DAIKIN

SIE-81

Service Manual

Inverter Multi
MX-H, MK-H Series

[APPLIED MODELS]

- **Inverter Multi: Cooling Only**
- **Inverter Multi: Heat Pump**

CONTENTS

Safety cautions

☆ Be sure to read the following safety cautions before conducting repair work.

☆ The caution items are classified into "⚠ Warning" and "⚠ Caution". The "⚠ Warning" items are especially important since they can lead to death or serious injury if they are not followed closely. The "⚠ Caution" items can also lead to serious accidents under some conditions if they are not followed. Therefore, be sure to observe all the safety caution items described below.

☆ About the pictograms

△ This symbol indicates an item for which caution must be exercised.
The pictogram shows the item to which attention must be paid.
○ This symbol indicates a prohibited action.
The prohibited item or action is shown inside or near the symbol.
● This symbol indicates an action that must be taken, or an instruction.
The instruction is shown inside or near the symbol.

☆ After the repair work is complete, be sure to conduct a test operation to ensure that the equipment operates normally, and explain the cautions for operating the product to the customer.

I . Cautions in repair

⚠ Warning

(1) Be sure to disconnect the power cable plug from the plug socket before disassembling the equipment for a repair.
Working on the equipment that is connected to a power supply can cause an electrical shock.
If it is necessary to supply power to the equipment to conduct the repair or inspecting the circuits, do not touch any electrically charged sections of the equipment.

(2) If the refrigerant gas discharges during the repair work, do not touch the discharging refrigerant gas.
The refrigerant gas can cause frostbite.

(3) When disconnecting the suction or discharge pipe of the compressor at the welded section, release the refrigerant gas completely at a well-ventilated place first.
If there is a gas remaining inside the compressor, the refrigerant gas or refrigerating machine oil discharges when the pipe is disconnected, and it can cause injury.

(4) If the refrigerant gas leaks during the repair work, ventilate the area.
The refrigerant gas can generate toxic gases when it contacts flames.

⚠ Warning

(5) The step-up capacitor supplies high-voltage electricity to the electrical components of the outdoor unit.
Be sure to discharge the capacitor completely before conducting repair work.
A charged capacitor can cause an electrical shock.

(6) Do not start or stop the air conditioner operation by plugging or unplugging the power cable plug.
Plugging or unplugging the power cable plug to operate the equipment can cause an electrical shock or fire.

⚠ Caution

(7) Do not repair the electrical components with wet hands.
Working on the equipment with wet hands can cause an electrical shock.

(8) Do not clean the air conditioner by splashing water.
Washing the unit with water can cause an electrical shock.

(9) Be sure to provide the grounding when repairing the equipment in a humid or wet place, to avoid electrical shocks.

(10) Be sure to turn off the power switch and unplug the power cable when cleaning the equipment.
The internal fan rotates at a high speed, and can cause injury.

(11) Do not tilt the unit when removing it.
The water inside the unit can spill and wet the furniture and floor.

(12) Be sure to check that the refrigerating cycle section has cooled down sufficiently before conducting repair work.
Working on the unit when the refrigerating cycle section is hot can cause burns.

⚠ Caution

(13) Use the welder in a well-ventilated place.
Using the welder in an enclosed room can cause oxygen deficiency.

Ⅱ. Cautions regarding products after repair

⚠ Warning

(14) Be sure to use parts listed in the service parts list of the applicable model and appropriate tools to conduct repair work. Never attempt to modify the equipment. The use of inappropriate parts or tools can cause an electrical shock, excessive heat generation or fire.

(15) When relocating the equipment, make sure that the new installation site has sufficient strength to withstand the weight of the equipment.
If the installation site does not have sufficient strength and if the installation work is not conducted securely, the equipment can fall and cause injury.

【For integral units only】
(16) Be sure to install the product correctly be using the provided standard installation frame.
Incorrect use of the installation frame and improper installation can cause the equipment to fall, resulting in injury.

【For integral units only】
(17) Be sure to install the product securely in the installation frame mounted on a window frame.
If the unit is not securely mounted, it can fall and cause injury.

(18) Be sure to use an exclusive power circuit for the equipment, and follow the technical standards related to the electrical equipment, the internal wiring regulations and the instruction manual for installation when conducting electrical work.
Insufficient power circuit capacity and improper electrical work can cause an electrical shock or fire.

⚠ Warning

(19) Be sure to use the specified cable to connect between the indoor and outdoor units. Make the connections securely and route the cable properly so that there is no force pulling the cable at the connection terminals.
Improper connections can cause excessive heat generation or fire.

(20) When connecting the cable between the indoor and outdoor units, make sure that the terminal cover does not lift off or dismount because of the cable.
If the cover is not mounted properly, the terminal connection section can cause an electrical shock, excessive heat generation or fire.

(21) Do not damage or modify the power cable.
damaged or modified power cable can cause an electrical shock or fire.
Placing heavy items on the power cable, and heating or pulling the power cable can damage the cable.

(22) Do not mix air or gas other than the specified refrigerant (R22) in the refrigerant system.
If air enters the refrigerating system, an excessively high pressure results, causing equipment damage and injury.

(23) If the refrigerant gas leaks, be sure to locate the leak and repair it before charging the refrigerant. After charging refrigerant, make sure that there is no refrigerant leak.
If the leak cannot be located and the repair work must be stopped, be sure to perform pump-down and close the service valve, to prevent the refrigerant gas from leaking into the room. The refrigerant gas itself is harmless, but it can generate toxic gases when it contacts flames, such as fan and other heaters, stoves and ranges.

(24) When replacing the coin battery in the remote controller, be sure to disposed of the old battery to prevent children from swallowing it.
If a child swallows the coin battery, see a doctor immediately.

⚠ Caution

(25) Installation of a leakage breaker is necessary in some cases depending on the conditions of the installation site, to prevent electrical shocks.

(26) Do not install the equipment in a place where there is a possibility of combustible gas leaks.
If a combustible gas leaks and remains around the unit, it can cause a fire.

【For integral units only】

(27) Be sure to install the packing and seal on the installation frame properly.
If the packing and seal are not installed properly, water can enter the room and wet the furniture and floor.

Ⅲ. Inspection after repair

⚠ Warning

(28) Check to make sure that the power cable plug is not dirty or loose, then insert the plug into a power outlet all the way.
If the plug has dust or loose connection, it can cause an electrical shock or fire.

(29) If the power cable and lead wires have scratches or deteriorated, be sure to replace them.
Damaged cable and wires can cause an electrical shock, excessive heat generation or fire.

(30) Do not use a joined power cable or extension cable, or share the same power outlet with other electrical appliances, since it can cause an electrical shock, excessive heat generation or fire.

⚠ Caution

(31) Check to see if the parts and wires are mounted and connected properly, and if the connections at the soldered or crimped terminals are secure.
Improper installation and connections can cause excessive heat generation, fire or an electrical shock.

(32) If the installation platform or frame has corroded, replace it.
Corroded installation platform or frame can cause the unit to fall, resulting in injury.

(33) Check the grounding, and repair it if the equipment is not properly grounded.
Improper grounding can cause an electrical shock.

(34) Be sure to measure the insulation resistance after the repair, and make sure that the resistance is 1 Mohm or higher.
Faulty insulation can cause an electrical shock.

(35) Be sure to check the drainage of the indoor unit after the repair.
Faulty drainage can cause the water to enter the room and wet the furniture and floor.

Inverter Multi
Room Air Conditioners MX-H, MK-H Series

- **Heat Pump**

INDOOR UNIT

CDX25HV1NB
CDX35HV1NB
CDX50HV1NB
CDX60HV1NB
FTX25HV1NB
FTX35HV1NB
FTX50HV1NB
FTX60HV1NB

OUTDOOR UNIT

4MX80HV1NB

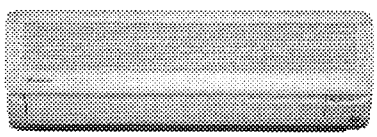
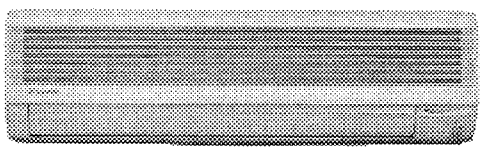
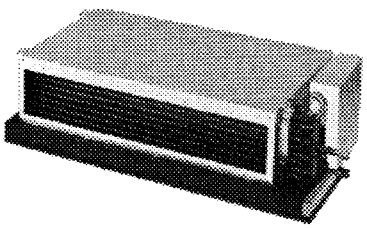
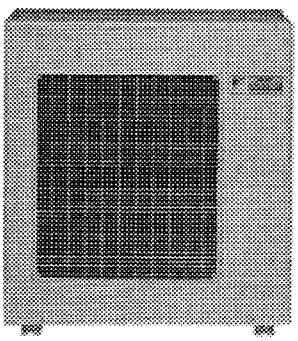
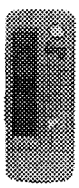
- **Cooling Only**

INDOOR UNIT

CDK25HV1NB
CDK35HV1NB
CDK50HV1NB
CDK60HV1NB
FTK25HV1NB
FTK35HV1NB
FTK50HV1NB
FTK60HV1NB

OUTDOOR UNIT

4MK90HV1NB

1. List of Functions

Cooling Only Model

Category	Functions	FTK		CDK	4MK	Category	Functions	FTK		CDK	4MK
		25, 35	50, 60	25-60	90H Series			25, 35	50, 60	25-60	90H Series
Basic Function	Energy Efficiency	○	○	○	○	Health Health & Clean	Air Purifying Filter (With Bacteriostatic Function, Virustatic Function, Deodrizing Function)	○	○	—	—
	Inverter, Inverter Power Control	○	○	○	○		Mold Proof Air Filter	○	○	—	—
	Cooling Operation Limit : Outdoor Temp.°C	—	—	—	*		Washable Grille	○	○	—	—
	Microprocessor Control	○	○	○	○		Filter Cleaning Indicator	○	○	—	—
Compressor	Scroll, Horizontal Scroll	—	—	—	○	Timer	24-Hour Clock Timer	○	○	○	—
	Swing	—	—	—	—		12-Hour Timer	—	—	—	—
	Rotary	—	—	—	—		On Timer	○	○	○	—
	Reluctance DC	—	—	—	—		Off Timer	○	○	○	—
Comfortable Airflow	Dual Flap	○	○	—	—		Night Set Mode	○	○	○	—
	Power-Airflow Flap	○	○	—	—		Alarm Timer	—	—	—	—
	Diffuser	○	○	—	—	Worry Free "Reliability & Durability"	Automatic Restart	○	○	○	—
	Wide-Angle Louvers	○	○	—	—		Self-Diagnosis Digital Display	○	○	○	—
	Vertical Auto-Swing	—	○	—	—		Self-Diagnosis LED Display	○	○	○	○
	Horizontal Auto-Swing	○	○	—	—		Theft Protection for Remote Controller (Option)	○	○	○	—
	3 Step Flow (H/P Only)	—	—	—	—		Wiring Error Check	—	—	—	○
"Comfortable Control" Comfort Control	Auto Fan Speed	○	○	○	—		Anti-Corrosion Treatment of Outdoor Heat Exchange Fins.	—	—	—	○
	Silent Operation Control	—	—	—	—	Flexibility	Multi-Split/Split Type Compatible Indoor Unit	○	—	—	—
	Double Thermostat Function	—	—	—	—		Flexible Voltage Correspondence	○	○	○	○
	Neuro-Heat Sensitive Control	—	—	—	—		Charge Less	—	—	—	70m
	Quick Heating Control	—	—	—	—	Remote Control	5-Rooms Centralized Controller	○	○	○	—
	Hot Start	—	—	—	—		Time Clock (Field Supply)	○	○	○	—
	Automatic Defrosting	—	—	—	—		Remote Control Adaptor (Normal Open-Pluse Contact)	○	○	○	—
Operation Intelligent Operation	Automatic Operation	—	—	—	—		Remote Control Adaptor (Normal Open Contact)	○	○	○	—
	Programme Dry	○	○	○	—	Remote Controller	Wireless	○	○	○	—
	Circulation	—	—	—	—		Wired	—	—	—	—
	Fan Only	○	○	○	—						
Convenient Lifestyle Convenience	New Powerful Operation	—	—	—	—						
	Powerful Operation	—	—	—	—						
	Inverter Powerful-Operation	○	○	○	○						
	Quiet Operation	—	—	—	—						
	Laundry Program Operation	—	—	—	—						
	Energy Saving Operation	—	—	—	—						
	Power Select	—	—	—	—						
	On/Off Switch on Indoor Unit	○	○	—	—						
	Signal Reception Indicator	—	—	—	—						
	Temperature Indicator	—	—	—	—						

○ :Holding Functions — :No Functions * :More Than 10°CDB

Heat Pump Model

Category	Functions	FTX 25, 35	FTX 50, 60	CDX 25-60	4MX 80H Series	Category	Functions	FTX 25, 35	FTX 50, 60	CDX 25-60	4MX 80H Series
Basic Function	Energy Efficiency	○	○	○	○	Health Health & Clean	Air Purifying Filter (With Bacteriostatic Function, Virustatic Function, Deodrizing Function)	○	○	–	–
	Inverter, Inverter Power Control	○	○	○	○		Mold Proof Air Filter	○	○	–	–
	Cooling Operation Limit : Outdoor Temp.°C	–	–	–	*		Washable Grille	○	○	–	–
	Microprocessor Control	○	○	○	○		Filter Cleaning Indicator	○	○	–	–
Compressor	Scroll, Horizontal Scroll	–	–	–	○	Timer	24-Hour Clock Timer	○	○	○	–
	Swing	–	–	–	–		12-Hour Timer	–	–	–	–
	Rotary	–	–	–	–		On Timer	○	○	○	–
	Reluctance DC	–	–	–	–		Off Timer	○	○	○	–
Comfortable Airflow	Dual Flap	○	○	–	–		Night Set Mode	○	○	○	–
	Power-Airflow Flap	○	○	–	–		Alarm Timer	–	–	–	–
	Diffuser	○	○	–	–	Worry Free "Reliability & Durability"	Automatic Restart	○	○	○	–
	Wide-Angle Louvers	○	○	–	–		Self-Diagnosis Digital Display	○	○	○	–
	Vertical Auto-Swing	–	○	–	–		Self-Diagnosis LED Display	○	○	○	○
	Horizontal Auto-Swing	○	○	–	–		Theft Protection for Remote Controller (Option)	○	○	○	–
	3 Step Flow (H/P Only)	○	○	–	–		Wiring Error Check	–	–	–	○
"Comfortable Control" Comfort Control	Auto Fan Speed	○	○	○	–		Anti-Corrosion Treatment of Outdoor Heat Exchange Fins.	–	–	–	○
	Silent Operation Control	–	–	–	–	Flexibility	Multi-Split/Split Type Compatible Indoor Unit	○	–	–	–
	Double Thermostat Function	–	–	–	–		Flexible Voltage Correspondence	○	○	○	○
	Neuro-Heat Sensitive Control	–	–	–	–		Charge Less	–	–	–	70m
	Quick Heating Control	–	–	–	○	Remote Control	5-Rooms Centralized Controller	○	○	○	–
	Hot Start	○	○	○	–		Time Clock (Field Supply)	○	○	○	–
	Automatic Defrosting	–	–	–	○		Remote Control Adaptor (Normal Open-Pluse Contact)	○	○	○	–
Operation Intelligent Operation	Automatic Operation	○	○	○	–		Remote Control Adaptor (Normal Open Contact)	○	○	○	–
	Programme Dry	○	○	○	–	Remote Controller	Wireless	○	○	○	–
	Circulation	–	–	–	–		Wired	–	–	–	–
	Fan Only	–	–	–	–						
Convenient Lifestyle Convenience	New Powerful Operation	–	–	–	–						
	Powerful Operation	–	–	–	–						
	Inverter Powerful-Operation	○	○	○	○						
	Quiet Operation	–	–	–	–						
	Laundry Program Operation	–	–	–	–						
	Energy Saving Operation	–	–	–	–						
	Power Select	–	–	–	–						
	On/Off Switch on Indoor Unit	○	○	–	–						
	Signal Reception Indicator	–	–	–	–						
	Temperature Indicator	–	–	–	–						

○ :Holding Functions – :No Functions * :More Than 10°CDB

2. Printed Circuit Board Connector Wiring Diagram and Name

Cooling Only

- **CDK25~60HV1NB**

Heat Pump

- **CDX25~60HV1NB**

Printed Circuit Board (1) (Control PCB)
Printed Circuit Board (2) (Power Supply PCB)
Printed Circuit Board (3) (Display/Signal Receiver PCB)

Name of Connector

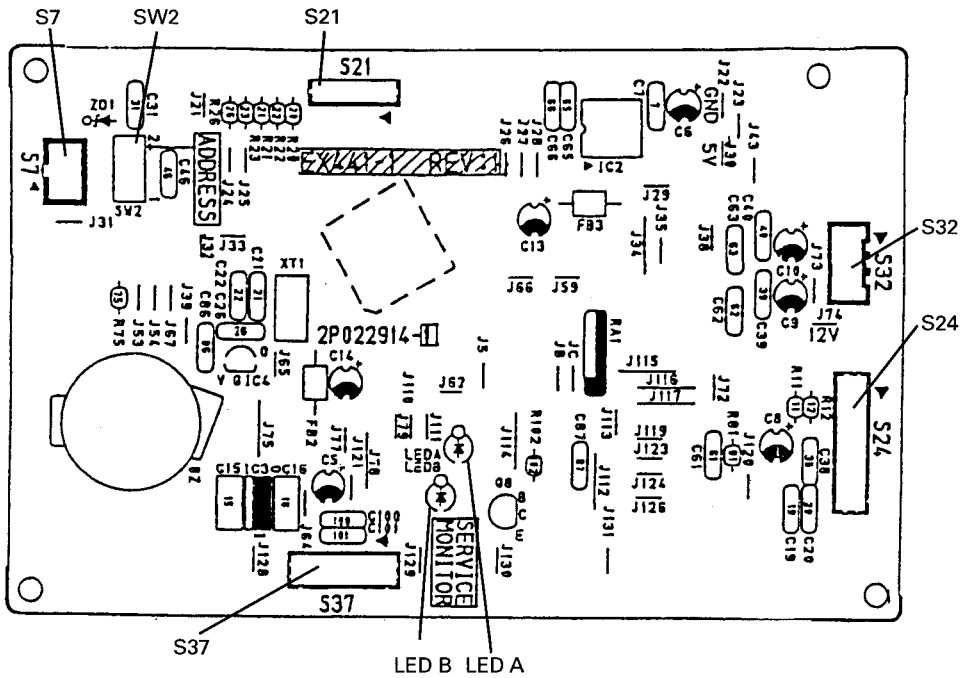
1)	S1	Connector for Fan Motor
2)	S7	Connector for Fan RPM (Hall IC Output)
3)	S21	Connector for Centralized Control to 5 Rooms
4)	S24	Connector for Display PCB
5)	S25, S27, S36	Connector for Control PCB
6)	S31, S32	Connector for Room Temp/Heat Exchanger Thermistor
7)	S37	Connector for Power Supply PCB

Note) Other Designations

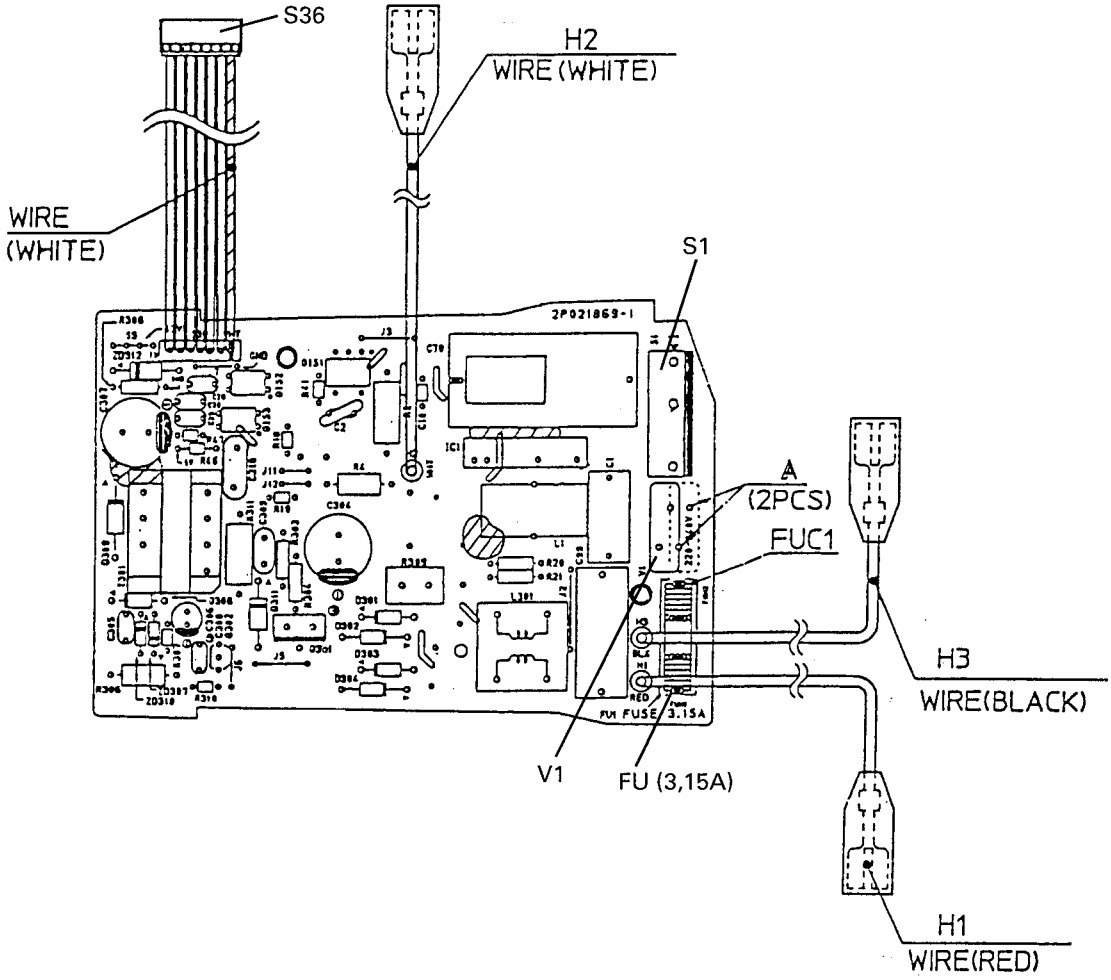
1) V1	Varistor
2) SW2 (S2W)	Address Switch
3) SW7 (S1W)	Operation Switch
4) LED3	LED for Operation
5) LED4	LED for Timer
6) LED A, LED B	LED for Service Monitor

(Control PCB)

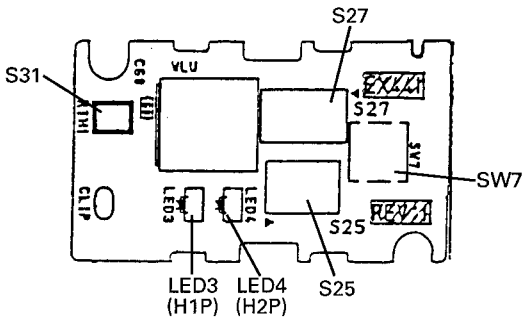
Printed Circuit Board (1)



(Power Supply PCB)
Printed Circuit Board (2)



(Display/Signal Receiver PCB)
Printed Circuit Board (3)



Cooling Only

- **FTK25/35HV1NB**

Heat Pump

- **FTX25/35HV1NB**

Printed Circuit Board (1) (Control PCB)
Printed Circuit Board (2) (Power Supply PCB)
Printed Circuit Board (3) (Display PCB)
Printed Circuit Board (4) (Signal Receiver PCB)

Name of Connector

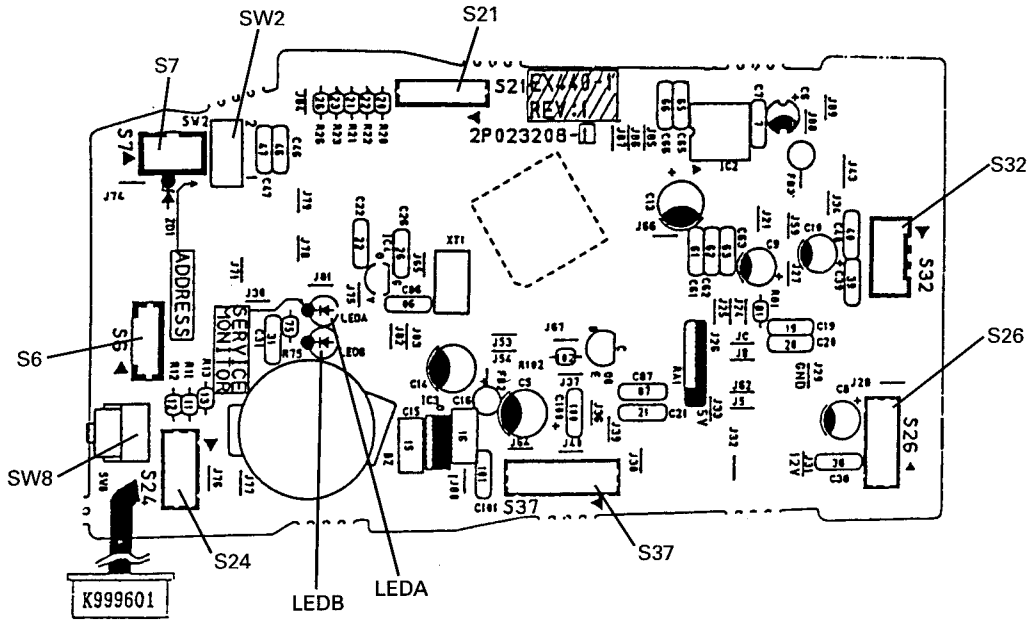
1)	S1	Connector for Fan Motor
2)	S6	Connector for Swing Motor (Horizontal Flap)
3)	S7	Connector for Fan RPM (Hall IC Output)
4)	S21	Connector for Centralized Control to 5 Rooms
5)	S24	Connector for Display PCB
6)	S25, S27, S36	Connector for Control PCB
7)	S26	Connector for Signal Receiver PCB
8)	S31, S32	Connector for Room Temp/Heat Exchanger Thermistor
9)	S37	Connector for Power Supply PCB

Note) Other Designations

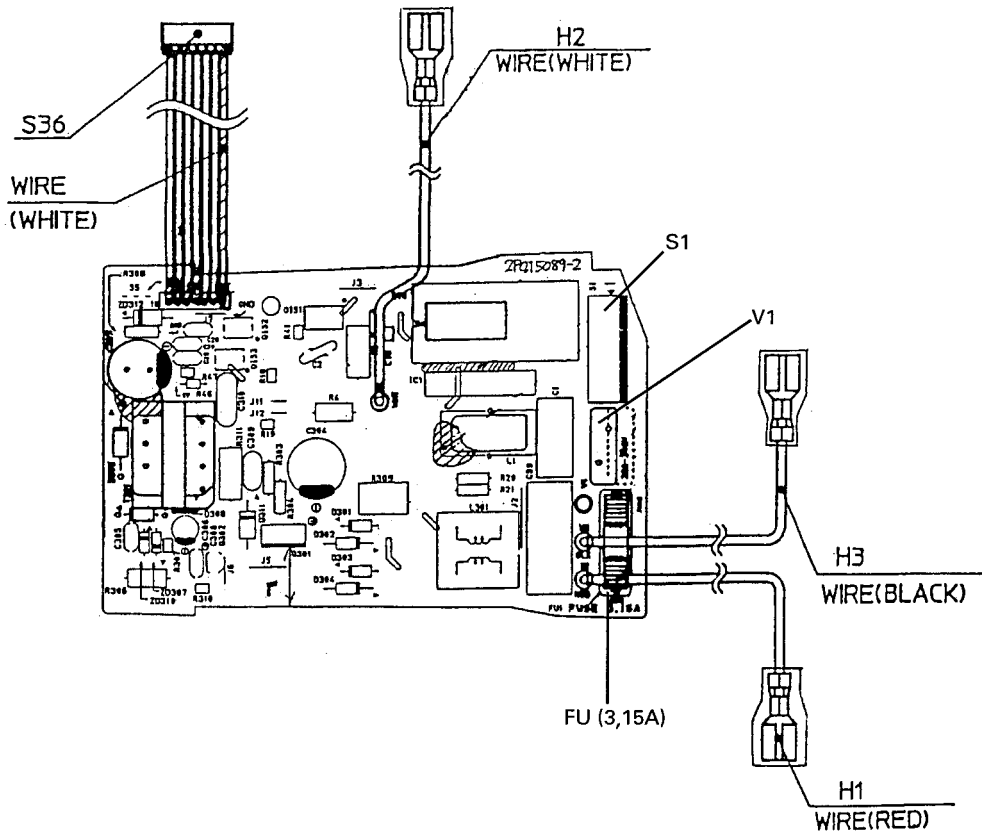
1)	V1	Varistor
2)	SW7 (S1W)	Operation Switch
3)	SW2 (S2W)	Address Switch
4)	SW8 (S8W)	Cleaning Indicator Reset Switch
5)	LED3 (GRN)	LED for Operation
6)	LED4 (YLW)	LED for Timer
7)	LED5 (RED)	LED for Cleaning
8)	LED A, LED B	LED for Service Monitor

(Control PCB)

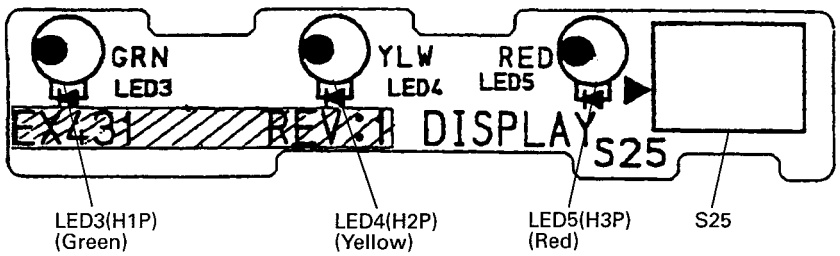
Printed Circuit Board (1)



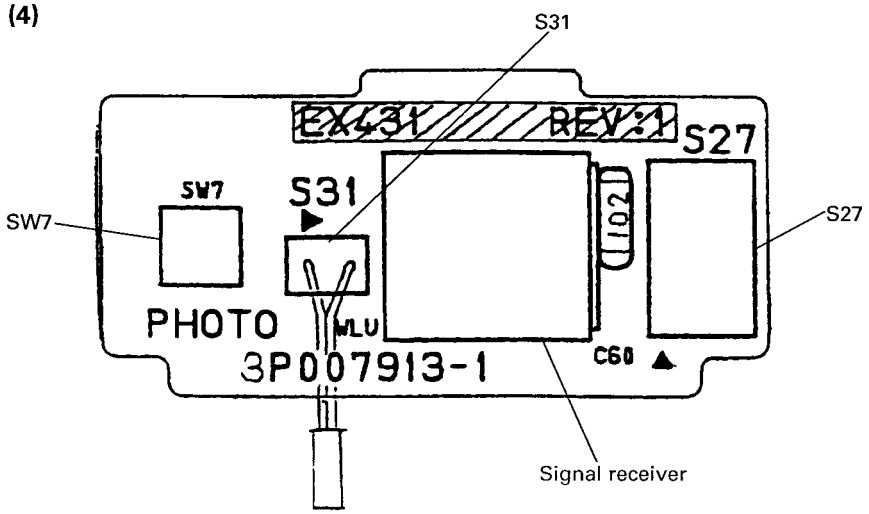
(Power Supply PCB)
Printed Circuit Board (2)



(Display PCB)
Printed Circuit Board (3)



(Signal Receiver PCB)
Printed Circuit Board (4)



Cooling Only
- **FTK50/60HV1NB**

Heat Pump
- **FTX50/60HV1NB**

Printed Circuit Board (1) (Control PCB)
Printed Circuit Board (2) (Power Supply PCB)
Printed Circuit Board (3) (Display PCB)
Printed Circuit Board (4) (Signal Receiver PCB)

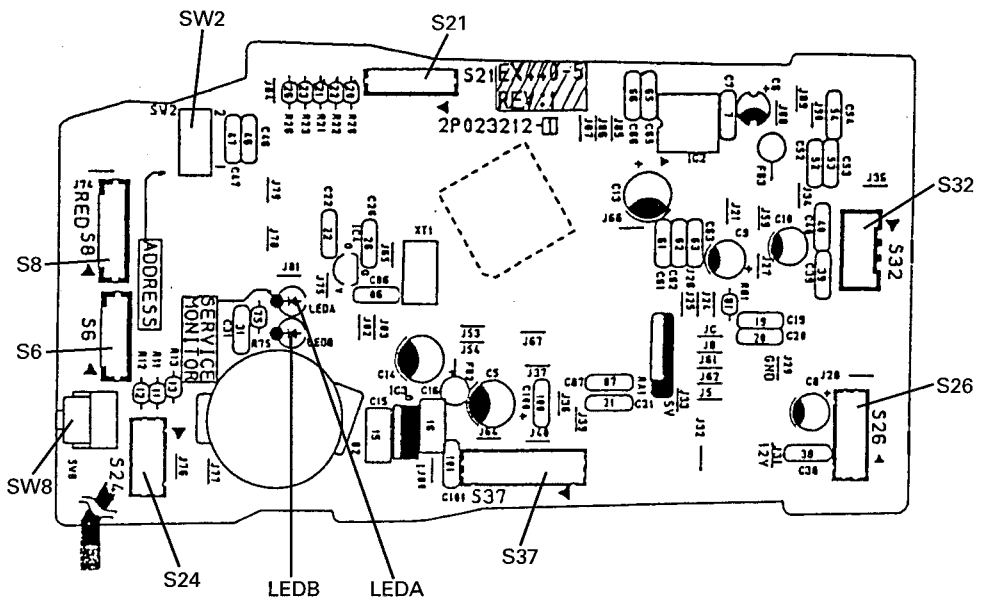
Name of Connector

1)	S1	Connector for Fan Motor
2)	S6	Connector for Swing Motor (Horizontal Flap)
3)	S8	Connector for Swing Motor (Vertical Flap)
4)	S21	Connector for Centralized Control to 5 Rooms
5)	S24	Connector for Display PCB
6)	S25, S27, S36	Connector for Control PCB
7)	S26	Connector for Signal Receiver PCB
8)	S31, S32	Connector for Room Temp/Heat Exchanger Thermistor
9)	S37	Connector for Power Supply PCB

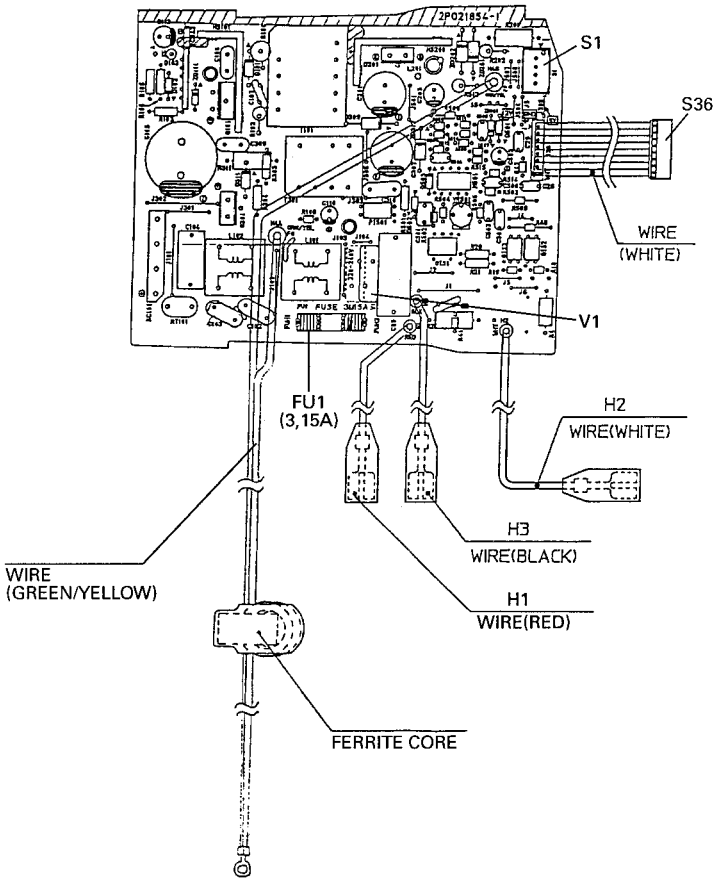
Note) Other Designations

1)	V1	Varistor
2)	SW7 (S1W)	Operation Switch
3)	SW2 (S2W)	Address Switch
4)	SW8 (S8W)	Cleaning Indicator Reset Switch
5)	LED3 (GRN)	LED for Operation
6)	LED4 (YLW)	LED for Timer
7)	LED5 (RED)	LED for Cleaning
8)	LED A, LED B	LED for Service Monitor

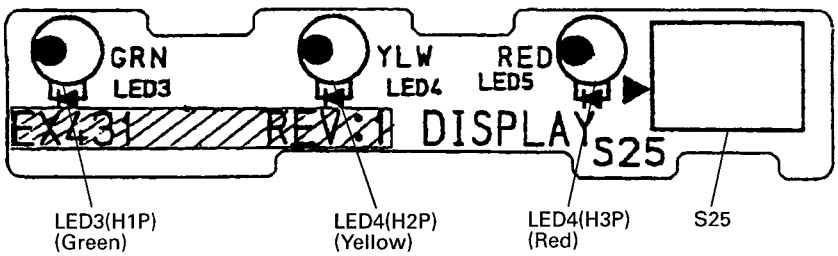
(Control PCB)
Printed Circuit Board (1)



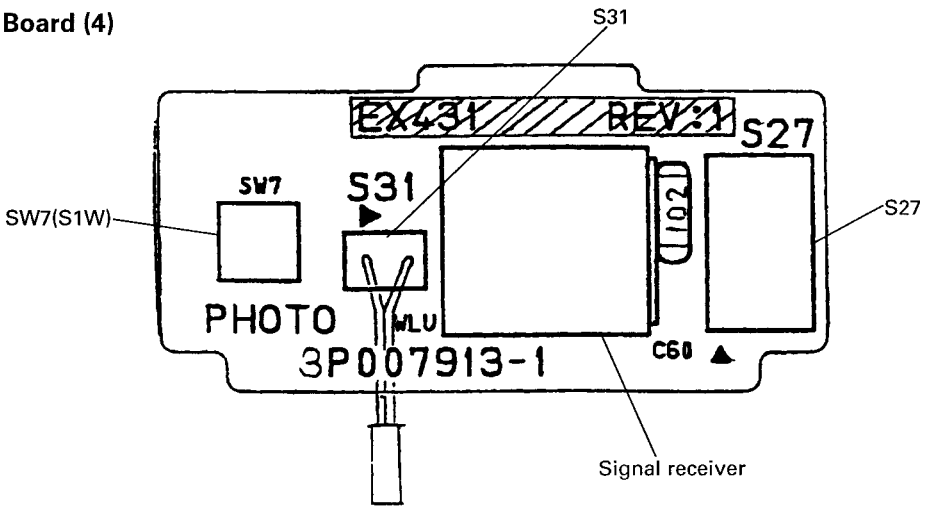
(Power Supply PCB)
Printed Circuit Board (2)



(Display PCB)
Printed Circuit Board (3)



(Signal Receiver PCB)
Printed Circuit Board (4)



Cooling Only
- **4MX80HV1NB**

Heat Pump
- **4MK90HV1NB**

Printed Circuit Board (1) (Control and Monitor PCB)

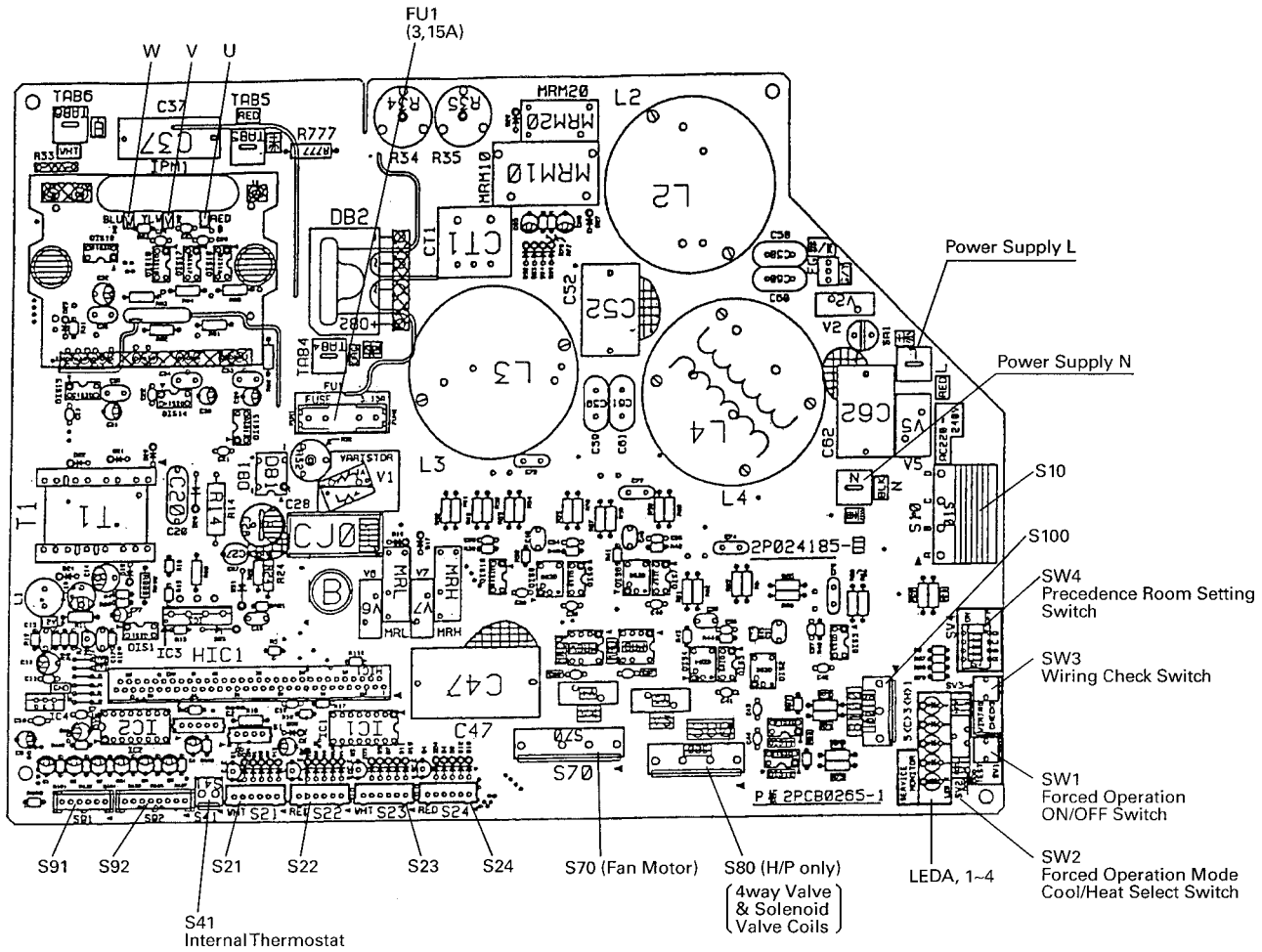
Name of Connector

1)	S10	Connector for Communication Line to Each Room
2)	S21, S22, S23, S24	Connector for Electronic Expansion Valve
3)	S41	Internal Thermostat
4)	S70	Connector for Fan Motor
5)	S91	Connector for Discharge Pipe/Condenser/Outdoor Air Temp. Thermistor (R2T/R3T/R4T)
6)	S92	Connector for Liquid Pipe Temp. to Each Room (R5T/R6T/R7T)
7)	S100	Cool/Heat Mode Connector

Other designation

1)	FU	Fuse
2)	SW1(S1W)	Forced Operation ON/OFF SW
3)	SW2(S2W)	Forced Operation Mode Select SW
4)	SW3(S3W)	Wiring Check SW
5)	SW4(S4W)	Precedence Room Setting SW
6)	LED A, LED 1 to 4	Service Monitor LED

Printed Circuit Board (1) (Control and Monitor PCB)



See the list of functions for the functions applicable to different models.

3. Main Functions

(1) Inverter Power Control

■ Principle of Operation of an Inverter

The heating and cooling load on the air conditioner varies depending on the outside temperature and the load conditions inside the room. Although the capacity of the air conditioner also changes with the rotational speed of the compressor, since the frequency of the normal motors is fixed (50Hz or 60Hz depending on the country and region), the range over which the capacity can be varied becomes narrow. The inverter air conditioner is one in which the control of the air conditioner performance is made over a wide range by converting the frequency.

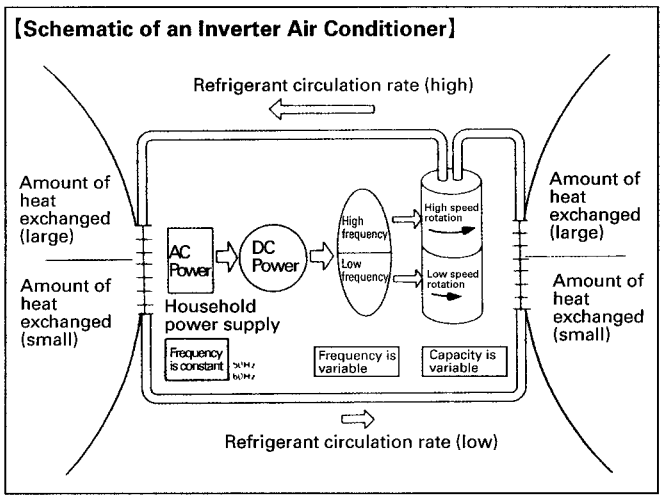
(1) The single phase AC is first converted into DC.

(2) The DC is then converted into three phase AC power supply whose frequency can be varied from the minimum frequency to the maximum frequency that are required.

(3) When the frequency is made higher, the rotational speed of the compressor increases, the circulation of the refrigerant becomes faster, and hence the amount of heat exchanged per unit time increases.

(4) When the rotational speed of the compressor is made lower, the circulation of the refrigerant becomes slower, and hence the amount of heat exchanged per unit time gets reduced.

[Schematic of an Inverter Air Conditioner]



■ Important Features of Inverters

(1) The capacity can be changed according to the changes in the outside temperature and cooling/heating load.

(2) Quick heating and quick cooling
The compressor rotational speed is increased at the time of starting the heating (or cooling). This increases (or decreases) the room temperature in a short time.

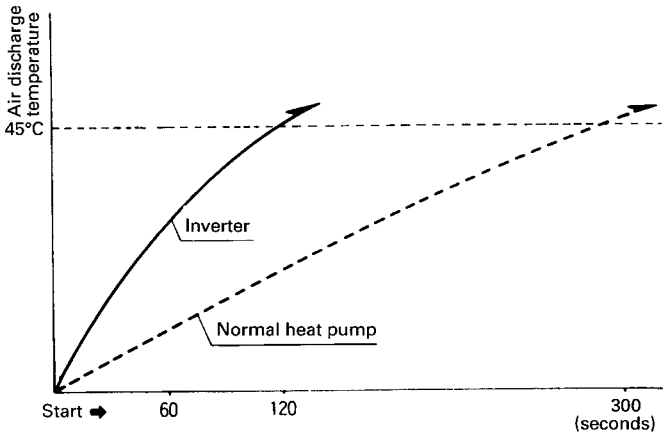
(3) High capacity is achieved even during extreme cold weather
High heating capacity is maintained even when the outside temperature is 0°C.

(4) Comfortable Air conditioning
Detailed adjustment is made to meet the changes in the room temperature. It is possible to Air condition with a very small room temperature variation.

(5) Energy saving heating and cooling
Once the room has been heated (during heating), energy saving operation is made at a low power while maintaining the room temperature.

(6) Defrosting without reducing the room temperature
Defrosting is completed in about 3 to 4 minutes while maintaining the hot air discharge. The reduction in the room temperature due to defrosting becomes small and a comfortable temperature is maintained constantly. (The time required may vary depending on the conditions.)

■ Quick Heating Capability



- The hot air discharge is started about 300 seconds after starting in the case of the general heating and cooling units and about 120 seconds after starting in the case of the inverter units (comparison of our company's products under the conditions of the outside temperature of 0°C and room temperature of 10°C).

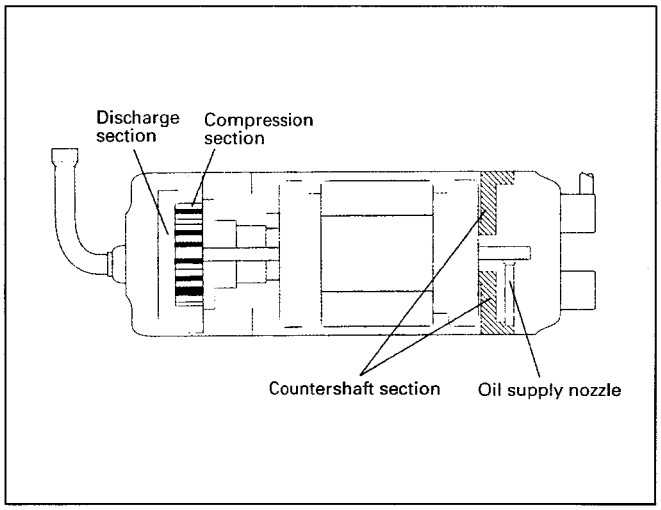
(2) Horizontal Scroll Type Compressor

Compared with conventional scroll compressors, the asymmetrical horizontal scroll type compressor with a new construction provides higher efficiency and lower vibration.

■ Features of the horizontal scroll type compressor

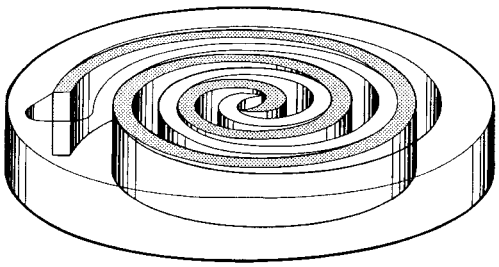
1) By using the peripheral section which was not used as a part of compression stroke by conventional scroll compressors, compression volume has been increased and efficiency has been improved.
2) Since compression starts right after taking in the refrigerant, overheat loss has been reduced.
3) Compressed gas with an appropriate pressure is continuously discharged due to modification in the discharge port. This reduces the loss caused by excessive compression, pulsation during discharging, vibration, and operating noise.
4) Since the passage for compressed high-temperature and high-pressure gas is separated from the suction side, expansion of the suction gas is prevented and the compressor exhibits high performance even during low-speed operation.
5) The shaft that runs at a speed of higher than 1000 rpm is supported by the rigid countershaft section. This prevents deflection of the shaft and ensures reliability during low speed operation.
6) Compared with vertical compressors, horizontal compressors tend to have an oil shortage problem in the motor bearing, particularly during low speed operation. The nozzle structure that utilizes a suction force properly lubricates even during low speed operation.

■ Construction Diagram of the Scroll Compressor



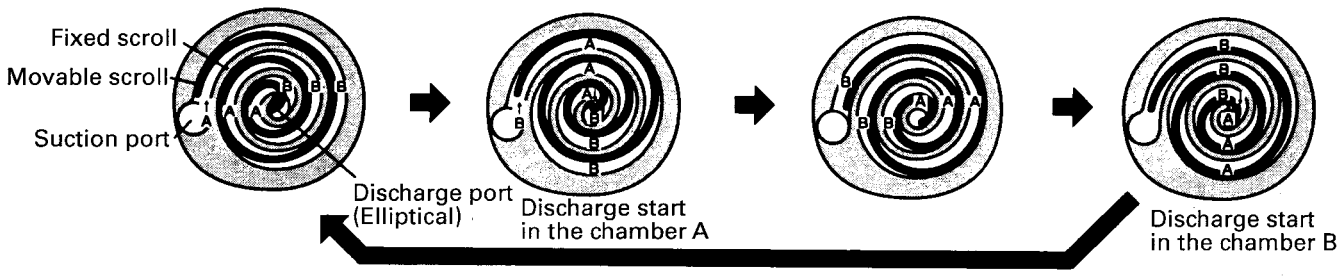
- **Compression section of the horizontal scroll type compressor**

The high efficiency feature of conventional scroll compressors has been further improved; compression efficiency has been improved by reducing the passage for uncompressed suction gas and low vibration has been improved by modifying the discharge port profile.



■ Features and operation of the horizontal scroll type compressor

Compression ratio between the chamber A and chamber B has been made asymmetrical by extending the compression stroke distance of the chamber B by 180°.



- By reducing the passage for uncompressed suction gas, the loss caused by overheated suction gas has been eliminated and the compression section volume has been enlarged, thus reducing the loss rate per volume.
- Since the modified discharge port profile takes care of any deviation in the compression ratio and the gas is separately discharged twice, the compression loss and vibration caused by discharge gas have been reduced.

(3) Power-airflow Flap & Diffuser

(For FTK, FTX25~60 H Series)

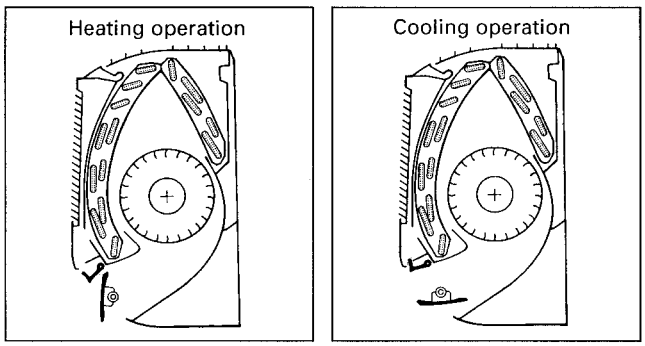
The large flaps send ample volume of warm air downward to heat the feet of people in the room, while the wide-angle diffuser ensures the air reaches every corner of the room. The upper and lower flaps located at the air outlet provide optimum air flow control in the cooling, heating and dry modes. In a heating operation, the large flaps direct warm air downward to heat the feet area. The wide-angle diffuser presses the air down to lay a "carpet" of warm air above the floor. In a cooling operation, the diffuser is retracted into the air conditioner body to distribute cool air throughout the room.

