFF combination*). |

*At this point, the setting (ON or OFF) that is closer to the current time is displayed; when that time comes, the next PROGRAM indicator (ON or OFF) is displayed.

• Checking the timer setting

Each time the CHK./CHNG. button is pressed, the time display and the operation type change and the timer setting is displayed. After a pause, the display changes to the clock display.

Adjusting the Airflow Direction

Horizontal directions (Automatic)

The horizontal airflow can be adjusted by moving the vertical vanes to the left or right.

Press the SWEEP button to start the vanes moving to the left and right. If you want to stop the vane movement and to direct the air to the desired direction, press the SWEEP button again.

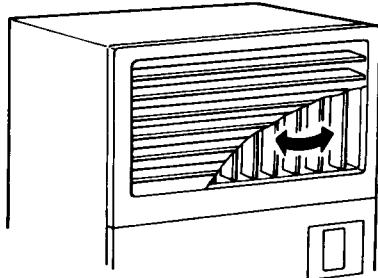


CAUTION

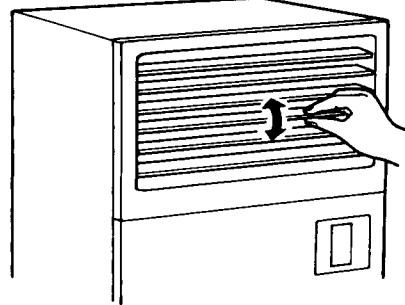
Do not move the vertical vanes with your hands

Vertical directions (Manual)

The vertical airflow can be adjusted by moving the flaps. Hold the end of the flaps and move up and down.



Horizontal (right and left)



Vertical (up and down)

5

Care and Cleaning


WARNING

For safety's sake, be sure to turn the appliance off and also to disconnect it from the power mains before cleaning it. Do not pour water on the unit to clean it. This will damage the internal components and cause an electric shock hazard.

Indoor Unit
Casing and Grille

Clean the casing and grille of the indoor unit with a vacuum cleaner brush, or wipe them with a clean soft cloth.

If these parts are stained, use a clean cloth moistened with a mild liquid detergent. When cleaning the grille, be careful not to force the vanes out of place.


CAUTION

Never use solvents, or harsh chemicals. Do not wipe the plastic fan with very hot water.

Air filter

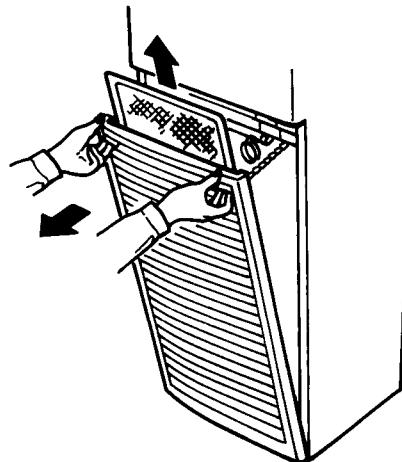
The air filter collects dust and other particles from the air and should be cleaned about once a week. If the filter gets blocked, the efficiency of the air conditioner drops greatly.

How to remove the filter

1. Pull both edges of the top of the grille up and then pull the grille out.
2. Remove the air filter.

How to clean the filter

If only slightly soiled a light dusting is sufficient. If heavily soiled, the filter should be washed in water and dried thoroughly before being replaced.


Outdoor Unit

CAUTION

1. Certain metal edges and the condenser fins are sharp and may cause injury if handled improperly; special care should be taken when you clean these parts.
2. Periodically check the outdoor unit to see if the air outlet or air intake is clogged with dirt or soot.
3. The internal coil and other components of the outdoor unit must also be cleaned periodically. Consult your dealer or service center.

Care: After a Prolonged Idle Period

Check the indoor and outdoor unit air intakes and outlets for blockage; if there is a blockage, remove it.

Care: Before a Prolonged Idle Period

- Operate the fan for half a day to dry out the inside.
- Disconnect the power supply and also turn off the breaker.
- Clean the air filter and replace it in its original position.
- Outdoor unit internal components must be checked and cleaned periodically. Contact your local dealer for this service.

Troubleshooting

If your air conditioner does not work properly, first check the following points before requesting service. If it still does not work properly, contact your dealer or a service center.

Trouble	Possible Cause	Remedy
Air conditioner does not run at all.	1. Power failure 2. Leakage breaker has tripped 3. Line voltage is too low. 4. Operation button is OFF.	1. Restore power. 2. Contact service center. 3. Consult your electrician or dealer. 4. Press the button again.
Compressor runs but soon stops.	1. Obstruction in front of condenser coil	1. Remove obstruction.
Poor cooling (or heating) performance	1. Dirty or clogged air filter 2. Heat source or many people in room 3. Doors and/or windows are open. 4. Obstacle near air intake or air discharge port 5. Thermostat is set too high for cooling (or too low for heating). 6. (Outdoor temperature is too low.) 7. (Defrosting system does not work.)	1. Clean the air filter to improve the airflow. 2. Eliminate heat source if possible. 3. Shut them to keep the heat (or cold) out. 4. Remove it to ensure good airflow. 5. Set the temperature lower (or higher). 6. (Try to use a back-up heater.) 7. (Consult your dealer.)
"CHECK" is displayed.	1. Trouble in wiring system	1. Contact service center.

Tips for Energy Saving

5

- Avoid**
- Do not block the air intake and outlet of the unit. If either is obstructed, the unit will not work well, and may be damaged.
 - Do not let direct sunlight into the room. Use sunshades, blinds or curtains. If the walls and ceiling of the room are warmed by the sun, it will take longer to cool the room.
- Do**
- Always try to keep the air filter clean. (Refer to "Care and Cleaning".) A clogged filter will impair the performance of the unit.
 - To prevent conditioned air from escaping, keep windows, doors and any other openings closed.

NOTE
Should the power fail while the unit is running

If the power supply for this unit is temporarily interrupted the unit will automatically resume operation (once the power is restored) with the same settings that were in effect before the power was interrupted.

SANYO

SANYO Electric Co., Ltd.

Osaka, Japan

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