- **In heating operation**

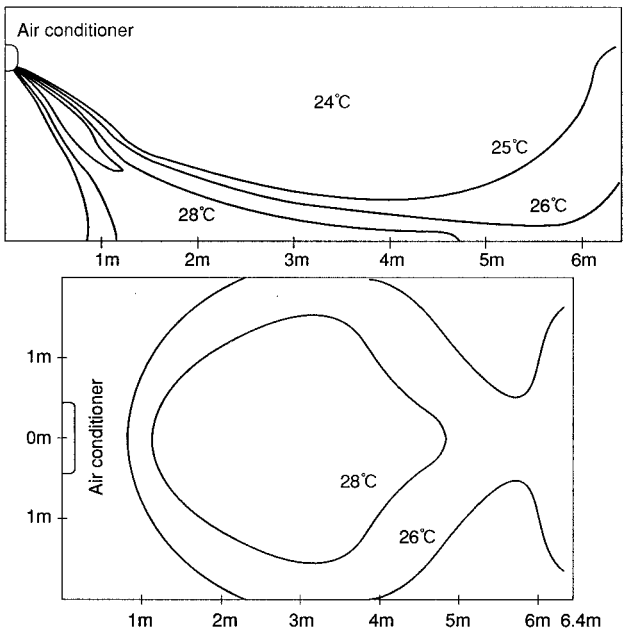
Warm air is sent out straight down by the flaps, while the diffuser produces an air stream that presses down the warm air.

- **In cooling operation**

The diffuser is stored inside the unit, and the wide-angle flaps send cool air throughout the room.



■ Temperature distribution



< Conditions >

Outside temperature: 7°C DB, thermostat setting: 23°C, air flow setting: High (H tap), approximately 40 minutes after operation start, height of air outlet: approx. 2 m.

* Note that temperature distribution varies depending on the heat insulation, furniture arrange and other factors in the room.

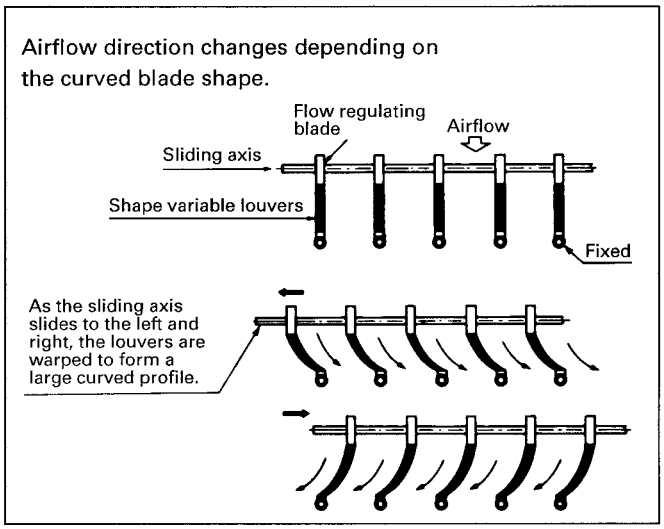
(4) Wide-angle Louvers

(For FTK, FTX50, 60 H Series)

The louvers provide wide-range airflow and minimize uneven temperature distribution that gives an uncomfortable feeling.

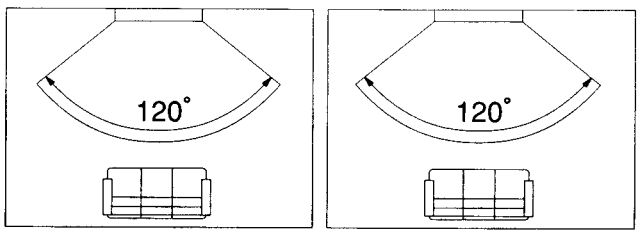
All-round louvers are adopted to create wide-range airflow. They can be easily warped to allow airflow control in a wide angle. They can swing to a maximum of 120° (during heating) as shown below, air can be distributed to every corner of the room.

■ All-round louvers

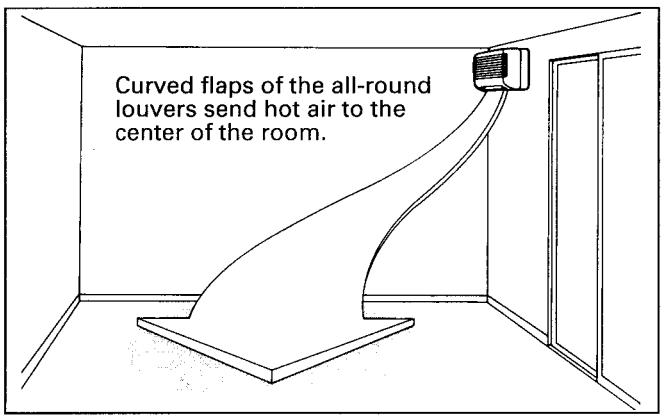


■ Flap angle

- **During heating**
- **During cooling**



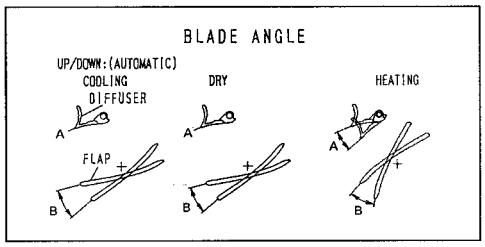
■ Capable of sending air to the center of a room even if it is installed at a corner of the room.



(5) Horizontal Auto-Swing (Up and Down)

(For FTK, FTX25~60 H Series)

Auto-swing angles are about "A" degrees when the fan is ON, and about "B" degrees when the cooling or program dry operation is ON. The up-and-down swing of the flaps widens the direction of wind.



Cooling, Dry, Operation (For Cooling Only Model)

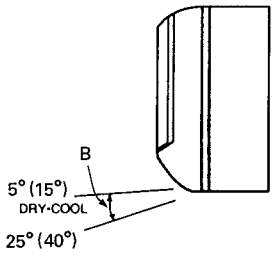
		Cooling	Dry
FTK25/35H Series	A	20°	20°
	B	5° ⟷ 25°	0° ⟷ 25°
FTK50/60H Series	A	20°	20°
	B	15° ⟷ 40°	15° ⟷ 40°

Cooling, Dry, Heating Operation (For Heat Pump Model)

		Cooling	Dry	Heating
FTX25/35H Series	A	20°	20°	20° ⟷ 30°
	B	5° ⟷ 25°	0° ⟷ 25°	20° ⟷ 50°
FTX50/60H Series	A	20°	20°	20° ⟷ 40°
	B	15° ⟷ 40°	15° ⟷ 40°	30° ⟷ 60°

Notes on flap angles

- The diffuser is kept open in DRY,COOL or FAN mode.



NOTE

Unless [SWING] is selected, you should set the flap at a near-horizontal angle in COOL or DRY mode to obtain the best perfor-mance.

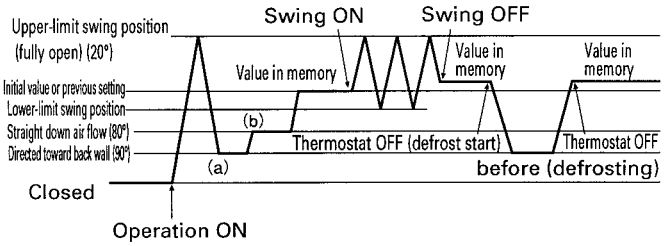
(6) 3 Step Flow

(6)-1

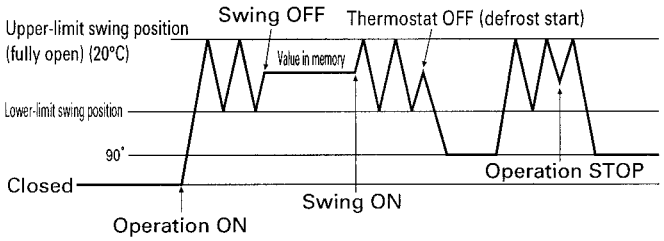
(For FTX25/35 H Series (Heat Pump Only))

When the unit starts in a heating operation, it sends warm air towards the back wall to prevent it from directly blowing on people in the room. Then, the unit directs air straight down to quickly warm the feet of people in the room. When the walls and floor become sufficiently warm, the air flow angle and volume change to the settings (use the remote controller for air flow angle and volume setting.)

1) Heating (Swing-OFF start)



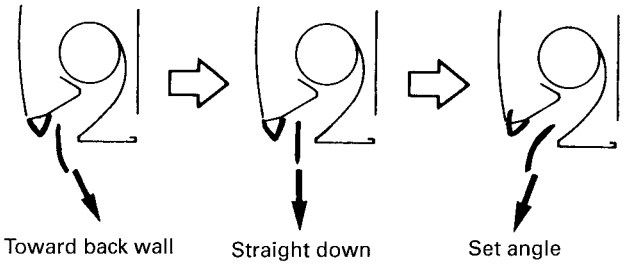
2) Heating (Swing-ON start)



1st step
Upper flap in straight-down position
Lower flap fixed at 90°

2nd step
Five minutes after (a) or when the heat exchanger temperature reaches 28°C or higher, the flap moves to send air straight down.

3rd step
Five minutes after (b) or when the room temperature reaches 15°C or higher after three minutes of operation, the flap moves to the set angle.



Notes
1. The movements of the large and small flap are not linked, and they move with a time lag of several seconds.
2. When the unit is not operating, the diffuser and flaps cover the air outlet.

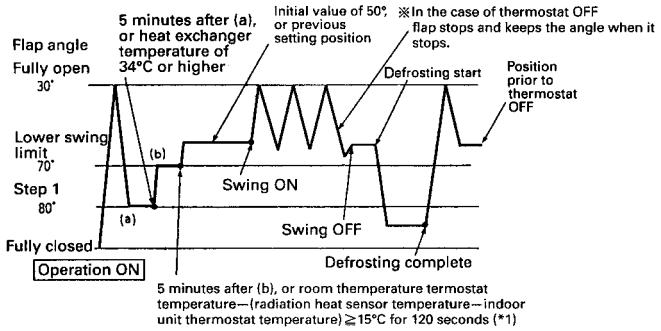
(6)-2

(For FTX50/60 H Series (Heat Pump Only))

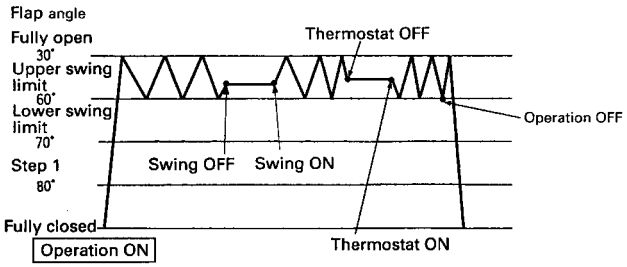
In the beginning of a heating operation, the unit sends warm air towards the wall behind the unit to prevent the air from directly blowing on people in the room. After a while, it blows air downward to warm up the area close to the floor. After the walls and floor become warm, the unit sends out air according to the set angle and fan speed. (Air flow angle and fan speed set from remote controller)

Fig. 1-8

1) Heating (in the case of Swing-OFF start)

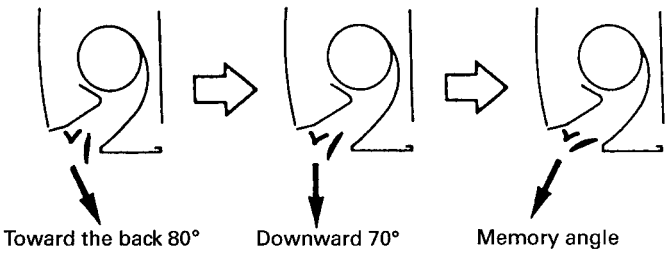


2) Heating (in the case of Swing-ON start)



* The flaps remain in the preset position for about 10 seconds before they return to the full-open processing.

Step 1	Step 2	Step 3
The flap is set to 80° angle.	The flaps move to send air downward when 5 minutes elapse from (a) or the heat exchanger temperature becomes 34°C or higher.	The flaps move to the position of the stored data when 5 minutes elapse from (b) or condition *1 is met.



(7) Auto Fan Speed Control

■ Automatic airflow rate control (linear)

If the AIRFLOW ADJUSTING button is set to AUTOMATIC, airflow rate is automatically controlled depending on the difference between the set temperature and room temperature.

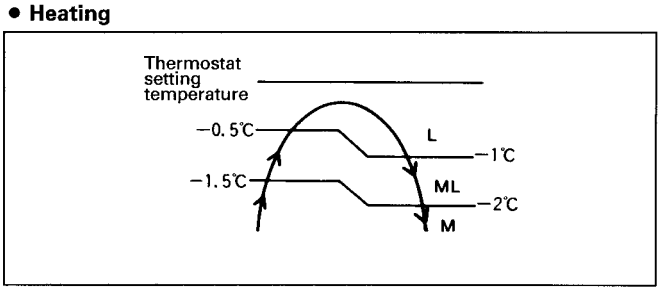
- Phase control (Revolution is controlled by Hall IC) STOP plus 8 steps (LLL, LL, L, ML, M, HM, H, and HH)

Scale mode \ Tap	LLL	LL	L	ML	M	HM	H	HH
Cooling			(Gentle ■ Weak)			■	Strong	
Heating			(Gentle ■ Weak)				Strong	
Drying			( )					

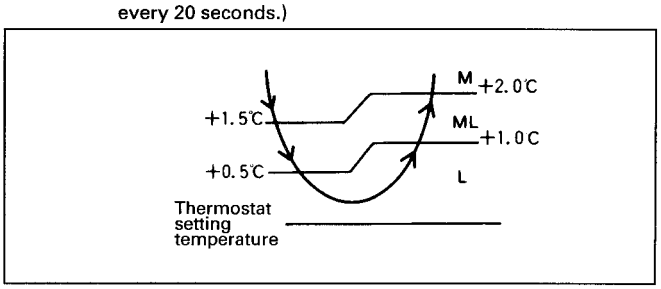
Note When the AIRFLOW ADJUSTING button is set to AUTOMATIC, the airflow rate is automatically controlled within the range indicated with ( ).

■ Automatic airflow rate control (inverters)

- **Heating**



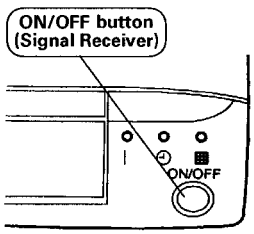
- **Cooling** (Some models give gentle changes in the airflow rate every 20 seconds.)



(8) ON/OFF Button on Indoor Unit

(FTK, FTX25~60 H Series)

An ON/OFF switch is provided on the front panel of the unit. Use this switch when the remote controller is missing or if its battery has run out. Every press of the switch changes from Operation to Stop or from Stop to Operation



- Push this button once to start operation. Push once again to stop it.
- This button is useful when the remote controller is missing.
- The operation mode refers to the following table.

	Mode	Temperature setting	Air flow rate
FTK	COOL	22°C	AUTO
FTX	AUTO	25°C	AUTO

- In the case of multi system operation, there are times when the unit does not activate with this button.

(9) Signal Receiving Sign

When the indoor unit receives a signal from the remote controller, the unit emits a signal receiving sound.

(10) Air Purifying Filter

(For FTK, FTX25~60 H Series)

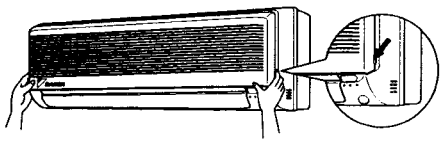
The air purifying filter (electrostatic filter) catches pollen or smoke of cigarette as small as 0.01 micron through electro static charging. An activated carbon deodorizing filter in a net shape is also mounted to absorb and minimize fine odor particles.

(11) Washable Grille

(FTK, FTX25~60 H Series)

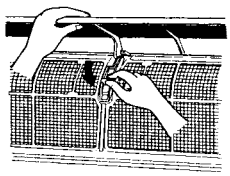
1) Open the front grille.

- Hold the grille by the tabs on the two sides and lift it until it stops with a click.



2) Remove the front grille.

- Supporting the front grille with one hand, release the lock by sliding down the knob with the other hand.
- To remove the front grille, pull it toward yourself with both hands.

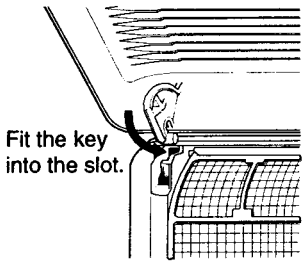


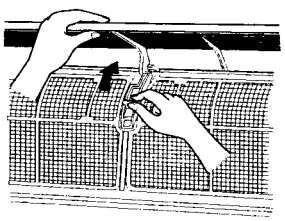
3) Clean the front grille.

- You may wipe it with a soft cloth soaked in water.
- Only neutral detergent may be used.
- You may wash the grille with water. After washing, dry it with cloth, then dry it up in the shade.

4) Attach the front grille.

- Set the 3 keys of the front grille into the slots and push them in all the way.
- Supporting the front grille with one hand, fit the lock by sliding up the knob with the other hand.
- Close the front grille slowly in this state. (Push the grille at the 3 points, two at both sides and in the middle).





Slide up the knob.

⚠ CAUTION

- When removing or attaching the front grille, use a robust and stable stool and watch your steps carefully.
- When removing or attaching the front grille, support the grille securely with hand to prevent it from falling.
- For cleaning, do not use water hotter than 40°C, benzine, gasoline, thinner, nor other volatile oils, polishing compound, scrubbing brushes nor other hard stuff.
- After cleaning, make sure that the front grille is securely fixed.

(12) Filter Cleaning Indicator

(For FTK, FTX25~60 H Series)

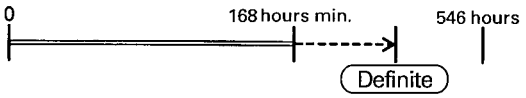
■ The filter check indicator located at the center of the unit will indicate the time for cleaning the air filters.

The indicator will indicate an appropriate cleaning time depending on the environment (dusty place or not). This will prevent you from forgetting filter cleaning and also prevent performance drop that might be caused by using clogged filters and wasteful use of electricity by approximately 8%.

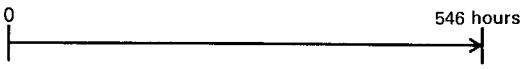
〈**Contents of indication**〉

- **Sensed by the operation hours and the fan motor voltage**

1) Filter clogging (※)



2) Accumulated operation hours



Indicates the earlier one of the above 1) or 2).

※ This indicator utilizes the characteristic that the fan motor voltage drops as the crossflow fan gets clogged; it does not detects the amount of filter clogging.

Note:

- When the power supply is reset, the accumulated operation hour is also reset.
- After cleaning and mounting the filters, press the reset button located inside the panel of the unit.

(13) Mold Resisting Treatment Filter

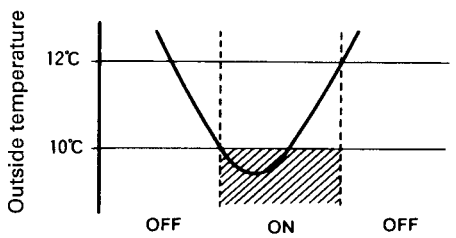
The filter net is treated with mold resisting agent TBZ (harmless, colorless, and odorless). Due to this treatment, the amount of mold growth is much smaller than that of normal filters.

(14) Warm-up Function (Heat Pump Only)

(1) When the equipment has been stopped, the compressor is warmed up by passing a small single-phasing current through the compressor motor so that the start up is speeded up.

(2) The power consumption during warming up is about 15 to 35W.

(3) This function operates only when the outside temperature is low (less than about 10°C) so that power saving is achieved.



(15) Hot Start Function (Heat Pump Only)

In order to prevent the cold air blast that normally comes when heating is started, the temperature of the heat exchanger of the indoor unit is detected, and either the air flow is stopped or is made very weak thereby carrying out comfortable heating of the room.

※ The cold air blast is also prevented using a similar control when the defrosting operation is started or when the thermostat gets turned ON.

(16) Program Dry Function

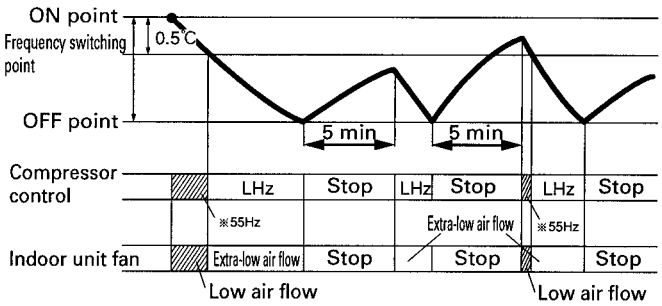
Program dry function removes humidity while preventing the room temperature from lowering.

Since the microcomputer controls both the temperature and air flow volume, the temperature adjustment and fan adjustment buttons are inoperable in this mode.

■ In the case of inverter units

The microcomputer automatically sets the temperature and fan settings. The difference between the room temperature at startup and the temperature set by the microcomputer is divided into two zones. Then, the unit operates in the dry mode with an appropriate capacity for each zone to maintain the temperature and humidity at a comfortable level.

Room temperature at startup	Temperature (ON point) at which operation starts	Frequency switching point	Temperature difference for operation stop
24℃	Room temperature at startup	0.5℃	1.5℃
			1.0℃
18℃	18℃		
17℃		—	



LHz indicates low frequency. Item marked with varies depending on models.

(17) Automatic Operation (Heat Pump Only)

Automatic cooling/heating function

When the AUTO mode is selected with the remote controller, the microcomputer automatically determines the operation mode from cooling and heating according to the room temperature and setting temperature at the time of the operation startup, and automatically operates in that mode.

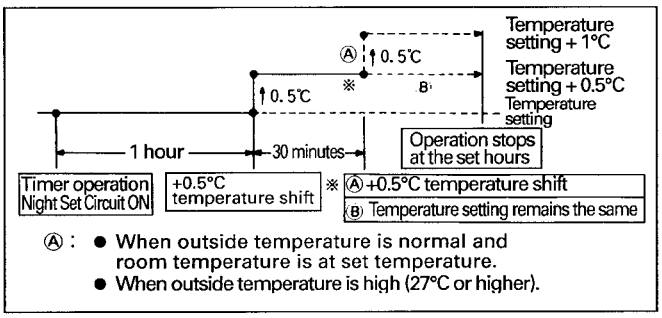
(18) Night Set Mode

When the OFF Timer is set, the New Night Set Circuit automatically activates.

The Night Set Circuit automatically switches the fan speed to a low setting to minimize operating noise. On the other hand, the New Night Set Circuit maintains the airflow setting made by users. (Some models are equipped with an Night Set Circuit ON switch.)

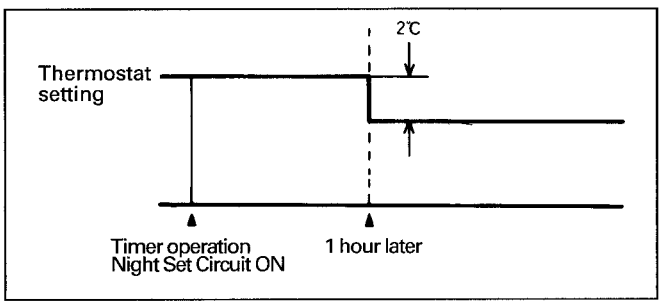
The Night Set Circuit continues heating or cooling the room at the set temperature for the first one hour, then automatically lowers the temperature setting slightly in the case of cooling, or raises it slightly in the case of heating, for economical operations. This prevents excessive heating in winter and excessive cooling in summer to ensure comfortable sleeping conditions, and also conserves electricity.

Cooling operation



※ For other models, the temperature setting increases by 1°C after one hour of operation.

Heating operation



(19) Self-Diagnosis Digital Display

The microcomputer continuously monitors main operating conditions of the indoor unit, outdoor unit and the entire system. Should an abnormality occur, the LCD remote controller displays information and the indicators on the indoor and outdoor units light. These indications allow prompt maintenance operations.

(20) Self-Diagnosis LED Display

The lighting patterns of the indoor unit LEDs (Operation, Timer and Dry/Hot Start indicators) and the LEDs on the outdoor unit's printed circuit board allow diagnosis of problem areas and faulty conditions of the interconnecting wire.

(21) Auto-restart Function

Even if a power failure (including one for just a moment) occurs during the operation, the operation restarts in the condition before power failure automatically when power is restored.

(Note) It takes 3 minutes to restart the operation because the 3-minute standby function is activated.

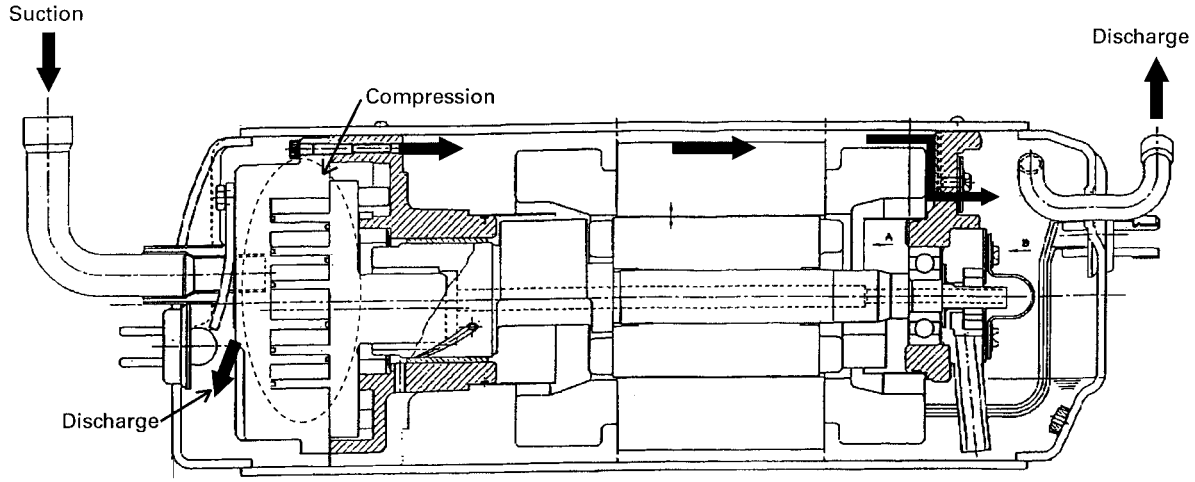
4. Function of Main Structural Parts

4-1. Main Structural Parts

① Compressor

A horizontal scroll compressor, being operated by INV control.

- **Scroll compressor structural drawing**



② Four-Way Valve * Only for Heat Pump Model

The types of coil that conducts current for cooling and does not conduct it for heating are used.

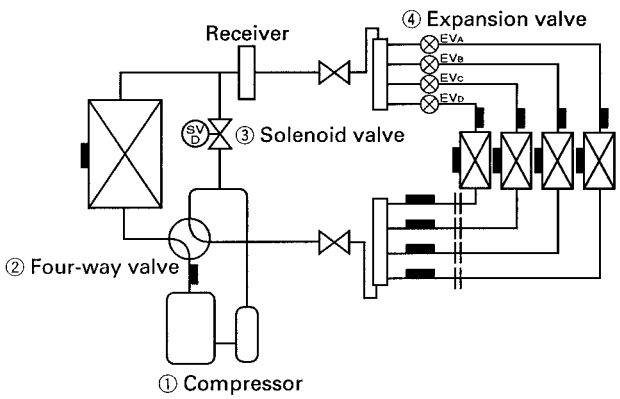
③ Defrost solenoid valve (SVD) * Only for Heat Pump Model

The types of coil that conducts current for defrosting and does not conduct it for other operations are used.

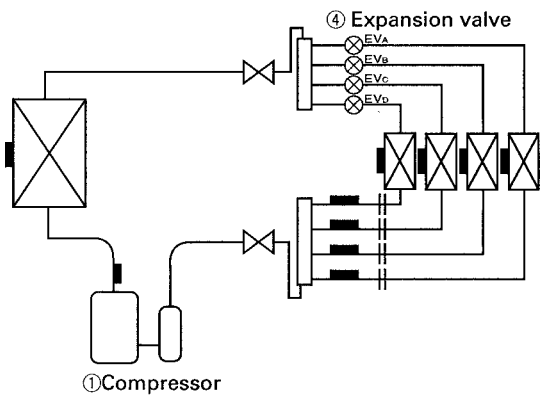
④ Electronic expansion valve (EVA - D)

Adjust the opening of the electronics expansion valve so that it operates optimally.

Heat Pump Model



Cooling Only Model



4-2. Function of Thermistor

(1) Heat pump model

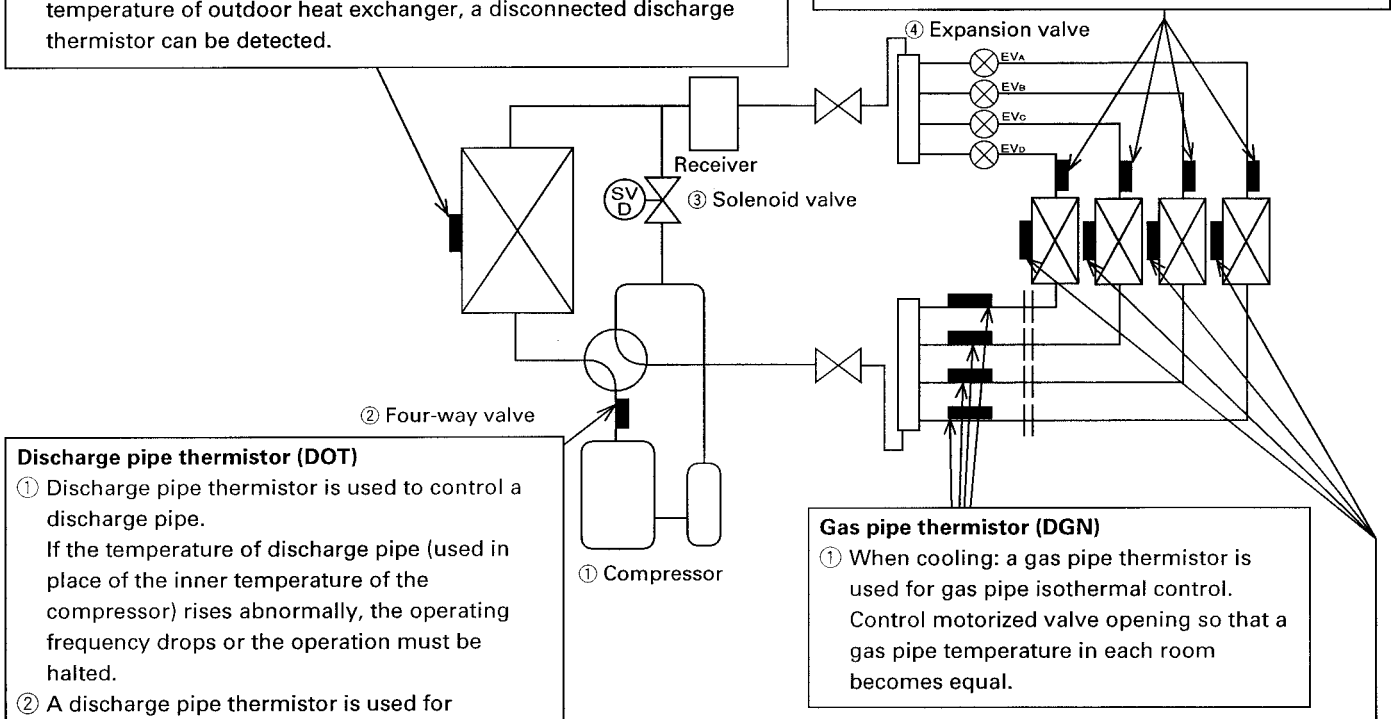
Outdoor heat exchanger thermistor (DCB)

① An outdoor heat exchanger thermistor is used for controlling a target discharge temperature.
Set a target discharge temperature depending on an outdoor and indoor heat exchanger temperature.
Control the motorized valve opening so that the target discharge temperature can be obtained.

② An outdoor heat exchanger thermistor is used for detecting an disconnected discharge thermistor when cooling.
When the temperature of the discharge piping is lower than the temperature of outdoor heat exchanger, a disconnected discharge thermistor can be detected.

Indoor liquid pipe thermistor (DLN)

① When heating: used for a super cooling control.
Calculate an actual super cooling from the temperature of indoor liquid pipes and a heat exchanger temperature.
Actual super cooling
A maximum heat exchanger temperature in each room - adjust the opening of the motorized valve so that the liquid pipe temperature of each room becomes an target super cooling.



Discharge pipe thermistor (DOT)

① Discharge pipe thermistor is used to control a discharge pipe.
If the temperature of discharge pipe (used in place of the inner temperature of the compressor) rises abnormally, the operating frequency drops or the operation must be halted.

② A discharge pipe thermistor is used for detecting an disconnected discharge thermistor.

Gas pipe thermistor (DGN)

① When cooling: a gas pipe thermistor is used for gas pipe isothermal control.
Control motorized valve opening so that a gas pipe temperature in each room becomes equal.

Indoor heat exchanger thermistor (DCN)

① An indoor heat exchanger thermistor is used for controlling target discharge pipe temperature.
Set a target discharge pipe temperature according to the outdoor and indoor heat exchanger temperature.
Control the motorized valve so that the target discharge pipe temperature can be obtained.

② An indoor heat exchanger thermistor is used to prevent freezing.
During the cooling operation, if the temperature drops abnormally, the operating frequency becomes lower, then the operation must be halted.

③ An indoor heat exchanger thermistor is used for anti-icing control.
During the cooling operation, if the heat exchanger temperature in the room where operation is halted becomes −1°C, or if the room temperature − heat exchanger temperature in the room where operation is halted becomes ≧10°C, it is assumed as icing.

④ During heating: an indoor heat exchanger thermistor is used for detecting a disconnected discharge pipe thermistor.
When a discharge pipe temperature become lower than an indoor heat exchanger temperature, a disconnected discharge pipe thermistor can be detected.

⑤ An indoor heat exchanger thermistor is used for detecting incorrect wiring.
During the operation of checking incorrect wiring, refrigerant is passed in order from the port A to detect a heat exchanger temperature, and then wiring and piping will be checked.

⑥ An indoor heat exchanger thermistor is used for super cooling control.
An actual super cooling must be calculated from an indoor liquid pipe temperature and a heat exchanger temperature. The indoor heat exchanger thermistor controls the motorized valve opening to get a target super cooling.

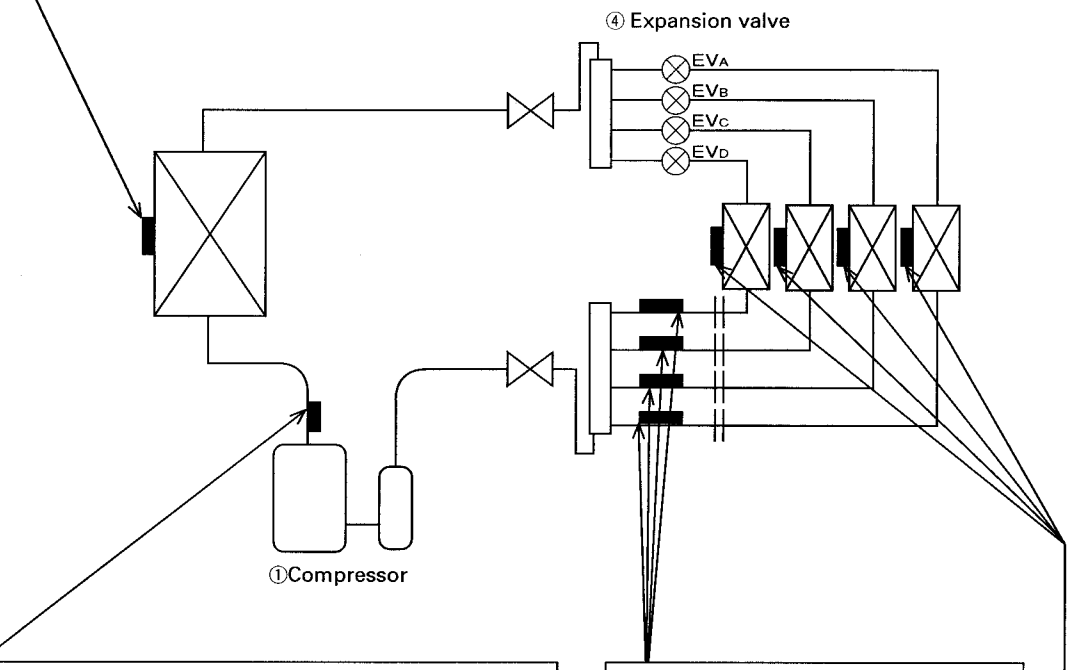
⑦ An indoor heat exchanger thermistor is used for heating isothermal control of heat exchanger.
When heating: if the difference in temperature of each room is greater than 8°C, the motorized valve of the room whose temperature is the higher is opened.

(2) Cooling only model

Outdoor heat exchanger thermistor (DCB)

① An outdoor heat exchanger thermistor is used for controlling a target discharge temperature.
Set a target discharge temperature depending on an outdoor and indoor heat exchanger temperature.
Control the motorized valve opening so that the target discharge temperature can be obtained.

② When cooling: an outdoor heat exchanger thermistor is used for detecting an disconnected discharge thermistor.
When the temperature of the discharge piping is lower than the temperature of outdoor heat exchanger, a disconnected discharge thermistor can be detected.



Discharge pipe thermistor (DOT)

① Discharge pipe thermistor is used to control a discharge pipe.
If the temperature of discharge pipe (used in place of the inner temperature of the compressor) rises abnormally, the operating frequency drops or the operation must be halted.

② A discharge pipe thermistor is used for detecting an disconnected discharge thermistor.

Gas pipe thermistor (DGN)

① When cooling: a gas pipe thermistor is used for gas pipe isothermal control.
Control motorized valve opening so that a gas pipe temperature in each room becomes equal.

Indoor heat exchanger thermistor (DCN)

① An indoor heat exchanger thermistor is used for controlling target discharge pipe temperature.
Set a target discharge pipe temperature according to the outdoor and indoor heat exchanger temperature.
Control the motorized valve opening so that the target discharge pipe temperature can be obtained.

② An indoor heat exchanger thermistor is used to prevent freezing.
During the cooling operation, if the temperature drops abnormally, the operating frequency becomes lower, then the operation must be halted.

③ An indoor heat exchanger thermistor is used for anti-icing control.
During the cooling operation, if the heat exchanger temperature in the room where operation is halted becomes − 1°C, or if the room temperature − heat exchanger in the room where operation is halted becomes ≧10°C, it is assumed as icing.

④ An indoor heat exchanger thermistor is used for detecting incorrect wiring.
During the operation of checking incorrect wiring, refrigerant is passed in order from the port A to detect a heat exchanger temperature, and then wiring and piping will be checked.

5. Control Specification

5-1. Details of Functions

(1) Mode component

[Outline]

There are two modes; the mode selected in user's place (normal air conditioning mode) and forced operation mode for installation and providing service.

[Detail]

1) Air conditioner's control mode

① For heat pump model

There are following modes; stop, cooling (includes drying), heating (include defrosting).

- Air conditioner control mode
  - Forced operating mode
    - Forced cooling
    - Forced heating
    - Check incorrect wiring
  - Normal operating mode
    - Cooling
    - Heating
    - Defrosting
    - Stop mode (except for cooling/heating modes by indoor command)
      - Preheat operation
      - During C (capacitor) is discharging
      - Stop

② For cooling only model

There are following models; stop and cooling (including drying).

- Air conditioner control mode
  - Forced operating mode
    - Forced cooling
    - Check incorrect wiring
  - Normal operating mode
    - Cooling
    - Stop mode (except for cooling modes by indoor command)
      - Preheat operation
      - During C (capacitor) is discharging
      - Stop

Note: Unless specified otherwise, an indoor dry operation command must be regarded as cooling operation. An indoor fan operation command cannot be made in a multiple indoor unit. (A forced fan command to the indoor from the outside must be made during forced operation.)

2) Determine operating mode

Judge the operating mode command set by each room in accordance with the instructing procedure, and determine the operating mode of the system.

The following procedure will be taken as the modes conflict with each other.

*1. The system will follow the mode determined first. (First-push, first-set)

*2. For the rooms set with different mode, select stand-by mode. (Operation lamp flashes)

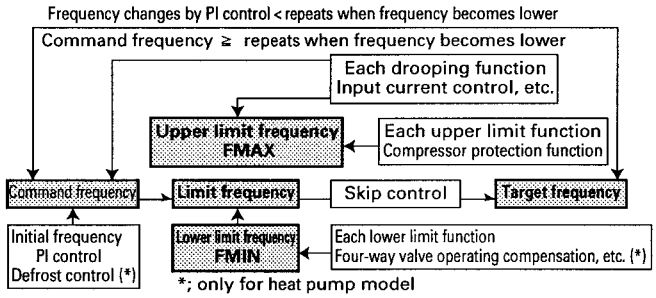
(2) Frequency control

[Outline]

Frequency that corresponds to each room's capacity will be determined according to the difference in the temperature of each room and the temperature that is set by the remote controller.

The function is explained as follows.

1. How to determine frequency.
2. Frequency command from an indoor unit. (The difference between a room temperature and the temperature set by the remote controller.)
3. Frequency command from an indoor unit. (The ranked capacity of the operating room).
4. Frequency initial setting.
5. PI control.



[Detail]

1) How to determine frequency

The compressor's frequency will finally be determined by taking the following steps.

For heat pump model

① Determine command frequency

- Command frequency will be determined in the following order of priority.
  - ① Limiting frequency by drooping function
    Input current, discharge pipes, low Hz high pressure limit, peak cutting, freeze prevention
  - ② Limiting defrost control time
  - ③ Forced cooling/heating
  - ④ JIS function
  - ⑤ Indoor frequency command

② Determine upper limit frequency

- Set a minimum value as an upper limit frequency among the frequency upper limits of the following functions: Compressor protection, input current, discharge pipes, Low Hz high pressure, peak cutting, freeze prevention, defrost, when starting SCR

③ Determine lower limit frequency

- Set a maximum value as an lower limit frequency among the frequency lower limits of the following functions:
  Four-way valve operating compensation, moisture prevention 1, when starting SCR, optimum V/F lock detection.

④ Determine prohibited frequency

- There is a certain prohibited frequency such as a power supply frequency.

For cooling only model

① Determine command frequency
- Command frequency will be determined in the following order of priority.
  - ① Limiting frequency by drooping function
    Input current, discharge pipes, freeze prevention
  - ② JIS function
  - ③ Indoor frequency command

② Determine upper limit frequency
- Set a minimum value as an upper limit frequency among the frequency upper limits of the following functions: Compressor protection, input current, discharge pipes, freeze prevention, when starting SCR

③ Determine lower limit frequency
- Set a maximum value as an lower limit frequency among the frequency lower limits of the following functions: Moisture prevention 1, when starting SCR, optimum V/F lock detection.

④ Determine prohibited frequency
- There is a certain prohibited frequency such as a power supply frequency.

2) Indoor frequency command (△D signal)

The difference between a room temperature and the temperature set by the remote controller will be taken as the "△D signal" and is used for frequency command.

Temperature difference	ΔD signal	Temperature difference	ΔD signal	Temperature difference	ΔD signal	Temperature difference	ΔD signal
0	*Th OFF	2.0	4	4.0	8	6.0	C
0.5	1	2.5	5	4.5	9	6.5	D
1.0	2	3.0	6	5.0	A	7.0	E
1.5	3	3.5	7	5.5	B	7.5	F

*Th OFF = Thermostat OFF

3) Indoor unit capacity (S value)

The capacity of the indoor unit is a "S" value and is used for frequency command.

Capacity	S value	Capacity	S value
2.5 kW	5	5.0 kW	10
3.5 kW	7	6.0 kW	12

4) Frequency initial setting
- Outline

When starting the compressor, or when conditions are varied due to the change of the operating room, the frequency must be initialized according to the total of a maximum ΔD value of each room and a total value of S (ΣS) of the operating room (the room in which the thermos is set to ON).

5) PI control (determine frequency up/down by ΔD signal)

① P control
- Outline
  Calculate a total of the ΔD value in each sampling time (20 seconds), and adjust the frequency according to its difference from the frequency previously calculated.

② I control
- Outline
  If the operating frequency is not change more than a certain fixed time, adjust the frequency up and down according to the ΣΔD value, obtaining the fixed ΣΔD value.
  When the ΣΔD value is small...lower the frequency.
  When the ΣΔD value is large...increase the frequency.

③ Limit of frequency variation width
- Outline
  When the difference between input current and input current drooping value is less than 1.5 A, the frequency increase width must be limited.

④ Frequency management when other controls are functioning
- When each frequency is drooping;
  If $\Delta F \geqq 0$, carry out no frequency management, and carry out frequency management if $\Delta F < 0$.
- For limiting lower limit
  if $\Delta F < 0$, carry out no frequency management, and carry out frequency management if $\Delta F \geqq 0$.

⑤ Upper and lower limit of frequency by PI control (includes when operating with low noise)
When low noise commands come from the indoor unit more than one room, the upper limit frequency must be lowered than the usual setting.

(3) Preheating operation

[Outline]

Operate the inverter in the open phase operation with the conditions including the preheating command (only for heat pump model) from the indoor, the outside temperature and discharge pipe temperature.

[Detail]

1) Preheating ON condition
- When outside temperature is below −5°C and discharge pipe temperature is below −5°C , inverter in open phase operation starts.

2) OFF condition
- When outside temperature is higher than −3°C or discharge pipe temperature is higher than −3°C , inverter in open phase operation stops.

(4) Four-way valve switching (only for heat pump model)

[Outline]

During the cooling and defrosting operation current must be conducted and during heating current must not be conducted. In order to eliminate the switching sound (as the four-way valve coil switches from ON to OFF) when the cooling is stopped, the delay switch of the four way valve must be carried out after the operation stopped.

[Detail]

The OFF delay of four-way valve
Energize the coil for 150 sec after unit operation is stopped.

(5) Four-way valve operation compensation (Only for heat pump model)

[Outline]

At the beginning of the operation as the four-way valve is switched, acquire the differential pressure required for activating the four-way valve by having output the operating frequency, which is more than a certain fixed frequency, for a certain fixed time .

[Detail]

1) Staring conditions

① When starting compressor for cooling.
② When starting compressor for heating, which is previous used for cooling.
③ When starting compressor for rushing defrosting or resetting.
④ When starting compressor for the first time after the reset with the power is ON.
Set the lower limit frequency to 55 Hz for 70 seconds with the OR conditions with ① through ④ above.

(6) 3 minutes stand-by

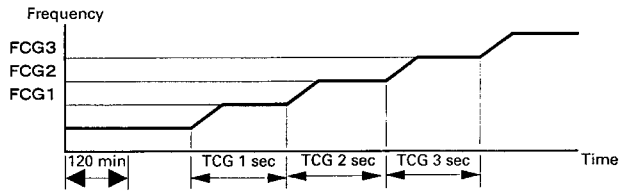
[Outline]

Prohibit to turn ON the compressor for 3 minutes after turning it off.
(Except when defrosting. (only for heat pump model).)

(7) Compressor protection function

[Outline]

When turning the compressor from OFF to ON, the upper limit of frequency must be set as follows. (The function must not be used when defrosting (only for heat pump model).)



(8) Discharge pipe control

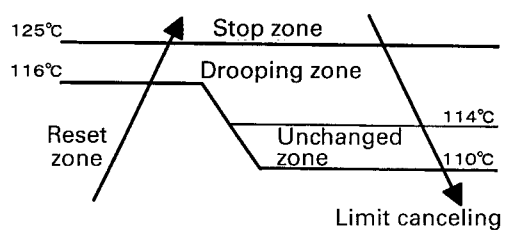
[Outline]

The compressor's inner temperature with the discharge pipe temperature is substituted, and the upper limit of operating frequency is set as the discharge pipe temperature surpasses the fixed temperature so that the temperature rise inside the compressor can be prevented.

[Detail]

1) Divide the zone

Divide the zone as follows.



2) Management within the zone

Zone	Control contents
Stop zone	When the temperature reaches the stop zone, stop the compressor and correct abnormality.
Drooping zone	Start the timer and make the frequency drooping at specified rate.
Unchanged zone	Keep the frequency upper limit .
Reset zone	Cancel the frequency limit.

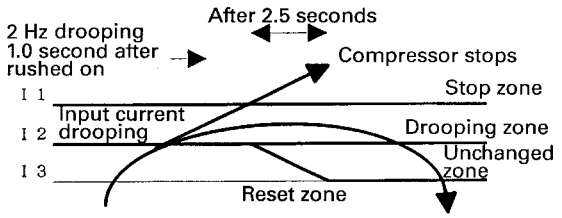
(9) Input current control

[Outline]

Detect an input current by the CT during the compressor is running, and set the frequency upper limit from such input current.
In case of heat pump model, this control is the upper limit control function which takes priority of the lower limit of four-way valve activating compensation.

[Detail]

The frequency control will be made within the following zones.



When a "stop current" continues for 2.5 seconds after rushing on the stop zone, the compressor operation stops.
If a "drooping current" is continues for 1.0 second after rushing on the drooping zone, the frequency will be 2 Hz drooping.
Repeating the above drooping continues until the current rushes on the zone without change.
In the unchanged zone, the frequency limit will be remained.
In the reset zone, the frequency limit will be canceled.

Limitation of current drooping and stop value according to the outside temperature

① In case the operation mode is cooling
- The current droops when outside temperature becomes higher than 40°C.

② In case the operation mode is heating (only for heat pump model)
- The current droops when outside temperature becomes higher than 21°C.

(10) Control to prevent freezing during cooling operation

[Outline]

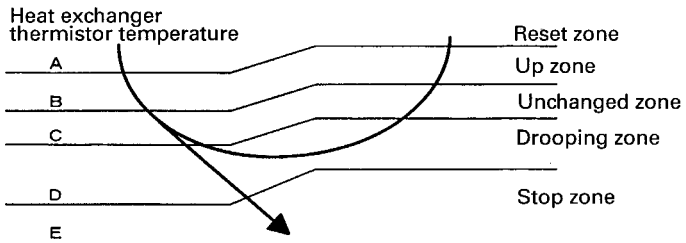
During cooling operation, the signals being sent from the indoor unit allow the operating frequency limitation and outdoor fan control and then prevent freezing of the indoor heat exchanger. (The signal from the indoor unit must be divided into the zones as the followings.

[Detail]

1) Conditions for start controlling

Judge the controlling start with the indoor heat exchanger temperature after 10 min from operation start and after 2 sec from changing number of operation room.

2) Control in each zone



(11) Heating peak-cut control (only for heat pump model)

[Outline]

During heating operation, the signals being sent form the indoor unit allow the operating frequency limitation and outdoor fan control and prevent abnormal high pressure. (The signal from the indoor unit must be divided as follows.)

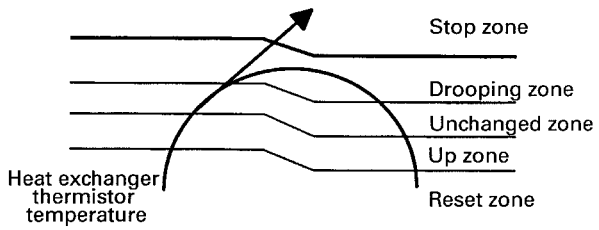
[Detail]

1) Conditions for start controlling

Judge the controlling start with the indoor heat exchanger temperature after 2 min from operation start and after 30 sec from changing number of operation room.

2) Control in each zone

The maximum value of heat exchange intermediate temperature of each indoor unit controls the following (excluding stopped rooms).



(12) Fan control

[Outline]

Fan control must be carried out according to the following priority.

① Fan ON control for electric component cooling fan
② Fan OFF control when defrosting
③ Fan OFF delay when stopped
④ Tap fixing during JIS mode
⑤ ON/OFF control when cooling operation
⑥ Fan control when the number of heating rooms decreases
⑦ Tap control when drooping function is working
⑧ Tap fixing when forced operation
⑨ Tap control in low noise mode
⑩ Fan control during heating operation
(②, ⑥, ⑧, ⑨ and ⑩ functions are only for heat pump model.)

1) Fan OFF control when stopped

- Fan OFF delay for 50 seconds must be made when the compressor is stopped.

2) ON/OFF control when cooling operation is stopped

When the outside temperature is below 8°C, the compressor must be stopped as the fan becomes OFF.

3) Fan control when the number of heating room decreases (only for heat pump model)

When the out side temperature is more than 10°C, the fan must be turned OFF for 30 seconds.

4) Tap control in low noise mode

① When cooling
When the outside temperature is less than 37°C, the fan tap must be set to L.
② When heating operation
When the outside temperature is less than 4°C, the fan tap must be turned to L (only for heat pump model).

(13) Moisture protection function 1

[Outline]

By limiting the lower operating frequency when the outside temperature is low, suction dryness for the compressor is obtained.

[Detail]

In Heating Operation

1) Starting condition of function

- When the outside temperature is below 6.5°C, the lower limit frequency is set.

2) Canceling function

- When the outside temperature is above 7.5°C, the lower limit frequency is canceled.

In Cooling Operation

1) Starting condition of function

- When the outside temperature is below 19°C, the lower limit frequency is set.

2) Canceling function

- When the outside temperature is above 20°C, the lower limit frequency is canceled.

(14) Moisture protection function 2

[Outline]

In order to obtain the dependability of the compressor, the compressor must be stopped according to the conditions of the temperature of the outside air and outdoor heat exchanger.

[Detail]

<Heat Pump Model>

1) Stop operation depending on the temperature of the outside air and the outdoor heat exchanger.

- After continuous 15 minutes passed at the outdoor heat exchanger temperature of below 18°C, compressor operation turns OFF, under the conditions that the system is in cooling operation and outside temperature is below 8°C.

2) Operation stop depending on the outside temperature

- Compressor operation turns OFF under the conditions that the system is in cooling operation and outside temperature is below 0°C.

<Cooling Only Model>

1) Operation stops depending on the outside temperature.

- Compressor operation turns OFF under the condition that outside temperature is below 10°C.

(15) Defrost control (only for heat pump model)

[Outline]

When defrosting is carried out by the cooling cycle (reverse cycle), the defrosting time or outdoor heat exchanger temperature must be more than its fixed value when finishing.

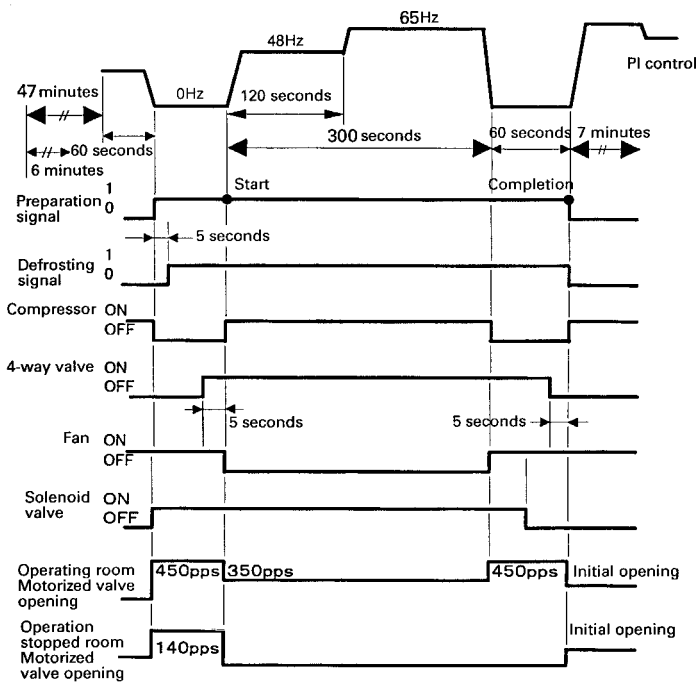
[Detail]

1) Judge rush on to defrost

- The rush-on judgment must be made with the outside temperature and heat exchanger temperature, under the conditions that the system is in heating operation, 6 minutes after the compressor is started and more than 47 minutes has passed since the start of the operation or ending the defrosting.

2) Conditions for canceling the defrosting mode

- The judgment must be made with heat exchanger temperature. (4°C~12°C)



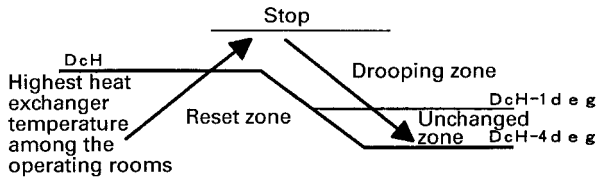
(16) Low Hz high pressure limit (only for heat pump model)

[Outline]

Set the upper limit of high pressure in a low Hz zone. Set the upper limit of the indoor heat exchanger temperature by its operating frequency of Hz. Separate into three zones, reset zone, unchanged zone and drooping zone and the frequency control must be carried out in such zones.

[Detail]

Separate into zones



(17) Electronic expansion valve control

[Outline]

The following items are included in the motorized valve control.

1) Motorized valve is fully closed

① Motorized valve is fully closed when turning on the power.
② Pressure equalizing control

2) Room distribution control

① Gas pipe isothermal control
② SC control (only for heat pump model)
③ Indoor heat exchanger isothermal control (only for heat pump model)

3) Open control

① Motorized valve control when starting operation
② Control when frequency changed
③ Control for defrosting (only for heat pump model)
④ Oil recover control
⑤ Control when a discharge pipe temperature is abnormally high
⑥ Control when the discharge pipe thermistor is disconnected
⑦ Control for indoor unit freeze prevention

4) Feedback control

① Discharge pipe temperature control
② JIS operation

The followings are the examples of control which function in each mode by the motorized valve control.

Operation pattern	○: function ×: not function	Gas pipe isothermal control	SC control (only for heat pump model)	Control when frequency changed	Control for abnormally high discharge pipe temperature	Heat exchanger isothermal control when heating (only for heat pump model)	Oil recovery control	Indoor freeze prevention control
When power is turned ON	Fully closed when power is turned ON	×	×	×	×	×	×	×
Cooling, 1 room operation	Open control when starting	×	×	×	○	×	○	○
	(Control of target discharge pipe temperature)	×	×	○	○	×	○	○
Cooling, 2 rooms operation to Cooling, 4 rooms operation	Control when the operating room is changed	×	×	×	○	×	○	○
	(Control of target discharge pipe temperature)	○	×	○	○	×	○	○
Determine JIS	JIS mode	○	×	○	○	×	×	○
Stop	Pressure equalizing control	×	×	×	×	×	×	×
Heating, 1 room operation (only for heat pump model)	Open control when starting	×	×	×	○	○	×	×
	(Control of target discharge pipe temperature)	×	○	○	○	○	×	×
Heating, 2 rooms operation to Heating, 4 rooms operation (only for heat pump model)	Control when the operating room is changed	×	×	×	○	○	×	×
	(Control of target discharge pipe temperature)	×	○	○	○	○	×	×
	(Defrost control FD=1) (only for heat pump model)	×	×	×	×	×	×	×
Stop	Pressure equalizing control	×	×	×	×	×	×	×
Heating operation (only for heat pump model)	Open control when starting	×	×	×	○	○	×	×
Control of discharge pipe thermistor disconnection	Continue	×	○	×	×	○	×	×
Stop	Pressure equalizing control	×	×	×	×	×	×	×

(18) Electronic expansion valve is fully closed (when power is turned on)

[Outline]

Initialize the electronic expansion valve when turning on the power, set the opening position and develop pressure equalizing.

(19) Electronic expansion valve is fully closed (pressure equalization control)

[Outline]

When the compressor is stopped, open and close the electronic expansion valve and develop pressure equalization.

(20) Opening limit of electronic expansion valve

[Outline]

Limit a maximum and minimum opening of the electronic expansion valve in the operating room.

[Detail]

- A maximum electronic expansion valve opening in the operating room: 450 pulses
- A minimum electronic expansion valve opening in the operating room: 75 pulses

The electronic expansion valve is fully closed in the room where cooling is stopped and is opened with fixed opening during defrosting.

(21) Control when starting/changing operating room

[Outline]

Control the electronic expansion valve opening when the system is starting or the operating room is changed, and prevent the system to be excessively super heated or moistened.

(22) Control when discharge pipe temperature is abnormally high

[Outline]

When the compressor is operating, if the discharge pipe temperature exceeds a certain value, open the electronic expansion valve and remove the refrigerant to the low pressure side and lower discharge temperature.

(23) Oil recovery function

[Outline]

The electronic expansion valve opening in the cooling stopped room must be set as to open for a certain time at a specified interval so that the oil in the cooling stopped room may not be accumulated.

[Detail]

- During cooling operation, every 1 hour continuous operation, the electronic expansion valves in the operation stopped room must be opened by 80 pulses for specified time.

(24) Gas pipe isothermal control during cooling

[Outline]

When the units are operating in multiple rooms, detect the gas piping temperature and correct the electronic expansion valve opening so that the temperature of the gas pipe in each room becomes identical.

When the gas pipe temperature > the average gas pipe temperature, → open the electronic expansion valve in that room

When the gas pipe temperature < the average gas pipe temperature, → close the electronic expansion valve in that room

(25) Heat exchanger isothermal control for heating (only for heat pump model)

[Outline]

Detect the indoor heat exchanger temperature and compare it with the highest temperature room and each room. If the difference is greater than the specified value, open the electronic expansion valve in the room with the higher temperature.

[Detail]

1) Start functioning basic conditions

After finishing the starting control (for 30 seconds after the beginning of the operation), control the all electronic expansion valves in operating and stopped rooms.

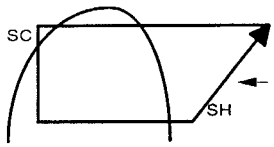
2) Adjustment of electronic expansion valve opening

Detect each indoor heat exchanger temperature and adjust relevant electronic expansion value so that the temperature difference from the maximum value becomes constant.

(26) Target discharge pipe temperature control

[Outline]

Obtain the target discharge pipe temperature from the indoor and outdoor heat exchange temperature, and adjust the electronic expansion valve opening so that the actual discharge pipe temperature become close to that temperature. (Indirect SH control using the discharge pipe temperature)



Set the target discharge pipe temperature as to become an aiming SH.
Regard that the inclination cannot be changed due to the operating condition.

Determine an amount of the electronic expansion valve compensation and drive it according to the deflection of the target discharge temperature and actual discharge temperature, and the discharge temperature variation by the hour.

(27) SC control (only for heat pump model)

[Outline]

Detect the temperature of liquid pipe and heat exchanger of the rooms and compensate the electronic expansion valve opening so that the SC of each room becomes the target SC.
When the actual SC is >target SC, open the electronic expansion valve of the room.
When the actual SC is <target SC, close the electronic expansion valve of the room.

[Detail]

1) Start functioning conditions

After finishing the open control (660 seconds after the beginning of the operation), control all the electronic expansion valve in the operating room and operation stopped room.

2) Determine electronic expansion valve opening

Adjust the motorized valve so that the temperature difference between the maximum heat exchanger temperature of connected room and the temperature of liquid pipe thermistor becomes constant.

(28) Control when the discharge pipe thermistor is disconnected

[Outline]

Detect a disconnected discharge pipe thermistor by comparing the discharge pipe temperature with the condensation temperature. If any is disconnected, open the electronic expansion valve according to the outside temperature and the operating frequency and operate for a specified time, and then stop.

After 3 minutes of waiting, restart the unit and check if any is disconnected. If any is disconnected stop the system after operating for a specified time. If the disconnection is detected 5 times in succession, then the system will be down.

[Detail]

1) Detect disconnection

If a 630-second timer for open control becomes over, and a 9-minute timer for the compressor operation continuation is not counting time, the following adjustment must be made.

① When the operation mode is cooling
When the discharge pipe temperature is lower than the outdoor heat exchanger temperature, the discharge pipe thermistor disconnection must be ascertained.

② When the operation mode is heating (only for heat pump model)
When the discharge pipe temperature is lower than the max temperature of operating room heat exchanger, the discharge pipe thermistor disconnection must be ascertained.

2) Adjustment when the thermistor is disconnected

- When compressor stop repeats specified time, the system should be down.

(29) Control when frequency is changed

[Outline]

When the target pipe temperature control is active, if the target frequency is changed for a specified value in a certain time period, cancel the target discharge pipe temperature control and change the opening of the target electronic expansion valve according to the change.

(30) Sensor malfunction detection

[Outline]

Sensor malfunction may occur either in the thermistor or current transformer (CT) system.

1) Relating to thermistor malfunction

① Outdoor heat exchanger thermistor
② Discharge pipe thermistor
③ Fin thermistor
④ Gas pipe thermistor
⑤ The ambient thermistor

2) Relating to CT malfunction

When the output frequency is more than 55 Hz and the input current is less than 1.25A, carry out abnormal adjustment.

(31) Detection of over load and over current

[Outline]

In order to protect the inverter, detect an excessive output current, and for protecting compressor, monitor the OL operation.

[Detail]

If an interruption occurs on the input interrupter port of the microcomputer, the inverter must be stopped. Check the causes of the abnormality.

1) When the discharge temperature (IT detection section) is not abnormal (125°C), it must be recognized that there is an excessive output current and turn off the compressor.

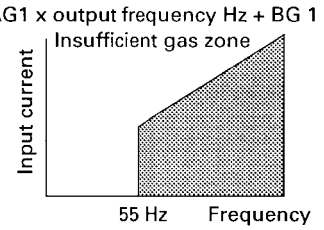
2) When the discharge temperature (IT detection section) is abnormal (less than 125°C), it must be recognized that OL operation is operated and turn off the compressor.

(32) Insufficient gas control

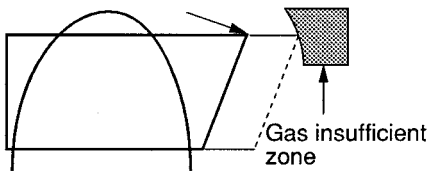
[Outline]

If an input current is below the specified value in which the frequency is higher than the specified frequency, it must be regarded as gas insufficient.

In addition to such conventional function, if the discharge temperature is higher than the target discharge pipe temperature, and more than the specified temperature, and the electronic expansion valve opening is remained more than the specified time, it is considered as an insufficient gas.



With the conventional function, an input current is weak comparing with that in the normal operation when gas is insufficient, and gas insufficiency is detected by checking an input current.



When operating with insufficient gas, although the rise of discharge pipe temperature is great and the electronic expansion valve is open, it is recognized as an insufficient gas if the discharge pipe temperature is higher than the target discharge pipe temperature.

[Detail]

1) Judgment by input current

- When an output frequency is exceeds 55 Hz and the input current is less than specified value, the adjustment is made for insufficient gas.

2) Judgment by discharge pipe temperature

- When discharge pipe temperature is 20°C higher than target value and the electronic expansion value opening is 450 plus (max.), the adjustment is made for insufficient gas.

(33) Preventing indoor freezing

[Outline]

During cooling, if the heat exchanger temperature in the operation stopped room becomes below the specified temperature for the specified time, open the electronic expansion valve in the operation stopped room as specified, and carry out the fully closed operation. After this, if freezing abnormality occurs more than specified time, the system shall be down as the system abnormality.

(34)Detection of optimum V/F lock

[Outline]

Because there is not much difference in the input current when locked in the low Hz operation and when loading lightly, an incorrect detection may occur in the conventional lock detection with the input current control. With this control, variation of the input current in the unit hour is detected, and if the current is higher than specified, adjust the lower limit frequency to be higher at which OCP can activate, then the lock detection can be made with that OCP.

(OCP : Over Current Protect
VF : Output Voltage/Frequency)

(35) Detection of SCR (Scroll compressor) starting malfunction

[Outline]

When the compressor is starting, in order to prevent the OCP operation, which is compressing the refrigerant oil, the refrigerant oil can be extracted by operation at low Hz for the specified time.
(OCP : Over Current Protection)

(36) Forced operation mode

[Outline]

Forced operating mode includes functions such as; forced cooling, forced heating, incorrect wiring, incorrect piping check.
Operating mode must be selected by operating the forced operation switch.

[Detail]

1) Forced cooling, forced heating (only for heat pump model)

Item	Forced cooling	Forced heating
Forced operation allowing conditions	① The indoor unit is not abnormal, but the indoor unit which is not in the freezing prohibiting zone is present in more than 1 room. ② The outdoor unit is not abnormal and not in the 3-minute stand-by mode. ③ The operating mode of the outdoor unit is the stop mode. ④ The slide selection switch of the forced operation is the cooling mode. The forced operation is allowed when the above "and" conditions are met.	① The indoor unit is not abnormal. The indoor unit which is not in the peak-cut prohibited zone is present in more than 1 room. ← ← ④ The slide selection switch of the forced operation is the heating mode. The forced operation is allowed when the above"and"conditions are met.
Starting/ adjustment	If the forced operation switch is pressed as the above conditions are met.	←
① Determie operating room	• 1 room operation, with the room that can enable operation and its NO is the smallest (A>B >C>D). Other rooms operation must be stopped.	←
② Commad frequency	• JT45: 45 Hz	• JT45: 35 Hz
③Motorized valve opening	• Depending on the capacity of the operating indoor unit.	←
④ Outdoor unit adjustment	• Compressor is in operation	←
⑤ Indoor unit adjustment	• Transmit the command of forced draft to the indoor unit.	←
End	① When the forced operation switch is pressed again. ② The operation is to end automatically after 30 min.	← ←
Others	The protect functions are prior to all others in the forced operation.	←

2) Checking incorrect wiring/piping (in case of that two rooms connected system)

- Outline of function
  When the electronic expansion valve is opened during cooling operation, the temperature of the heat exchanger connected may drop. Utilize this phenomena to open the electronic expansion valve one after the other from the A port and carry out each judgment.

1. Allowable conditions
   ① The indoor units in all rooms are not abnormal, and not in the freezing prohibiting zone or peak-cut prohibiting zone.
   ② The outdoor unit is not abnormal.
   ③ Not in a 3-minute stand-by.
   ④ The outdoor unit operating mode is in the stop mode.
   ⑤ The ambient temperature is 2°C or more.
   The function is allowable when the "and" conditions in the above (1) through (5) are met.
2. Starting/adjustment
   In the above conditions, the function will start when the incorrect wiring/piping check switch is pressed.
3. Judgment
   Open the electronic expansion valves of each room in order, and make judgments on the valves by utilizing the phenomena that the temperature of the heat exchanger intermediate thermistor becomes lower.
   If the wiring and piping is correct;
   - If the electronic expansion valve on the port A is open, the heat exchange thermistor temperature in Room A will drop. Same goes with port B and C.
   - If there is any incorrect wiring or piping, the heat exchanger thermistor temperature of the rooms except for Room A will drop when the port A electronic expansion valve is opened. The same goes with port B and C.

   According to the above, for the electronic expansion valve opening signal (wiring), as the temperature detection (piping) of heat exchanger thermistor is compared, if the temperature does not drop, the indoor unit whose temperature has dropped will be automatically corrected.
4. End
   ① If the above judgments are made, end the procedure as turning off the compressor.
   ② End the procedure when the check switch is pressed again during the checking.
   ③ 1. End the procedure when the "and" conditions in ① through ③ are not met.
   ④ End the procedure when signal transmission to the operating room becomes abnormal. (This cannot be checked.)
5. Indication
   The followings are displayed on the service monitor.

LED	1	2	3	4	Judgment
Indication contents	flashing in order			Lights off	Completed auto-correction
	All flash			Flash	Auto-correction unable

Auto-correction...LED 1 through 3 flash in order (LED 4: lights off)
Auto-correction unable...LED 1 through 4 flash at the same time

(37) JIS function

[Outline]

When the JIS mode is determined, the operating frequency, target discharge pipe temperature,and target SC must be fixed.

[Detail]

Starting condition of control

① ΣS=ΣSJIS
② Indoor/outdoor air temperature are the JIS standard conditions.
Cooling : Indoor 27±1°C, Outdoor 35±1°C
Heating : Indoor 20±1°C, Outdoor 7±1°C (only for heat pump model)
③ Indoor fan: High
Set the room temperature: cooling-lowest limit
heating-highest limit (only for heat pump model)
④ All the operating rooms must satisfy the conditions in ② and ③.

5-2. Additional Function

(38) Connection pipe condensation preventing function

This control function maintains the temperature of outdoor unit gas pipe thermistor (GDN) at 8°C or higher during cooling operation.

(39) Priority room setting

Electronic expansion valves are controlled to provide the unit designated as the priority room with the capacity of other room units.
(Distribution of capacity: Priority room unit --- ΔD Max., other room units --- ΔD - α)

- Setting method
  Turn off the circuit breaker before changing the setting.
  Only one room can be set as the priority room.

- Control start conditions
  Priority room setting is made.
  AND
  "Powerful" signal from the priority room unit is received.

(Note)
The operation mode of the priority room unit has precedence.

- Cancellation of control
  The control function is canceled when the "Powerful" operation mode is switched off.

(40) "Powerful" operation mode

Compressor operating frequency is increased to P1 Max. (Max. Hz of operating room unit ΣS) and outdoor unit airflow rate is increased.

(41) Voltage detection function

Power supply voltage is detected each time equipment operation starts.
* Used for V/F control adjustment

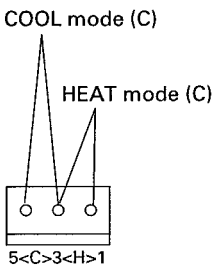
(42) Fixed cooling/heating mode

(Heat-pump units only)

Use the S100 connector to set the unit to only cool or heat.
Setting to only cool (C): Short-circuit pins 1 and 3 of the connector <S100>.
Setting to only heat (H): short-circuit pins 3 and 5 of the connector <S100>.
The following specifications apply to the connector housing and pins.

JST products Housing: VHR-5N
Pin: SVH-21T-1,1

Note that forced operation is also possible in COOL/HEAT mode.



6. System Configuration

Operation Instructions

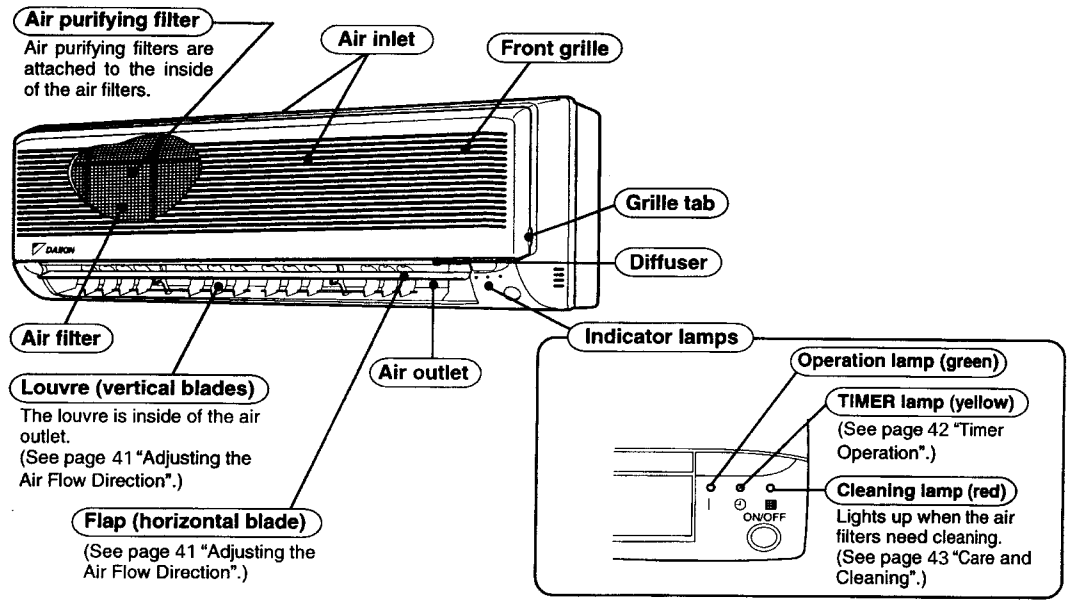
After the installation and test operation of the room airconditioner have been completed, it should be operated and handled as described below. Every user would like to know the correct method of operation of the room airconditioner, to check if it is capable of cooling (or heating) well, and to know a clever method of using it.

In order to meet this expectation of the users, giving sufficient explanations taking enough time can be said to reduce about 80% of the requests for servicing. However good the installation work is and however good the functions are, the customer may blame either the room airconditioner or its installation work because of improper handling. The installation work and handing over of the unit can only be considered to have been completed when its handling has been explained to the user without using technical terms but giving full knowledge of the equipment.

<FTK25~60H, FTX25~60H Series>

(1) Names of Parts

Indoor unit

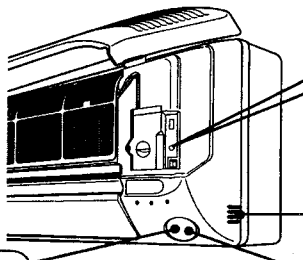


Opening the front grille

How to open the front grille: (See page 43 "Care and Cleaning".)

⚠ CAUTION

Before opening the front grille, be sure to stop the operation and turn the breaker OFF. If the power is on, the fan may rotate inside and may cause injury.



Control panel

CLEANING LAMP RESET

Cleaning lamp reset button

- Push this button to turn the CLEANING lamp off.

Room temperature sensor:

- senses the air temperature around the unit.

ON/OFF button

- Push this button once to start operation. Push once again to stop it.
- This button is useful when the remote controller is missing.

Receiver:

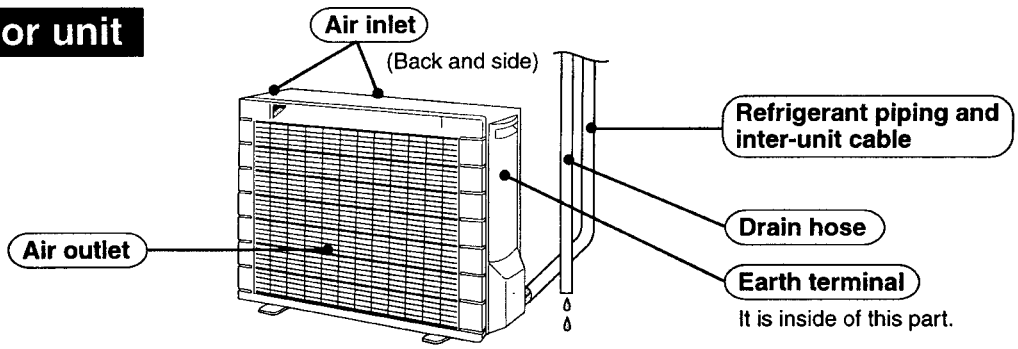
- receives signals from the remote controller.
- When the unit receives a signal, you will hear a short beep.

•The operation mode refers to the following table.

	Mode	Temperature setting	Air flow rate
FTK	COOL	22°C	AUTO
FTX	AUTO	25°C	AUTO

- In the case of multi system operation, there are times when the unit does not activate with this button. (See page 39.)

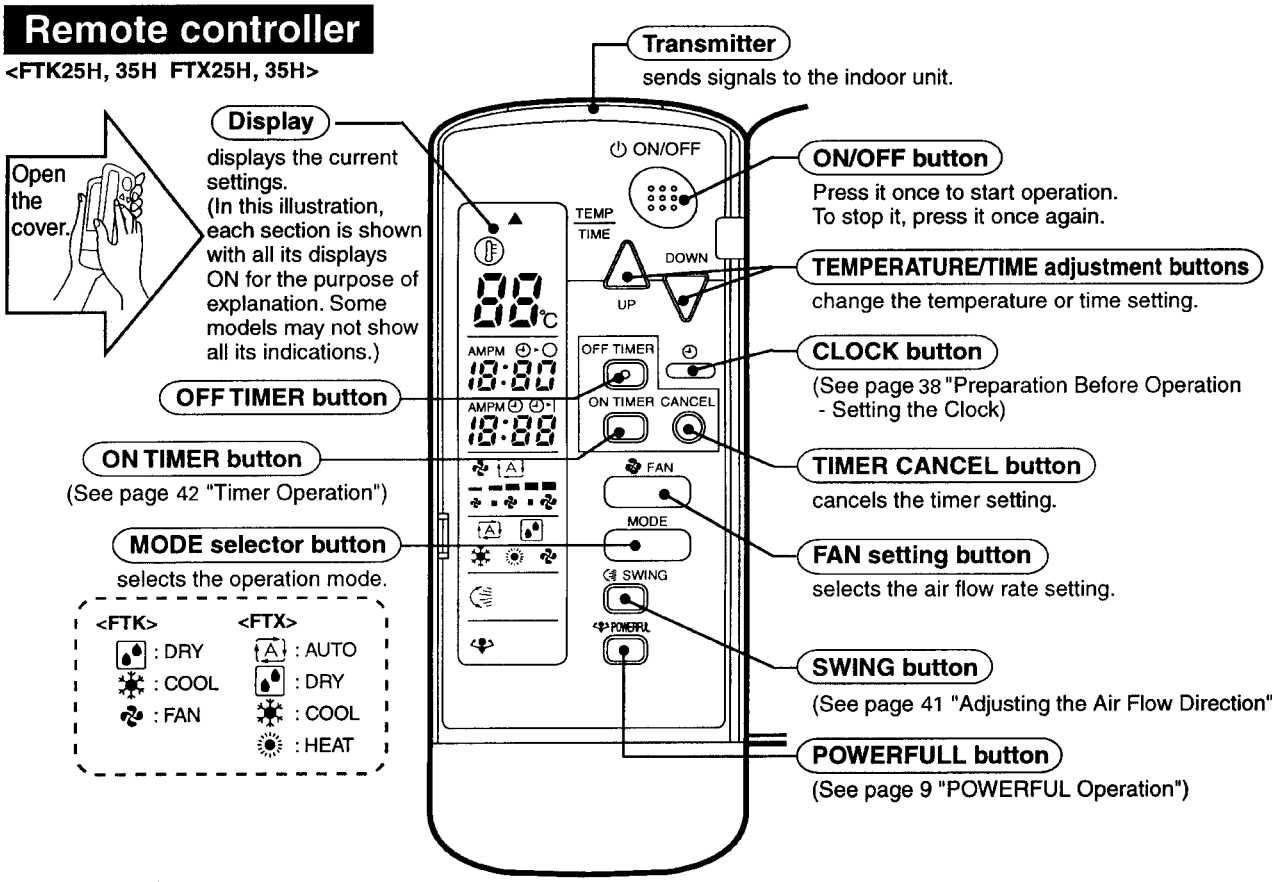
Outdoor unit



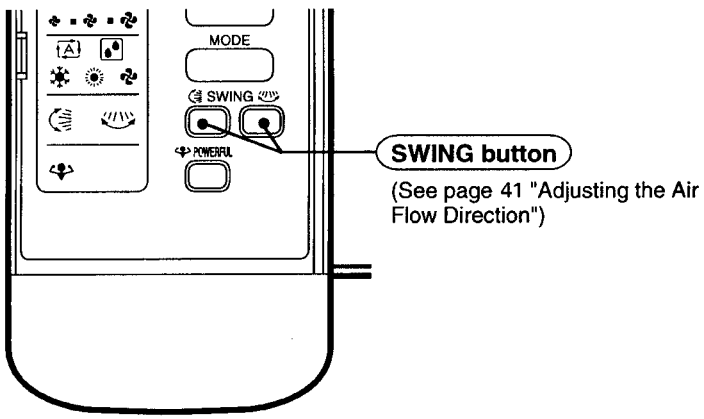
Appearance of the outdoor unit may differ with some models.

Remote controller

<FTK25H, 35H FTX25H, 35H>



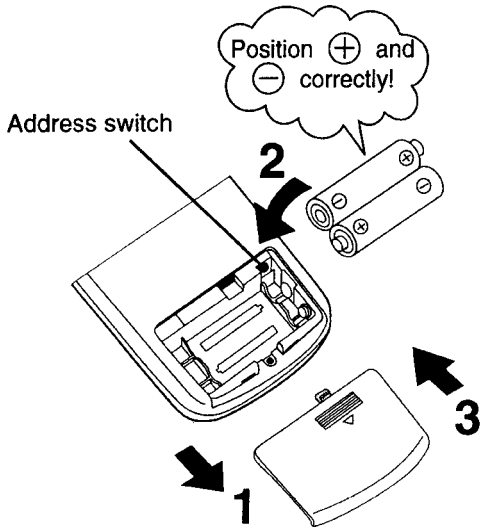
<FTK50H, 60H FTX50H, 60H>



(2) Preparation Before Operation

Remote controller

■ Setting the batteries



1 Press ▭ with a finger and slide the back cover to take it off.

2 Set two alkaline dry batteries (LR03).

3 Set the back cover as before.
- This will cause the figures on the display to flash. Set the clock at this point.

- The address switch is used when two indoor units are to be installed in a single room.
- If there is only one indoor unit in the room, it must be set to "1".
- To install two units in a single room, consult the shop where you bought the air conditioner.

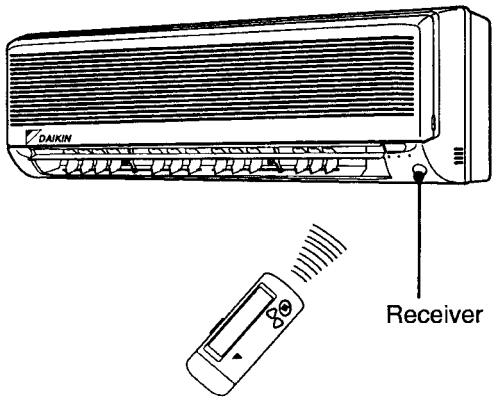
ATTENTION

About batteries

- Always replace two batteries at the same time. Replace them with new ones of an identical type.
- Do not use manganese dry batteries since their use may cause a malfunction.
- If you are not going to use the air conditioner for a long period, take out all the batteries.
- Batteries should last for about a year under normal conditions. When you find the displays unclear and signal communication often failing, replace them with new ones.
- Batteries may be exhausted even before the recommended date of consumption printed on them, if the air conditioner was manufactured many months ago.
- Never try to recharge the batteries.

■ Operating the remote controller

- To use the remote controller, aim the transmitter at the indoor unit. If there is anything to block signals between the unit and the remote controller, such as a curtain, the unit will not operate.
- Do not drop the remote controller. Do not get it wet.
- The maximum distance for communication is about 7 m.

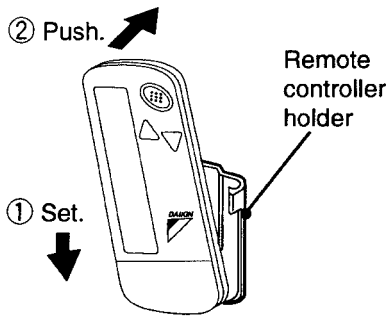


■ To fix the remote controller holder on the wall

1 Choose a place from where the signals reach the unit.

2 Fix the holder to a wall, a pillar, etc. with the screws supplied with the holder.

3 Fit the claw of the holder into the bottom of the remote controller, and push the remote controller onto the wall.



- To remove, pull it upwards.

ATTENTION

About the remote controller

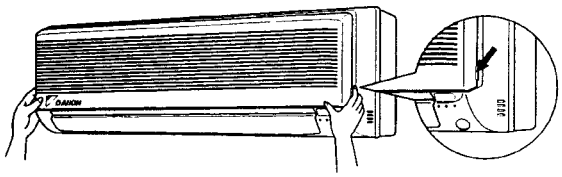
- Never expose the remote controller to direct sunlight.
- Dust on the signal transmitter or receiver will reduce the sensitivity. Wipe off dust with soft cloth.
- Signal communication may be disabled if an electronic-starter-type fluorescent lamp (such as inverter-type lamps) is in the room. Consult the shop if that is the case.
- If the remote control signals happen to operate another appliance, move that appliance to somewhere else, or consult the shop.

Indoor unit

■ Setting the air purifying filters

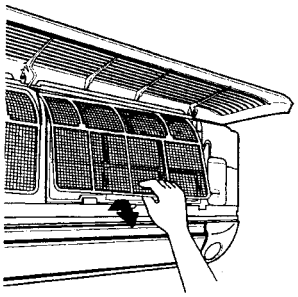
1 Open the front grille.

- Hold the grille by the tabs on the two sides and lift it until it stops with a click. (about 60°)



2 Pull out the air filters.

- Push upwards the tab at the center of each air filter, then pull it down.



3 Set the air purifying filters.

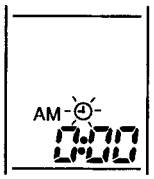
- Attach an air purifying filter to each air filter. (See page 43 "Care and Cleaning".)

4 Set the air filters in their original positions and close the front grille.

- Operation without air filters may result in troubles as dust will accumulate inside the indoor unit.

■ Setting the clock

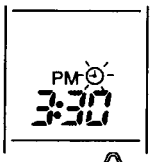
1 Press ⏲.



AM 0:00 is displayed.

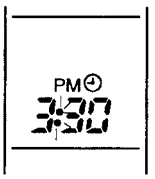
⏲ blinks.

2 Press UP / DOWN to set the clock to the present time.



- Holding down (UP) or (DOWN) button rapidly increases or decreases the time display.

3 Press ⏲.



: blinks.

(Now the clock is set.)

■ Turn the breaker ON

- Turning ON the breaker opens the flap, then closes it again. (This is a normal procedure.)

NOTE

Tips for saving energy

- Be careful not to cool the room too much. Keeping the temperature setting at a moderate level helps save energy.

Recommended temperature setting

For cooling: 26°C ~ 28°C
For heating: 20°C ~ 24°C

- Cover windows with a blind or a curtain. Blocking sunlight and air from outdoors increases the cooling effect.
- Clogged air filters cause inefficient operation and waste energy. Cleaning lamp tells you when the air filters need cleaning. Clean them once in about every two weeks.

Please note

- The air conditioner always consumes 15 ~ 35 watts of electricity even while it is not operating.
- If you are not going to use the air conditioner for a long period, for example in spring or autumn, turn the breaker OFF.
- Use the air conditioner in the following conditions.

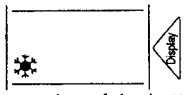
Mode	Operating conditions	If operation is continued out of this range:
COOL	Outdoor temperature : 10 to 46°C Indoor temperature : 18 to 32°C Indoor humidity : 80% max.	• A safety device may work to stop the operation. (In multi system, it may work to stop the operation of the outdoor unit only.) • Condensation may occur on the indoor unit and drip.
HEAT	Outdoor temperature : −10 to 21°C Indoor temperature : 14 to 28°C	• A safety device may work to stop the operation.
DRY	Outdoor temperature : 21 to 46°C Indoor temperature : 18 to 32°C Indoor humidity : 80% max.	• A safety device may work to stop the operation. • Condensation may occur on the indoor unit and drip.

- Operation outside this humidity or temperature range may cause a safety device to disable the system.

(3) Manual Operation

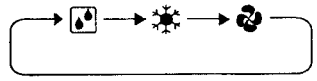
The air conditioner operates with the settings of your choice.
From the next time on, the air conditioner will operate with the same settings.

1 Press MODE and select a mode.

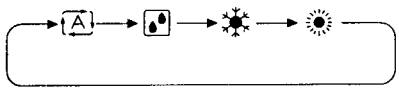


- Each pressing of the button advances the mode setting in sequence.

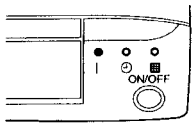
<FTK>



<FTX>



2 Press ⏻ ON/OFF .



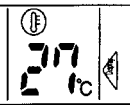
Then OPERATION lamp lights up.

■ To stop:

Press ⏻ ON/OFF once again.

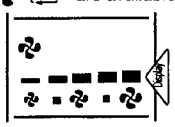
Then OPERATION lamp goes off.

■ To change the temperature setting:

DRY or FAN mode	HEAT or COOL mode
The temperature setting is not variable.	Press △ UP to raise the temperature and press ▽ DOWN to lower the temperature.
	Set to the temperature you like. 

■ To change the air flow rate setting:

Press FAN .

DRY mode	HEAT or COOL or FAN mode
The air flow rate setting is not variable.	Five levels of air flow rate setting from " " to " " plus " A " are available. 

- At smaller air flow rates, the cooling or heating effect is also smaller.

■ To change the air flow direction:

(See page 41.)

NOTE

<Note on HEAT mode operation>

Since this air conditioner heats the room by taking heat from outdoor air to indoors, the heating capacity becomes smaller in lower outdoor temperatures. If the heating effect is insufficient, it is recommended to use another heating appliance in combination with the air conditioner.
The heat pump system heats the room by circulating hot air around all parts of the room. After the start of heating operation, it takes some time before the room gets warmer.
In heating operation, frost may occur on the outdoor unit and lower the heating capacity. In that case, the system switches into defrosting operation to take away the frost. During defrosting operation, hot air does not flow out of indoor unit.

<Note on DRY mode operation>

This operation dehumidifies the indoor air when it is humid.

MORE FEATURE

(Three step flow)

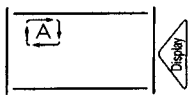
At the start heating, the human body feels uncomfortable if it is directly exposed to the air flow even if it is warm. To overcome this problem, the air conditioner is equipped with a three step flow system to provide a comfortable warm air around you.

1) At the start of operation, the flap is set toward the back.
2) When the air temperature has risen, the air starts blowing downward to warm up the floor.
3) When the floor and walls are warmed up, the warm air starts blowing toward the area around people.

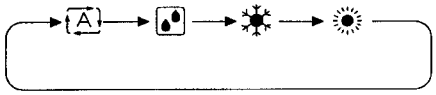
(4) AUTO Mode Operation

In AUTO mode, the air conditioner automatically selects the most appropriate settings. (FTX only)

1 Press MODE and select "Ⓐ".



- Each pressing of the button advances the mode setting in sequence.



2 Press ⏻ ON/OFF .

Then OPERATION lamp lights up.

■ To stop:

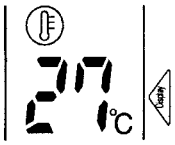
Press ⏻ ON/OFF once again.

Then OPERATION lamp goes off.

■ To change the temperature setting:

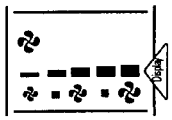
Press △ UP to raise the temperature and press ▽ DOWN to lower the temperature.

Set to the temperature you like.



■ To change the air flow rate setting:

Five levels of air flow rate setting from "▁" to "▇" plus "Ⓐ" are available.



■ To change the air flow direction:

(See page 41 "Adjusting the Air Flow Direction")

NOTE

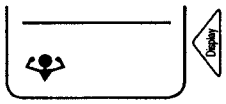
- In AUTO operation, the system selects a temperature setting and an appropriate mode (COOL or HEAT) based on the room temperature at the start of the operation.
- The system automatically reselects settings at a regular interval to bring the room temperature to user-setting level.
- If you do not like AUTO operation, you can select manually the mode and settings you like.

(5) POWERFUL Operation

POWERFUL operation quickly maximizes the cooling effect in any operation mode. You can get the maximum capacity with a touch of a button.

- Pressing the (POWERFUL) button during operation starts POWERFUL operation.
- POWERFUL operation ends in 20 minutes. Then the system automatically operates again with the settings which were used before POWERFUL operation.

1 Press POWERFUL .



■ To cancel POWERFUL operation:

Press POWERFUL .

Notes on POWERFUL operation

- **In COOL and HEAT mode**
  To maximize the cooling and heating effect, the capacity of outdoor unit must be increased and the air flow rate be fixed to the maximum setting.
  The temperature and air flow settings are not variable.
- **In DRY mode**
  The temperature setting is lowered by 3°C and the air flow rate is slightly increased.
- **In FAN mode**
  The air flow rate is fixed to the maximum setting.

■ Note for Multi System

- **Precedence-room setting**
  When setting the preference-room during installation, the indoor unit's operation mode always takes priority.
  When the precedence-setting room unit is operated in POWERFUL mode, there are times that air conditioners in other rooms will temporarily stop in order to centralize power to the unit in the room.
  Please adjust the precedence-room setting to match your life style. Moreover, for precedence-room settings, please consult the service shop where you bought the unit.
- **COOL/HEAT mode**
  This mode is used to set the unit to only cool or heat. For information on using this mode, consult the service shop where you bought the unit.

NOTE

<Note for heat pump multi system>

When two or more indoor units have no precedence-room settings and are set to modes that differ from each other, the indoor unit which is operated first activates, while the other indoor unit does not activate and the OPERATION lamp blinks. (This is not a malfunction.)
An indoor unit that is not in operation will automatically start and operate in the mode in which a previously operated indoor unit was stopped. However, if the unit in operation provides only COOL and DRY modes, simultaneous operation is possible.

(6) Adjusting the Air Flow Direction

You can adjust the air flow direction to increase your comfort.

Adjusting the horizontal blade (flap)

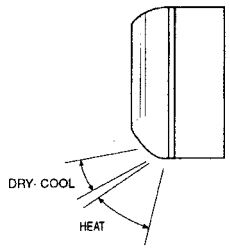
Press SWING .

- Every time the button is pressed, "" appears or disappears.

	..... The flap automatically swings up and down.
No display	..... To stop the flap at an angle you like, press SWING .

Notes on flap angles

- When [SWING] is selected, the flap swinging range depends on the operation mode. (See the figure.)
- When [SWING] is selected in heating operation, the flap and the diffuser swing up and down in combination.
- The diffuser is kept open in DRY or COOL mode.



NOTE

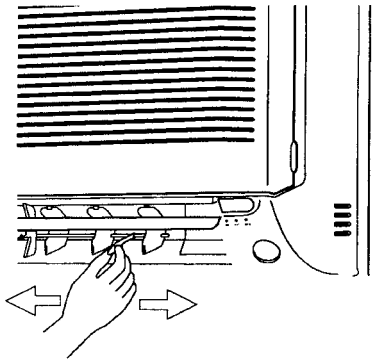
- Unless [SWING] is selected, you should set the flap at a downward position in HEAT mode and at a near-horizontal angle in COOL or DRY mode to obtain the best performance.
- In DRY mode, if the flap is fixed at a upward position, the flap automatically moves in about 60 minutes to prevent condensation on it.

ATTENTION

- Always use a remote controller to adjust the flap angle. If you attempt to move it forcibly with hand when it is swinging, the mechanism may be broken.

Adjusting the louvre

<FTK25H, 35H FTX25H, 35H>



Hold the knob and move the louvre.
(You will find a knob on the left-end and the right-end blades.)

ATTENTION

- Be careful when adjusting the louvre. Inside the air outlet, a fan is rotating at a high speed.

<FTK50H, 60H FTX50H, 60H>

Press SWING .

- Every time the button is pressed, "" appears or disappears.

	..... The louver automatically swings right and left.
No display	..... To stop the louver at an angle you like, press SWING .

ATTENTION

- Always use a remote controller to adjust the louver angle. If you attempt to move it forcibly with hand when it is swinging, the mechanism may be broken.

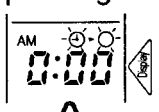
(7) Timer Operation

Timer functions are useful for automatically switching the air conditioner on or off at night or in the morning. You can also use OFF TIMER and ON TIMER in combination.

OFF TIMER operation

- Check that the clock is correct.
  If not, set the clock to the present time. (See page 38.)

1 Press OFF TIMER ( ) while the air conditioner is operating.

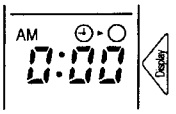


AM 0:00 is displayed.
⏲·○ blinks.

2 Press UP ( ) DOWN ( ) until the time setting reaches the point you like.

- Every pressing of either button increases or decreases the time setting by ten minutes. Holding down either button changes the setting rapidly.

3 Press OFF TIMER ( ) once again.



Then the TIMER lamp lights up.

■ To cancel the timer:

Press CANCEL ( ) . Then the TIMER lamp goes off.

Notes on OFF TIMER

- When the OFF TIMER is set, the air conditioner automatically adjusts the temperature setting (0.5°C up in COOL, 2.0°C down in HEAT) to prevent excessive cooling for your pleasant sleep.

ON TIMER operation

- Check that the clock is correct. If not, set the clock to the present time (See page 38).

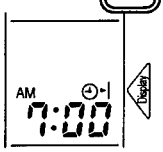
1 Press ON TIMER ( ) while the air conditioner is not operating.

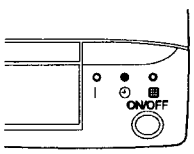
AM 6:00 is displayed.
⏲·I blinks.

2 Press UP ( ) DOWN ( ) until the time setting reaches the point you like.

- Every pressing of either button increases or decreases the time setting by ten minutes. Holding down either button changes the setting rapidly.

3 Press ON TIMER ( ) once again.





Then the TIMER lamp lights up.

■ To cancel the timer:

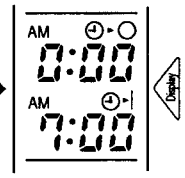
Press CANCEL ( ) .

Then the TIMER lamp goes off.

Combining ON TIMER and OFF TIMER

- A sample setting for combining the two timers is shown below.

(Example)
Present time: 11:00 PM
(The unit operating)
OFF TIMER at 0:00 a.m.) Combined
ON TIMER at 7:00 a.m.)



Notes on ON,OFF TIMER

- When TIMER is set, the present time is not displayed.
- Once you set ON,OFF TIMER, the time setting is kept in the memory. (The memory is canceled when remote controller batteries are replaced.)

ATTENTION

■ In the following cases, set the timer again.
- After a breaker has turned OFF.
- After a power failure.
- After replacing batteries in the remote controller.

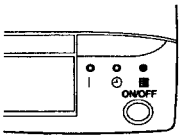
(8) Care and Cleaning

⚠ CAUTION

Before cleaning, be sure to stop the operation and turn the breaker OFF.

Cleaning the air filters

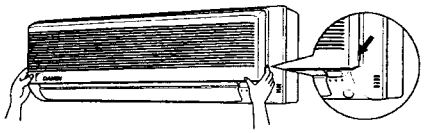
(It is recommended to clean them every two weeks.)



- Clean the air filters, when cleaning lamp lights up.

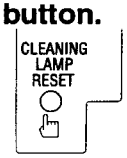
1 Open the front grille.

- Hold the grille by the tabs on the two sides and lift it until it stops with a click. (about 60°)



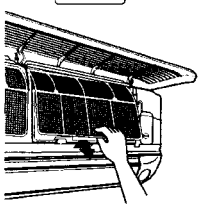
2 Push cleaning lamp reset button.

(See page 35 "Names of Parts".)



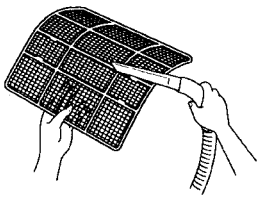
3 Pull out the air filters.

- Push a little upwards the tab at the center of each air filter, then pull it down.

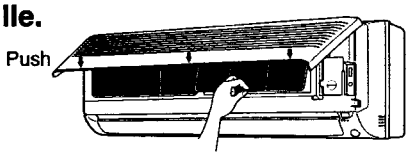


4 Take off the air purifying filters and clean them.

- Wash them with water, or clean them with a vacuum cleaner.
- If the dust does not come off easily, wash them with neutral detergent thinned with lukewarm water, then dry them up in the shade.



5 Set the air purifying filters and the air filters as they were and close the front grille.



- Insert claws of the filters into slots of the front panel. The front grille should lock at both sides and at the point in the middle. Push the grille at the 3 points indicated by ⬇.

NOTE

- In a dusty environment, clean the air filters at least once in every two weeks even before the cleaning lamp lights up.
- Operation with dusty air filters lowers the cooling and heating capacity and wastes energy.

Cleaning the indoor and outdoor units and the remote controller

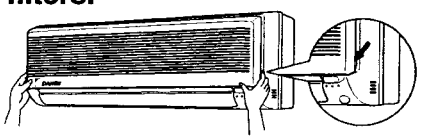
- Wipe them with dry soft cloth.
  For cleaning, do not use water hotter than 40°C, benzine, gasoline, thinner, nor other volatile oils, polishing compound, scrubbing brushes nor other hard stuff.

Replacing air purifying filters

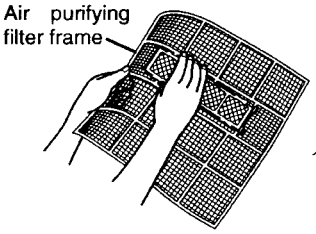
(It is recommended to replace them every three months.)

- Air purifying filters need to be replaced regularly.

1 Open the front grille and pull out the air filters.

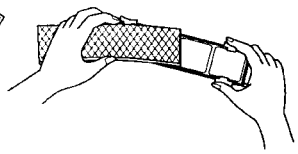


2 Take off the air purifying filters.

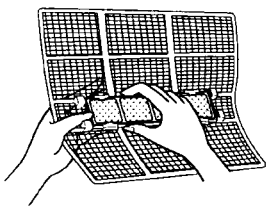


- Hold the recessed parts of the frame and unhook the four claws.

3 Detach the filter element and attach a new one.



4 Attach the air purifying filter.



5 Set the air filters as they were and close the front grille.

(Push the grille at the 3 points, two at both sides and in the middle.)

NOTE

- To order air purifying filters, contact the service shop where you bought the air conditioner.
- Once the air purifying filter element gets dirty, it is not reusable but must be thrown away.
- Operation with dirty air purifying filters:
  - cannot clean the air.
  - results in poor cooling.
  - may cause odour.

Item	Part No.
Air purifying filter (with frame)	KAF918A41
Air purifying filter (without frame)	KAF918A42

Cleaning the front grille

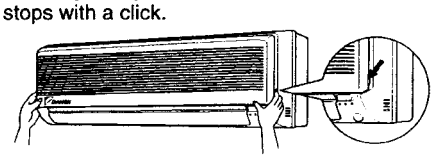
You may remove the front grille for cleaning.

⚠ CAUTION

- When removing or attaching the front grille, use a robust and stable stool and watch your steps carefully.
- When removing or attaching the front grille, support the grille securely with hand to prevent it from falling.
- For cleaning, do not use water hotter than 40°C, benzine, gasoline, thinner, nor other volatile oils, polishing compound, scrubbing brushes nor other hard stuff.
- After cleaning, make sure that the front grille is securely fixed.

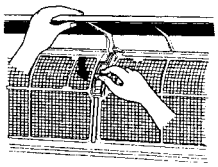
1 Open the front grille.

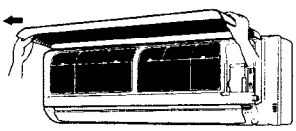
- Hold the grille by the tabs on the two sides and lift it until it stops with a click.



2 Remove the front grille.

- Supporting the front grille with one hand, release the lock by sliding down the knob with the other hand.
- To remove the front grille, pull it toward yourself with both hands.



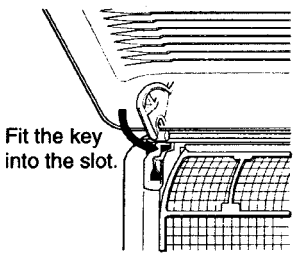


3 Clean the front grille.

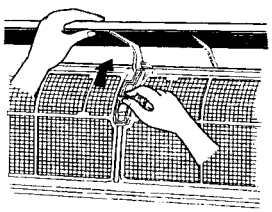
- You may wipe it with a soft cloth soaked in water.
- Only neutral detergent may be used.
- You may wash the grille with water. After washing, dry it with cloth, then dry it up in the shade.

4 Attach the front grille.

- Set the 3 keys of the front grille into the slots and push them in all the way.
- Supporting the front grille with one hand, fit the lock by sliding up the knob with the other hand.
- Close the front grille slowly in this state. (Push the grille at the 3 points, two at both sides and in the middle.)



Fit the key into the slot.



Slide up the knob.

Check

Check that the base, stand and other fittings of the outdoor unit are not decayed or corroded.

Check that nothing blocks the air inlets and the outlets of the indoor unit and the outdoor unit.

Check that the earth wire is not disconnected or broken.

Check that the drain comes smoothly out of the drain hose during COOL or DRY operation.

- If no drain water is seen, water may be leaking from the indoor unit. Stop operation and consult the service shop if this is the case.

Before a long idle period

1 Operate the fan alone for several hours on a fine day to dry out the inside.

<FTK>

1 Press MODE and select "".

2 Press ⏻ ON/OFF .

<FTX>

1 Press MODE and select "".

2 Press △ UP and set the temperature to 32°C

3 Press ⏻ ON/OFF .

- The air flow rate is fixed regardless of the setting.
- Perform this operation when the room temperature is under 28°C.

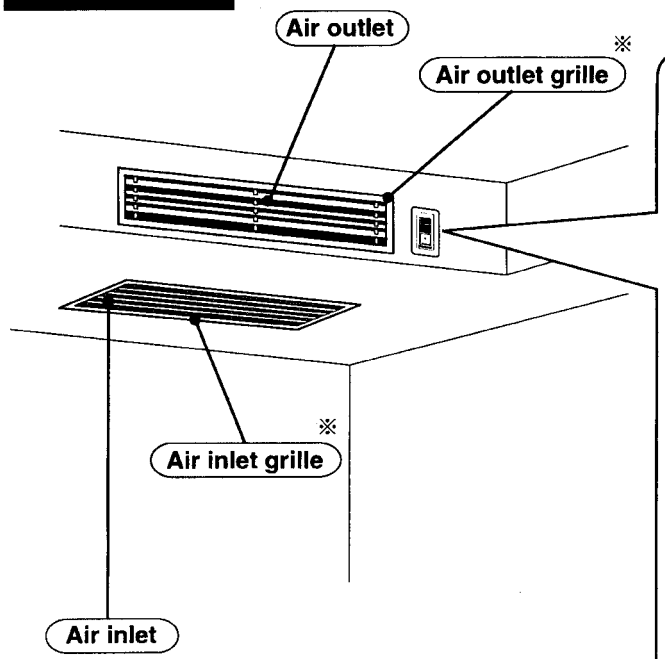
2 Clean the air filters and set them again.

3 Take out batteries from the remote controller.

4 Turn OFF the breaker for the room air conditioner.

<CDK25~60H, CDX25~60H Series>
(1) Names of Parts

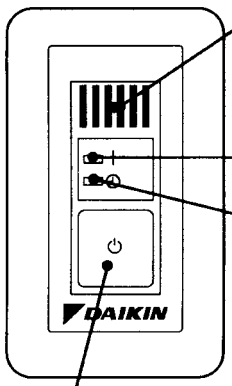
Indoor unit



- There are models which are not equipped with the air filter inside of the unit.
- Clean the air filter periodically. (See page 51 "Care and Cleaning".

※ Appearance of the Air outlet grille and Air inlet grille may differ with some models.

Indicator lamps, Control panel



Room temperature sensor:

- senses the air temperature around the unit.

Operation lamp (green)

TIMER lamp (yellow)

(See page 50 "Timer Operation".)

Emergency operation button

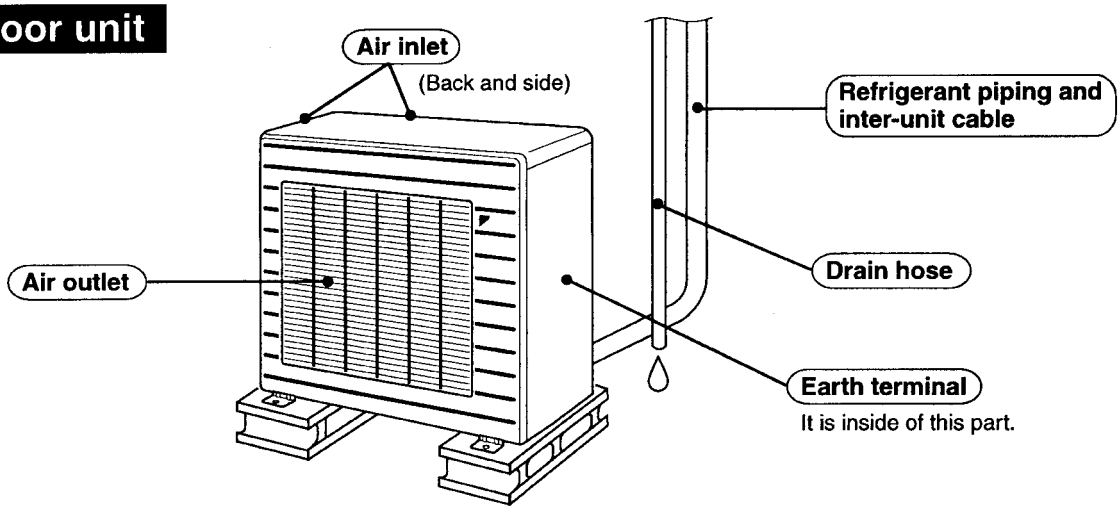
- Push this button once to start operation. Push once again to stop it.
- This button is useful when the remote controller is missing.

• The operation mode refers to the following table.

	Mode	Temperature setting	Air flow rate
CDK	COOL	22°C	AUTO
CDX	AUTO	25°C	AUTO

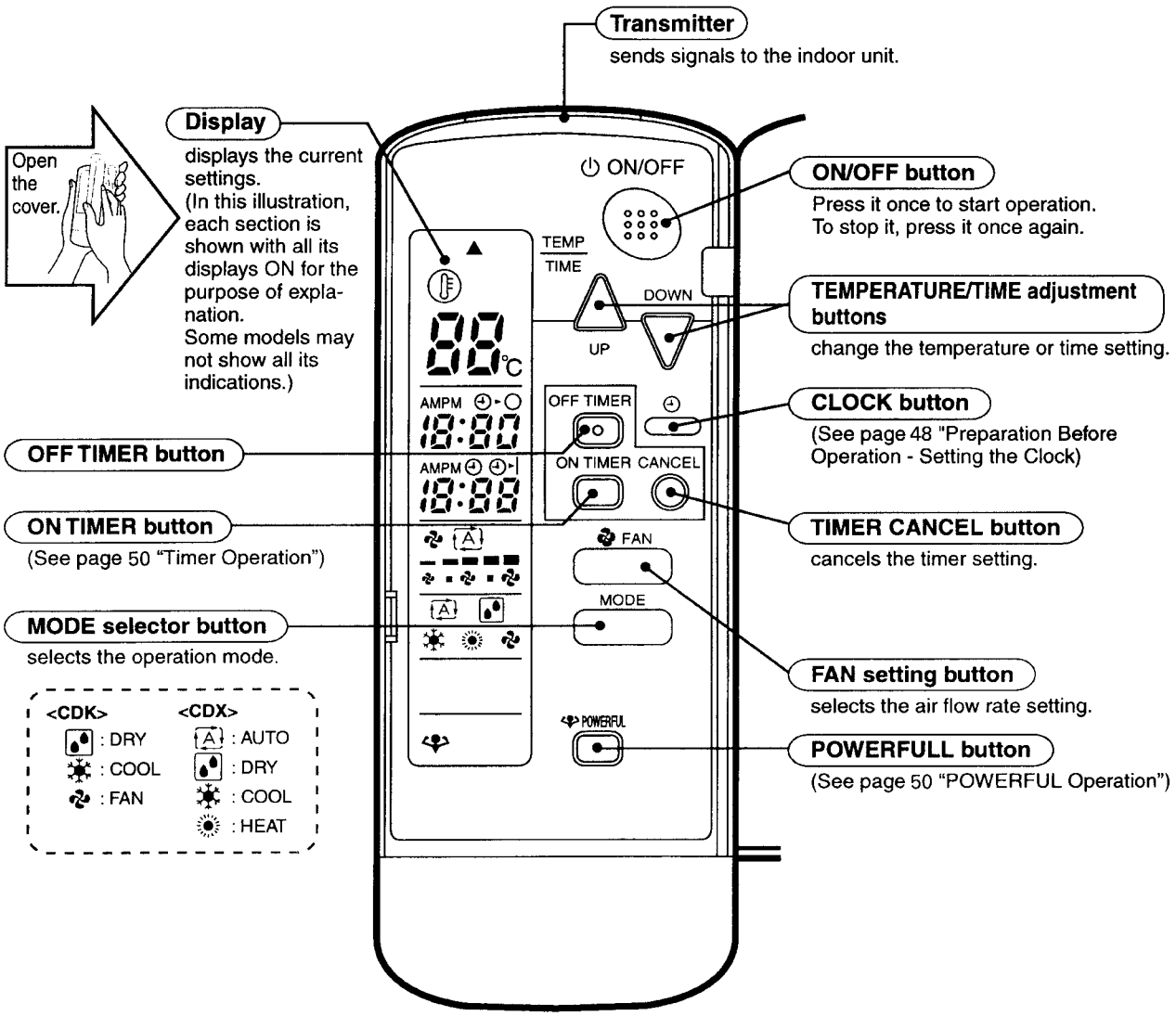
- In the case of multi system operation, there are times when the unit does not activate with this button. (See page 49.)

Outdoor unit



Appearance of the outdoor unit may differ with some models.

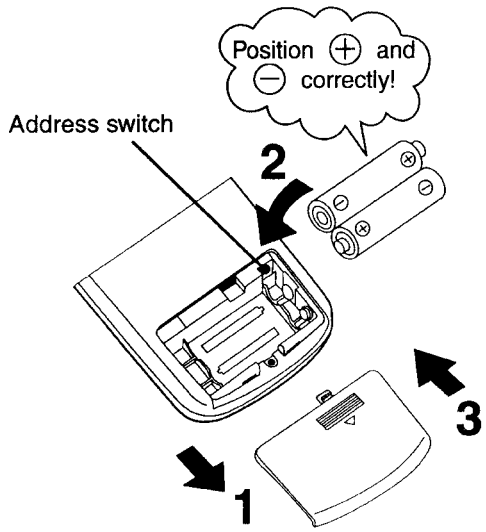
Remote controller



(2) Preparation Before Operation

Remote controller

■ Setting the batteries



1 Press ▽ with a finger and slide the back cover to take it off.

2 Set two alkaline dry batteries (LR03).

3 Set the back cover as before.
- This will cause the figures on the display to flash. Set the clock at this point.

- The address switch is used when two indoor units are to be installed in a single room.
- If there is only one indoor unit in the room, it must be set to "1".
- To install two units in a single room, consult the shop where you bought the air conditioner.

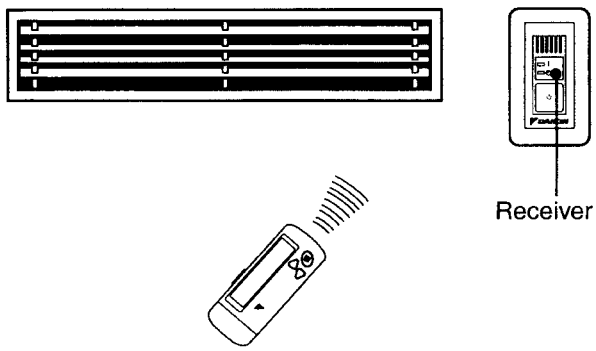
ATTENTION

About batteries

- Always replace two batteries at the same time. Replace them with new ones of an identical type.
- Do not use manganese dry batteries since their use may cause a malfunction.
- If you are not going to use the air conditioner for a long period, take out all the batteries.
- Batteries should last for about a year under normal conditions. When you find the displays unclear and signal communication often failing, replace them with new ones.
- Batteries may be exhausted even before the recommended date of consumption printed on them, if the air conditioner was manufactured many months ago.
- Never try to recharge the batteries.

■ Operating the remote controller

- To use the remote controller, aim the transmitter at the indoor unit. If there is anything to block signals between the unit and the remote controller, such as a curtain, the unit will not operate.
- Do not drop the remote controller. Do not get it wet.
- The maximum distance for communication is about 7 m.

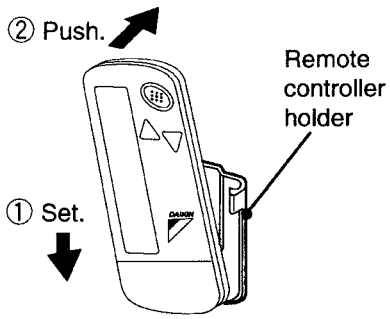


■ To fix the remote controller holder on the wall

1 Choose a place from where the signals reach the unit.

2 Fix the holder to a wall, a pillar, etc. with the screws supplied with the holder.

3 Fit the claw of the holder into the bottom of the remote controller, and push the remote controller onto the wall.



- To remove, pull it upwards.

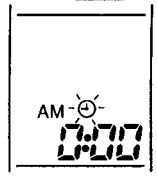
ATTENTION

About the remote controller

- Never expose the remote controller to direct sunlight.
- Dust on the signal transmitter or receiver will reduce the sensitivity. Wipe off dust with soft cloth.
- Signal communication may be disabled if an electronic-starter-type fluorescent lamp (such as inverter-type lamps) is in the room. Consult the shop if that is the case.
- If the remote control signals happen to operate another appliance, move that appliance to somewhere else, or consult the shop.

■ Setting the clock

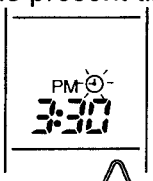
1 Press ⏲.



AM 0:00 is displayed.

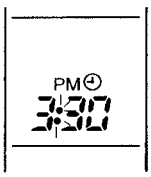
⏲ blinks.

2 Press UP / DOWN to set the clock to the present time.



- Holding down (UP) or (DOWN) button rapidly increases or decreases the time display.

3 Press ⏲.



: blinks.

(Now the clock is set.)

Indoor unit

■ Turn the breaker ON

- Turning ON the breaker opens the flap, then closes it again. (This is a normal procedure.)

NOTE

Tips for saving energy

- Be careful not to cool the room too much. Keeping the temperature setting at a moderate level helps save energy.

Recommended temperature setting

For cooling: 26°C ~ 28°C
For heating: 20°C ~ 24°C

- Cover windows with a blind or a curtain. Blocking sunlight and air from outdoors increases the cooling effect.
- Clogged air filters cause inefficient operation and waste energy. Clean them once in about every two weeks.

Please note

- The air conditioner always consumes 15 ~ 35 watts of electricity even while it is not operating.
- If you are not going to use the air conditioner for a long period, for example in spring or autumn, turn the breaker OFF.
- Use the air conditioner in the following conditions.

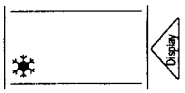
Mode	Operating conditions	If operation is continued out of this range:
COOL	Outdoor temperature : 10 to 46°C Indoor temperature : 18 to 32°C Indoor humidity : 80% max.	• A safety device may work to stop the operation. (In multi system, it may work to stop the operation of the outdoor unit only.) • Condensation may occur on the indoor unit and drip.
HEAT	Outdoor temperature : −10 to 21°C Indoor temperature : 14 to 28°C	• A safety device may work to stop the operation.
DRY	Outdoor temperature : 21 to 46°C Indoor temperature : 18 to 32°C Indoor humidity : 80% max.	• A safety device may work to stop the operation. • Condensation may occur on the indoor unit and drip.

- Operation outside this humidity or temperature range may cause a safety device to disable the system.

(3) Manual Operation

The air conditioner operates with the settings of your choice. From the next time on, the air conditioner will operate with the same settings.

1 Press MODE and select a mode.

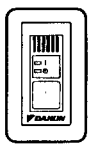


- Each pressing of the button advances the mode setting in sequence.

<CDK> → → → →

<CDX> → → → → →

2 Press ⏻ ON/OFF .



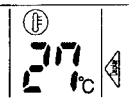
Then OPERATION lamp lights up.

■ To stop:

Press ⏻ ON/OFF once again.

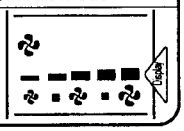
Then OPERATION lamp goes off.

■ To change the temperature setting:

DRY or FAN mode	HEAT or COOL mode
The temperature setting is not variable.	Press △ UP to raise the temperature and press ▽ DOWN to lower the temperature.
	Set to the temperature you like. 

■ To change the air flow rate setting:

Press FAN .

DRY mode	HEAT or COOL or FAN mode
The air flow rate setting is not variable.	Five levels of air flow rate setting from "▁" to "▇" plus "🌀 A" are available. 

- At smaller air flow rates, the cooling or heating effect is also smaller.

NOTE

<Note on HEAT mode operation>

Since this air conditioner heats the room by taking heat from outdoor air to indoors, the heating capacity becomes smaller in lower outdoor temperatures. If the heating effect is insufficient, it is recommended to use another heating appliance in combination with the air conditioner.

The heat pump system heats the room by circulating hot air around all parts of the room. After the start of heating operation, it takes some time before the room gets warmer.

In heating operation, frost may occur on the outdoor unit and lower the heating capacity. In that case, the system switches into defrosting operation to take away the frost. During defrosting operation, hot air does not flow out of indoor unit.

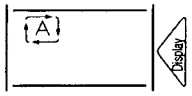
<Note on DRY mode operation>

This operation dehumidifies the indoor air when it is humid.

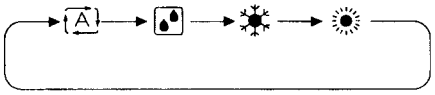
(4) AUTO Mode Operation

In AUTO mode, the air conditioner automatically selects the most appropriate settings. (CDX only)

1 Press MODE and select "A".



- Each pressing of the button advances the mode setting in sequence.



2 Press ⏻ ON/OFF .

Then OPERATION lamp lights up.

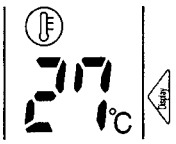
■ To stop:

Press ⏻ ON/OFF once again.

Then OPERATION lamp goes off.

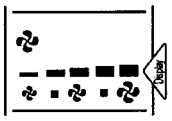
■ To change the temperature setting:

Press △ UP to raise the temperature and press ▽ DOWN to lower the temperature.

Set to the temperature you like. 

■ To change the air flow rate setting:

Five levels of air flow rate setting from "▁" to "▇" plus "🌀 A" are available.



NOTE

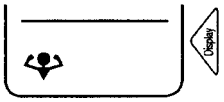
- In AUTO operation, the system selects a temperature setting and an appropriate mode (COOL or HEAT) based on the room temperature at the start of the operation.
- The system automatically reselects settings at a regular interval to bring the room temperature to user-setting level.
- If you do not like AUTO operation, you can select manually the mode and settings you like.

(5) Powerful Operation

POWERFUL operation quickly maximizes the cooling and heating effect in any operation mode. You can get the maximum capacity with a touch of a button.

- Pressing the (POWERFUL) button during operation starts POWERFUL operation.
- POWERFUL operation ends in 20 minutes. Then the system automatically operates again with the settings which were used before POWERFUL operation.

1 Press POWERFUL.



■ To cancel POWERFUL operation:

Press POWERFUL.

Notes on POWERFUL operation

- **In COOL and HEAT mode**
  To maximize the cooling and heating effect, the capacity of outdoor unit must be increased and the air flow rate be fixed to the maximum setting.
  The temperature and air flow settings are not variable.
- **In DRY mode**
  The temperature setting is lowered by 3°C and the air flow rate is slightly increased.
- **In FAN mode**
  The air flow rate is fixed to the maximum setting.

■ Note for Multi System

- **Precedence-room setting**
  When setting the preference-room during installation, the indoor unit's operation mode always takes priority.
  When the precedence-setting room unit is operated in POWERFUL mode, there are times that air conditioners in other rooms will temporarily stop in order to centralize power to the unit in the room.
  Please adjust the precedence-room setting to match your life style. Moreover, for precedence-room settings, please consult the service shop where you bought the unit.
- **COOL/HEAT mode**
  This mode is used to set the unit to only cool or heat. For information on using this mode, consult the service shop where you bought the unit.

NOTE

<Note for heat pump multi system>

When two or more indoor units have no precedence-room settings and are set to modes that differ from each other, the indoor unit which is operated first activates, while the other indoor unit does not activate and the OPERATION lamp blinks. (This is not a malfunction.)
An indoor unit that is not in operation will automatically start and operate in the mode in which a previously operated indoor unit was stopped. However, if the unit in operation provides only COOL and DRY modes, simultaneous operation is possible.

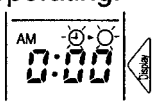
(6) Timer Operation

Timer functions are useful for automatically switching the air conditioner on or off at night or in the morning. You can also use OFF TIMER and ON TIMER in combination.

- Check that the clock is correct.
  If not, set the clock to the present time. (See page 48.)

OFF TIMER operation

1 Press OFF TIMER while the air conditioner is operating.

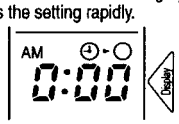


AM 0:00 is displayed.
🕘 blinks.

2 Press UP / DOWN until the time setting reaches the point you like.

- Every pressing of either button increases or decreases the time setting by ten minutes. Holding down either button changes the setting rapidly.

3 Press OFF TIMER once again.



Then the TIMER lamp lights up.

Notes on OFF TIMER

- When the OFF TIMER is set, the air conditioner automatically adjusts the temperature setting (0.5°C up in COOL, 2.0°C down in HEAT) to prevent excessive cooling for your pleasant sleep.

ON TIMER operation

1 Press ON TIMER while the air conditioner is not operating.

2 Press UP / DOWN until the time setting reaches the point you like.

- Every pressing of either button increases or decreases the time setting by ten minutes. Holding down either button changes the setting rapidly.

3 Press ON TIMER once again.

■ To cancel the timer:

Press CANCEL.

Then the TIMER lamp goes off.

Combining ON TIMER and OFF TIMER

- A sample setting for combining the two timers is shown below.

(Example)
Present time: 11:00 PM
(The unit operating)
OFF TIMER at 0:00 a.m.) Combined
ON TIMER at 7:00 a.m.)

Notes on ON,OFF TIMER

- When TIMER is set, the present time is not displayed.
- Once you set ON,OFF TIMER, the time setting is kept in the memory. (The memory is canceled when remote controller batteries are replaced.)

ATTENTION

■ In the following cases, set the timer again.
- After a breaker has turned OFF.
- After a power failure.
- After replacing batteries in the remote controller.

(7) Care and Cleaning

⚠ CAUTION

Before cleaning, be sure to stop the operation and turn the breaker OFF.

Cleaning the air filters

- There are models which are not equipped with the air filter inside of the unit.

(It is recommended to clean them every two weeks.)

1 Remove the air inlet grille.

2 Pull out the air filters.

3 Clean the air filters.

- Clean them with a vacuum cleaner.

4 Set the air filters and the air inlet grille as they were.

NOTE

- In a dusty environment, clean the air filters at least once in every two weeks.
- Operation with dusty air filters lowers the cooling and heating capacity and wastes energy.

Check

Check that the base, stand and other fittings of the outdoor unit are not decayed or corroded.

Check that nothing blocks the air inlets and the outlets of the indoor unit and the outdoor unit.

Check that the earth wire is not disconnected or broken.

Check that the drain comes smoothly out of the drain hose during COOL or DRY operation.

- If no drain water is seen, water may be leaking from the indoor unit. Stop operation and consult the service shop if this is the case.

Before a long idle period

1 Operate the fan alone for several hours on a fine day to dry out the inside.

<CDK>

1 Press MODE and select "".

2 Press ⏻ ON/OFF .

<CDX>

1 Press MODE and select "".

2 Press △ UP and set the temperature to 32°C

3 Press ⏻ ON/OFF .

- Perform this operation when the room temperature is under 28°C.

2 Clean the air filters and set them again.

3 Take out batteries from the remote controller.

4 Turn OFF the breaker for the room air conditioner.

7. Service Diagnosis

7-1. Caution for Diagnosis

• Troubleshooting with the Operation lamp

The Operation lamp flashes when any of the following errors is detected.

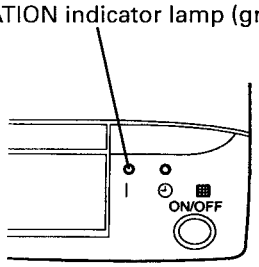
① When a protection device of the indoor or outdoor unit is activated or when the thermistor malfunctions, disabling equipment operation.

② When a signal transmission error occurs between the indoor and outdoor units.

In either case, conduct the diagnostic procedure described in the following pages.

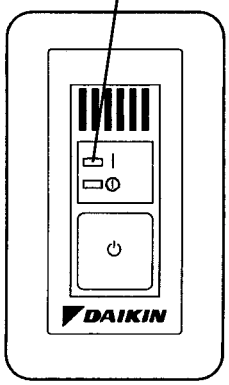
<Location of Operation Lamp>

OPERATION indicator lamp (green)



In case of
FTK25~60H Series
FTX25~60H Series

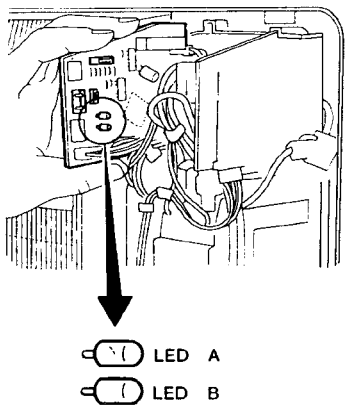
OPERATION indicator lamp



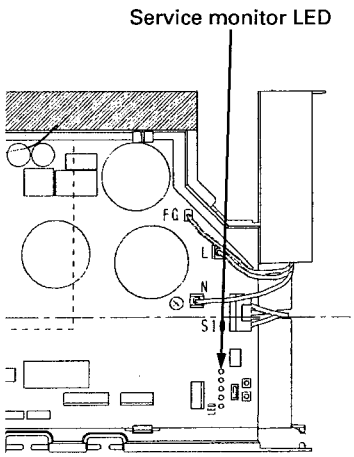
In case of
CDK25~60H Series
CDX25~60H Series

• Troubleshooting with the LED indication

Indoor unit
(for example,
FTK25~60H Sereis,
FTX25~60H Sereis)



Outdoor unit



① There are green and red LEDs on the PCB. The flashing green LED indicates normal equipment condition, and the OFF condition of the red LED indicates normal equipment condition.
(Troubleshooting with the green LED)
The outdoor unit is provided with one green LED, while the indoor unit has two. The LED of the outdoor unit and LED A of the indoor unit indicate microcomputer operation condition, while LED B of the indoor unit indicates signal transmission errors. If LED B on the indoor unit is OFF, be sure to check for wiring errors or breaking of wire in the connection wires first.
Even after the error is canceled and the equipment operates in normal condition, the LED indication remains.

7-2. Problem Symptoms and Measures

Problem symptom	Check item	Details of measure	Page No. to be referred
None of the units operates.	Check the power supply.	Check to make sure that the rated voltage is supplied.	——
	Check the type of the indoor units.	Check to make sure that the indoor unit type is compatible with the outdoor unit.	——
	Check the outside air temperature.	Heating operation cannot be used when the outside temperature is 30°C or higher (only for heat pump model), and cooling operation cannot be used when the outside temperature is below 0°C.	——
	Diagnosis with indoor unit LED indication	——	——
	Diagnosis with outdoor unit LED indication	——	57
	Check the remote controller addresses.	Check to make sure that address settings for the remote controller and indoor unit are correct.	——
Operation sometimes stops.	Check the power supply.	A power failure of 2 to 10 cycles can stop air conditioner operation. (Operation lamp OFF)	——
	Check the outside air temperature.	Heating operation cannot be used when the outside temperature is 30°C or higher (only for feat pump model), and cooling operation cannot be used when the outside temperature is below 0°C.	——
	Diagnosis with indoor unit LED indication	——	——
	Diagnosis with outdoor unit LED indication	——	57
Some indoor units do not operate.	Check the type of the indoor units.	Check to make sure that the indoor unit type is compatible with the outdoor unit.	——
	Diagnosis with indoor unit LED indication	——	——
	Diagnosis with outdoor unit LED indication	——	57
Equipment operates but does not cool, or does not heat (only for heat pump model).	Check for wiring and piping errors in the indoor and outdoor units connection wires and pipes.	Conduct the wiring/piping error check described on the product diagnosis nameplate.	——
	Check for thermistor detection errors.	Check to make sure that the main unit's thermistor has not dismounted from the pipe holder.	——
	Check for faulty operation of the motorized valve.	Set the units to cooling operation, and compare the temperatures of the liquid side connection pipes of the connection section among rooms to check the opening and closing operation of the motorizes valves of the individual units.	——
	Diagnosis with indoor unit LED indication	——	——
	Diagnosis with outdoor unit LED indication	——	57
	Diagnosis by service port pressure and operating current	Check for insufficient gas.	91
Large operating noise and vibrations	Check the output voltage of the power transistor.	——	86
	Check the power transistor.	——	——
	Check the installation condition.	Check to make sure that the required spaces for installation (specified in the Technical Guide, etc.) are provided.	——

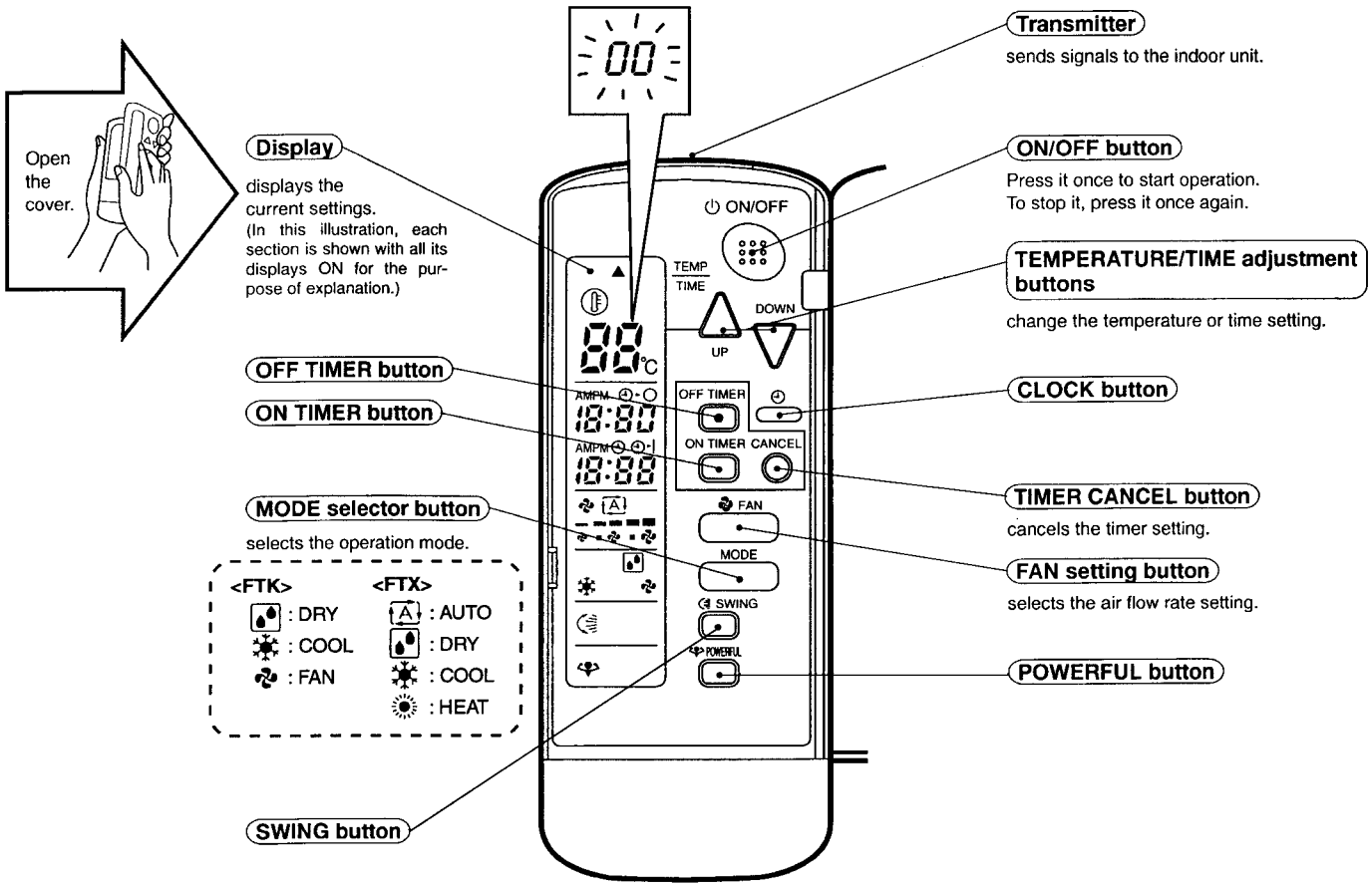
7-3. Service Check Function

ARC417 series

In the ARC417A series, the temperature display sections on the main unit indicate corresponding codes.

(1) When the timer cancel button is held down for 5 seconds, a "00" indication flashes on the temperature display section.

< Cover in open position >



(2) Press the timer cancel button repeatedly until a continuous beep is produced.

- The code indication changes in the sequence shown below, and notifies with a long beep.

No.	Code	No.	Code	No.	Code
①	00	⑪	C4	㉑	P4
②	E5	⑫	C5	㉒	LC
③	H8	⑬	E0	㉓	E7
④	U4	⑭	J3	㉔	U2
⑤	A6	⑮	C9	㉕	AJ
⑥	L4	⑯	J6	㉖	UF
⑦	E6	⑰	J9	㉗	A1
⑧	L5	⑱	U0	㉘	L3
⑨	A5	⑲	UA		
⑩	F3	⑳	H9		

< Notes >

1. A short beep and two consecutive beeps indicate non-corresponding codes.
2. To cancel the code display, hold the timer cancel button down for 5 seconds. The code display also cancels itself if the button is not pressed for 1 minute.

7-4. Code Indication on the Remote Controller

Error codes and description of fault

	Code indication	Description of problem
System	00	Normal
	U0	Insufficient gas
	U2	Power factor module abnormality
	U4	Signal transmission error (between indoor and outdoor units)
	U5	Signal transmission error (between indoor unit and remote controller)
Indoor unit	A3	Faulty drainage
	A5	Operation halt due to the freeze protection function or high pressure control
	A6	Fan motor or related abnormality
	C4 or C5	Heat exchanger temperature thermistor abnormality
	C9	Room temperature thermistor abnormality
	CA	Discharge air temperature thermistor abnormality
Outdoor unit	E5	OL activation (IT activation) or High discharge pipe temperature
	E6	Compressor startup error
	F3	Operation halt due to discharge pipe control funciton
	H8	CT or related abnormality
	H9	Outside air thermistor or related abnormality
	J3	Discharge pipe temperature thermistor or related abnormality
	J6	Heat exchanger temperature thermistor or related abnormality
	J9	Gas pipe temperature thermistor or related abnormality
	L4	Radiation fin temperature rise
	P3	Heat radiation fin thermistor or related abnormality
	P4	Heat radiation fin thermistor or related abnormality
	E0	Protectors Function

7-5. Troubleshooting

Indoor Units

Green : Flashes when in normal condition ☼: ON
Red : OFF in normal condition ●: OFF
— : Not used for troubleshooting ◑: Flashing
* : Varies depending on the cases.

Indoor unit LED indication		Indication on the remote controller	Description of the fault		Details of fault (Refer to the indicated page.)
Green					
A	B				
◑	◑	00 OR *	Indoor unit in normal condition (Conduct a diagnosis of the outdoor unit.)		—
◑	◑				
◑	◑	A5	Operation halt due to the freeze protection function or high pressure control (heat pump model only)		58
◑	◑				
◑	◑	A6	Faulty fan motor (AC motor stop)	AC motor	59
◑	◑				
◑	◑	C4 OR C5	Heat exchanger temperature thermistor or related abnormality		60
◑	◑				
◑	◑	C9	Suction thermistor or related abnormality		60
◑	◑	CA	Discharge thermistor or related abnormality		60
☼	*	*	Faulty indoor unit PCB		61
◑	☼				62
●	*	* OR U4	Faulty power supply or indoor unit PCB		63, 64
◑	●	U4	Signal transmission error (between indoor and outdoor units)		65
◑	●	U5	Signal transmission error (between indoor unit and remote controller)		66

Outdoor Units

Green : Flashes when in normal condition
Red : OFF in normal condition
— : Not used for troubleshooting
* : Varies depending on the cases.

☼: ON
●: OFF
◑: Flashing

Indoor unit LED indication					Indication on the remote controller	Description of the fault	Details of fault (Refer to the indicated page.)
Green	Red						
A	1	2	3	4			
◑	●	●	●	●	*	Outdoor unit in normal condition (Conduct a diagnosis of the indoor unit.)	—
◑	●	●	☼	☼	(U0)	Operation halt due to detection of insufficient gas.	67
◑	☼	●	☼	●	(E5)	Abnormal discharge pipe temperature.	68
						Operation halt due to IT activation.	69
◑	●	☼	☼	●	(E6)	Operation halt due to detection of compressor startup error.	70
◑	●	●	●	☼	—	Operation halt due to radiation fin temperature rise. (Protection of driver overheating)	72
◑	☼	☼	●	●	H8	Operation halt due to detection of CT abnormality.	73
◑	☼	☼	●	●	H9	Operation halt due to outside air thermistor abnormality.	75
					J3	Operation halt due to discharge pipe thermistor abnormality, or due to detection of disconnected discharge pipe thermistor.	74
					J6	Operation halt due to outdoor unit heat exchanger thermistor abnormality.	75
					J9	Operation halt due to gas pipe thermistor abnormality.	76
◑	●	●	☼	●	—	Operation halt due to detection of output overcurrent.	77
◑	●	☼	●	☼	—	Operation halt due to detection of input overcurrent.	78
◑	☼	●	☼	☼	—	Operation halt due to the freeze protection function.	79
◑	☼	●	☼	☼	—	Operation halt due to the freeze protection function or indoor unit icing protection.	80 (Conduct a diagnosis of the indoor unit.)
☼	*	*	*	*	*	Faulty outdoor unit PCB	83
●	*	*	*	*	*	Faulty outdoor unit PCB or signal transmitting/receiving circuit.	81, 82

Note 1: The indications in the parenthesis ( ) in the remote controller display column are displayed only when system-down occurs.
Note 2: When a sensor error occurs, check the remote controller display to determine which sensor is malfunctioning.
If the remote controller does not indicate the error type, conduct the following operation.
- Turn the power switch off and back on again. If the same LED indication appears again immediately after the power is turned on, the fault is in the thermistor.
- If the above condition does not result, the fault is in the CT.

Note 3: The indoor unit error indication may take the precedence in the remote controller display.

Remote controller indication	Indoor unit LED indication A	Indoor unit LED indication B	
A5	☼	☼	Operation halt due to the freeze protection function

1. Error detection method

The freeze protection control (operation halt) is activated during cooling operation according to the temperature detected by the indoor unit heat exchanger thermistor.

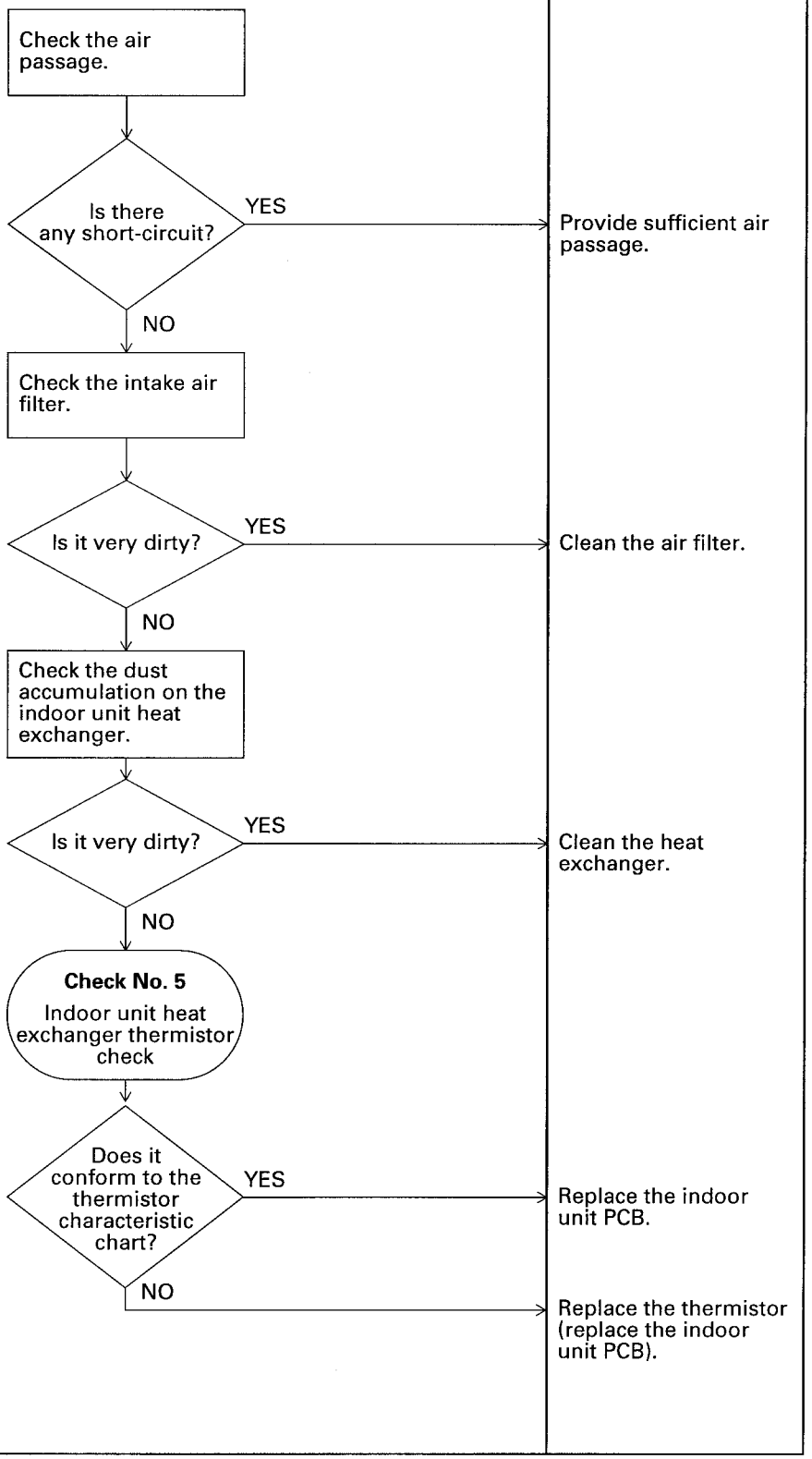
2. Error generating condition

Freeze protection
When the indoor unit heat exchanger temperature is below 0°C during cooling operation.

3. Possible causes

- Operation halt due to clogged air filter of the indoor unit.
- Operation halt due to dust accumulation on the indoor unit heat exchanger.
- Operation halt due to short-circuit.
- Detection error due to faulty indoor unit heat exchanger thermistor.
- Detection error due to faulty indoor unit PCB.

4. Troubleshooting



Remote controller indication	Indoor unit LED indication A	Indoor unit LED indication B	
A6	◑	◑	Operation halt due to fan motor (AC motor) or related abnormality.

1. Error detection method

The rotation speed detected by the hall IC during fan motor operation is used to determine abnormal fan motor operation.

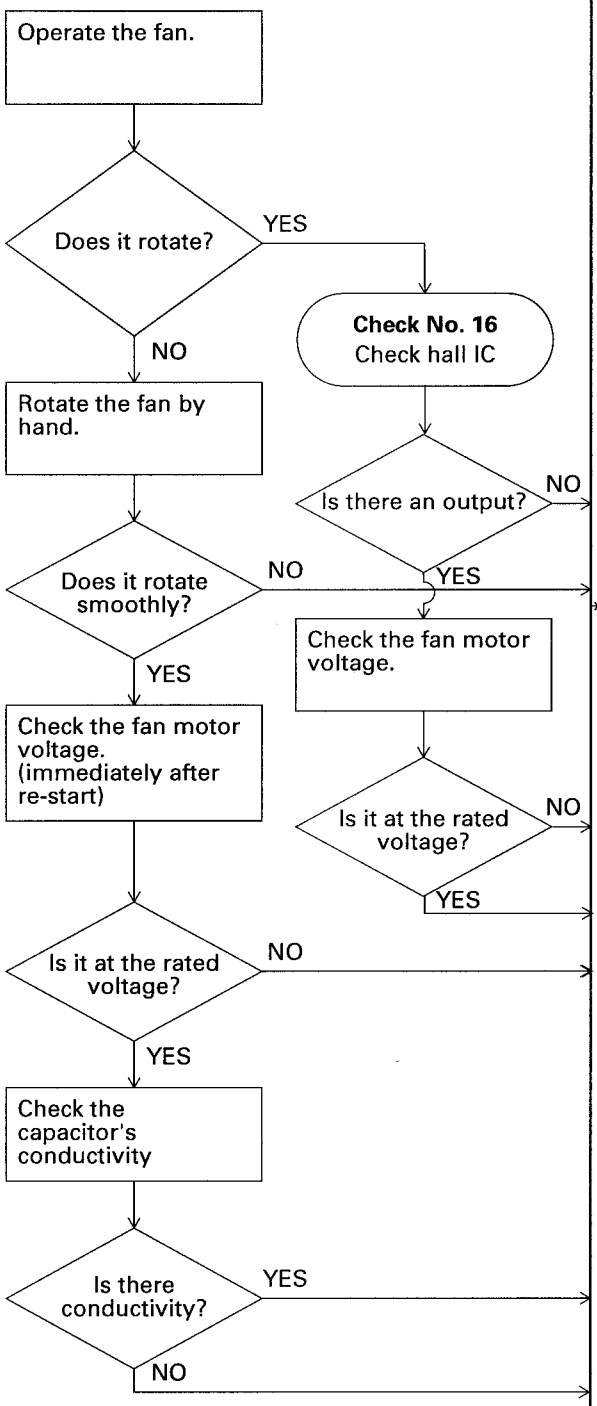
2. Error generating condition

When the detected rotation speed is less than 50% of the HH tap under maximum fan motor rotation demand.

3. Possible causes

- Operation halt due to short circuit inside the fan motor winding.
- Operation halt due to breaking of wire inside the fan motor.
- Operation halt due to breaking of the fan motor lead wires.
- Operation halt due to faulty capacitor of the fan motor.
- Detection error due to faulty indoor unit PCB (1).
- Detection error due to faulty indoor unit PCB (2).

4. Troubleshooting



Remote controller indication	Indoor unit LED indication		Operation halt due to detection of thermistor or related abnormality
	A	B	
C4, C5 C9, CA	◑	◑	

1. Error detection method

The temperatures detected by the thermistors are used to determine thermistor errors.

2. Error generating condition

When the thermistor input is more than 4.96 V or less than 0.04 V during compressor operation*.
* (reference)
When above about 212℃ (less than 120 ohms) or below about −50℃ (more than 1,860 kohms).
(Note) The values vary slightly in some models.

3. Possible causes

- Faulty connector connection
- Faulty thermistor
- Faulty PCB

4. Troubleshooting

Diagnosis	Measure
Check the connector connection.	
Is it normal? NO	Correct the connection.
YES	
Check No. 5 Thermistor resistance check	
Is it normal? NO	Replace the thermistor. (Replace the indoor unit PCB.)
YES	Replace the indoor unit PCB.

C4: Heat exchanger temperature thermistor
C5: Heat exchanger temperature thermistor
C9: Suction air thermistor

Remote controller indication	Indoor unit LED indication A	Indoor unit LED indication B	
*	☼	*	Faulty indoor unit PCB

1. Error detection method

The proper program operation of the microcomputer is checked by the program.

2. Error generating condition

When the microcomputer program does not function properly.

3. Possible causes

- Microcomputer program is in abnormal condition due to an external factor.
  - Noise.
  - Momentary voltage drop.
  - Momentary power failure, etc.
- Faulty indoor unit PCB.

4. Troubleshooting

Diagnosis	Measure
Turn on the power again.	
Does the same LED indication appear again? NO	Replace the outdoor unit PCB.
YES	
Check the grounding. (earth)	
Is the grounding proper? NO	Provide proper grounding.
YES	The malfunction may be caused by an external factor, rather than defective parts. Locate the cause of the noise, etc., and correct the situation.

Remote controller indication	Indoor unit LED indication A	Indoor unit LED indication B	Faulty indoor unit PCB
*	◑	☼	

1. Error detection method
The condition of the transmission circuit for indoor-outdoor signal transmission is detected.

2. Error generating condition
When the transmission circuit remains ON.

3. Possible causes
• Faulty indoor unit PCB

4. Troubleshooting	
Diagnosis	Measure
Replace the indoor unit PCB.	

Remote controller indication	Indoor unit LED indication A	Indoor unit LED indication B	
* or U4	●	*	Faulty power supply or indoor unit PCB

1. Error detection method

1) The proper program operation of the microcomputer is checked by the program.

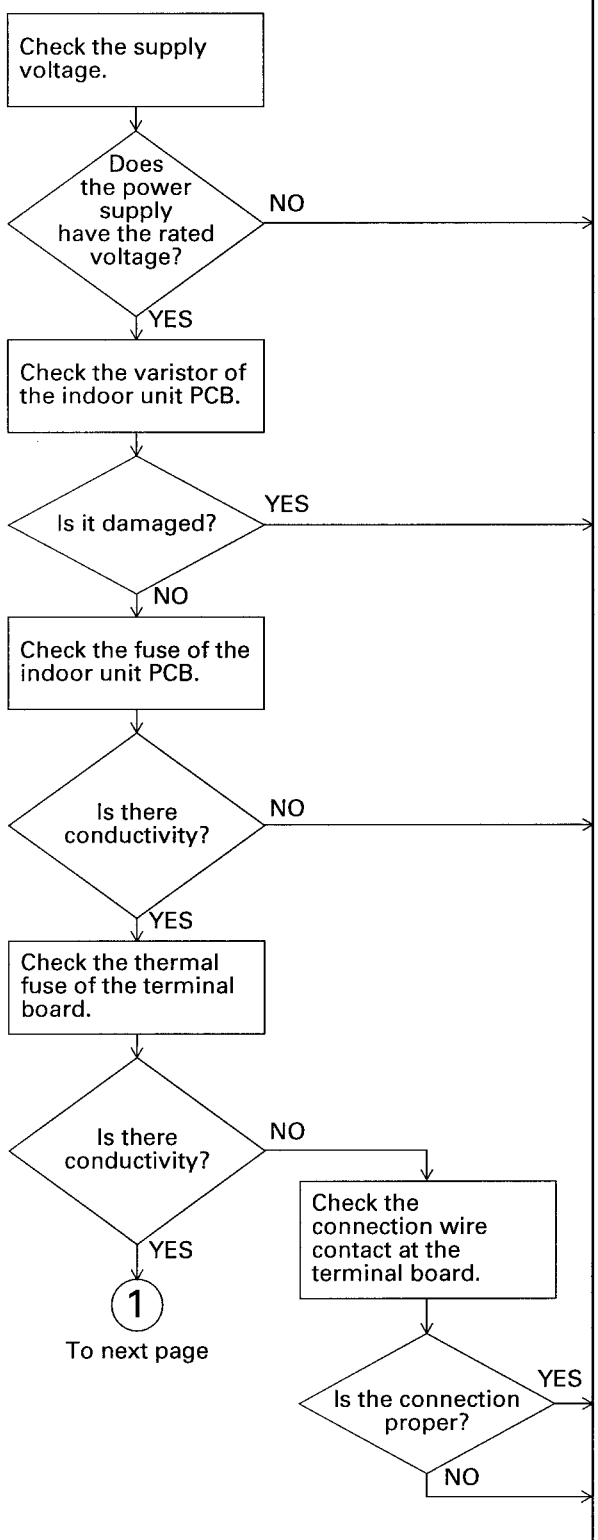
2. Error generating condition

When the microcomputer program does not function properly.

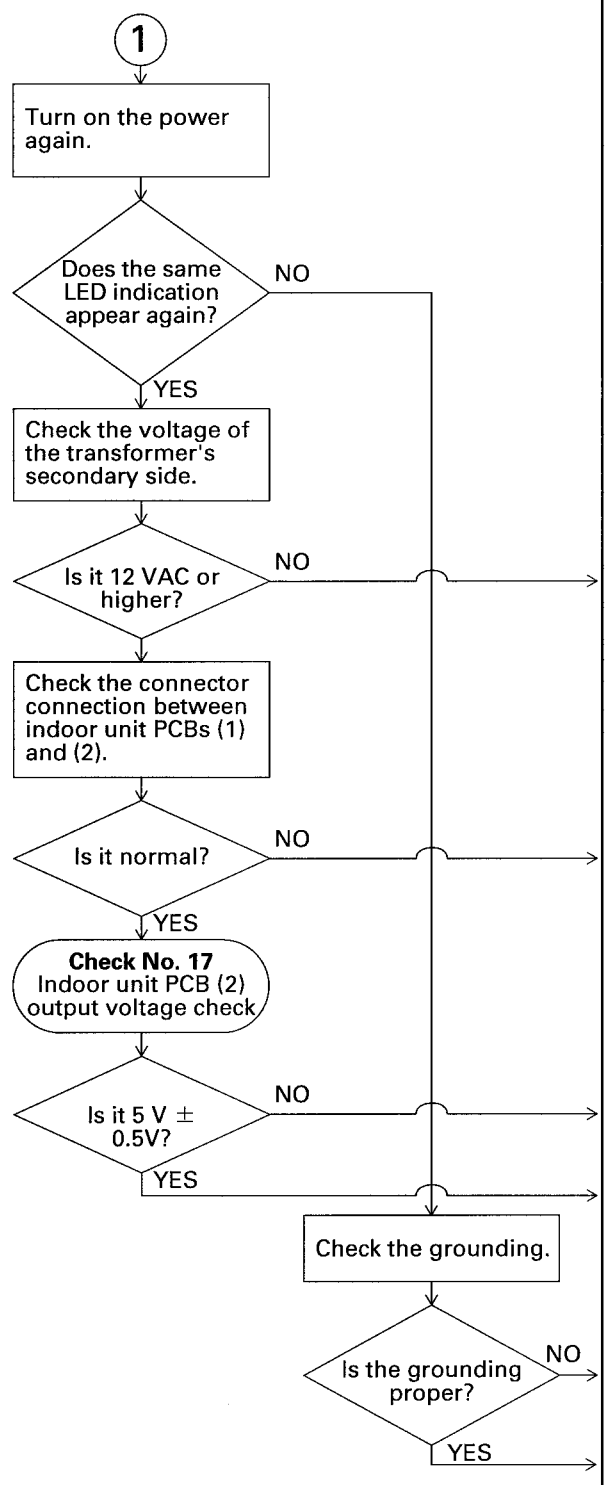
3. Possible causes

- Display disabled by fault power supply.
- Microcomputer program is in abnormal condition due to an external factor.
  - Noise.
  - Momentary voltage drop.
  - Momentary power failure, etc.
- Faulty indoor unit PCBs (1) and (2).

4. Troubleshooting



4. Troubleshooting



Remote controller indication	Indoor unit LED indication A	Indoor unit LED indication B	
U4	◑	●	Signal transmission error (between indoor and outdoor units)

1. Error detection method

The data received from the outdoor unit in indoor unit-outdoor unit signal transmission is checked whether it is normal.

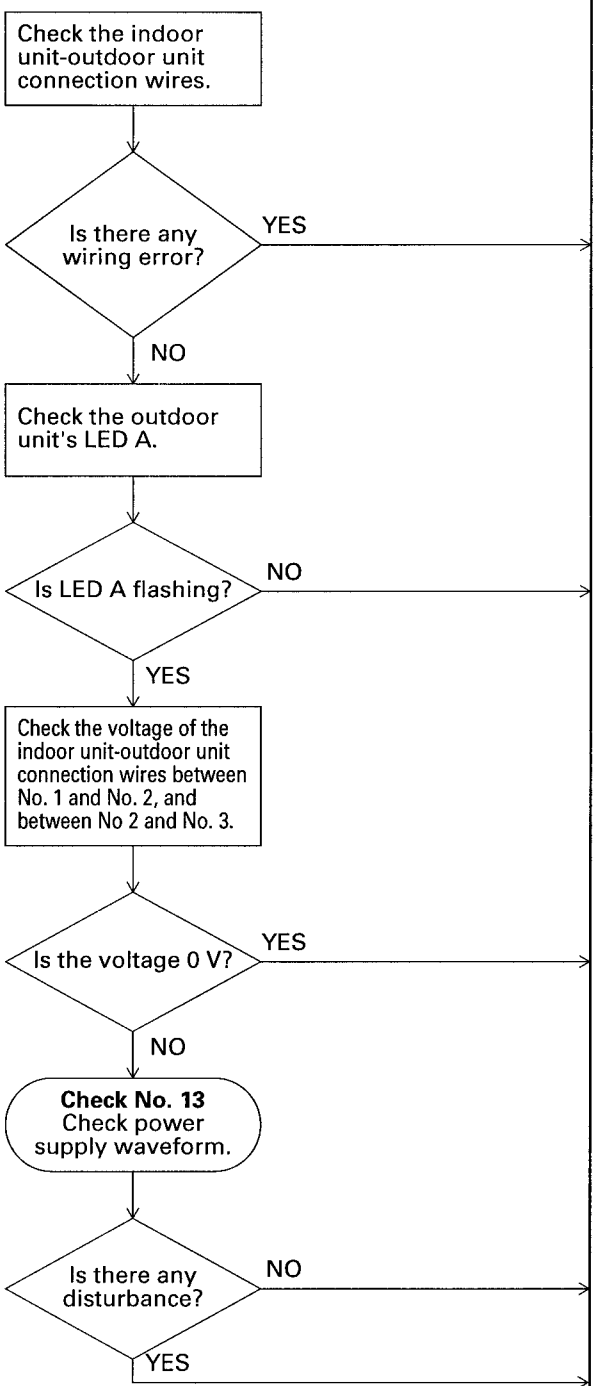
2. Error generating condition

When the data sent from the outdoor unit cannot be received normally, or when the content of the data is abnormal.

3. Possible causes

- Faulty outdoor unit PCB.
- Faulty indoor unit PCB.
- Indoor unit-outdoor unit signal transmission error due to wiring error.
- Indoor unit-outdoor unit signal transmission error due to disturbed power supply waveform.
- Indoor unit-outdoor unit signal transmission error due to breaking of wire in the connection wires between the indoor and outdoor units (wire No. 2).

4. Troubleshooting



Remote controller indication	Indoor unit LED indication A	Indoor unit LED indication B	
U5	◑	●	Signal transmission error (between indoor unit and remote controller)

1. Error detection method

The data received from the indoor unit in indoor unit-remote controller signal transmission is checked whether it is normal.

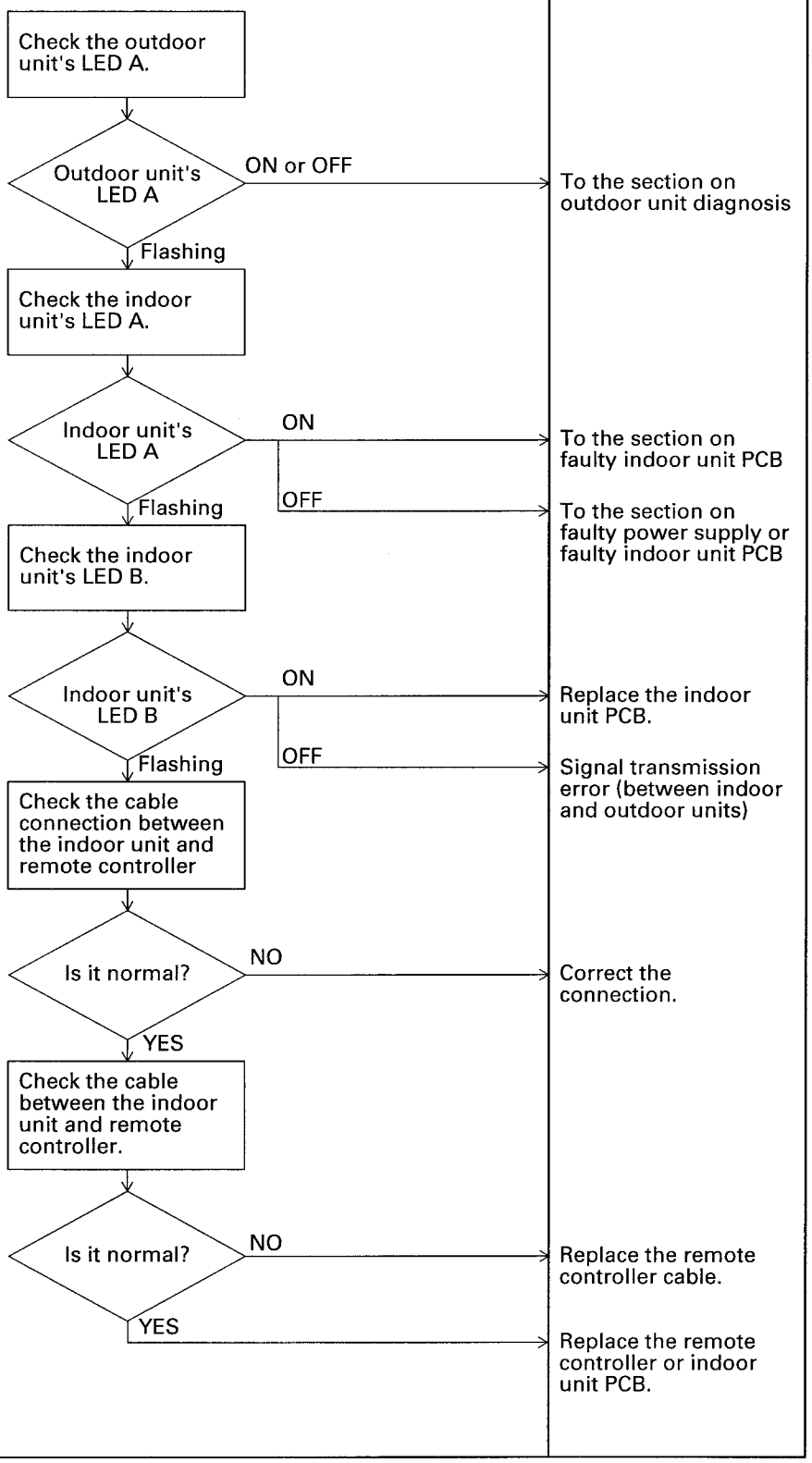
2. Error generating condition

When the data sent from the outdoor unit cannot be received normally, or when the content of the data is abnormal.

3. Possible causes

- Faulty outdoor unit PCB.
- Faulty indoor unit PCB.
- Faulty remote controller cable.
- Faulty remote controller.

4. Troubleshooting



Remote controller indication	Outdoor unit LED indication	Operation halt due to detection of insufficient gas
U0	A 1 2 3 4 ◑ ● ● ☼ ☼	

1. Error detection method

Detection method 1

Insufficient gas is checked by using the input current detected by the CT and compressor's operating frequency.

Detection method 2

Insufficient gas is detected by the discharge pipe temperature and electronic expansion valve opening.

2. Error generating condition

Detection method 1

Input current ≦
[A] in the below table × compressor's operating frequency + [B] in the below table
Only when the condition of; operating frequency > 55Hz remains for continuous 7 minutes.

Detection method 2

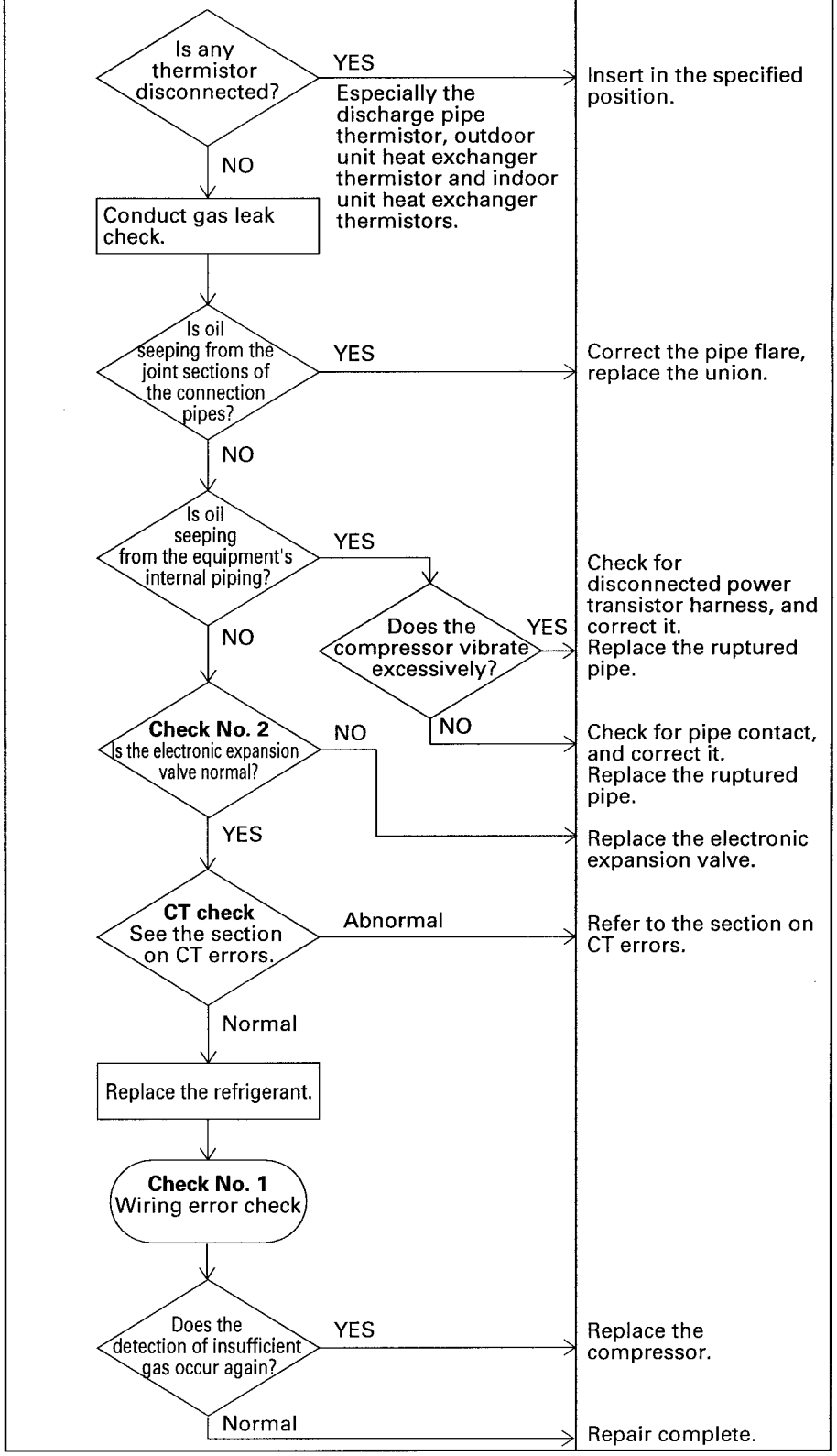
Discharge pipe temperature > target discharge pipe temperature + 20°C When the electronic expansion valve remains fully open (450 pulse) for 80 seconds
(Note) The target discharge pipe temperature is calculated by the microcomputer.

A	B
0.09	−3.5

3. Possible causes

- Insufficient gas due to refrigerant leaks.
- Faulty gas sensor for insufficient gas detection.
- Input current drop due to inadequate compression of the compressor.
- Disconnected thermistor (all thermistors).
- Faulty CT.
- Disconnected or faulty electronic expansion valve.
- Wiring or piping error.

4. Troubleshooting



Remote controller indication	Outdoor unit LED indication	Operation halt due to IT activation
E5	A 1 2 3 4 ◑ ☼ ● ☼ ●	

1. Error detection method

IT activation is detected using the condition of the IT contact (open).

2. Error generating condition

When the IT activation (open) input is sent from the IT detection circuit to the microcomputer.

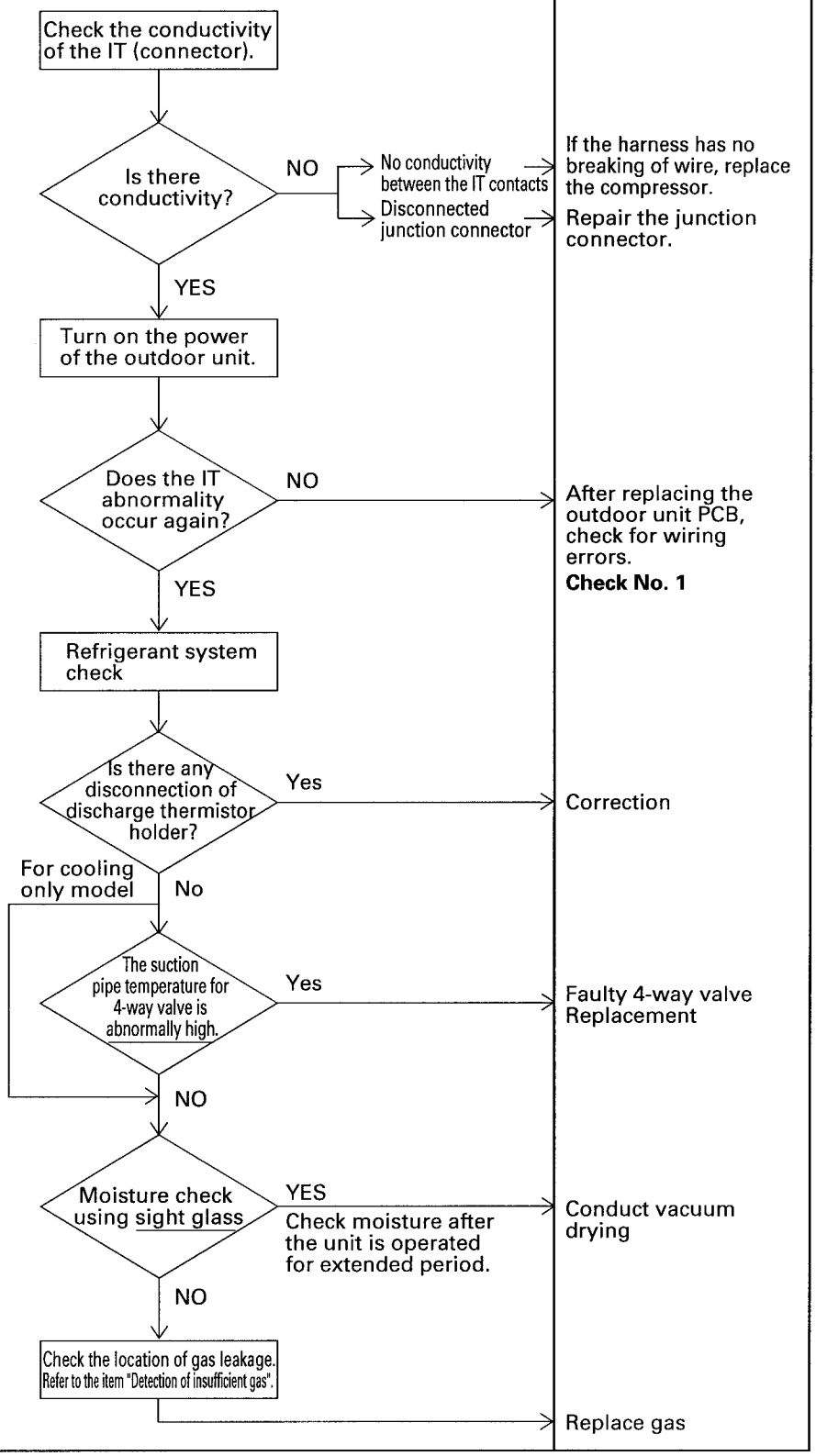
- When IT activation is detected twice, the system shuts down. (The 2-time counter resets itself when no outdoor unit abnormality occurs within 60 minutes of compressor operation (cumulative time) after the error generation.)

  IT setting: 145°C OPEN
  : 100°C CLOSE

3. Possible causes

- IT activation due to insufficient refrigerant.
- IT activation due to disconnected thermistor.
- IT activation due to faulty 4-way valve.
- Detection error due to faulty IT (open).
- Detection error due to breaking of wire the IT harness.
- Detection error due to faulty PCB (1).
- IT activation due to mixing of moisture in the pipes.

4. Troubleshooting



Remote controller indication	Outdoor unit LED indication	Discharge pipe temperature error
E5	A 1 2 3 4 ◑ ☼ ● ☼ ●	

1. Error detection method

The discharge pipe temperature detected by the discharge pipe thermistor is used for detection.

2. Error generating condition

When an operation halt due to discharge pipe temperature error is confirmed 6 times, the system shuts down.
(The 6-time counter resets itself when no outdoor unit abnormality occurs within 60 minutes of compressor operation (cumulative time) after the error generation.)
Operation halt due to discharge pipe temperature error
Setting: 125℃
Reset: 110℃

3. Possible causes

- IT activation due to insufficient refrigerant.
- IT activation due to disconnected thermistor.
- IT activation due to faulty 4-way valve.
- Detection error due to faulty IT (open).
- Detection error due to breaking of wire the IT harness.
- Detection error due to faulty PCB (1).
- IT activation due to mixing of water in the pipes.
- Clogged air filter.
- Faulty DE thermistor.

4. Troubleshooting

Diagnosis	Measure
Check the thermistor	
Is the DO detection temperature correct? — NO	Replace the thermistor.
YES	
Check for gas leaks.	
Are HP and LP normal? — NO	
YES	
Is oil seeping at the joint sections of the equipment's internal pipes? — YES	Conduct repair, and replace the refrigerant.
NO	
Check No. 2 Is the electronic expansion valve normal? — NO	Replace the electronic expansion valve.
YES	
Check No. 14 Check refrigerant system	

- Insufficient refrigerant
- Discharge pipe thermistor disconnected from the holder
- Mixing of water

Remote controller indication	Outdoor unit LED indication	Operation halt due to compressor startup error
E6	A 1 2 3 4 ◑ ● ☼ ☼ ●	

1. Error detection method

Compressor startup errors are detected using the frequency of operation halts due to the detection of output over current and compressor's operation time.

(Until a compressor startup error is detected, the LED indication shows the error code for operation halt due to detection of output over current.)

2. Error generating condition

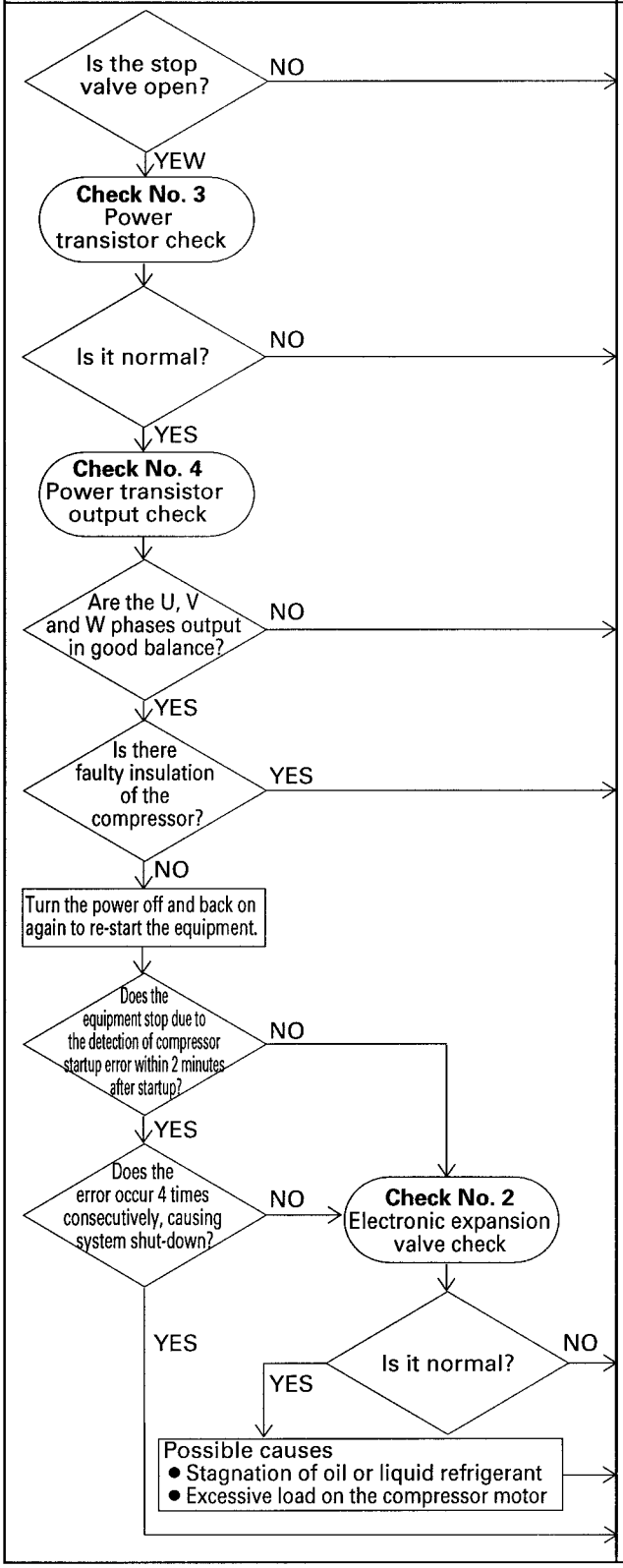
When the equipment operation stops 3 times consecutively due to the detection of output over current within 2 minutes after compressor startup.

- When a compressor startup error is generated 4 times consecutively, the system shuts down. (The 4-time counter resets itself when OL, radiation fin temperature rise, insufficient gas or compressor startup error does not occur within 60 minutes of compressor operation time (cumulative time) after the error generation.)

3. Possible causes

- Startup error due to faulty compressor.
- Startup error due to faulty outdoor unit PCB.
- Startup error due to closed stop valve.
- Detection error due to faulty outdoor unit PCB.
- Startup error due to faulty electronic expansion valve.
- Oil or liquid refrigerant stagnation inside the compressor.

4. Troubleshooting



Remote controller indication	Outdoor unit LED indication	Operation halt due to discharge pipe temperature rise
F3	A 1 2 3 4 ◑ ☼ ● ☼ ●	

1. Error detection method

The discharge pipe temperature detected by the discharge pipe thermistor is used for detection of insufficient gas.

2. Error generating condition

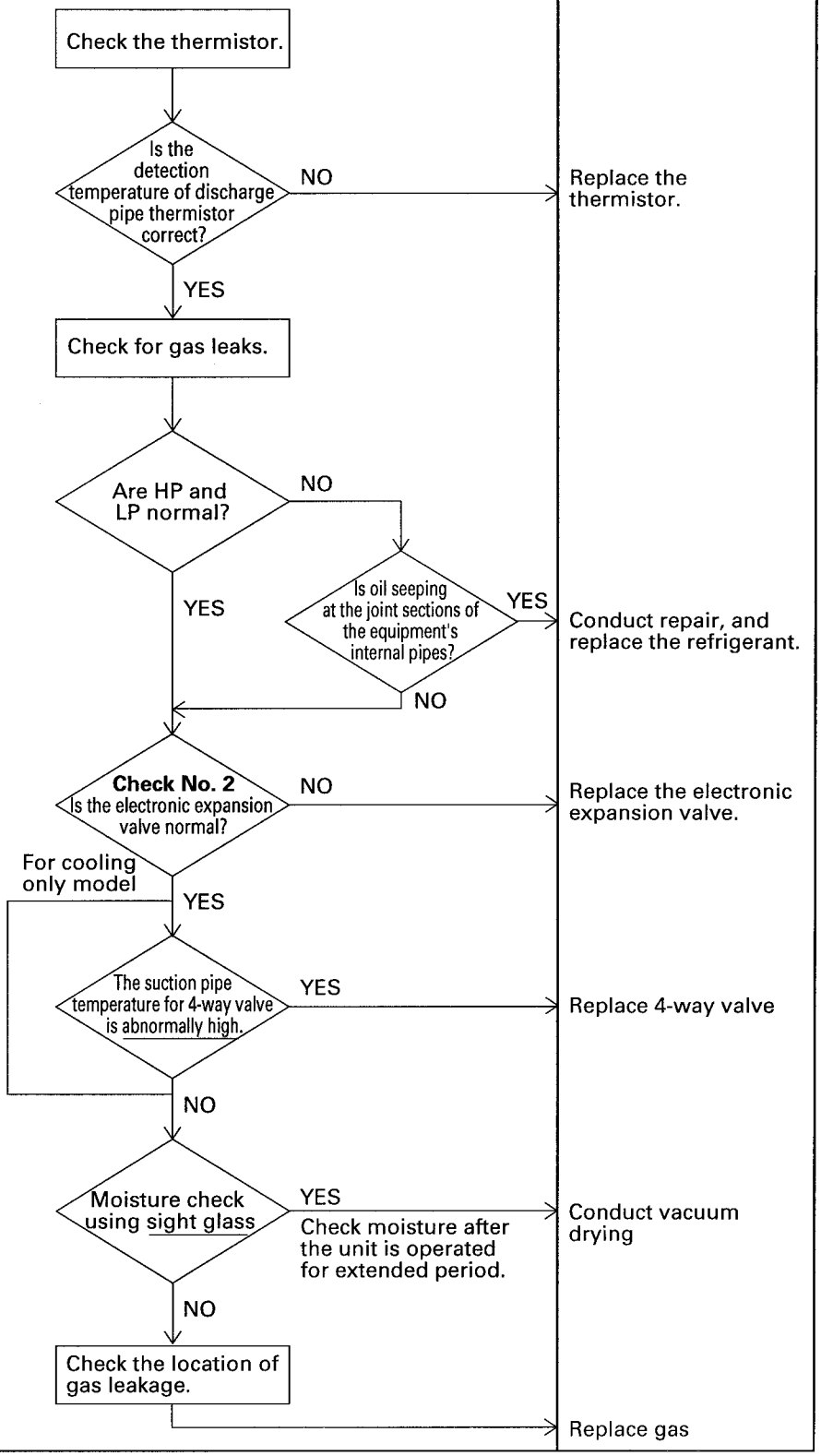
When an operation halt due to discharge pipe temperature error is confirmed 6 times, the system shuts down.
(The 6-time counter resets itself when no outdoor unit abnormality occurs within 60 minutes of compressor operation (cumulative time) after the error generation.)

Operation halt due to discharge pipe temperature error
Setting: 125°C
Reset: 110°C

3. Possible causes

- IT activation due to insufficient refrigerant.
- Activation due to disconnected thermistor.
- Activation due to faulty 4-way valve.
- Detection error due to faulty PCB.
- Activation due to mixing of moisture in the pipes installed at site.
- Clogged air filter.

4. Troubleshooting



Remote controller indication	Outdoor unit LED indication	Operation halt due to radiation fin temperature rise (Protection of driver overheat)
—	A 1 2 3 4 	

1. Error detection method

Radiation fin temperature rise is detected using the temperature of the radiation fins detected by the fin thermistor during compressor operation.

2. Error generating condition

When the radiation fin temperature is as below mentioned value during compressor operation.

Judgment temperature

Model	Operation halt temperature	Reset temperature
80 and 90 series	150°C	130°C

3. Possible causes

- Fin temperature rise due to faulty outdoor unit fan.
- Fin temperature rise due to short-circuit.
- Detection error due to faulty outdoor unit PCB.

4. Troubleshooting

Diagnosis	Measure
Turn the power off and on again to restart.	
Does the error indication appear again?	
YES	
Check the outdoor unit fan rotation.	
YES	
Fan is rotating correctly	
NO	
Check the characteristic of thermistors (R2T, R3T)	
Normal	
NO	Replace the thermistor.
YES	Replace the outdoor unit fan motor or the outdoor unit PCB.
YES	
Check the outdoor unit installation.	
There is no fin-temperature rise due to short -circuit.	
NO	Correct the installation of outdoor unit.
YES	
Check the installation of power transistor.	
It is installed correctly	
NO	Correct the installation of power transistor.
YES	Replace the outdoor unit PCB.

Remote controller indication	Outdoor unit LED indication	Operation halt due to detection of CT error
H8	A 1 2 3 4 	

1. Error detection method

CT errors are detected using the compressor's operating frequency and the input current detected by the CT.

2. Error generating condition

When the compressor's operating frequency is 55 Hz or more and the CT input is1.25 A or less. (Refer to the following table.)

- When a CT error is generated 4 times, the system shuts down. (The 4-time counter resets itself when no outdoor unit abnormality occurs within 60 minutes (cumulative time) after the error generation.)

3. Possible causes

- Incorrect connectors connection
- Faulty thermistor
- Faulty power transistor
- Breaking of wire or faulty connection of internal wiring
- Faulty reactor
- Faulty PCB

4. Troubleshooting

Diagnosis	Measure
Turn the power on again to re-start the equipment.	
Check No. 7 Input current measurement	
Is the current less than 1.25A? — NO	After replacing the outdoor unit PCB, check for wiring errors. **Check No. 1**
YES	
Check No. 8 Internal wiring check (1)	
Is it normal? — NO	Correct the internal wiring.
YES	
Check the conductivity of the compressor coil.	
Is it normal? — NO	Replace the compressor.
YES	After replacing the PCB, check for wiring errors. **Check No. 1**

Remote controller indication	Outdoor unit LED indication	Operation halt due to thermistor error or disconnection detection
J3	A 1 2 3 4 ◑ ☼ ☼ ● ●	

1. Error detection method

Thermistor errors are detected using the temperatures detected by the thermistors.

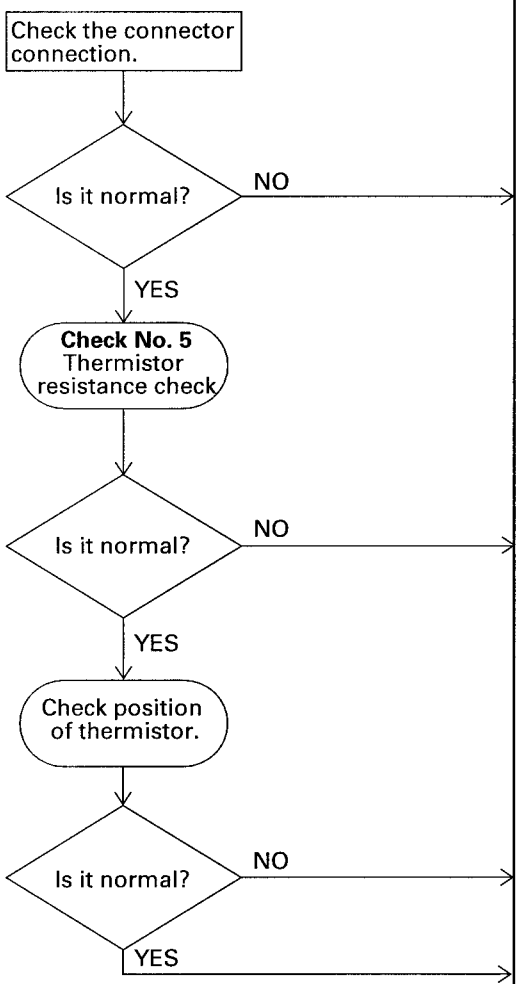
2. Error generating condition

When the thermistor input during compressor operation is more than 4.96 V or less than 0.04 V*.
* (reference)
Discharge pipe thermistor:
When higher than about 323°C (less than 26Ω), or lower than about −30°C (more than 409 kΩ).
Other thermistors:
When higher than about 212°C (less than 120Ω), or lower than about −50°C (more than 1,860 kΩ).
(Note) The values vary slightly in some models.

3. Possible causes

- Faulty connector connection
- Faulty thermistor
- Faulty PCB

4. Troubleshooting



Remote controller indication	Outdoor unit LED indication	Operation halt due to thermistor error
J6, H9	A 1 2 3 4 	

1. Error detection method

Thermistor errors are detected using the temperatures detected by the thermistors.

2. Error generating condition

When thermistor input terminal are opened or short circuited.

3. Possible causes

- Faulty connector connection
- Faulty thermistor
- Faulty PCB

4. Troubleshooting

Diagnosis	Measure
Check the connector connection.	
Is it normal? — NO	Correct wiring.
YES → **Check No. 5** Thermistor resistance check	
Is it normal? — NO	Replace thermistor.
YES	After replacing the outdoor unit PCB, check for wiring errors. **Check No. 1**

J6: Default thermistor (only for heat pump model)
H9: Outside air thermistor

Remote controller indication	Outdoor unit LED indication	Operation halt due to gas pipe thermistor error
J9	A 1 2 3 4 ◑ ☼ ☼ ● ●	

1. Error detection method

Thermistor errors are detected using the temperatures detected by the thermistors.

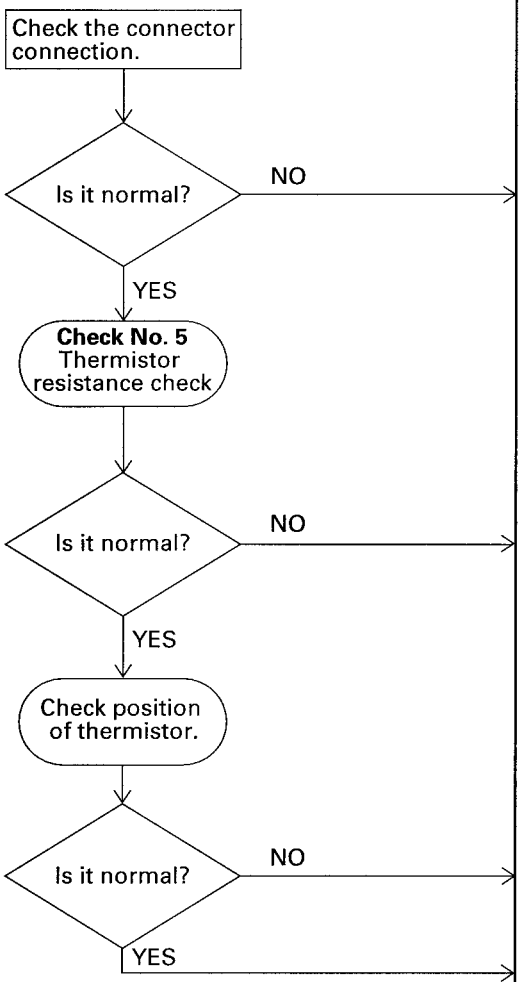
2. Error generating condition

When thermistor input terminal are opened or short circuited.
* Halt operation of the unit in which an thermistor error occurred. The system shuts down when the error is confirmed in all of the units.

3. Possible causes

- Faulty connector connection
- Faulty thermistor
- Faulty PCB

4. Troubleshooting



Remote controller indication	Outdoor unit LED indication A 1 2 3 4	Operation halt due to detection of output over current
—	◑ ● ● ☼ ●	

1. Error detection method

Output over current is detected using the current flowing in the shunt resistance.

2. Error generating condition

When the output over current detection circuit sends an output over current signal to the microcomputer.

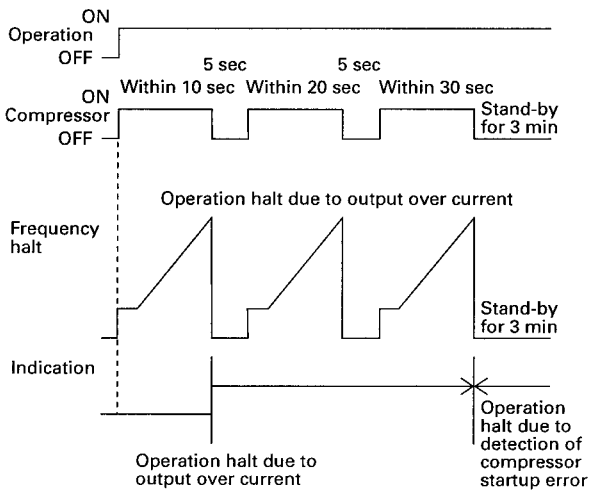
3. Possible causes

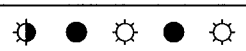
- Over current due to faulty power transistor
- Over current due to faulty internal wiring
- Over current due to faulty power supply voltage
- Over current due to faulty PCB
- Detection error due to faulty PCB
- Over current due to closing of the stop valve
- Over current due to faulty compressor
- Over current due to faulty installation condition
- Oil or liquid refrigerant stagnation inside the compressor

4. Troubleshooting

Diagnosis	Measure
* Internal wiring errors can cause an output over current. If the equipment stops due to an output over current after the wires are disconnected and connected again for parts replacement, etc., check for wiring errors.	
Is the stop valve fully open? — NO	Open the stop valve fully.
YES → Turn the power off and back on again to re-start the equipment, and check to see if the error occurs again.	
Does the error occur again within 2 minutes after starting? — NO	Since system shut-down does not occur, leave the equipment as it is.
YES → Wait for 2 or 3 minutes.	
The indication changed into compressor startup error. — NO	Check the connectors of electrical components.
YES → Carry out the diagnosis of "Operation halt due to compressor startup error".	Since this phenomenon is a characteristic of the horizontal scroll compressor, leave the equipment as it is.
Conduct long-term monitoring of the power supply voltage, discharge/suction pressures, etc. Possible causes ● Momentary power supply voltage drop ● Excessively large load on the compressor motor ● Short-circuit in the electrical circuit due to contact, etc. ● Oil or liquid refrigerant stagnation inside the compressor.	

*1 Indication of output over current detection of compressor startup, and detection of compressor startup error



Remote controller indication	Outdoor unit LED indication	Operation halt due to detection of input over current
—	A 1 2 3 4 	

1. Error detection method

Input over current is checked using the input current detected by the CT during compressor operation.

2. Error generating condition

When the CT input remains above the value shown in the below table for 2.5 seconds during compressor operation.

Table for constant

Model	Input current (A)
80 and 90 series	20.0/20.0

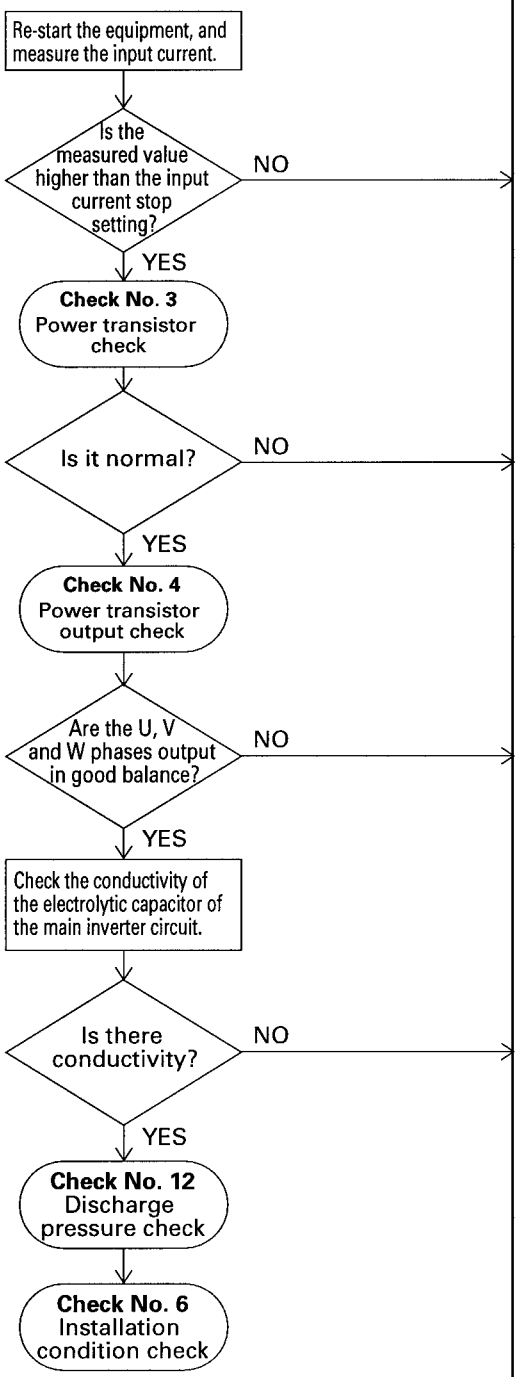
Cooling/Heating

3. Possible causes

- Over current due to faulty compressor.
- Over current due to faulty power transistor.
- Over current due to faulty electrolytic capacitor of the main inverter circuit.
- Over current due to faulty PCB (1).
- Detection error due to faulty PCB (1).
- Over current due to short-circuit.

4. Troubleshooting

Diagnosis	Measure
* Internal wiring errors can cause an input over current. If the equipment stops due to an input over current after the wires are disconnected and connected again for parts replacement, etc., check for wiring errors.	



Remote controller indication	Outdoor unit LED indication A 1 2 3 4	Operation halt due to peak cut (only for heat pump model) or freeze proofing control
—	◑ ☼ ● ☼ ☼	

1. Error detection method

Peak cut (only for heat pump model)
The temperature detected by the indoor unit heat exchanger thermistor is used to control the peak cut function (only for stop) during heating operation.

Freeze proofing
The temperature detected by the indoor unit heat exchanger thermistor is used to control the freeze proofing function (stop, frequency drop, etc.) during cooling operation.

2. Error generating condition

Peak cut (only for heat pump model)
When the indoor unit heat exchanger temperature rises higher than about 67°C during heating operation, the peak cut function is activated and stop the operation. (in the case of single-room operation)
* If the units in other rooms are operating, the peak cut function does not stop those units (no error indication with LEDs).

Freeze proofing
When the indoor unit heat exchanger temperature falls below about 0°C during cooling operation, the freeze proofing function is activated and stops the operation.
* If the units in other rooms are operating, the freeze proofing function does not stop those units (no error indication with LEDs).

3. Possible causes

- Operation halt due to wiring or piping error.
- Operation halt due to dirty air filter of the indoor unit.
- Operation halt due to faulty Ev operation in the rooms.
- Detection error due to faulty indoor unit heat exchanger thermistor.
- Operation halt due to insufficient gas (gas leakage).
- Operation halt due to faulty indoor fan motor.

4. Troubleshooting

Diagnosis	Measure
Check the wiring and piping connections.	
Is there any error? — YES	Wiring error check **Check No. 1**
NO	
Check the dirtiness of the suction air filter of the indoor unit.	
Is it excessively dirty? — YES	Clean the air filter
NO	
Check No. 2 Electronic expansion valve check	
Is there any abnormality? — YES	Replace the faulty Ev/coil.
NO	
Check the indoor unit heat exchanger thermistor.	
Gas replacement after evacuation (for removal of moisture from the equipment).	
Is there any abnormality? — YES	Replace the indoor unit heat exchanger thermistor Vacuum drying
NO	After replacing the PCB, check for wiring errors. **Check No. 1**

Remote controller indication	Outdoor unit LED indication	Operation halt due to the deicing function
—	A 1 2 3 4 ◑ ☼ ● ☼ ☼	

1. Error detection method

The temperatures detected by the indoor unit heat exchanger thermistors and room temperature thermistors of non-operating units are used to detect the icing during cooling operation.

2. Error generating condition

When the following (A) and (B) temperature conditions in the room with non-operating units simultaneously last for 5 minutes during cooling operation.
(A) Indoor unit heat exchanger temperature ≦ −1°C
(B) Indoor unit heat exchanger temperature ≦ room temperature −10 degrees
- When the indoor unit icing protection function activates and stops operation 4 times consecutively, the system shuts down. (The 4-time counter resets itself when OL, radiation fin temperature rise, insufficient gas or compressor startup error does not occur during the compressor operation (cumulative time) after the error generation.)
  (Cumulative time 60 minutes)

3. Possible causes

- Operation halt due to wiring or piping error.
- Operation halt due to faulty Ev operation in the rooms.
- Operation halt due to short-circuit.
- Detection error due to faulty indoor unit heat exchanger thermistor.
- Detection error due to faulty indoor unit thermistor.

4. Troubleshooting

Diagnosis	Measure
Check the wiring and piping connections.	
Is there any error? — YES	Wiring error check **Check No. 1**
NO	
Check No. 2 Electronic expansion valve check	
Is there any error? — YES	Replace faulty Ev/coil.
NO	
Check the indoor unit heat exchanger thermistor.	
Check the room temperature thermistor.	
Low	
Gas replacement after evacuation (for removal of moisture from the equipment).	
Is there any error? — YES	Replace the room temperature thermistor. Replace the indoor unit heat exchanger thermistor. Vacuum drying
NO	After replacing the indoor unit PCB, check for wiring errors. **Check No. 1**

Remote controller indication	Outdoor unit LED indication					Faulty outdoor unit PCB and transmitting/receiving circuit
	A	1	2	3	4	
✻	●	✻	✻	✻	✻	

1. Error detection method

① The proper program operation of the microcomputer is checked by the program.
② Signals transmitted from the outdoor unit to the indoor unit are received by the outdoor unit itself in indoor unit -outdoor unit signal transmission mode, and proper receiving of the signals by the indoor unit is checked.

2. Error generating condition

① When the microcomputer program does not function properly.
② When the signals transmitted from the outdoor unit to the indoor unit are received by the outdoor unit itself in indoor unit-outdoor unit signal transmission mode, but not properly.

3. Possible causes

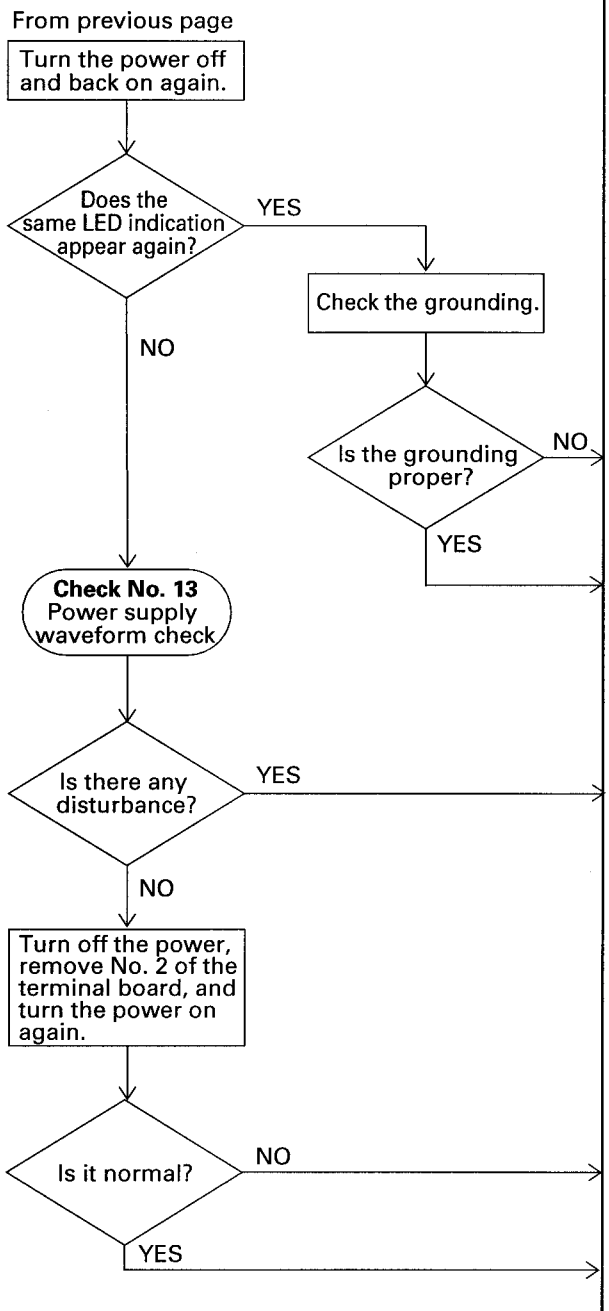
- Display disabled by faulty power supply.
- Faulty signal transmitting/receiving circuit of the outdoor unit PCB.
- Microcomputer program run-away due to an external factor.
  - Noise
  - Momentary voltage drop
  - Momentary power failure, etc.
- Faulty outdoor unit PCB.

4. Troubleshooting

Diagnosis	Measure
Check the power supply voltage.	
Is it at the rated voltage? NO	Correct the power supply.
YES	
Check the outdoor unit's 25A fuse.	
Is there conductivity? NO	Replace the fuse
YES	
Check the varistor of the outdoor unit PCB.	
Is it damaged? YES	Replace the varistor.
No	
Check the fuse on the outdoor unit PCB.	
Is there conductivity? NO	Replace the fuse.
YES	Check the voltage at the terminals marked with "5V" and "GND".
Check the 5-VDC power supply of the outdoor unit PCB.	
Is the voltage 5 ± 0.5 V? NO	After replacing the outdoor unit PCB, check for wiring errors. **Check No. 1**
YES	
Check the connection wires between the indoor and outdoor units.	
Is it normal? NO	Correct the interconnection wiring
YES	
To next page	

4. Troubleshooting

Diagnosis	Measure



Remote controller indication	Outdoor unit LED indication					Faulty outdoor unit PCB
	A	1	2	3	4	
✻	☼	✻	✻	✻	✻	

1. Error detection method

The proper program operation of the microcomputer is checked by the program.

2. Error generating condition

When the microcomputer program does not function properly.

3. Possible causes

- Microcomputer program run-away due to an external factor.
  - Noise
  - Momentary voltage drop
  - Momentary power failure, etc.
- Faulty outdoor unit PCB.

4. Troubleshooting

Diagnosis	Measure
Turn on the power again.	
Does the same LED indication appear again? — YES	After replacing the outdoor unit PCB, check for wiring errors. **Check No. 1**
Does the same LED indication appear again? — NO	
Check the grounding.	
Is the grounding proper? — NO	Provide proper grounding.
Is the grounding proper? — YES	The malfunction may be caused by an external factor, rather than defective parts. Locate the cause of the noise, etc., and correct the situation.

Check No.1 Wiring error check

This product is equipped with an automatic wiring correction.
Press the Wiring Correct switch <SW3> on the PCB of the outdoor unit.
Note that this switch does not function under the following conditions.

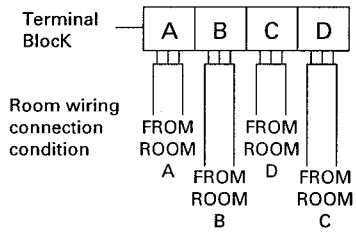
- The first minute after the power was turned on.
- When outdoor temperature is 5°C or less.
- When an indoor unit is in operation (turn off all indoor units).

When the Wiring Correct switch is pressed, inter-unit wiring is corrected within 15 to 20 minutes.
Service monitor LED indicates in the table below whether correction is possible or not. See the diagram on the right for the indication.

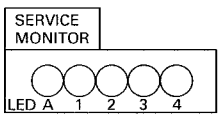
LED	1	2	3	4	Message
Status	All flashing				Automatic correction impossible
	Flashing One after another				Automatic correction completed
	☼ (One or more of LEDs 1 to 4 are ON)				Abnormal stop (Note 2)

Note 1) After the wiring correction is complete, LEDs continue to indicate until normal operation or forced operation is started. This is not malfunction.
Note 2) See the Service Guide for information.

Wiring Correct Example



LED lighting sequence after a wiring correction



Order of LED flaching: 1, 2, 4, 3

Check No.2 Electronic expansion valve check

Conduct the followings to check the electronic expansion valve (EV).

① Check to see if the EV connector is correctly inserted in the PCB. Compare the EV unit and the connector number.

② Turn the power off and back on again, and check to see if all the EVs generate latching sound.

③ If any of the EVs does not generate latching noise in the above step ②, disconnect that connector and check the conductivity using a tester.

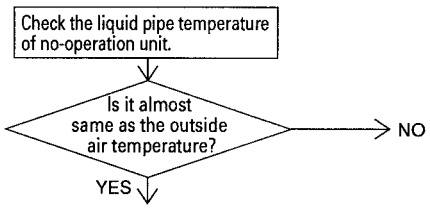
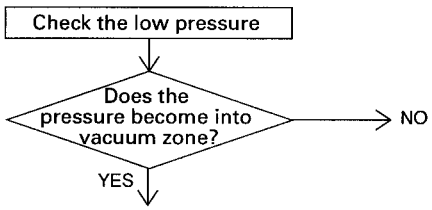
Check the conductivity between pins 1, 3 and 6, and between pins 2, 4 and 5. If there is no conductivity between the pins, the EV coil is faulty.

④ If no EV generates latching sound in the above step ②, the outdoor unit PCB is faulty.

⑤ If the conductivity is confirmed in the above step ②, mount a good coil (which generated latching sound) in the EV unit that did not generate latching sound, and check to see if that EV generates latching sound.

- If latching sound is generated, the outdoor unit PCB is faulty.
- If latching sound is not generated, the EV unit is faulty.

(Note) Please note that the latching sound varies depending on the valve type.

Valve body condition (symptom)	Check method/Measure
(1) Valve body catches at fully opened or half opened position. (Symptom) Cooling: Water leakage at the no-operation unit Flow noise of refrigerant in the no-operation unit Operation halt due to icing protection Heating: The unit does not heat (Only for heat pump model) Refrigerant flow rate vary by unit (Discharge air temperatures are different by room) Peak cut	Reset power supply and conduct cooling operation unit by unit.  Replace the EVn of the room.
(2) Valve body catches at complete close position. (Symptom) Cooling: • The only unit having problem does not cool the room . • When the only faulty unit is in operation, the unit makes pump down. (The low pressure of the unit becomes vacuum) • IT is activated. • Abnormal discharge pipe temperature Heating: Insufficient gas due to liquid refrigerant stagnation inside the faulty indoor unit (Only for heat pump model) • The unit does not heat the room. • IT is activated. • Abnormal discharge pipe temperature	Reset power supply and conduct cooling operation unit by unit.  Replace the EVn of the room
(3) Valve does not open fully. (Symptom) • The unit does not cool nor heat (only for heat pump model.) • IT is actuated. • Abnormal discharge pipe temperature	Check the number of rotation of shaft if it is 5 and half from full open to complete close using manual coil for electronic expansion valve. When the number of rotation of shaft is less than the above value, the valve may catch anywhere of the body. (Refer to the instruction "Using manual coil for electronic expansion valve")

Check No.3 Power transistor output check

Measure the output current and voltage of the power transistor.

(1)Output current measurement

Remove the front panel, and measure the current in the red, yellow and blue wire harness inside the compressor using a clamp meter.

① Attach the clamp meter to the red, yellow and blue wire harness, and conduct forced cooling operation.
② When the output frequency has stabilized, measure the output current of each phase.
③ If the current outputs of all the phase are balanced, it is normal.
④ If even one phase is out of balance, replace the outdoor unit PCB.
⑤ If the compressor stops before the output frequency stabilizes, measure the output voltage.

(2)Output voltage measurement

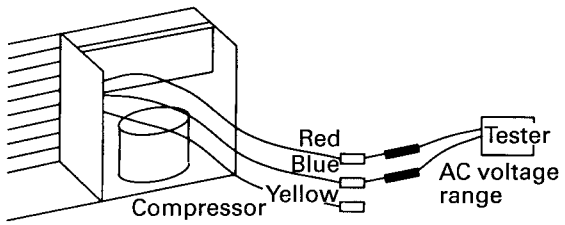
Remove the front panel, and disconnect the red, yellow and blue wire harness inside the compressor from the terminals. Measure the output voltage of the red, yellow and blue wires using a tester.

① Conduct forced cooling operation with the equipment in the condition shown in Fig.1.
② Measure the voltage between the operation start (when the outdoor unit fan starts rotating) to operation halt caused by an CT error (about 15 seconds).
③ Reset the power, and repeat steps (1) to (3) for each phase of U-V, V-W and W-U.
④ If the voltages of all the phases show results similar to the solid line in the graph shown in Fig.2, the outdoor PCB is normal.
⑤ If the voltage of even one phase deviates from the solid line shown in Fig.2, conduct the following test.

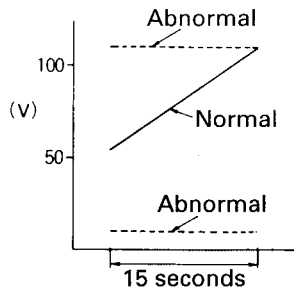
- Check the harness between the power transistor and compressor (check items: breaking of wire and wiring errors). If the harness is normal, replace the PCB.

[Fig.1] (Notes)

1. Do not touch the terminals of the red, yellow and blue wires when the power is supplied. (Touching them is very dangerous since a voltage of over 100V is applied.)
2. Do not short-circuit the terminals of the red, yellow, and blue wires.



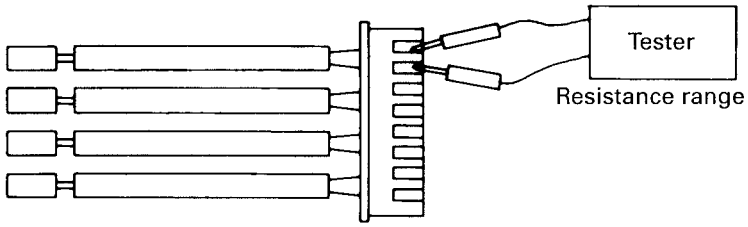
[Fig.2]



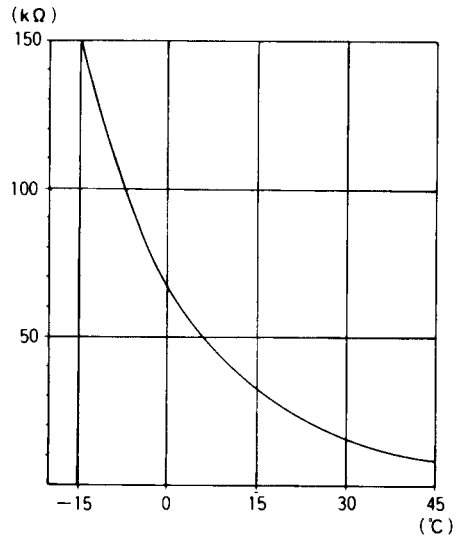
Check No.5 **Thermistor resistance check**

Remove the connectors of the thermistors on the PCB, and measure the resistance of each thermistor using tester.
The relationship between normal temperature and resistance is shown in the graph and the table below.

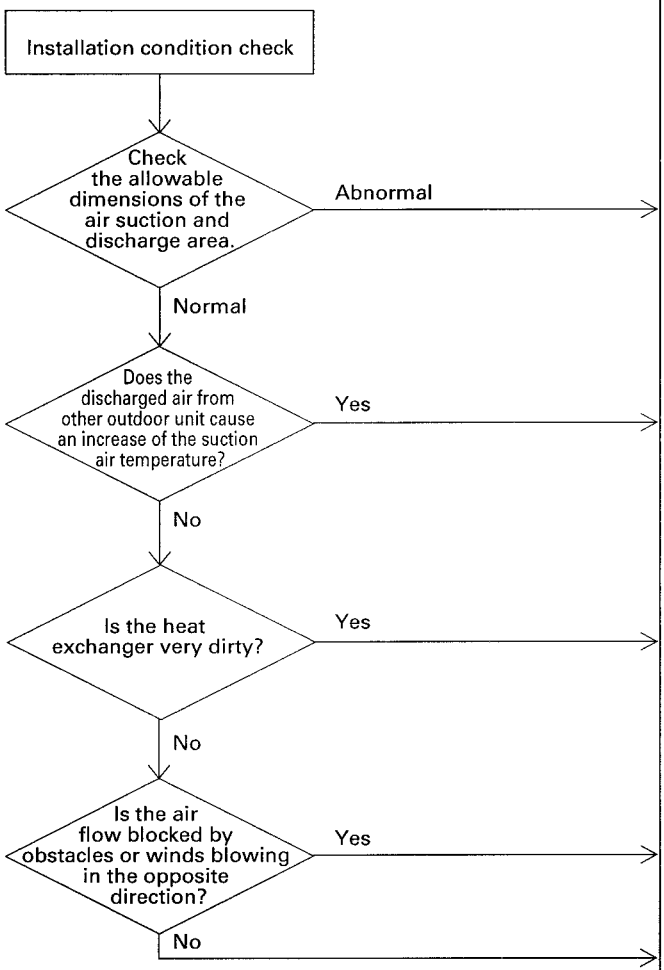
Thermistor / Temperature (°C)	R25℃=20kΩ B=3950
−20	211.0 (kΩ)
−15	150.0
−10	116.5
−5	88.0
0	67.2
5	51.9
10	40.0
15	31.8
20	25.0
25	20.0
30	16.0
35	13.0
40	10.6
45	8.7
50	7.2



(R25=20kΩ、B=3950)



Check No.5 **Installation condition check**

Diagnosis	Measure
	

Check No.6 Discharge pressure check

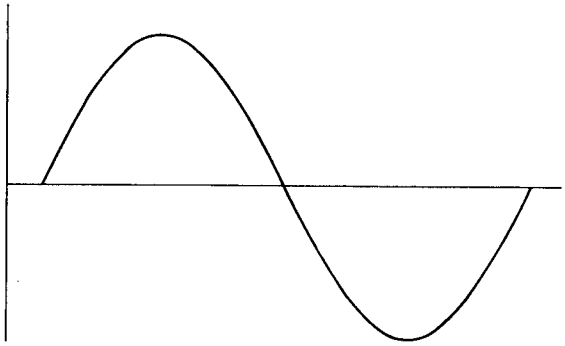
Diagnosis	Measure
Discharge pressure check	
Is the stop valve open? NO	Open the stop valve.
YES	
Is the connection pipe deformed? NO	Replace the pipe installed at the site.
YES	
At the heat exchanger and air filter dirty? NO	Clean.
YES	Replace the compressor.

Check No.7 Power supply waveforms check

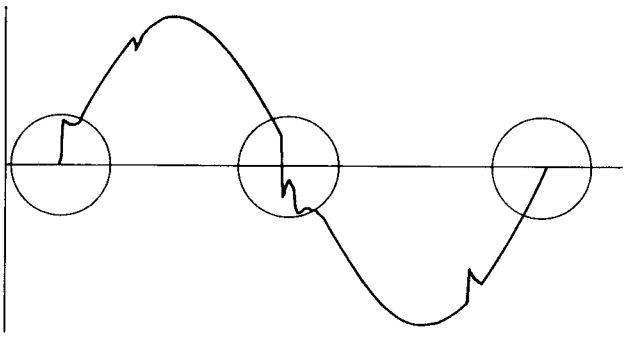
Measure the power supply waveform between pins 1 and 3 on the terminal board, and check the waveform disturbance.

- Check to see if the power supply waveform is a sine wave (Fig.1).
- Check to see if there is waveform disturbance near the zero cross (sections circled in Fig.2)

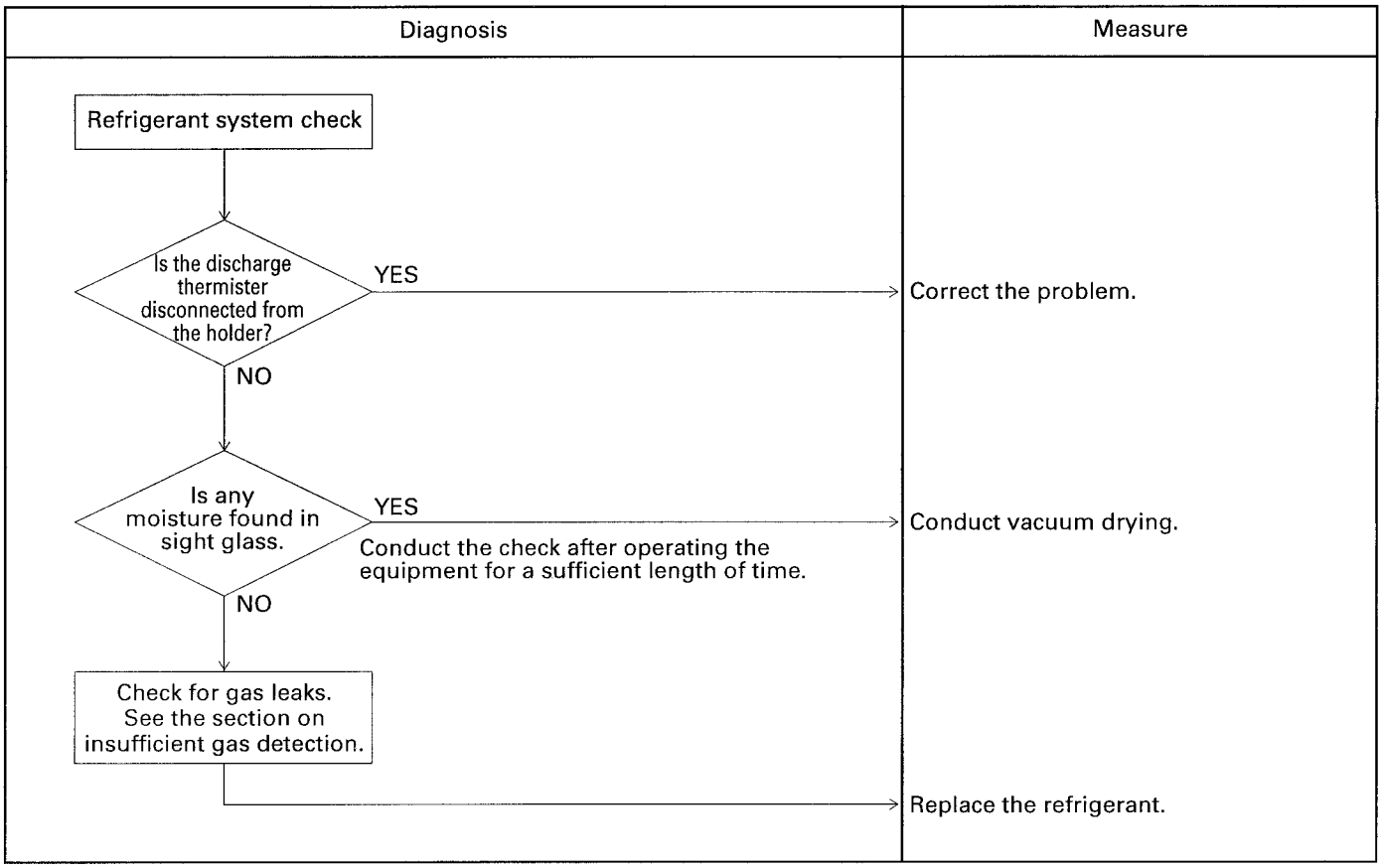
[Fig.1]



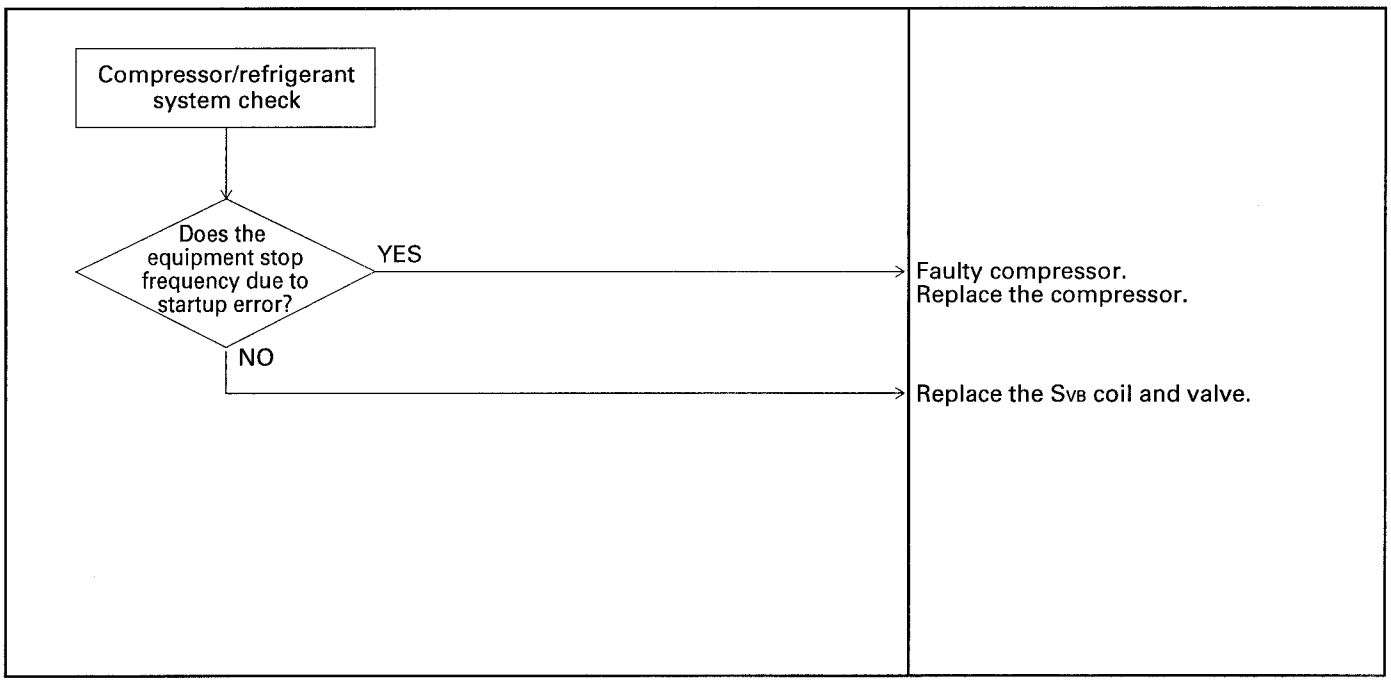
[Fig.2]



Check No. 8 **Inverter units** Refrigerant system check



Check No. 9 **Inverter units** Compressor/refrigerant system check

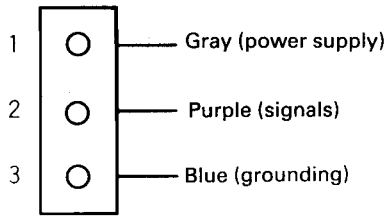


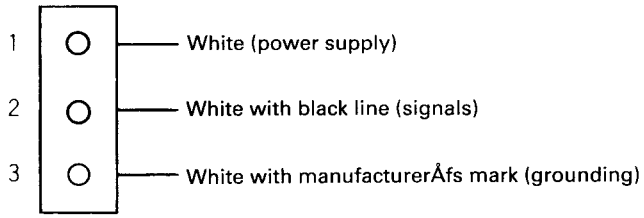
Check No.10 **Inverter units** Hall IC check

(1) Check the connector connection.
(2) With the power ON, operation OFF, and the connector connected, check the following.
① Output voltage of about 5 V between pins 1 and 3.
② Generation of 3 pulses between pins 2 and 3 when the fan motor is

Failure of (1) → faulty PCB → Replace the PCB. Failure of (2) → faulty hall IC → Replace the fan motor. Both (1) and (2) result → Replace the PCB.

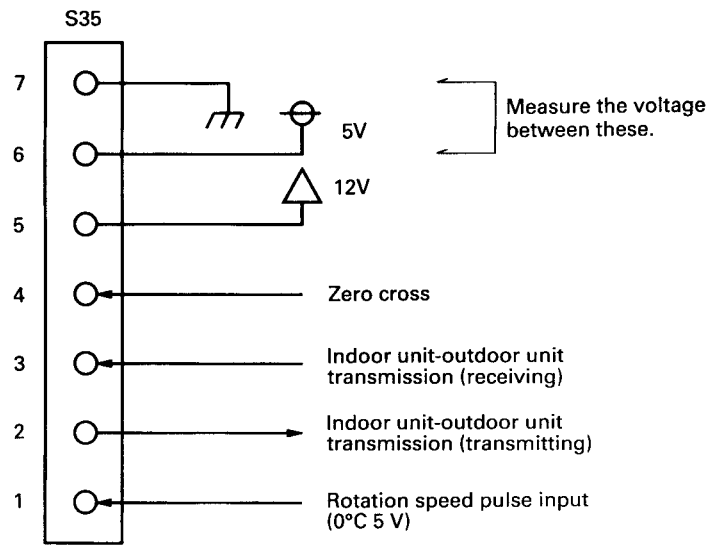
The connector has 3 pins, and there are three patterns of lead wire colors.





Check No.11 **Inverter units** Indoor unit PCB (2) output voltage check

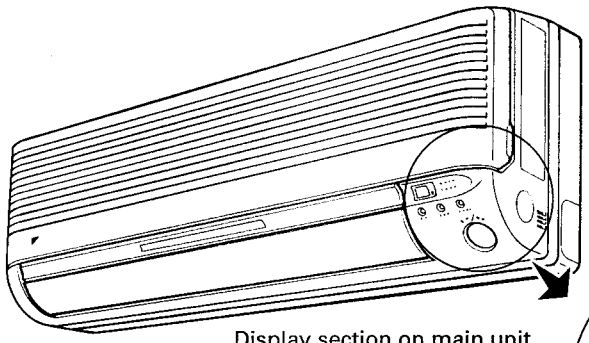
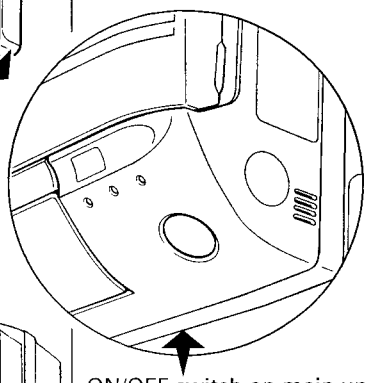
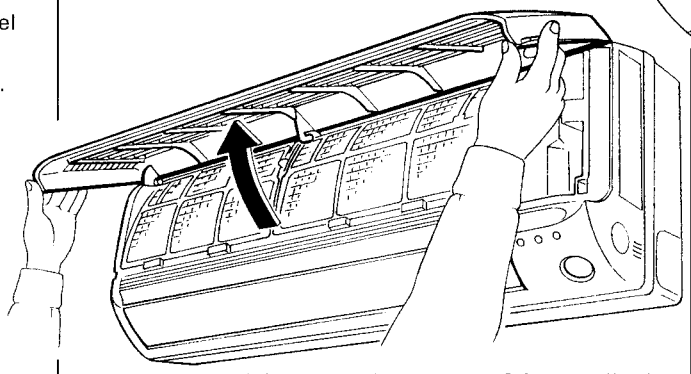
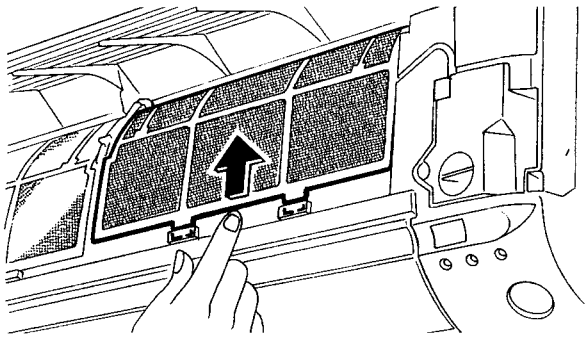
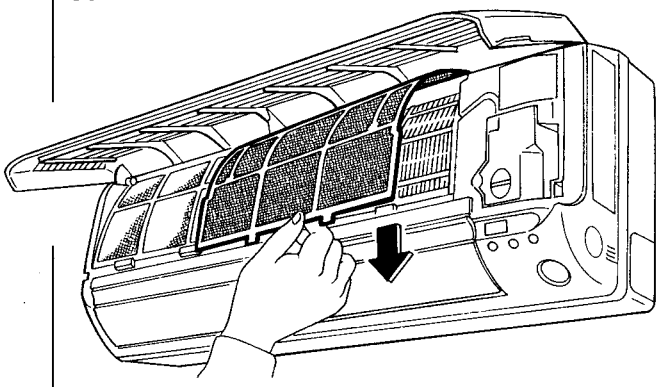
(1) Check the connector connection (breaking of wire check).
(2) With the power On and Off, check the following.
• Output voltage of about 5 VDC between pins 6 and 7.



8. Removal Procedure

(1) FTK25/35H Series and FTX25/35H Series

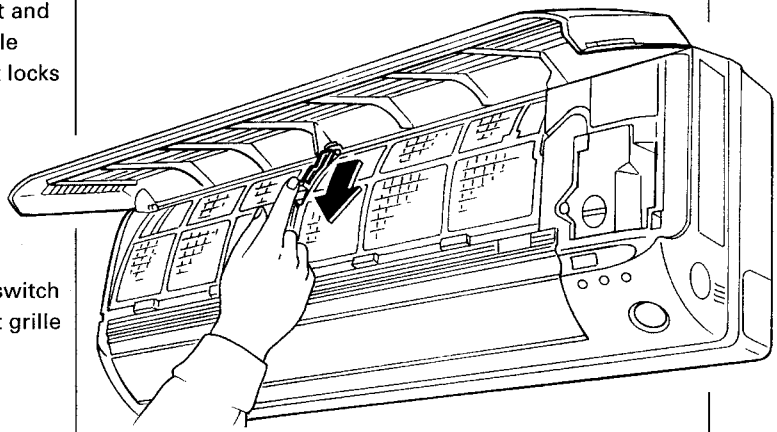
Removal of air filter	**Warning! Be sure to turn off all power supplies before disarrangement work.**

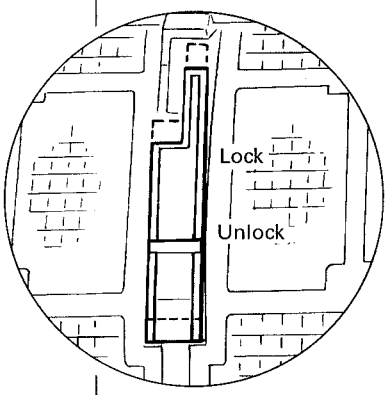
Procedure	Points
1. External features	
 Display section on main unit.	 ON/OFF switch on main unit also functions as remote controller signal receiving section.
2. Removing air filters ① Pull protrusions on left and right sides of panel with fingers and open front grille all the way.	
② Lift center section of air filter and disengage hooks at two locations.	
③ Remove air filter by pulling forward.	 * Left and right filters are interchangeable. * To re-install,insert air filter along the guide.

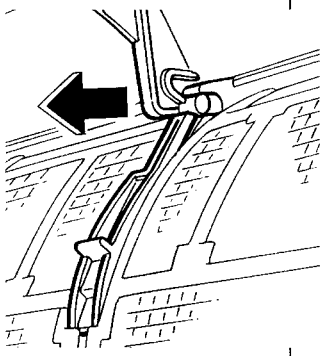
Removal of front grille

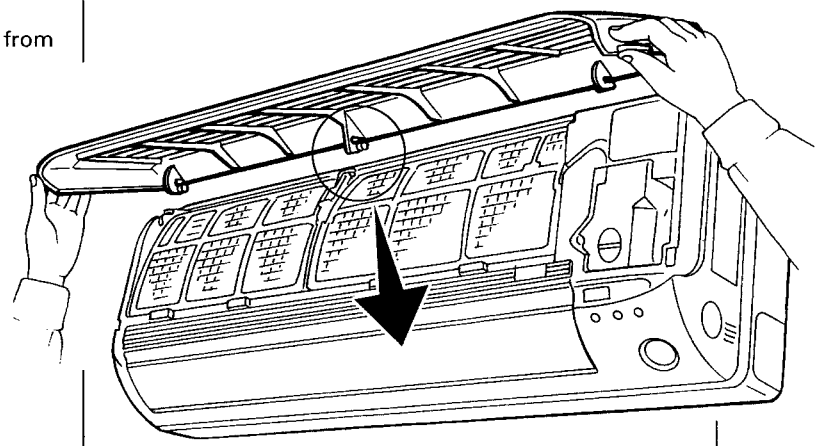
Warning! Be sure to turn off all power supplies before disarrangement work.

Procedure	Points
* Pull protrusions on left and right sides of front grille and open panel until it locks in position.	
① Slide down locking switch at the center of front grille and disjoin hinge.	
② Remove front grille from the unit.	* Lift front panel until a clicking sound is produced.



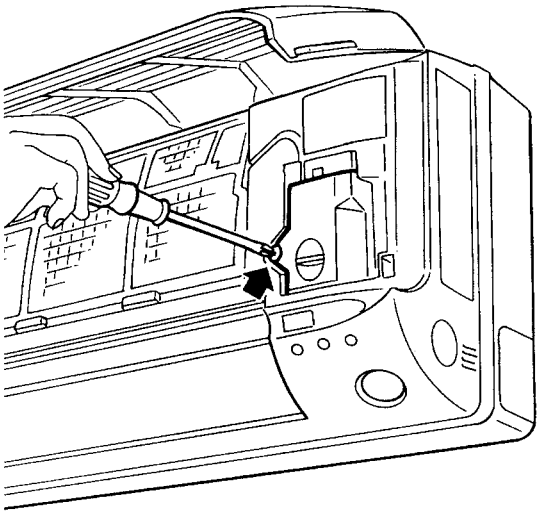
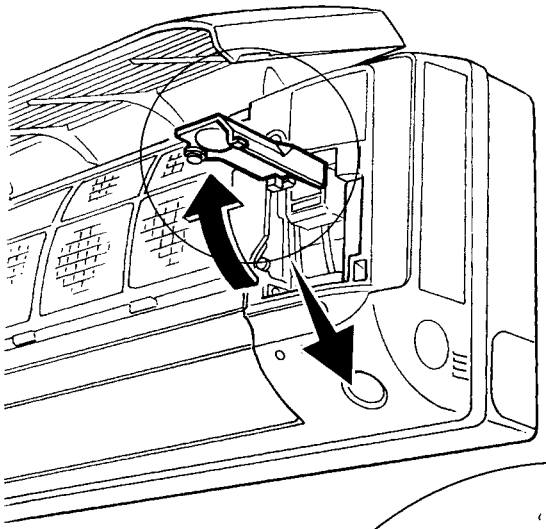
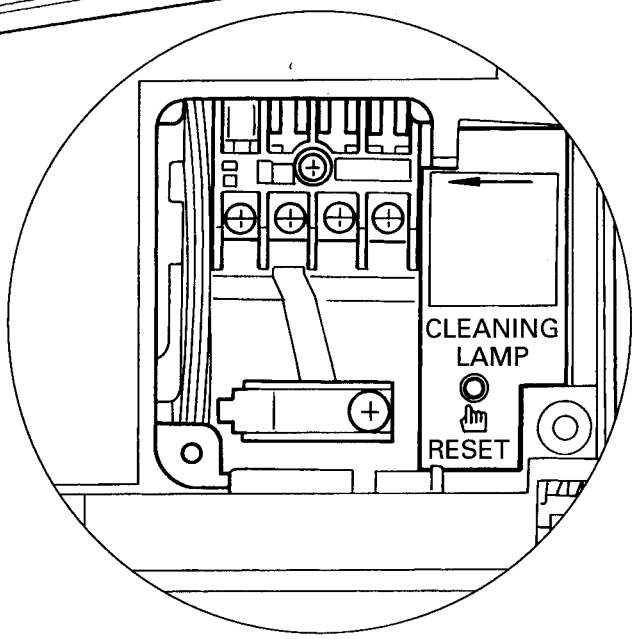






Opening and closing of service cover / Changing settings at installation site

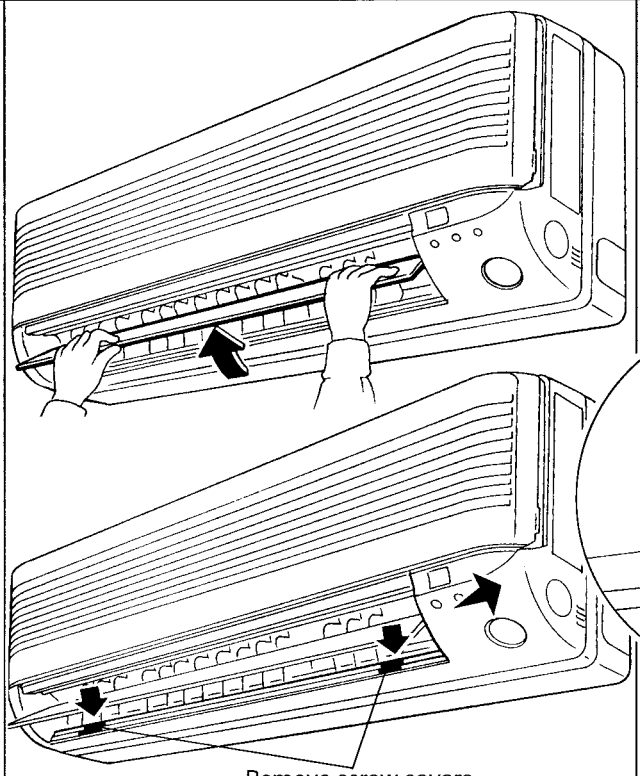
Warning! Be sure to turn off all power supplies before disarrangement work.

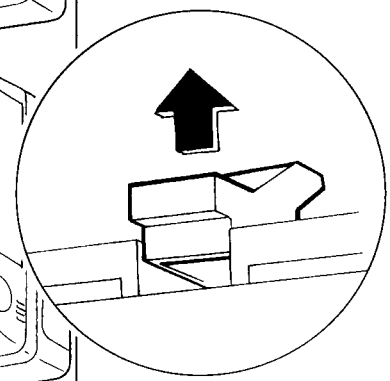
Procedure	Points
1. Opening and closing of service cover ① Remove service cover mounting screw.	
	
② Open service cover upward	
	
2. Changing settings at installation site ① Reminder timer is set to OFF at the factory. ② Filter sign can be reset.	
	

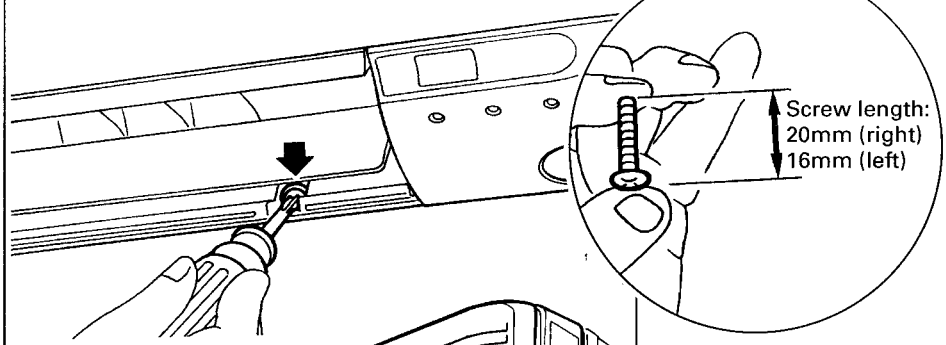
Removal of front panel

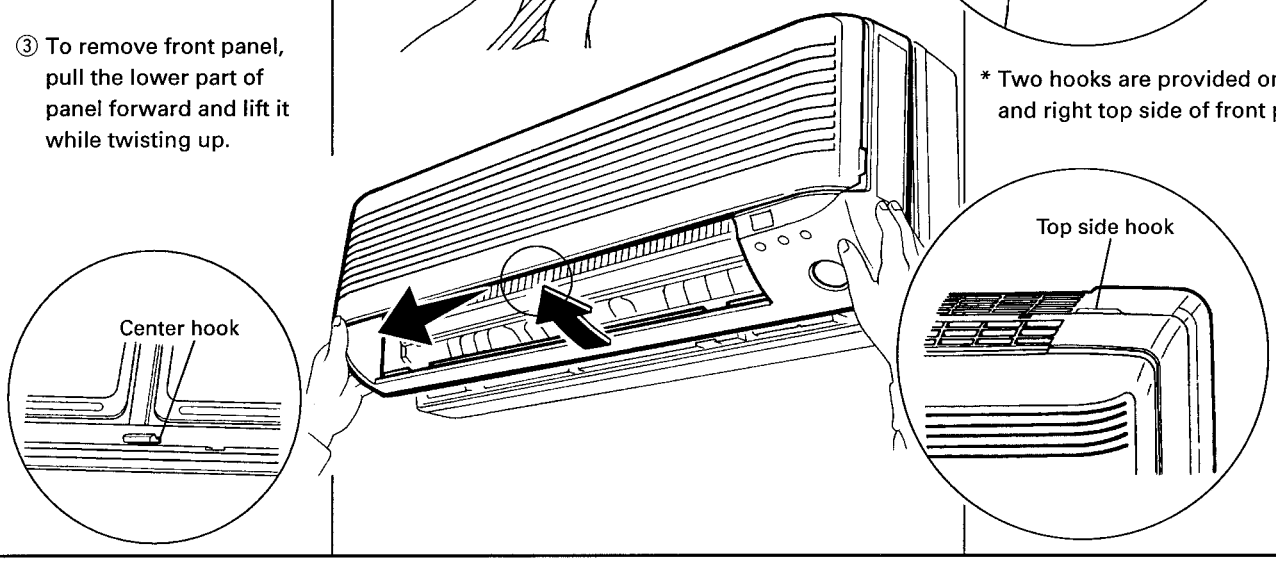
Warning! Be sure to turn off all power supplies before disarrangement work.

Procedure	Points
① Lift horizontal blade to open position.	
② Remove screw covers at two locations, then remove screws. Front cover can be now dismounted from the unit.	* Screws are longer than screws used previous models.
③ To remove front panel, pull the lower part of panel forward and lift it while twisting up.	* Two hooks are provided on left and right top side of front panel.





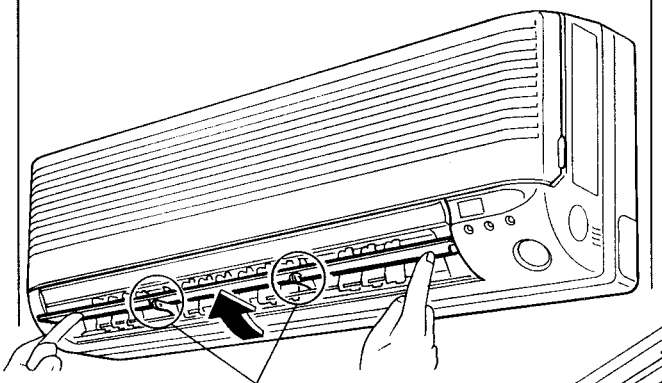


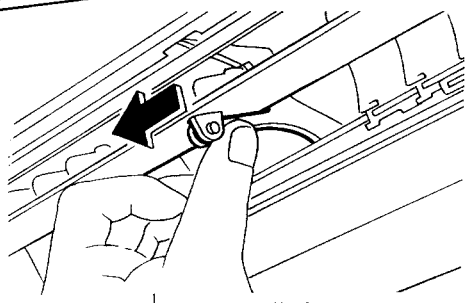


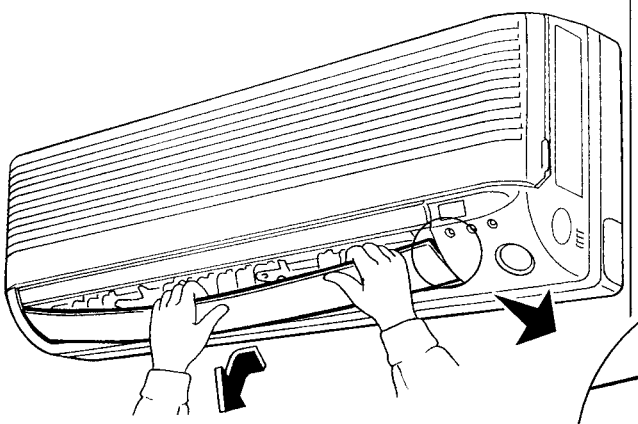
Removal of horizontal and vertical blades

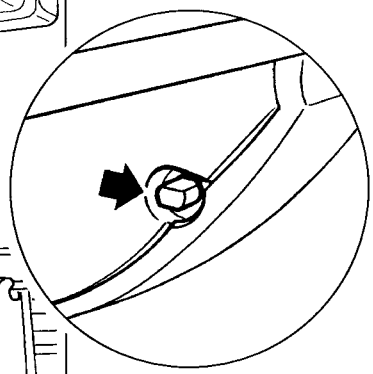
Warning! Be sure to turn off all power supplies before disarrangement work.

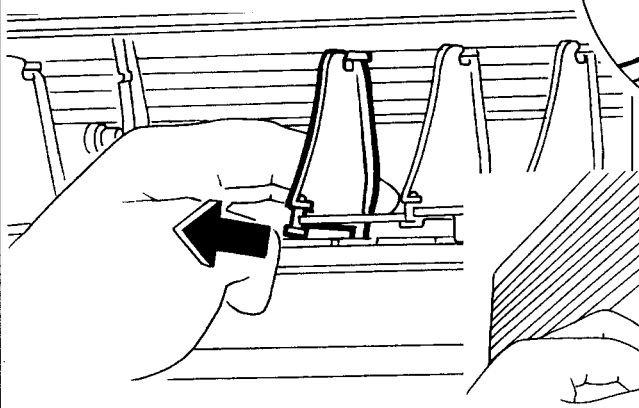
Procedure	Points
① Lift horizontal blade to open position.	
② Disengage horizontal blade from two blade retaining sections.	
③ Bend blade slightly and remove it from the unit.	* Re-installation ① Set blade while twisting onto the alignment key on right side first. ② Engage blade retaining sections at two locations.
④ Disengage vertical blades from bottom catch by bending them slightly.	
⑤ Pull the vertical blades forward to remove.	

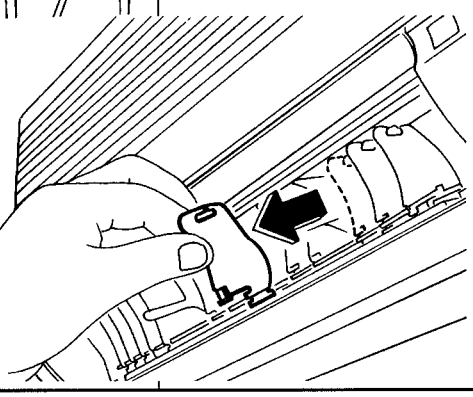






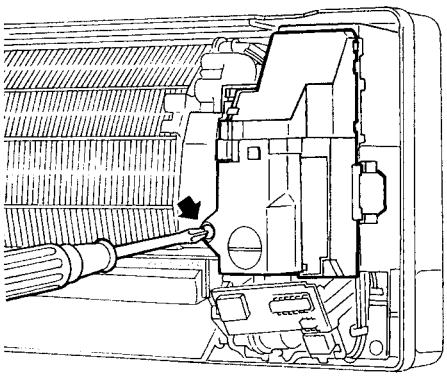
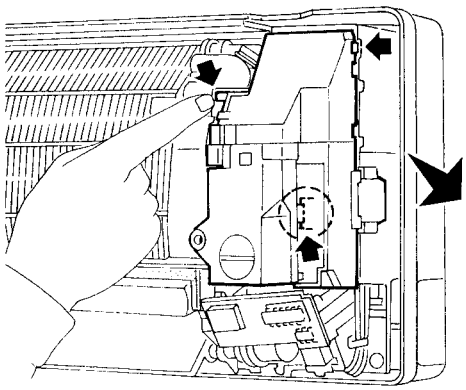
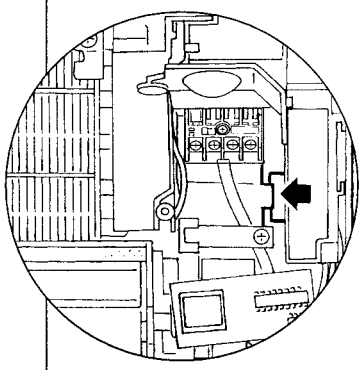
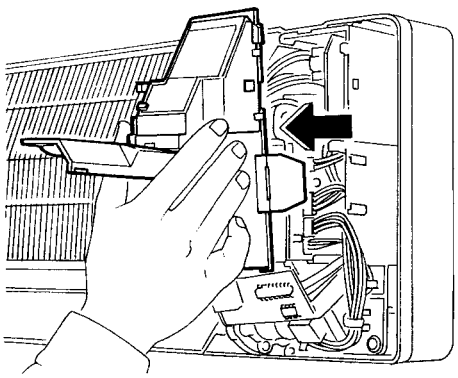
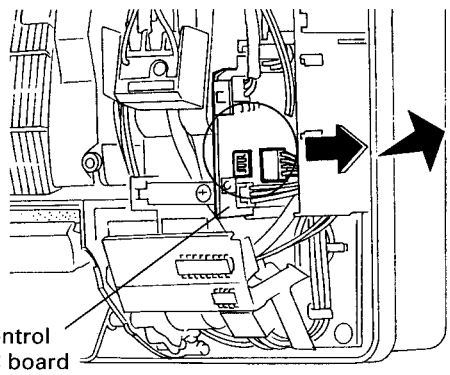
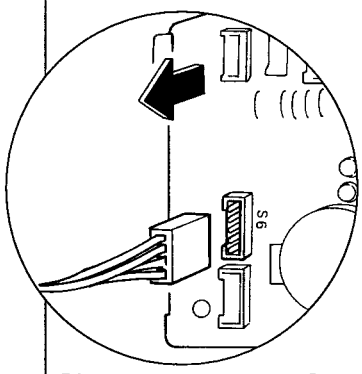






Removal of PC board (1/4)

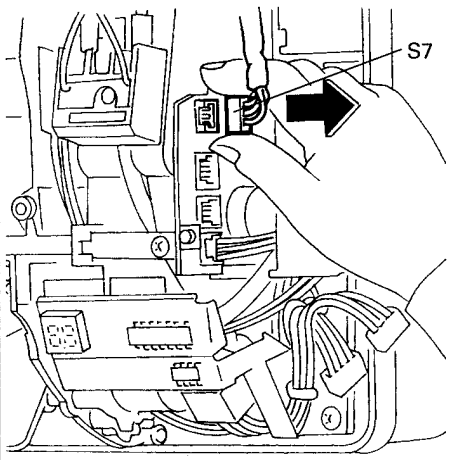
Warning! Be sure to turn off all power supplies before disarrangement work.

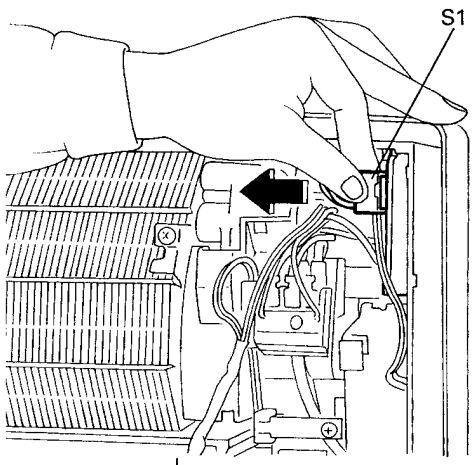
Procedure		Points
* Remove front panel. ① Remove screw of service cover.		
② Disengage three hooks of electrical parts box.		
③ Remove box cover		
④ Disconnect a connector of swing motor.		 Disconnect connectors"S6" .

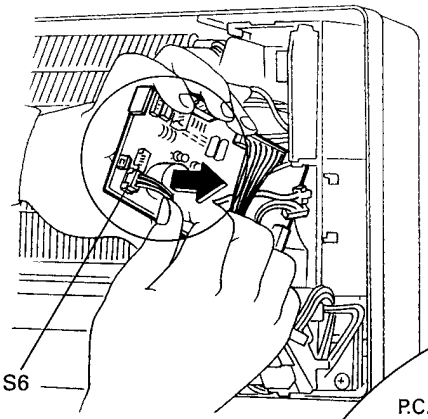
Removal of PC board (2/4)

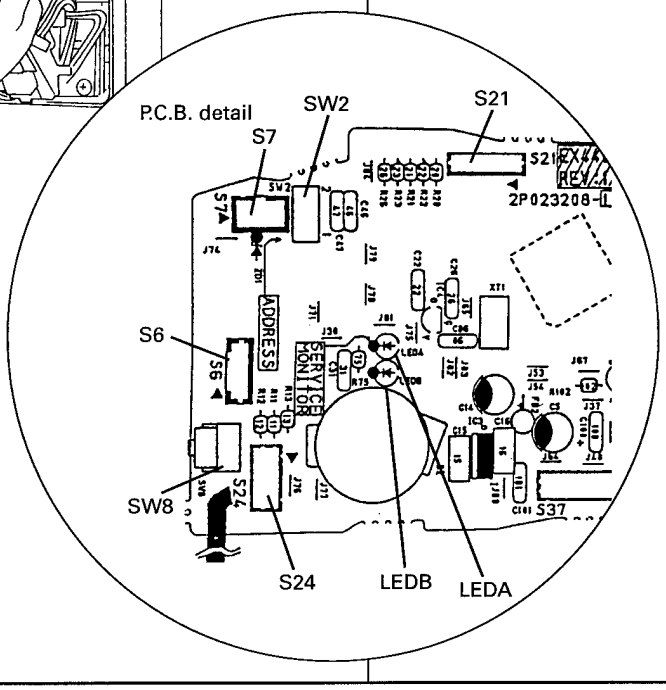
Warning! Be sure to turn off all power supplies before disarrangement work.

Procedure	Points
① To remove connector of fan motor, remove control PC board "S7" and power supply PC board "S1".	When disconnecting wire harness, pull out the connector holding terminal section of connector. Do not hold lead wire.
② Pull control PC board forward, then disconnect connectors.	





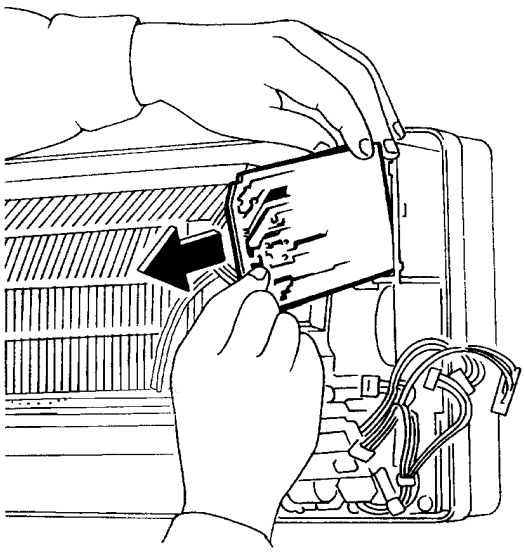


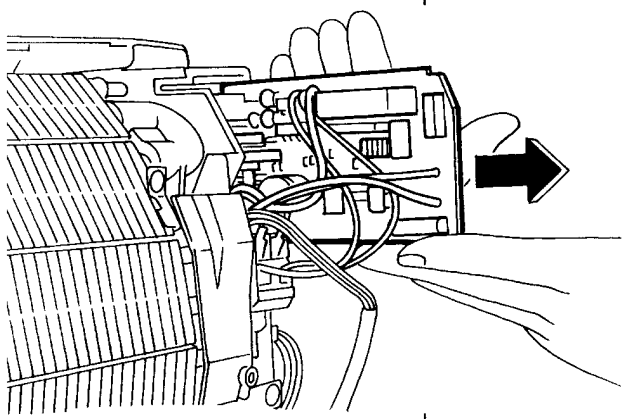


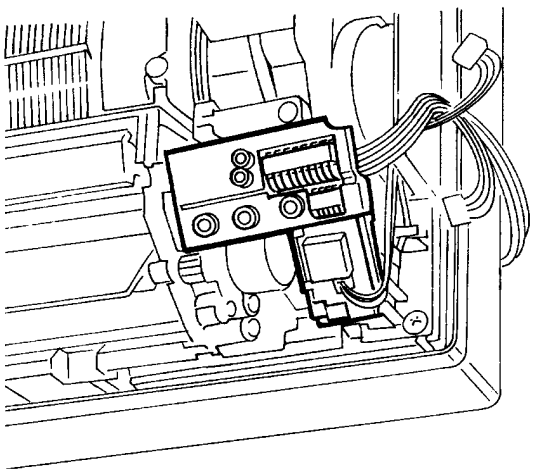
Removal of PC board (3/4)

Warning! Be sure to turn off all power supplies before disarrangement work.

Procedure	Points
⑦ Remove power supply PC board.	
⑧ Remove lamp house and signal receiving PC board	

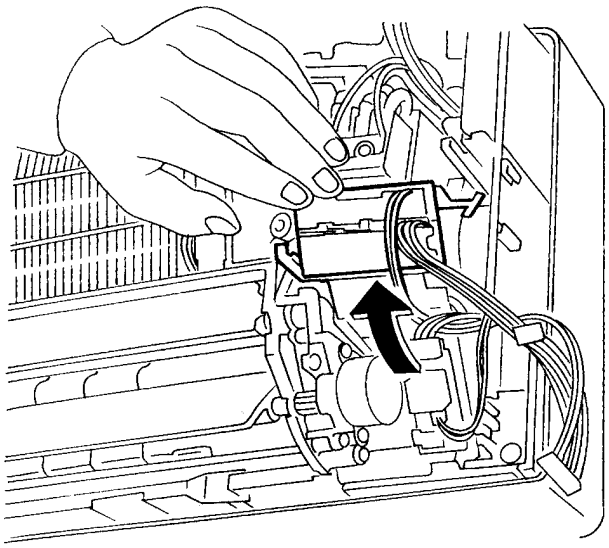
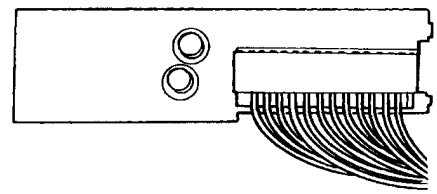
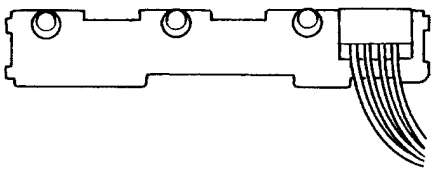
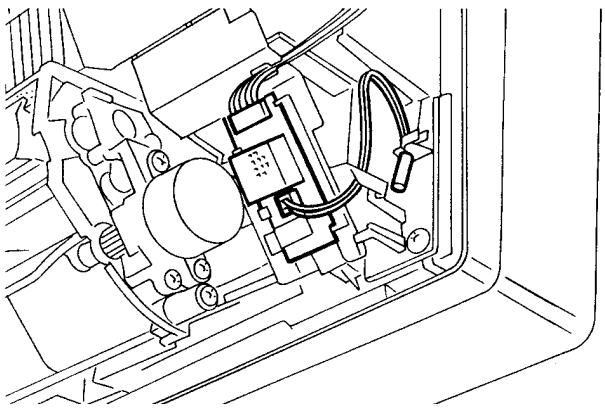






Removal of PC board (4/4)

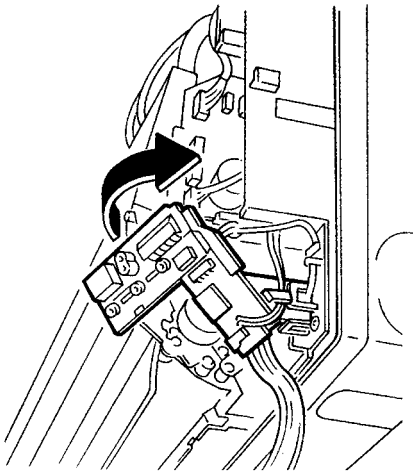
Warning! Be sure to turn off all power supplies before disarrangement work.

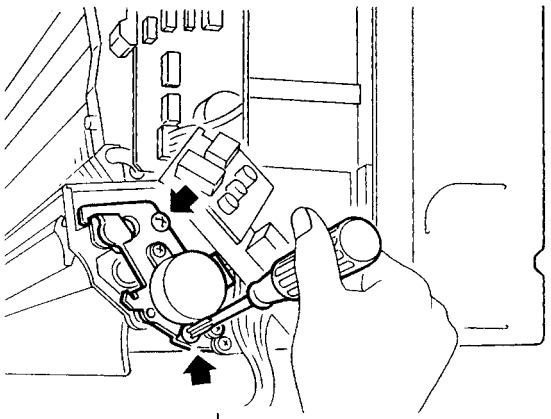
Procedure		Points
⑨ Disengage hook of lamp house, and open upward.		
⑩ Each PC board of indicator can be removed individually.	 	
⑪ Remove signal receiving PC board.		* Be sure to mount room temperature thermistor in correct direction.

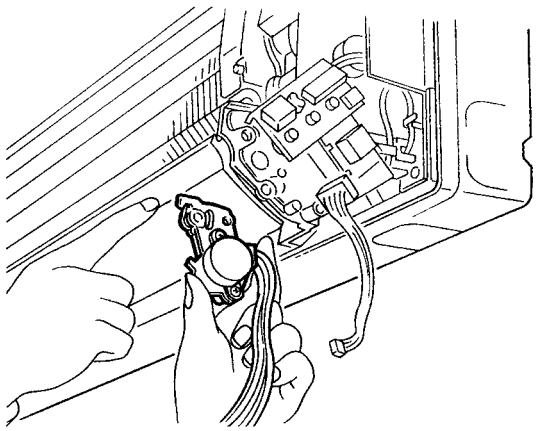
Removal of swing motor assembly.

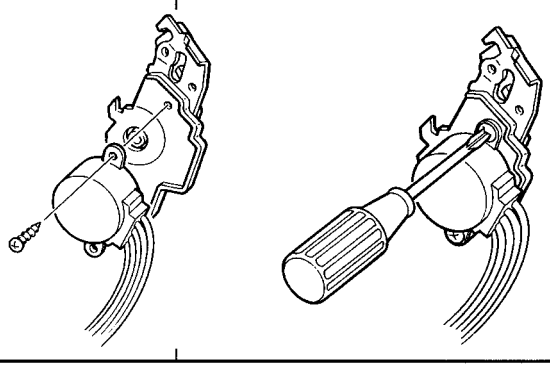
Warning! Be sure to turn off all power supplies before disarrangement work.

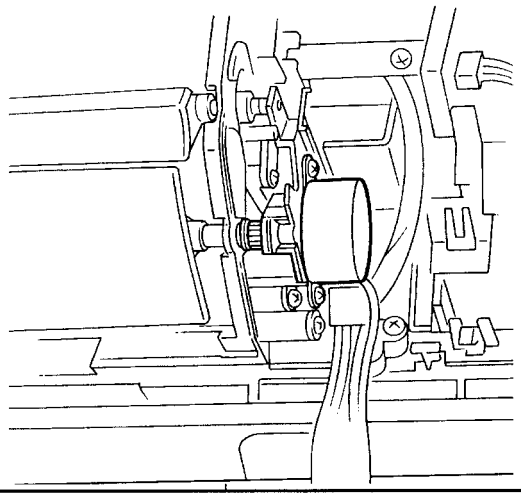
Procedure	Points
* Remove front panel. ① Open lamp house assembly.	
② To remove swing motor assembly, remove two screws.	
③ Remove swing motor assembly.	* Mounting screws for swing motor assembly and for swing motor are different in length respectively.
④ Remove swing motor. (Two screws)	





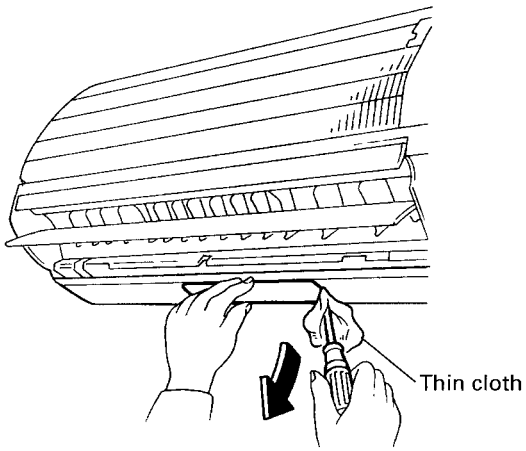
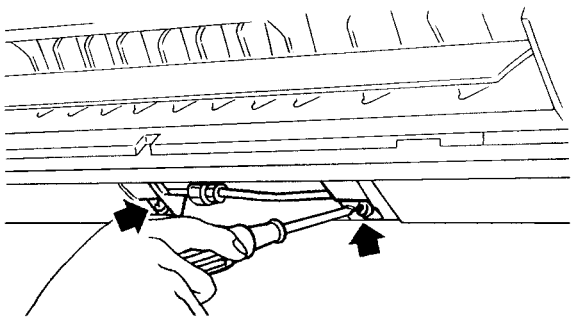
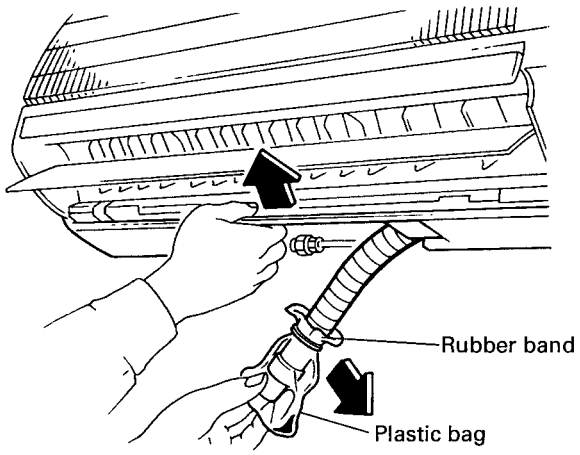






Removal of drain pan (1/2)

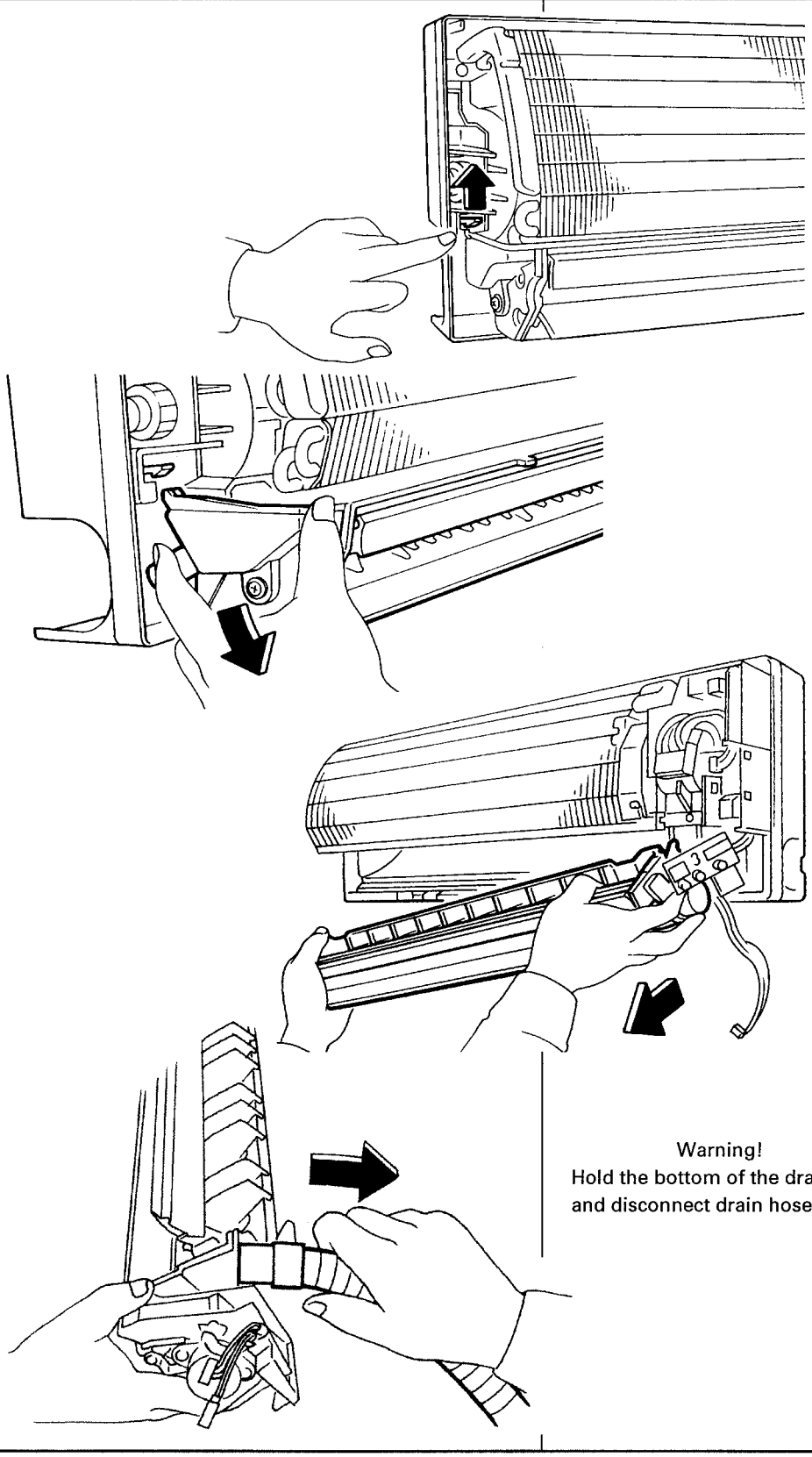
Warning! Be sure to turn off all power supplies before disarrangement work.

Procedure		Points
① Remove bottom cover to access drain hose (for left-handed piping).		* Wrap a thin cloth around the tip of screwdriver, and pry open the cover. * This step is not necessary for backside piping.
② Remove two screws that secure bottom frame to mounting plate.		
③ Lift the unit slightly and pull out drain hose.		* Be careful not to soil the floor with drain water.

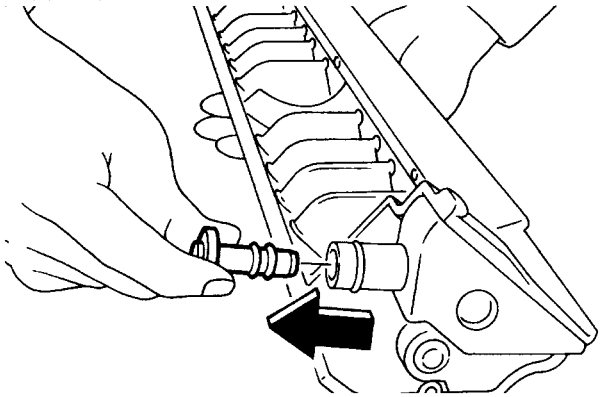
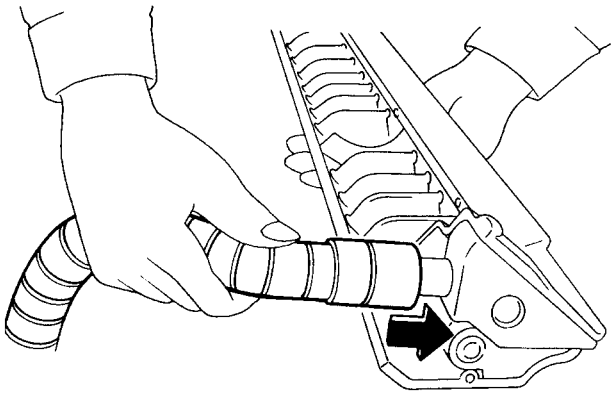
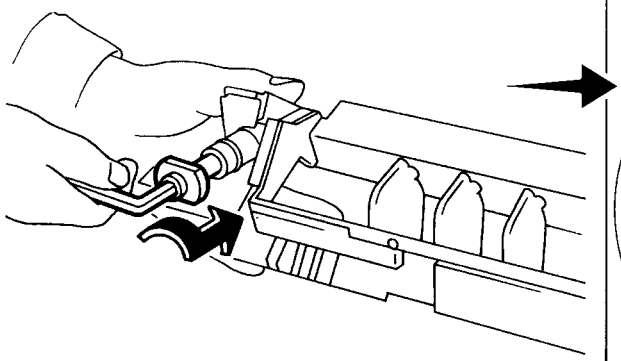
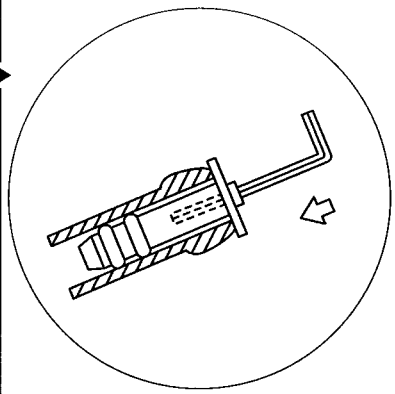
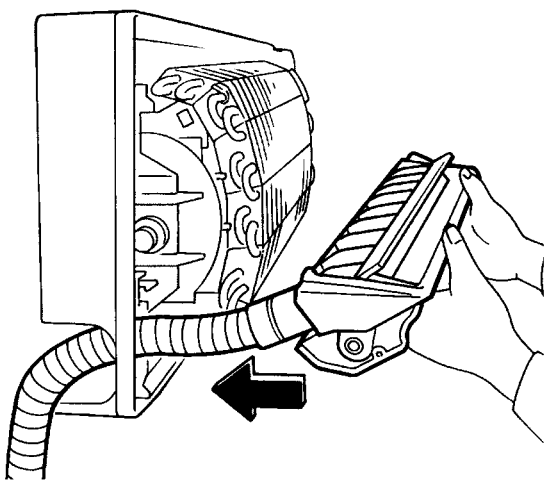
Removal of drain pan (2/2)

Warning! Be sure to turn off all power supplies before disarrangement work.

Procedure	Points
④ Disengage hook on left side.	
⑤ Dismount left side of drain pan from the unit.	
⑥ Dismount right side of drain pan from the unit.	
⑦ Disconnect drain hose.	Warning! Hold the bottom of the drain hose and disconnect drain hose.

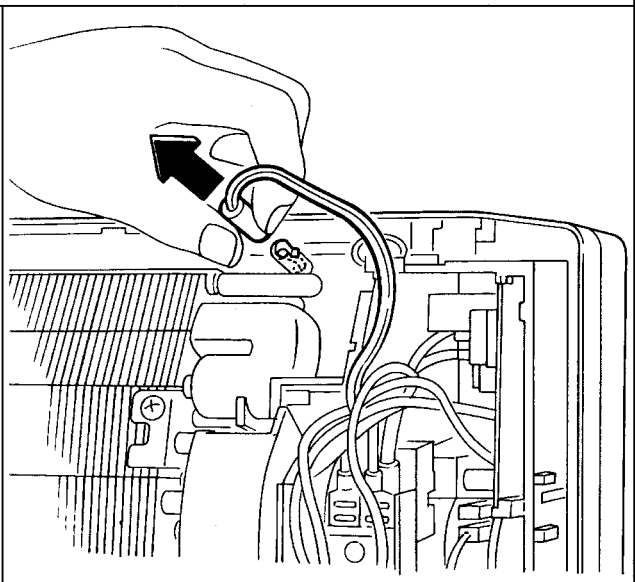
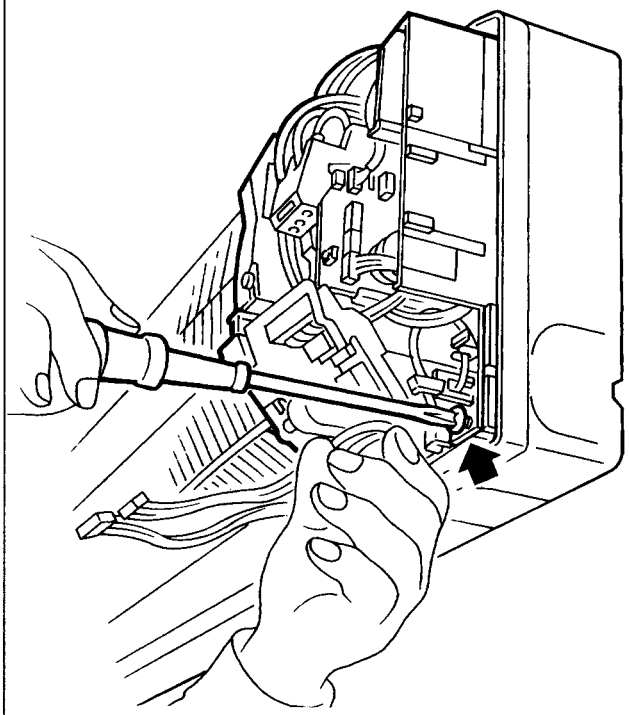


Piping of drain hose at left side	**Warning! Be sure to turn off all power supplies before disarrangement work.**

Procedure		Points
① Pull out drain plug located on left side of drain pan with fingers.		
② Insert drain hose.		Warning! Hold the bottom of the drain hose and insent drain hose properly.
③ Insert drain plug into the opening on right side, and press it in using hexagon wrench (4mm).		
④ Place drain hose into left side of the unit, and mount drain pan.		

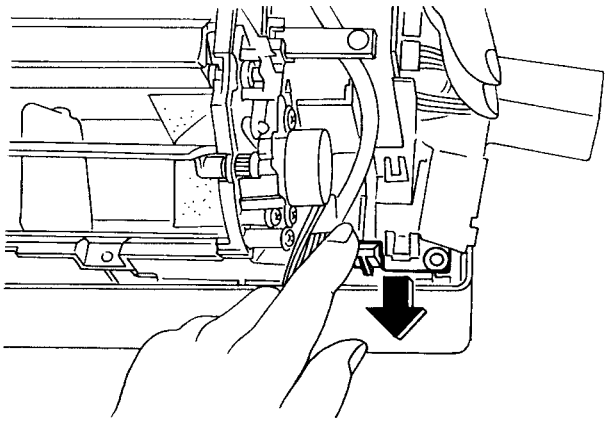
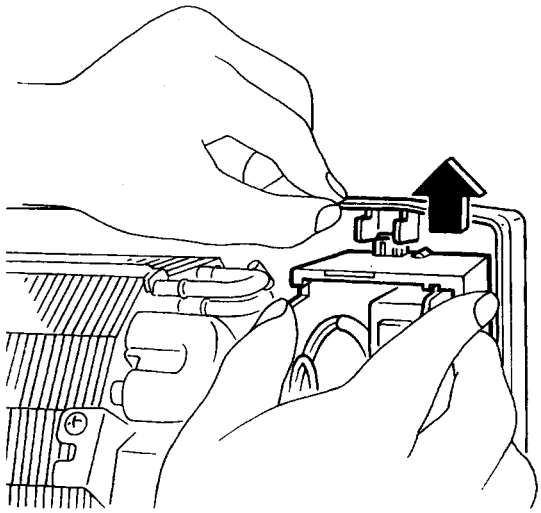
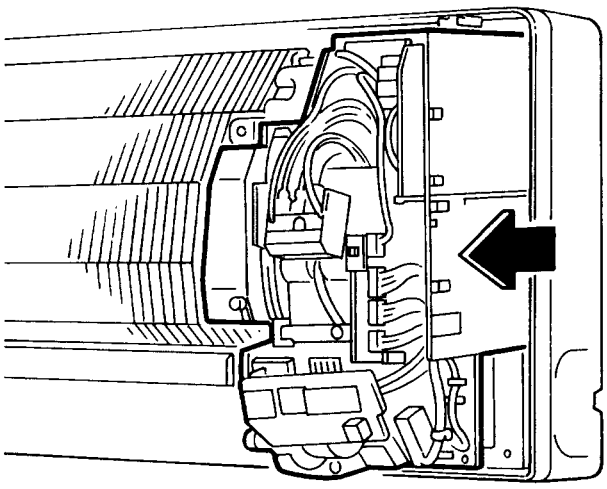
Removal of electrical parts box (1/2)

Warning! Be sure to turn off all power supplies before disarrangement work.

Procedure		Points
* Remove drain pan according to the procedure of "Removal of drain pan". ① Remove heat exchanger thermistor. Then disconnect all connectors of electrical parts box. (S1, S7, S6)		
② Remove screw located at bottom of electrical parts box.		

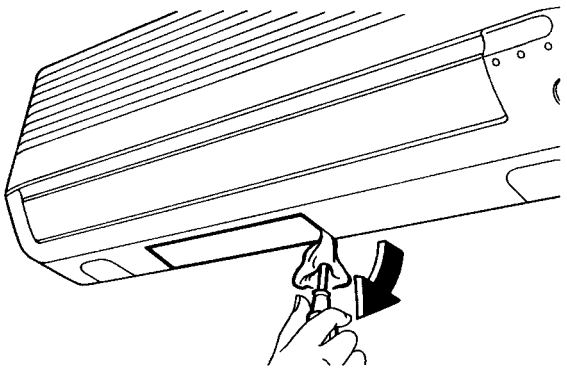
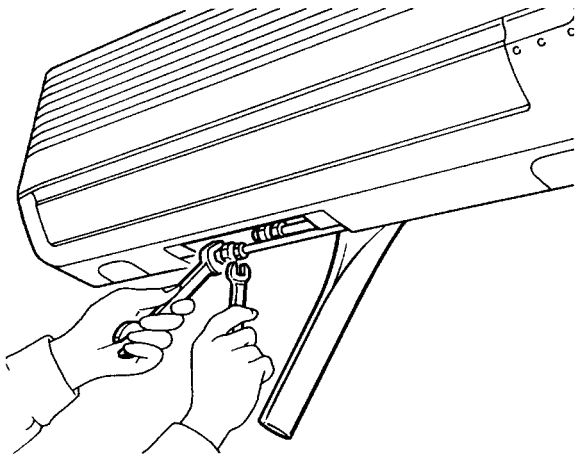
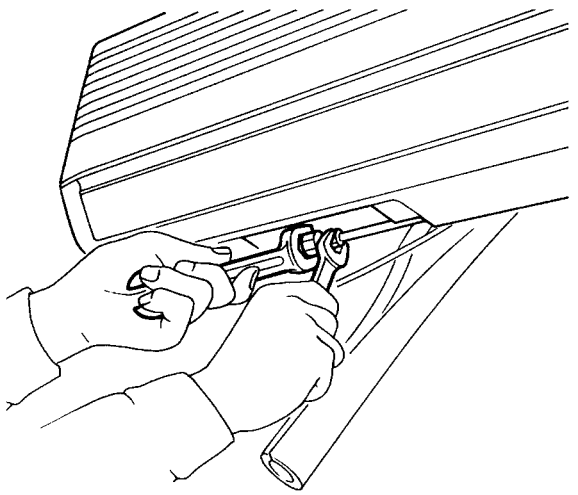
Removal of electrical parts box (2/2)

Warning! Be sure to turn off all power supplies before disarrangement work.

Procedure		Points
③ Lift up electrical parts box slightly and disengage hook located at bottom side.		
④ Disengage hook located at top side.		
⑤ Pull forward and remove electrical parts box.		

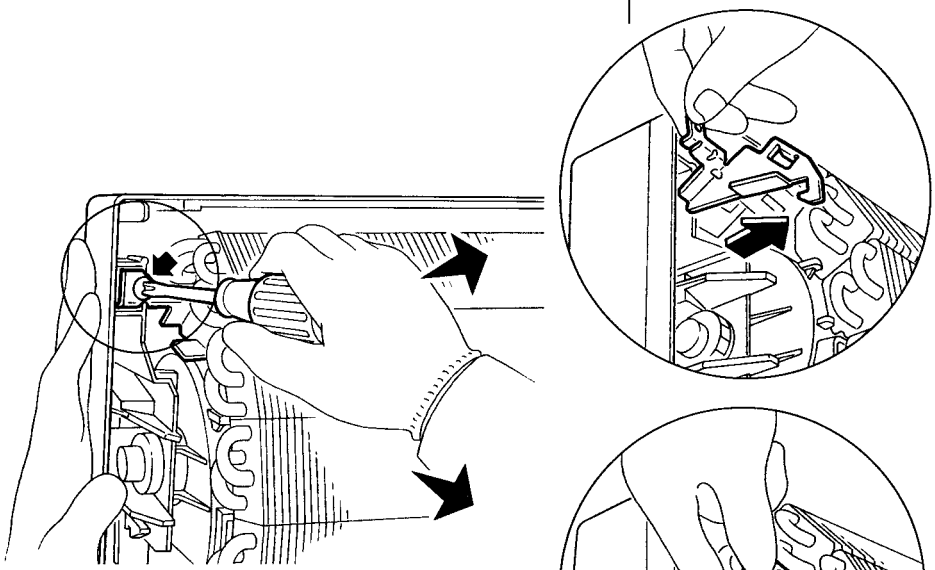
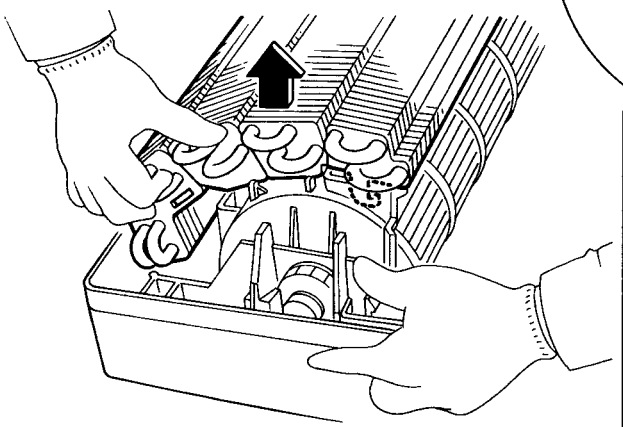
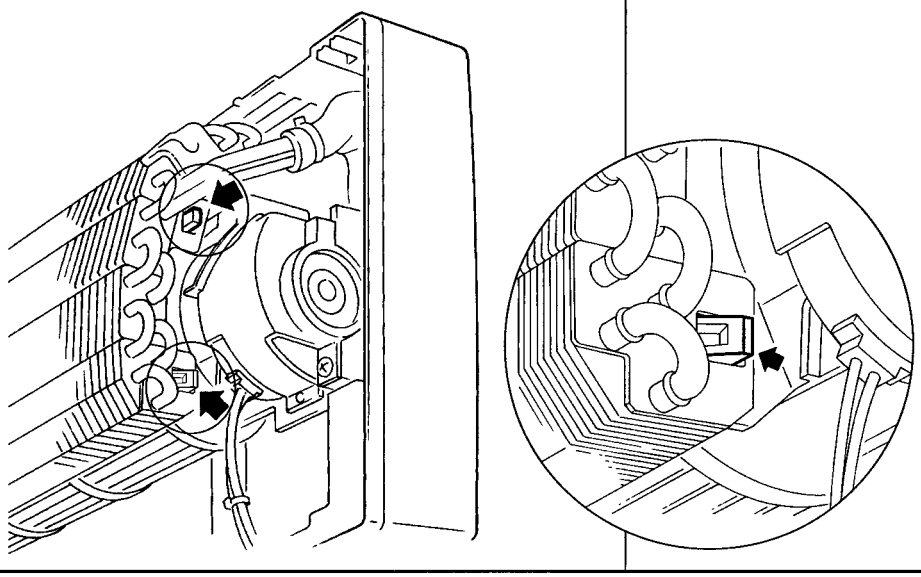
Removal of heat exchanger (1/4)

Warning! Be sure to turn off all power supplies before disarrangement work.

Procedure		Points
* Conduct pump-down operation. ① Remove bottom cover located at lower part of the unit and disconnect two screws. ② Push two positions at lower part of the unit to disengage bottom frame hooks from mounting plate. Lift the unit slightly. Refer page 202.		Warning! If gas leaks,repair the leak location, then connect all refrigerant from the unit. Conduct vacuum drying, and charge proper amount of refrigerant. Warning! Do not mix any gas (including air) other than the specified refrigerant (R22) into refrigerating cycle. (Mixing of air or other gas causes abnormal temperature rise in refrigerating cycle, and this results in pipe rupture or personal injuries.)
③ Remove insulation tube, and disconnect liquid pipe at the flare.		* Use two wrenches to disconnect pipe.
④ Disconnect gas pipe at the flare.		* After pipes are disconnected, close all pipe openings with caps to prevent dust and moisture from entering pipes.

Removal of heat exchanger (2/4)

Warning! Be sure to turn off all power supplies before disarrangement work.

Procedure	Points
* For removal of front panel, drain pan, electrical box and other parts, see reference pages.	
1. Lifting heat exchanger ① Remove screw holding heat exchanger mounting plate in place.	
② While raising heat exchanger, pull it forward and disengage hooks. ③ Lift heat exchanger.	 Caution! When removing or reinstalling heat exchanger, be sure to wear protective gloves or wrap heat exchanger with cloths. (Fins can cut fingers.)
2. Disconnecting right side ① Disengage hook located on right side.	

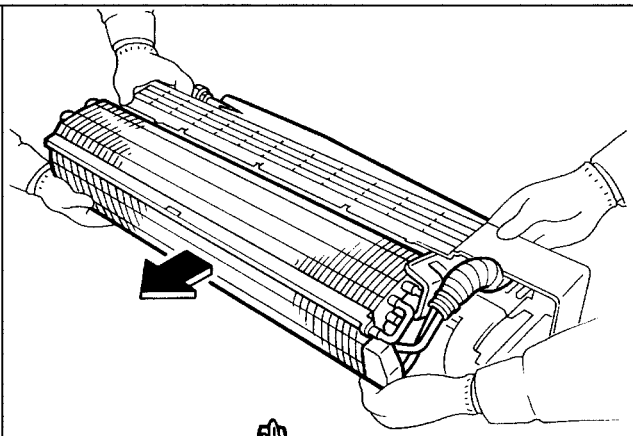
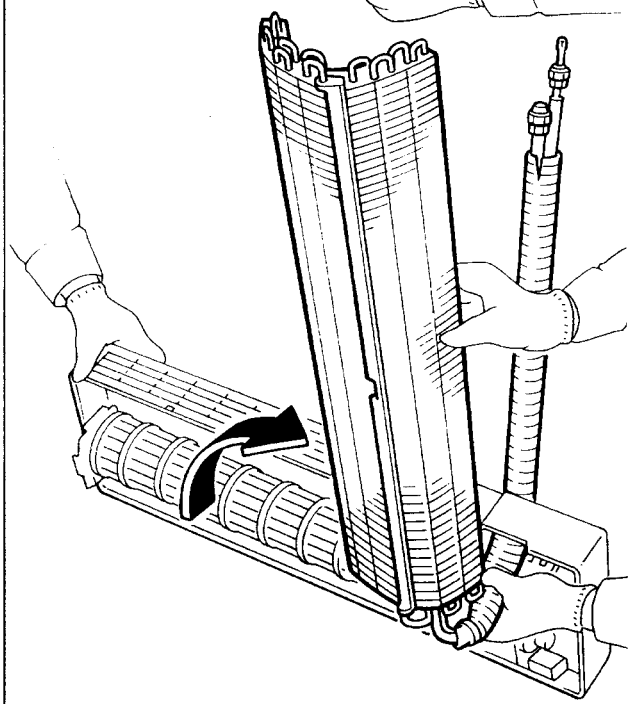
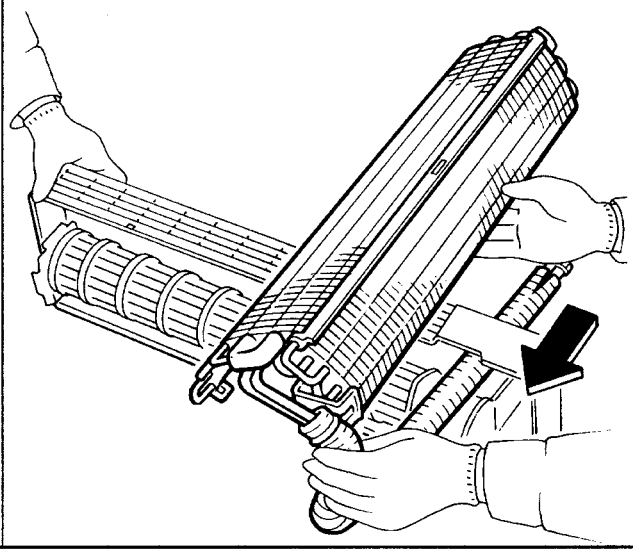
Removal of heat exchanger (3/4)

Warning! Be sure to turn off all power supplies before disarrangement work.

Procedure	Points
3. Loosening pipe retaining plate ① Disengage hook on pipe retaining plate, and turn the plate 90 degrees.	
② Pull auxiliary pipe forward to an angle of 10 to 20 degrees.	10-20 degree * Be careful to prevent pipe deformation.
③ Disengage hooks and lift heat exchanger.	

Removal of heat exchanger (4/4)

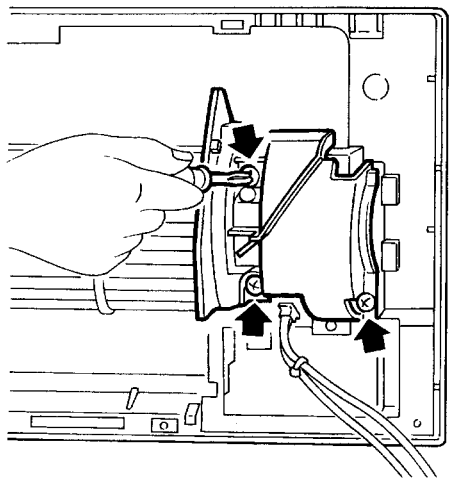
Warning! Be sure to turn off all power supplies before disarrangement work.

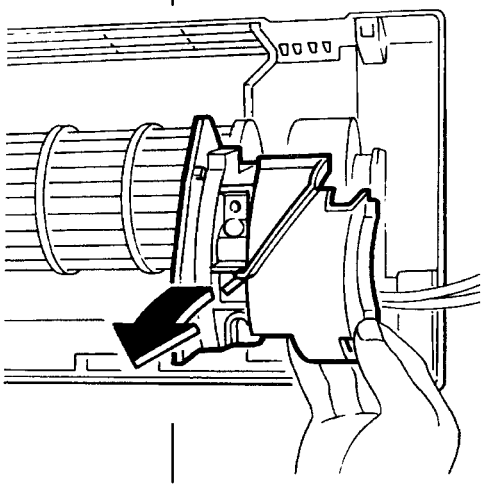
Procedure		Points
④ Pull heat exchanger forward.		Warning! Do not mix any gas (including air) other than the specified refrigerant (R22) into refrigerating cycle. (Mixing of air or other gas causes abnormal temperature rise in refrigerating cycle, and this results in pipe rupture or personal injuries.) Warning! If gas leaks, repair the leak location, then collect all refrigerant from the unit. Conduct vacuum drying, and charge proper amount of refrigerant.
⑤ Turn heat exchanger 90 to upright position.		Caution! When removing or re-installing heat exchanger, be sure to wear protective gloves or wrap heat exchanger with cloths. (Fins can cut fingers.)
⑥ Pull out the heat exchanger along the pipe from the unit.		

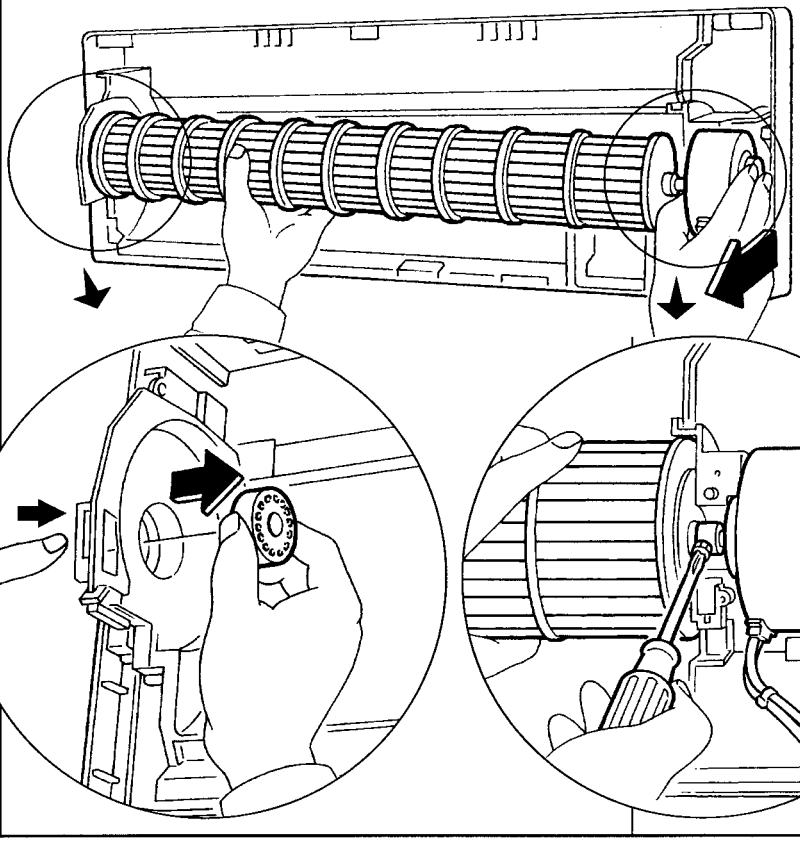
Removal of fan rotor and motor

Warning! Be sure to turn off all power supplies before disarrangement work.

Procedure	Points
① To remove right side panel, remove three screws.	
② Remove fan rotor and motor together from the unit.	
③ Loosen the hexagon head set screw on the fan rotor, and remove the motor. ⊕ screwdriver can be also used.	
④ Press the bearing with finger from the outside to remove it.	



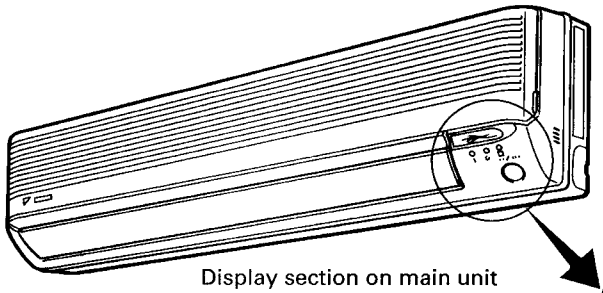
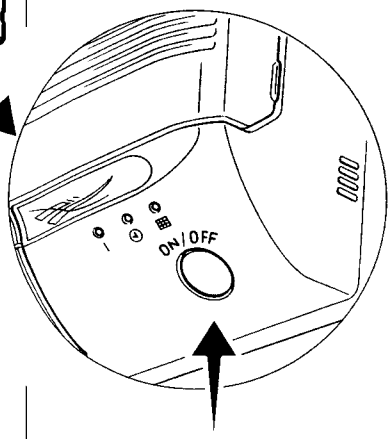
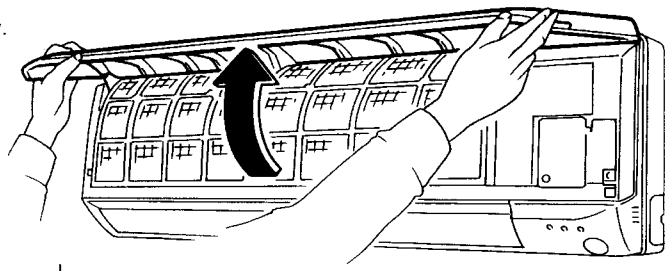
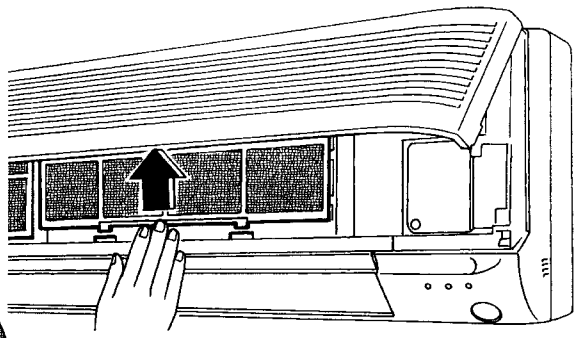
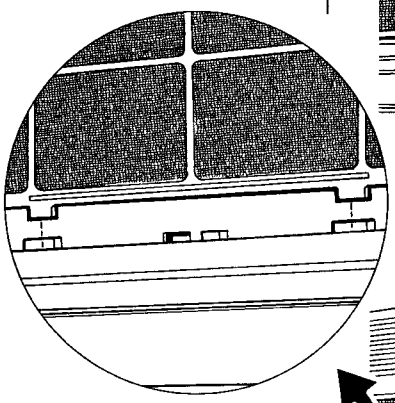
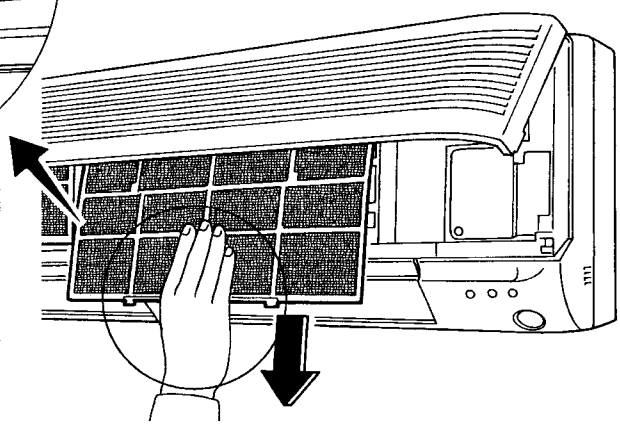




(2) FTK50/60 H series and FTX50/60 H series

Removal of air filter

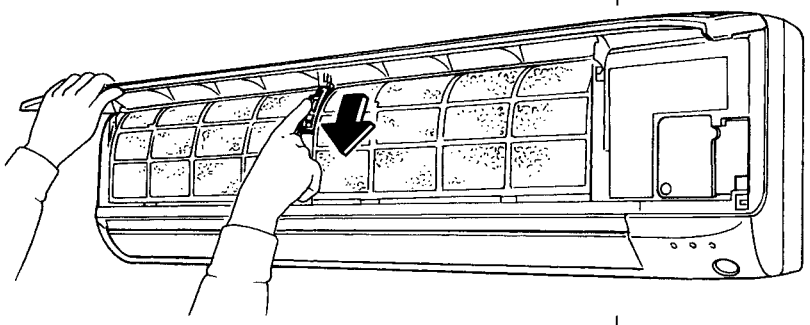
Warning! Be sure to turn off all power supplies before disarrangement work.

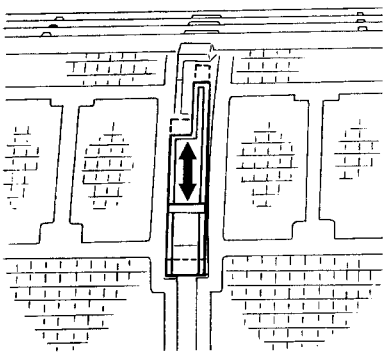
Procedure	Points
1. External features	
 Display section on main unit	
	ON/OFF switch on main unit also functions as remote controller signal receiving section.
2. Removing air filters ① Pull protrusions on left and right sides of grille with fingers and open front grille all the way.	
	
② Lift center section of air filter and disengage hooks at two locations.	
	
	
③ Remove air filter by pulling forward.	
	* Left and right filters are interchangeable. * To re-install, insert air filter along the guide.

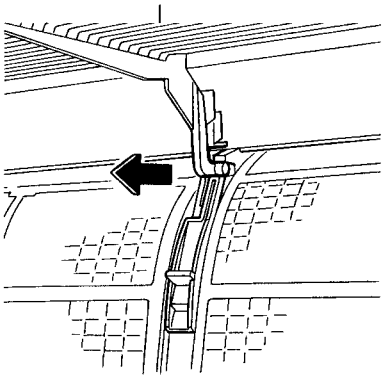
Removal of front grille

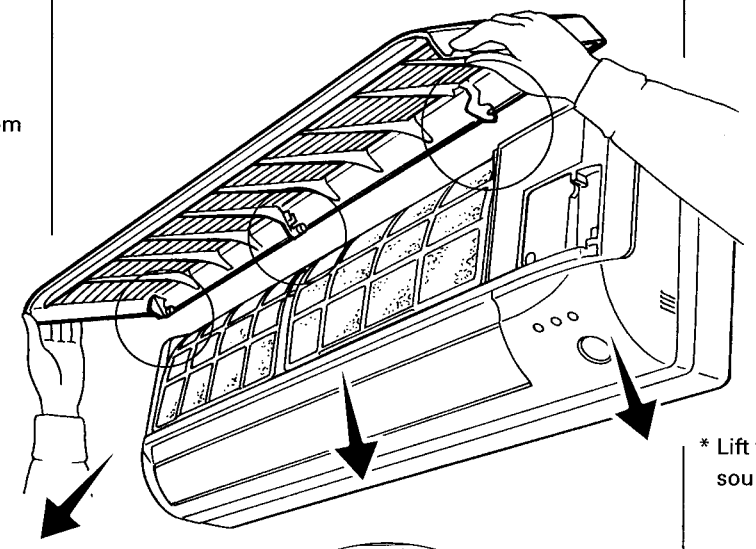
Warning! Be sure to turn off all power supplies before disarrangement work.

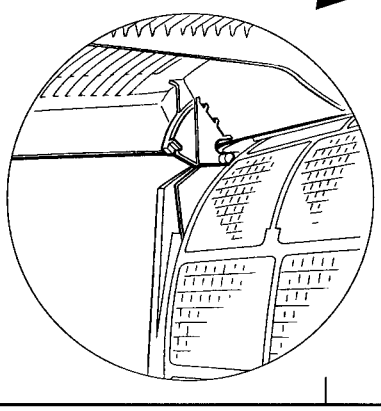
Procedure	Points
* Pull protrusions on left and right sides of front panel and open grille until it locks in position.	
① Slide down locking switch at the center of front grille and disjoin hinge.	
② Remove front grille from the unit.	* Lift front panel until a clicking sound is produced.

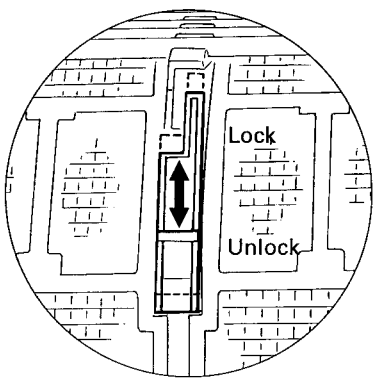


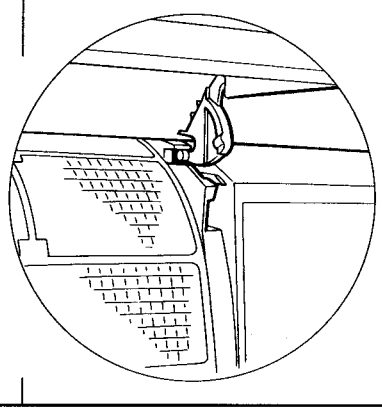








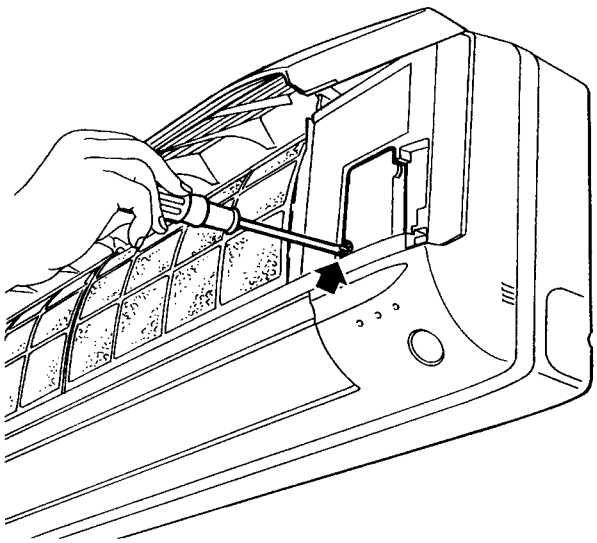


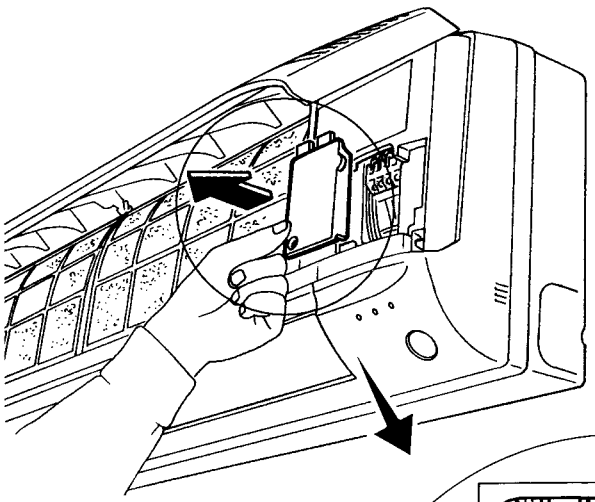


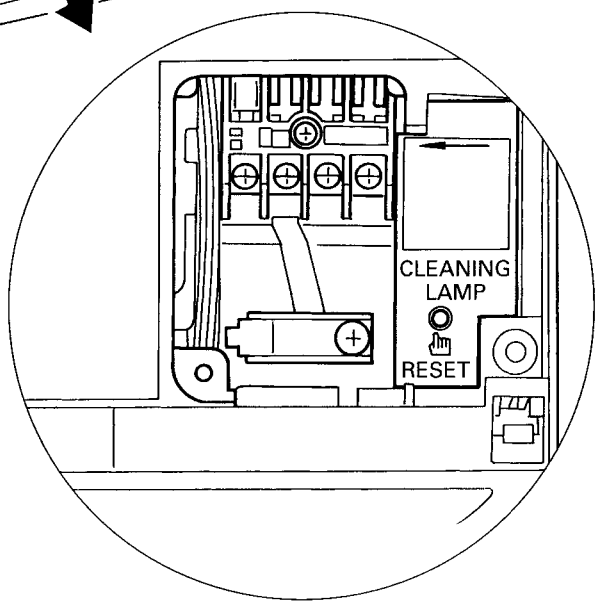
Opening and closing of service cover /
Changing settings at installation site

Warning! Be sure to turn off all power supplies before disarrangement work.

Procedure	Points
1. External features ① Remove service cover mounting screw. (M4× ℓ 12 black)	
② Take off cover by pulling down.	
2. Changing settings at installation site ① Filter sign can be reset.	



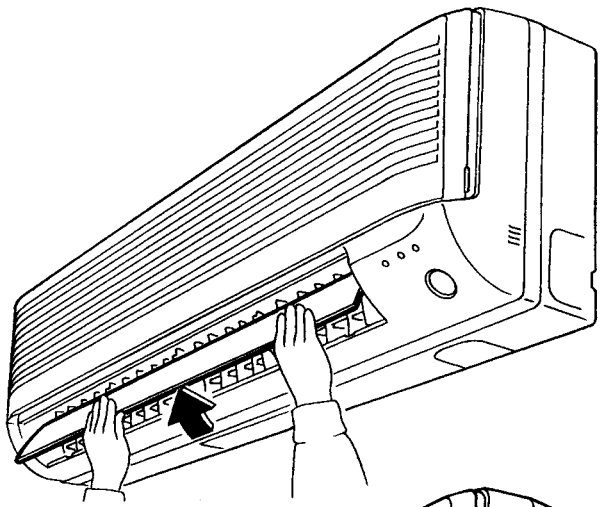


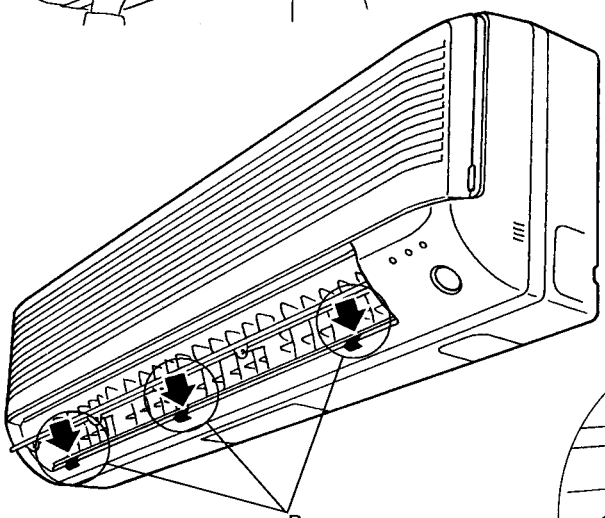


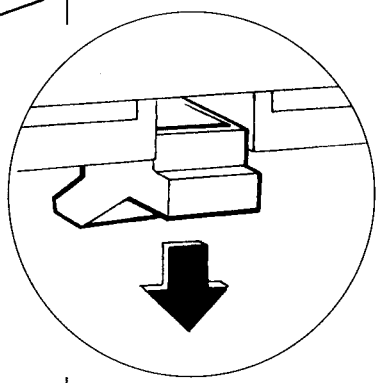
Removal of front panel (1/2)

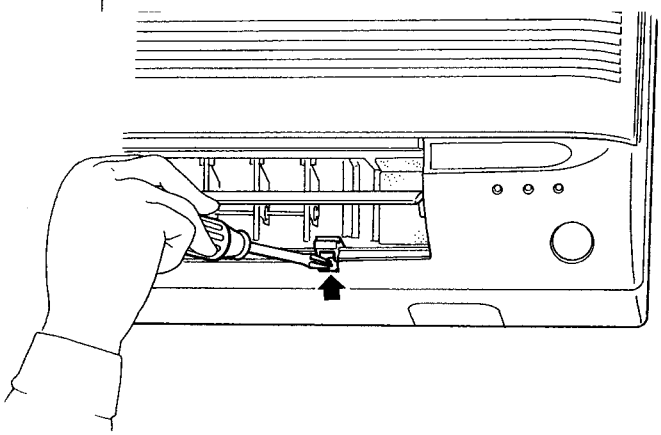
Warning! Be sure to turn off all power supplies before disarrangement work.

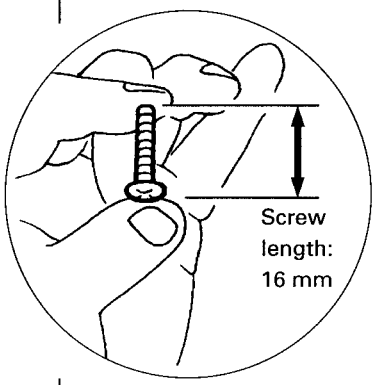
Procedure	Points
① Lift horizontal blade to open position.	
② Remove screw covers at three locations, then remove screws. (M4× ℓ 16×3 pcs.) Front cover can be now dismounted from the unit.	







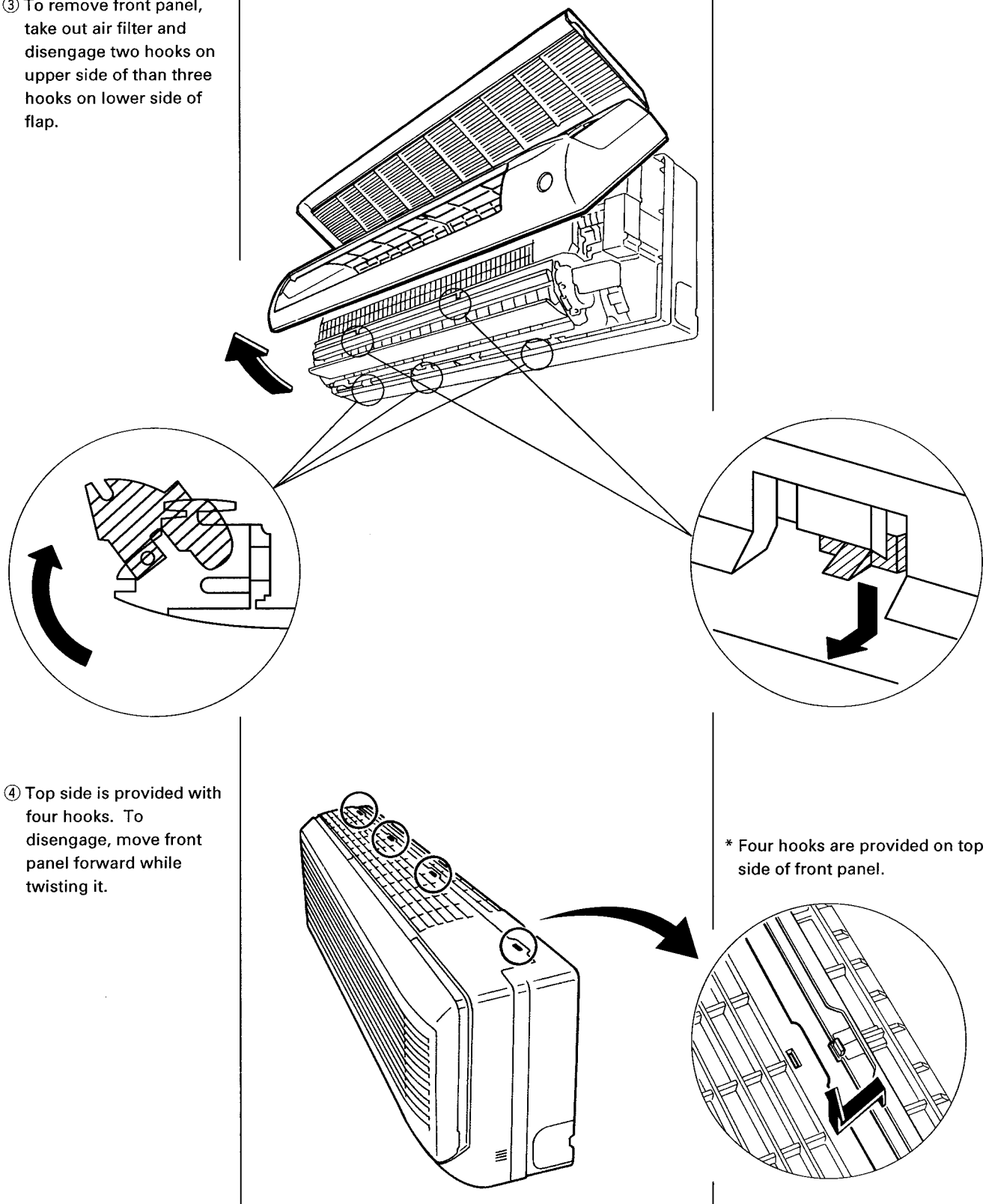




Removal of front panel (2/2)

Warning! Be sure to turn off all power supplies before disarrangement work.

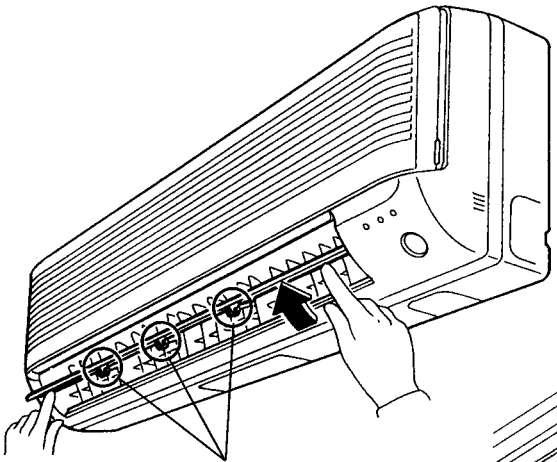
Procedure	Points
③ To remove front panel, take out air filter and disengage two hooks on upper side of than three hooks on lower side of flap.	
④ Top side is provided with four hooks. To disengage, move front panel forward while twisting it.	* Four hooks are provided on top side of front panel.

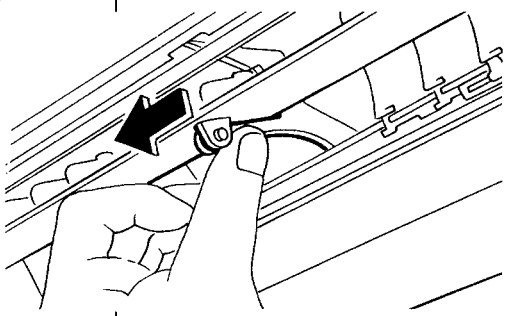


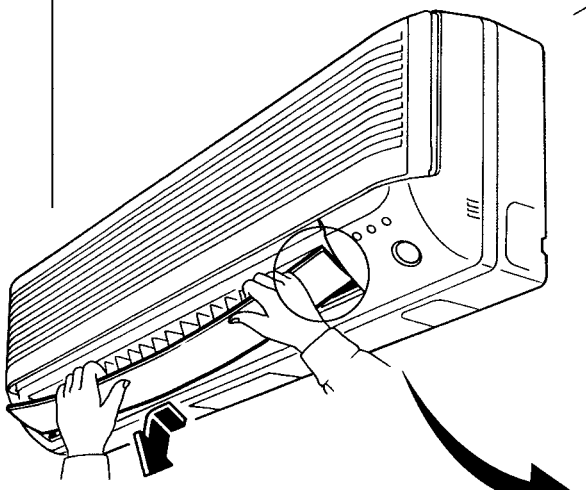
Removal of horizontal and vertical blades

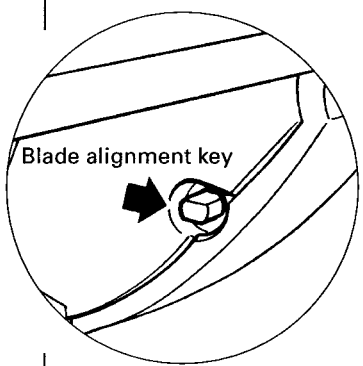
Warning! Be sure to turn off all power supplies before disarrangement work.

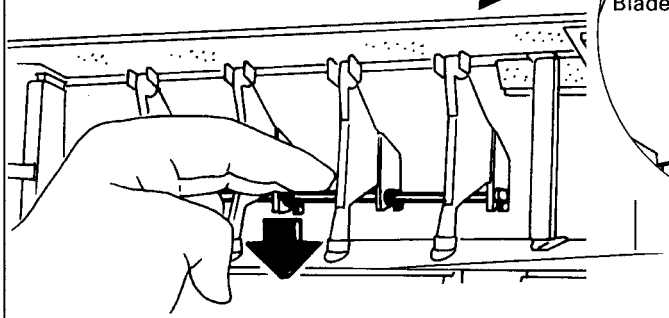
Procedure	Points
① Lift horizontal blade to open position. ② Disengage horizontal blade from three blade retaining sections. ③ Bend blade slightly and remove it from the unit. ④ Disengage vertical blades from bottom catch by bending them slightly. ⑤ Pull the vertical blades forward to remove.	* Re-installation ① Set blade onto the alignment key on right side first. ② Engage blade retaining sections at 3 locations.

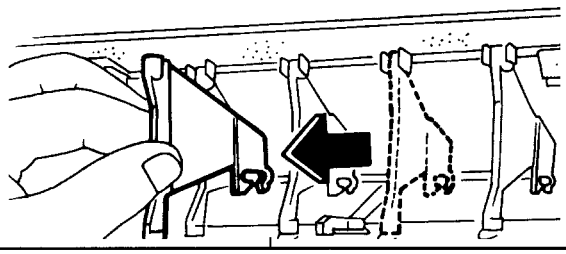






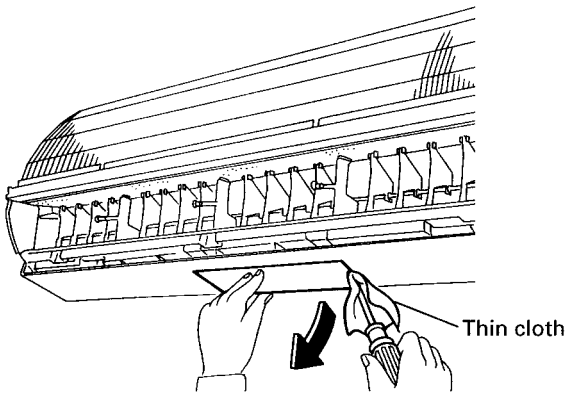
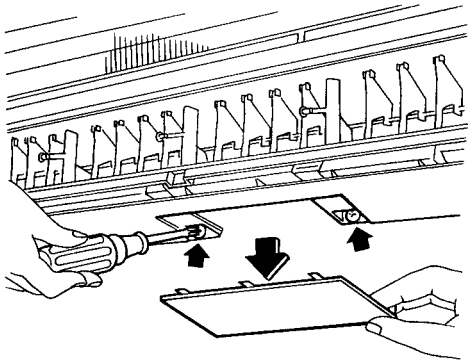
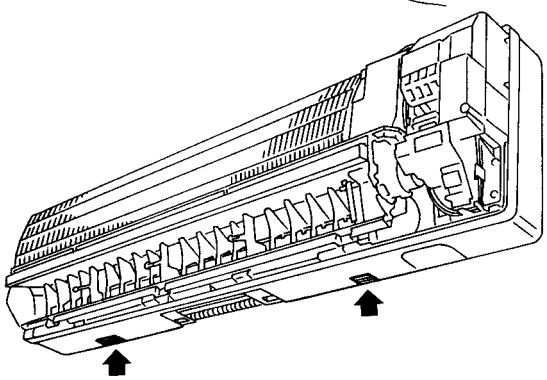
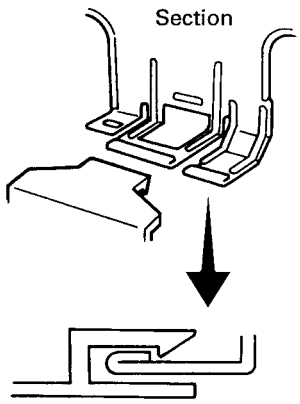
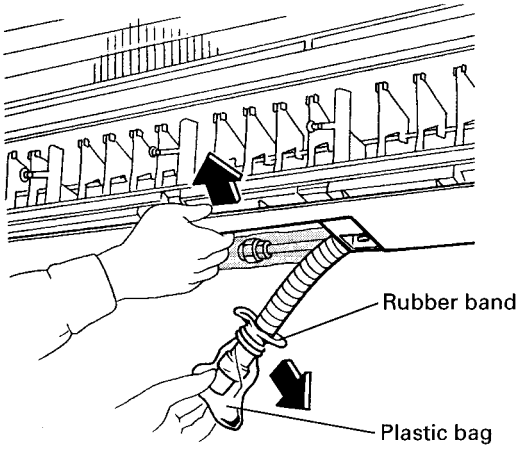






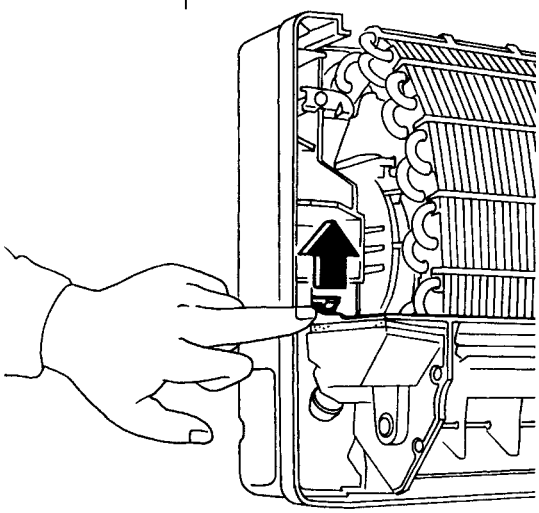
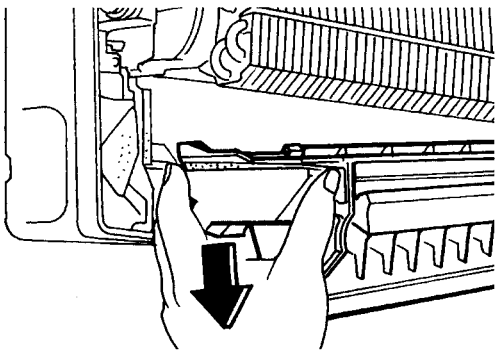
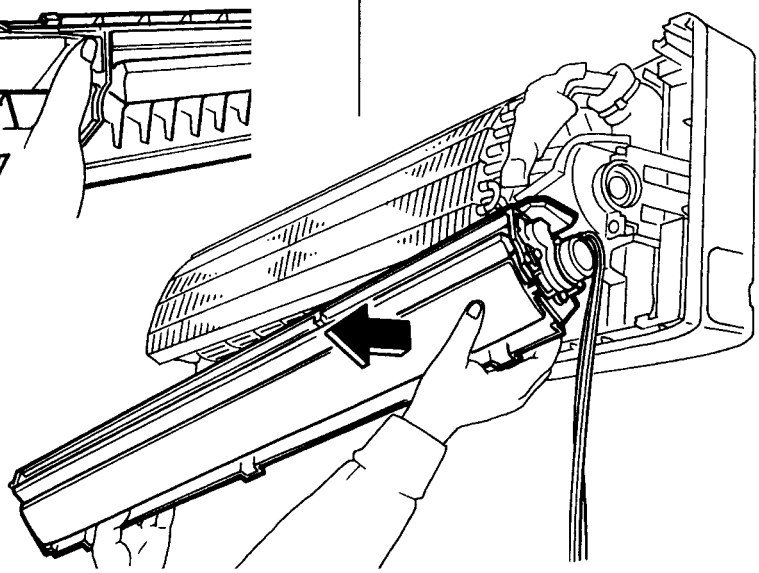
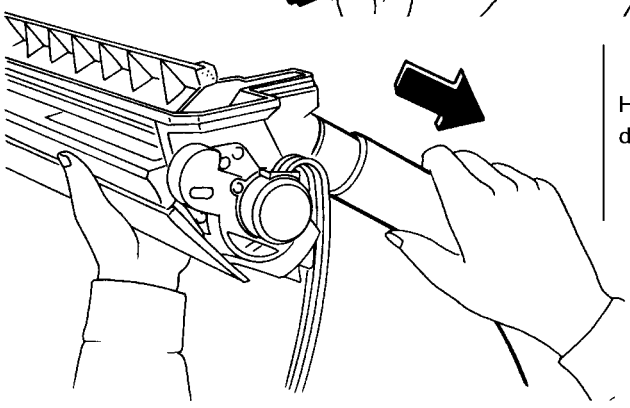
Removal of drain pan (1/2)

Warning! Be sure to turn off all power supplies before disarrangement work.

Procedure		Points
* Remove front grille. * Remove electrical box.		
① Remove bottom cover to access drain hose (for left-handed piping).		* Wrap a thin cloth around the tip of screwdriver, and pry open the cover. * This step is not necessary for backside piping.
② Remove two screws that secure bottom frame to mounting plate.		
③ Push two positions at lower part of the unit to disengage bottom frame hooks from mounting plate. Lift the unit slightly and pull out drain hose.		Listen to clicking sound to ensure secure mounting of parts. 
④ Lift the unit slightly and pull out drain hose.		* Be careful not to soil the floor with drain water.

Removal of drain pan (2/2)

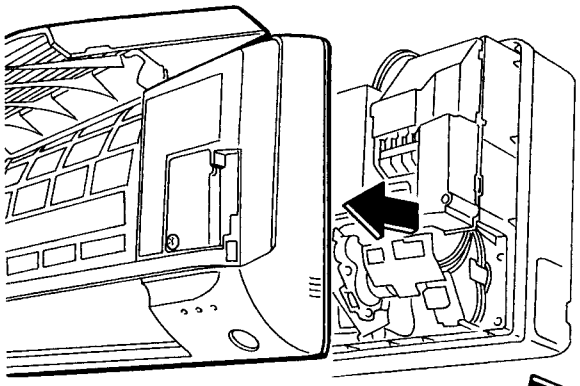
Warning! Be sure to turn off all power supplies before disarrangement work.

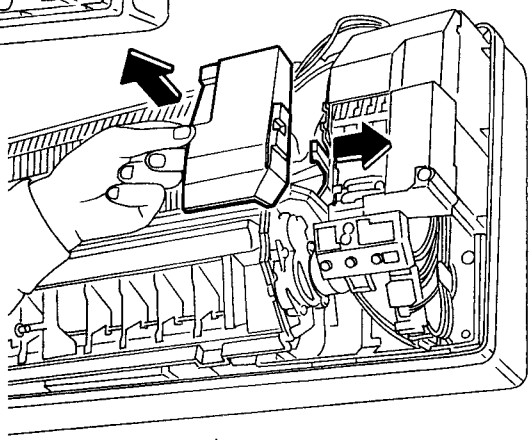
Procedure	Points
⑤ Disengage hook on left side.	
⑥ Dismount left side of drain pan from the unit.	
⑦ Dismount right side of drain pan from the unit.	
⑧ Disconnect drain hose.	 Warning! Hold the bottom of drain hose and disconnect drain hose.

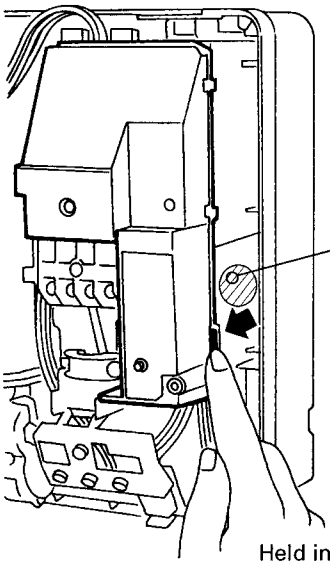
Removal of PC board (1/3)

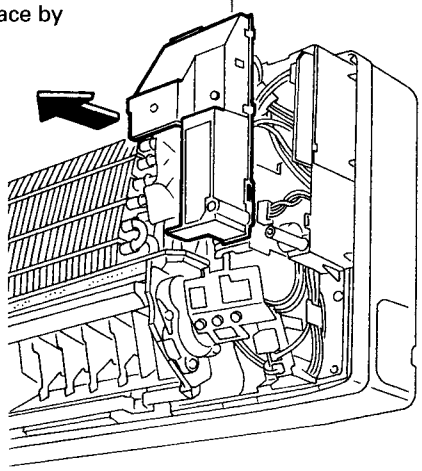
Warning! Be sure to turn off all power supplies before disarrangement work.

Procedure	Points
* Remove front panel.	
① Remove water-proofing plate. Cover can be removed by moving hook outward.	
② Electrical box cover is secured in position by two hook.	





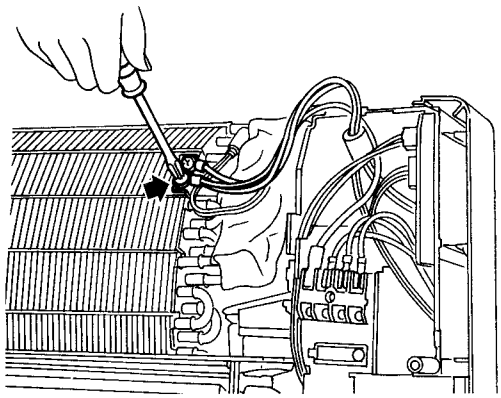


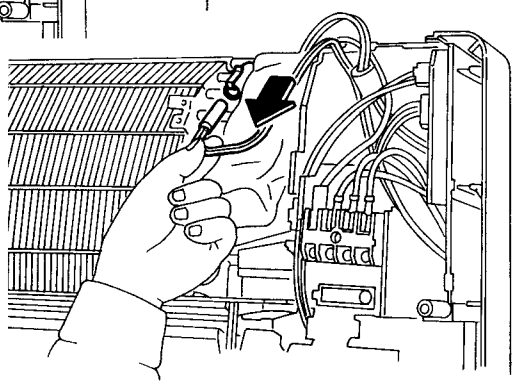


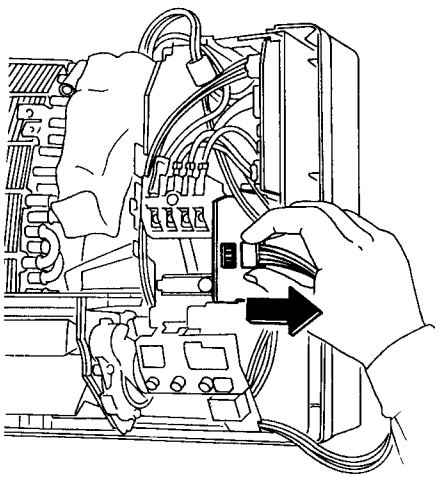
Removal of PC board (2/3)

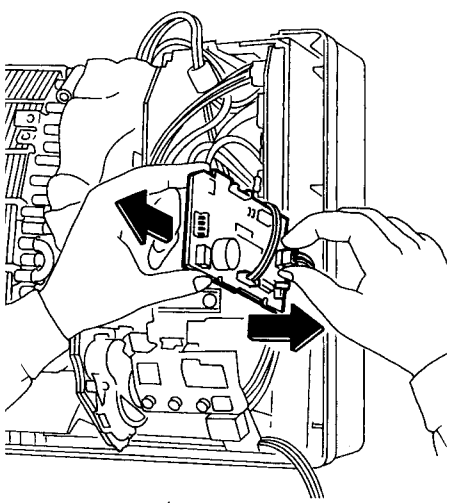
Warning! Be sure to turn off all power supplies before disarrangement work.

Procedure	Points
③ Disconnect earth wire.	
④ Disconnect heat exchanger thermistor.	
⑤ Disconnect swing motor wire harness. ⑥ Pull out printed circuit board, and unplug wire harness connector.	When disconnecting wire harness, pull out the connector holding terminal section of connector. Do not hold lead wire.
⑦ Remove P.C. Board.	

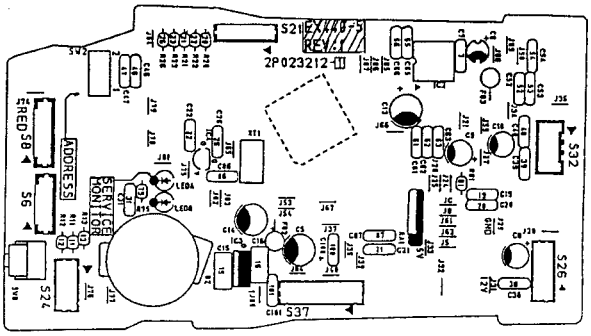
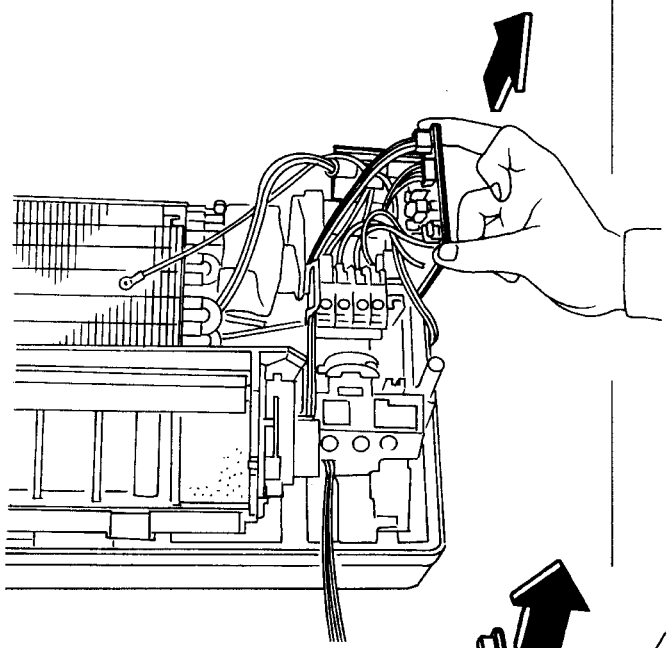
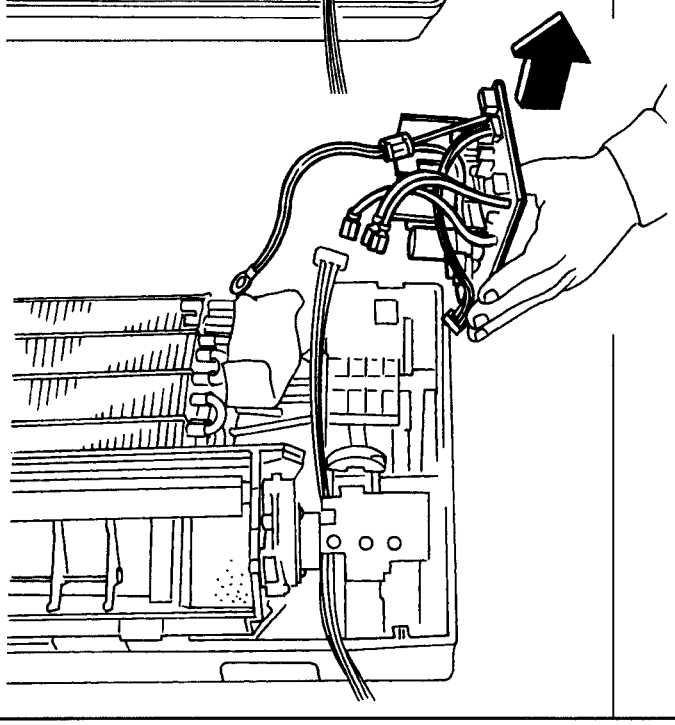








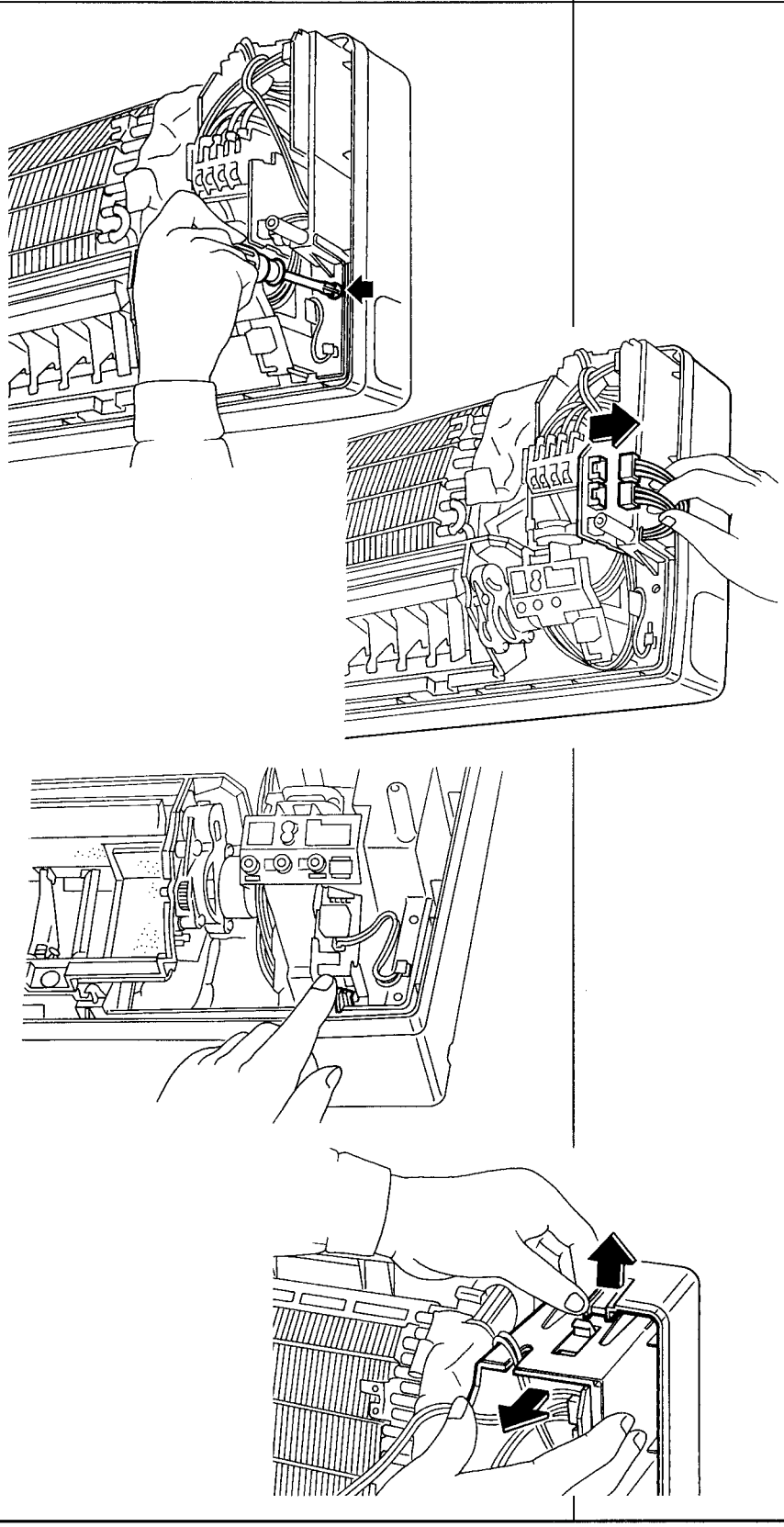
Removal of PC board (3/3)	**Warning! Be sure to turn off all power supplies before disarrangement work.**

Procedure		Points
⑧ Pull out power supply printed circuit board slightly.	 	
⑨ After disconnecting power supply terminal and motor wire harness, remove power supply printed circuit board. Fan motor : S1		

Removal of electrical parts box (1/2)

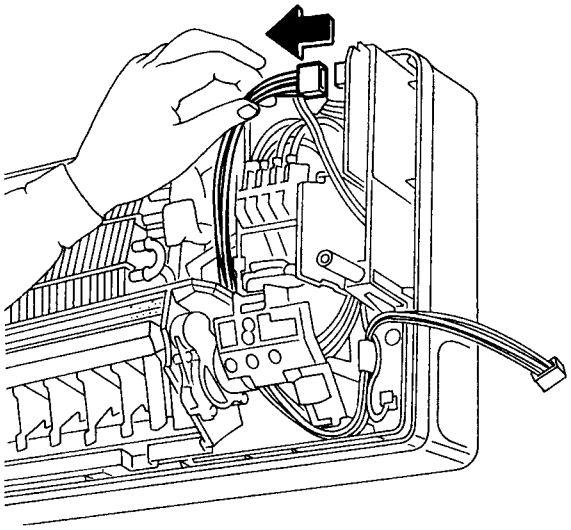
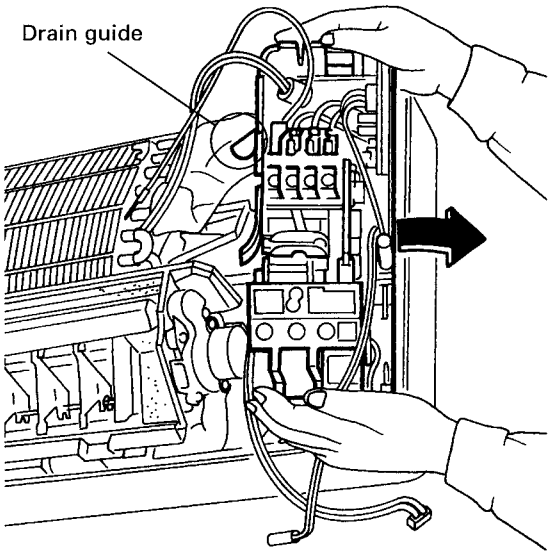
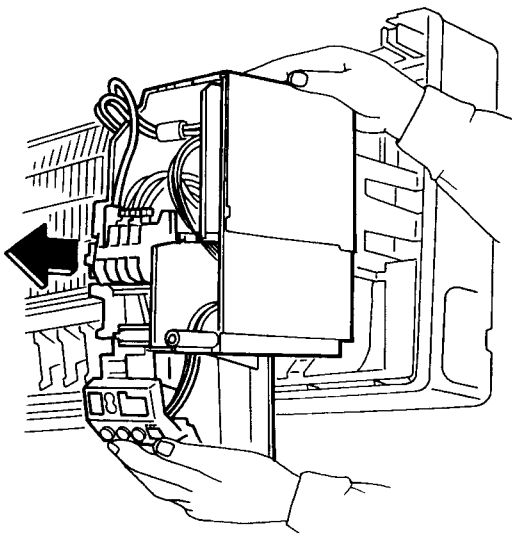
Warning! Be sure to turn off all power supplies before disarrangement work.

Procedure	Points
Remove thermistors, earth wire and connectors (S1, S6) ① Remove screw located at right lower side of electrical box. (M4× ℓ 16)	
② Disconnect swing motor wire harness.	
③ Lift up electrical parts box slighthy and disengage hook located at bottom side.	
④ Disengage hook located at top side.	



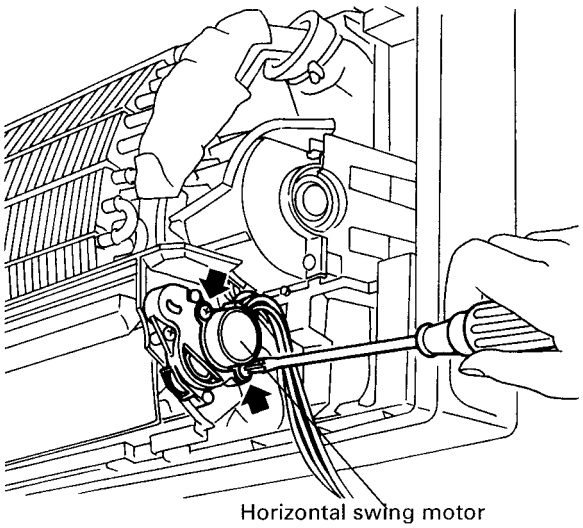
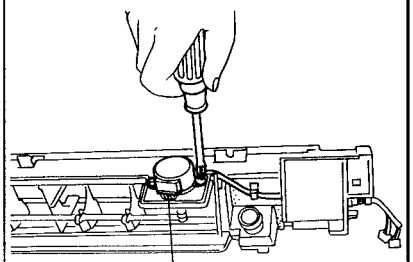
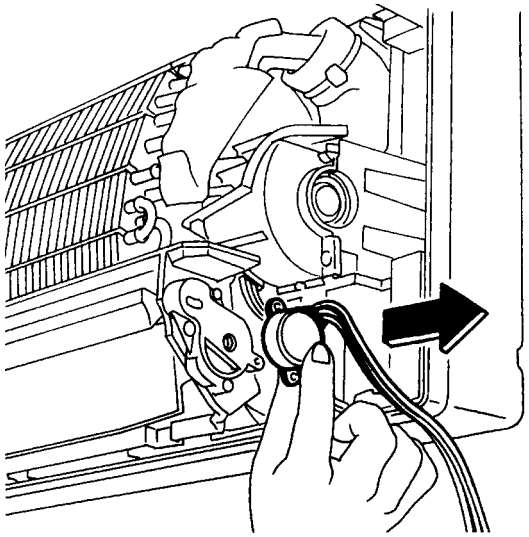
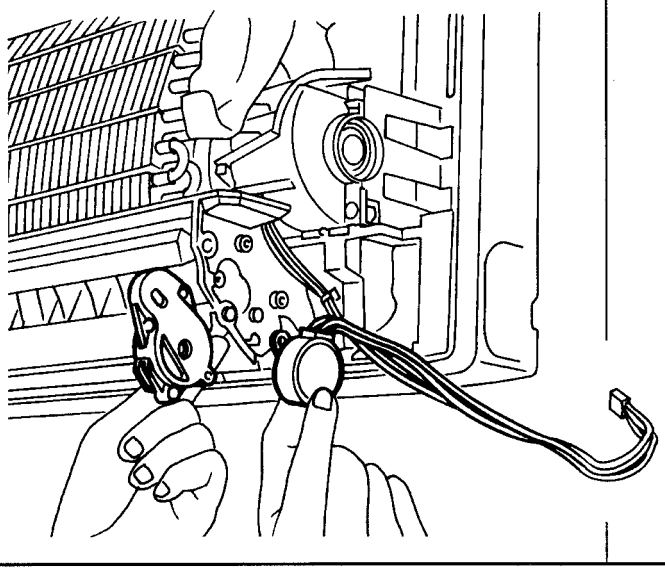
Removal of electrical parts box (2/2)

Warning! Be sure to turn off all power supplies before disarrangement work.

Procedure		Points
⑤ Unplug connector of fan motor wire harness. (S1)		
⑥ Move electrical box slightly to right, then pull out box forward.	 	Caution! Do not catch the putty on protrusion of drain guide in the flame protection panel.

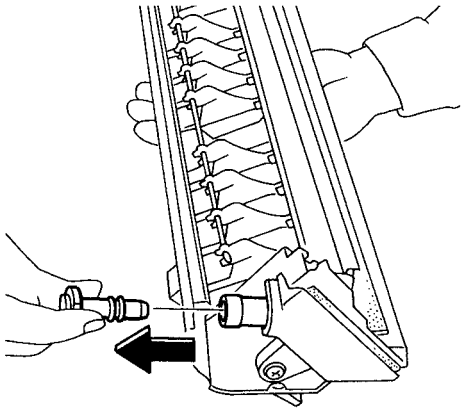
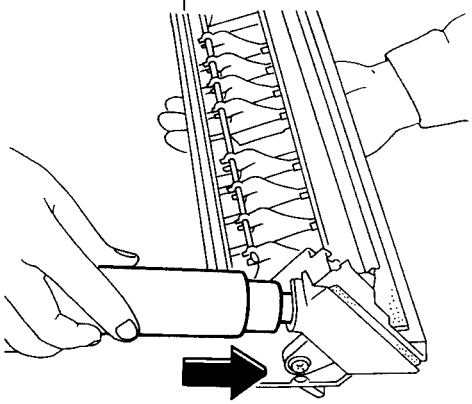
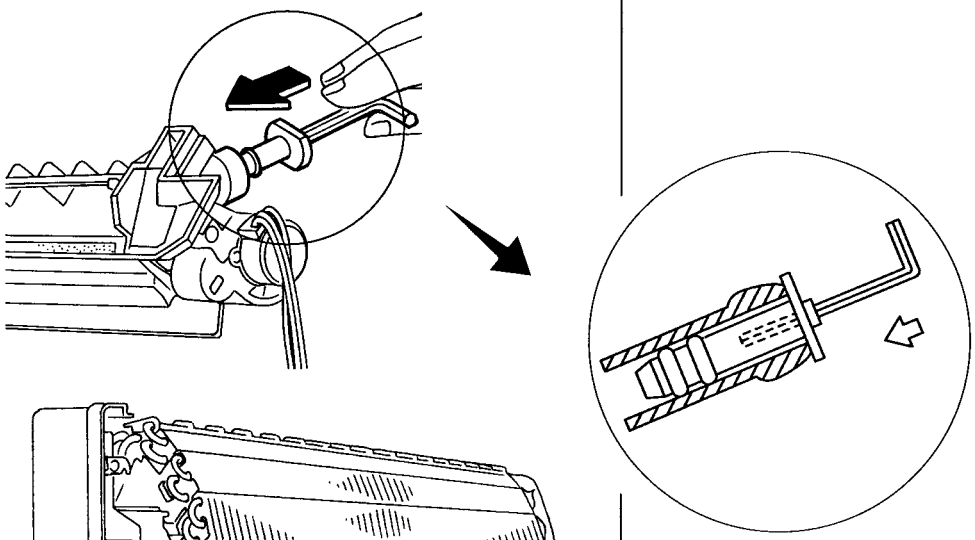
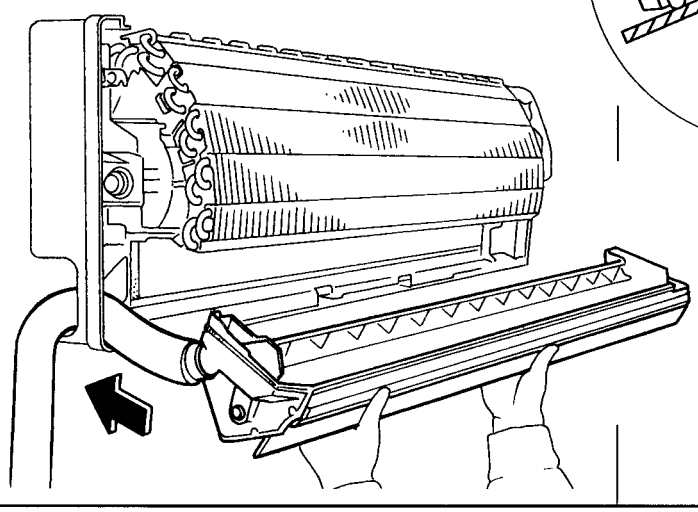
Removal of swing motor assembly

Warning! Be sure to turn off all power supplies before disarrangement work.

Procedure		Points
*Remove front panel. *Remove the electric parts box.		The number of motors varies depending on the model.
① Remove two screws holding horizontal swing motor in place. (M4× ℓ 8)	 Horizontal swing motor	 Vertical swing motor
② Remove two screws holding vertical swing motor in place.		
③ Remove two screws holding swing motor mechanism in place. (M4× ℓ 8)		

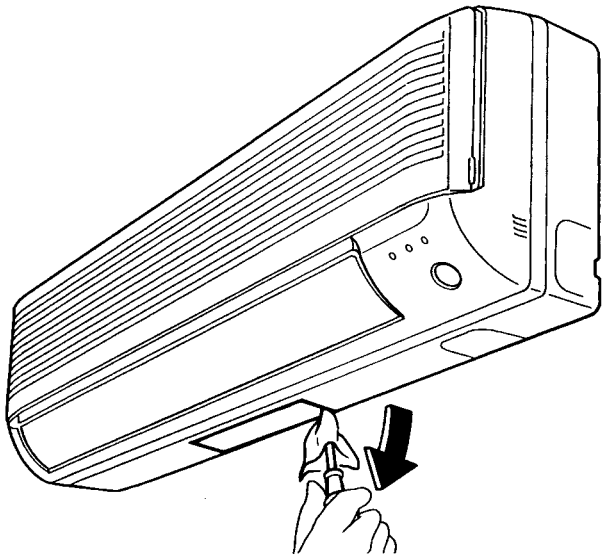
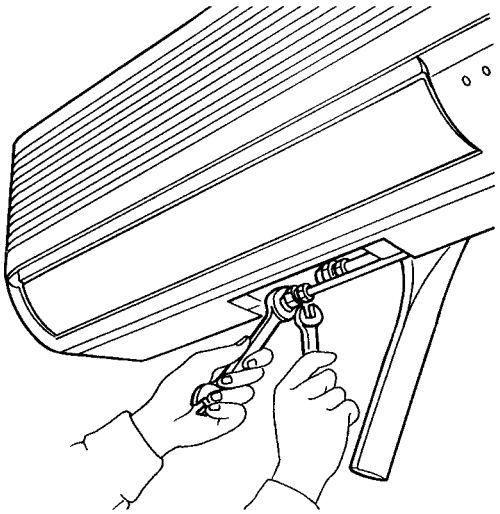
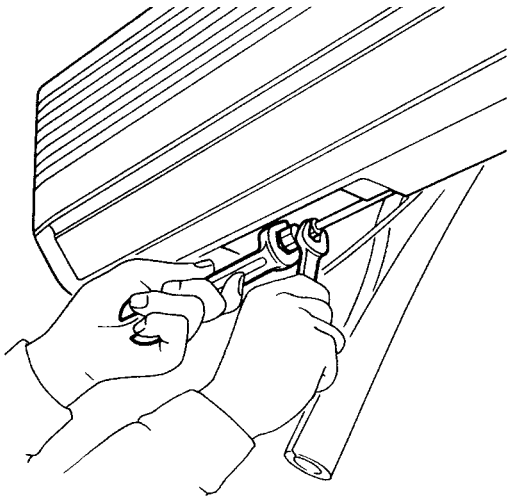
Piping of drain hose at left side

Warning! Be sure to turn off all power supplies before disarrangement work.

Procedure	Points
Remove drain pan. (Refer page 202, 203) ① Pull out drain plug located on left side of drain pan with fingers.	
② Insert drain hose.	Warning! Hold the bottom of drain hose and insert drain hose properly. 
③ Insert drain plug into the opening on right side, and press it in using hexagon wrench (4 mm).	
④ Place drain hose into left side of the unit, and mount drain pan. * Make sure to check draining the water properly.	

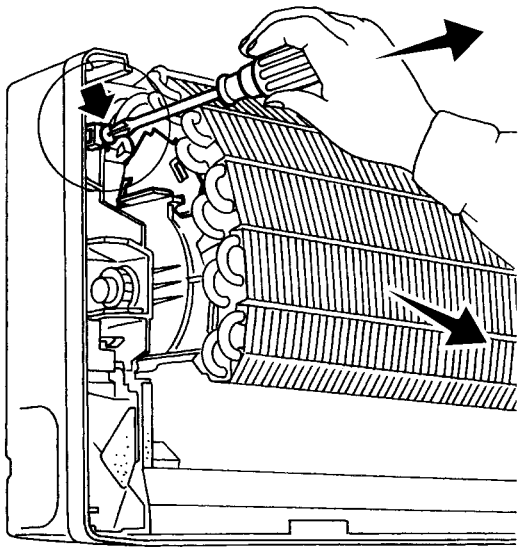
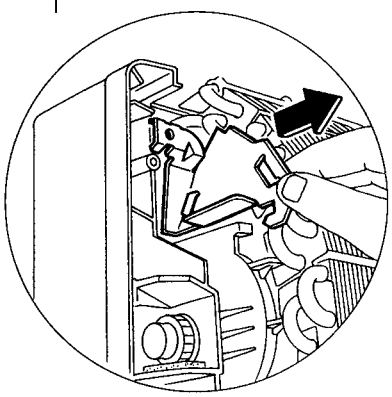
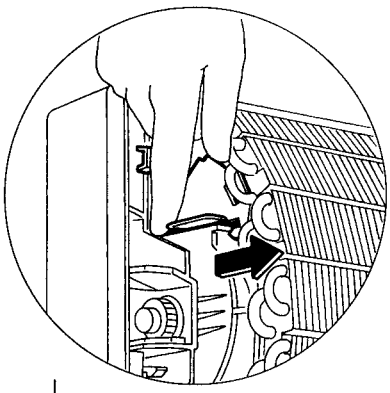
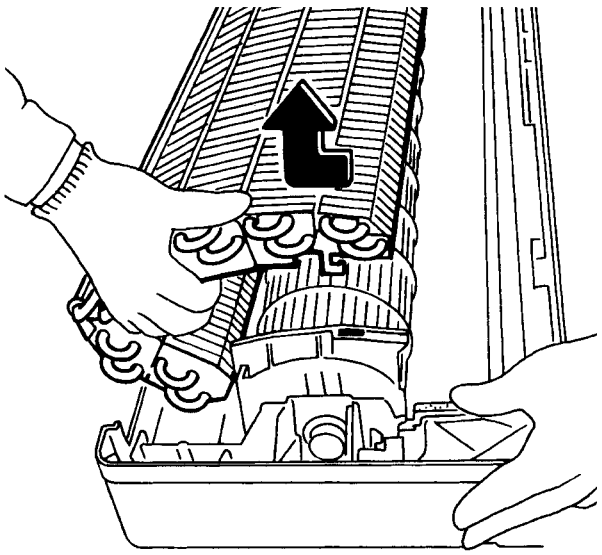
Removal of heat exchanger (1/5)

Warning! Be sure to turn off all power supplies before disarrangement work.

Procedure		Points
* Conduct pump-down operation. ① Remove bottom cover located at lower part of the unit and disconnect two screws. ② Push two positions at lower part of the unit to disengage bottom frame hooks from mounting plate. Lift the unit slightly. Refer page 202.		Warning! If gas leaks, repair the leak location, then collect all refrigerant from the unit. Conduct vacuum drying, and charge proper amount of refrigerant. Warning! Do not mix any gas (including air) other than the specified refrigerant (R22) into refrigerating cycle. (Mixing of air or other gas causes abnormal temperature rise in refrigerating cycle, and this results in pipe rupture or personal injuries.)
③ Remove insulation tube, and disconnect liquid pipe at the flare.		* Use two wrenches to disconnect pipe. * Be careful not to scratch the wall.
④ Disconnect gas pipe at the flare.		* After pipes are disconnected, close all pipe openings with caps to prevent dust and moisture from entering pipes.

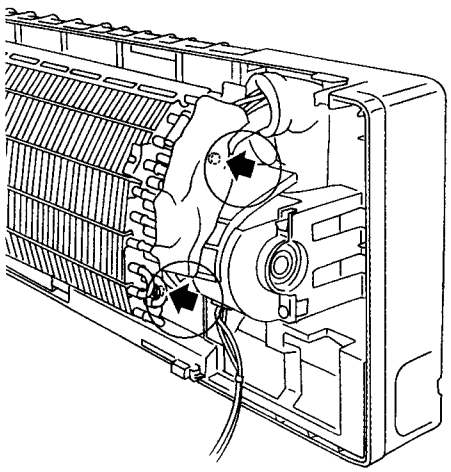
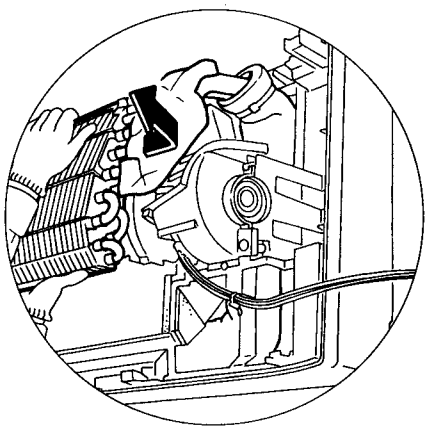
Removal of heat exchanger (2/5)

Warning! Be sure to turn off all power supplies before disarrangement work.

Procedure	Points
* For removal of front grille, drain pan, electrical box and other parts, see reference pages.	
1. Lifting heat exchanger ① Remove screw holding heat exchanger mounting plate in place.	  
② While raising heat exchanger, pull it forward and disengage hooks. ③ Lift heat exchanger.	
	Caution! When removing or re-installing heat exchanger, be sure to wear protective gloves or wrap heat exchanger with cloths. (Fins can cut fingers.)

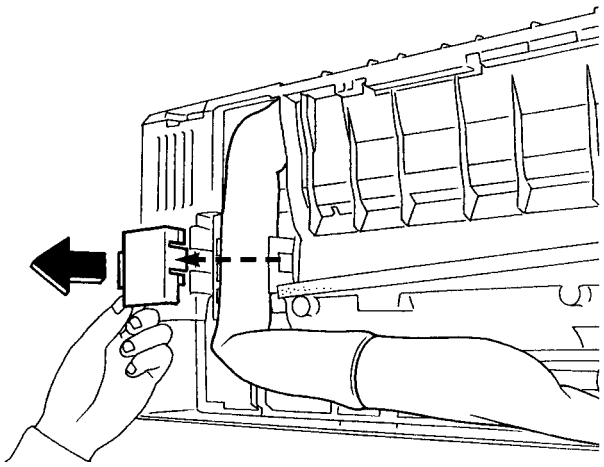
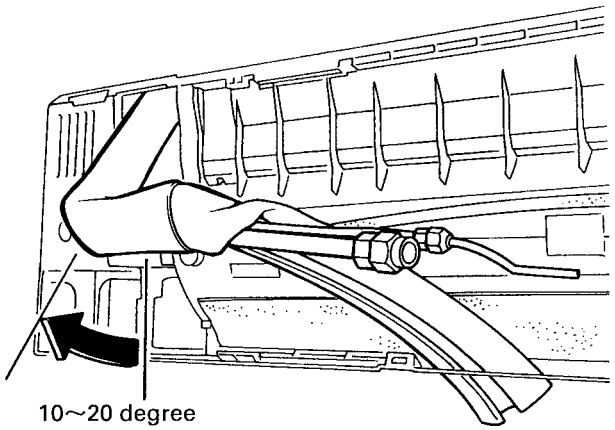
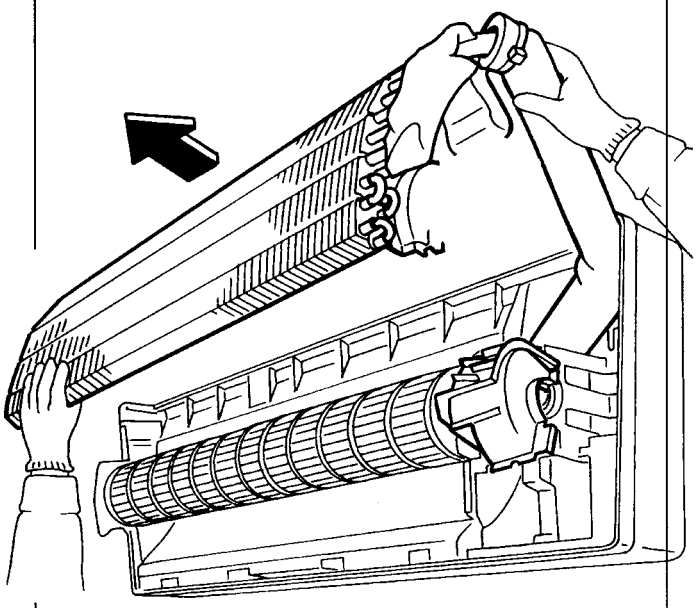
Removal of heat exchanger (3/5)

Warning! Be sure to turn off all power supplies before disarrangement work.

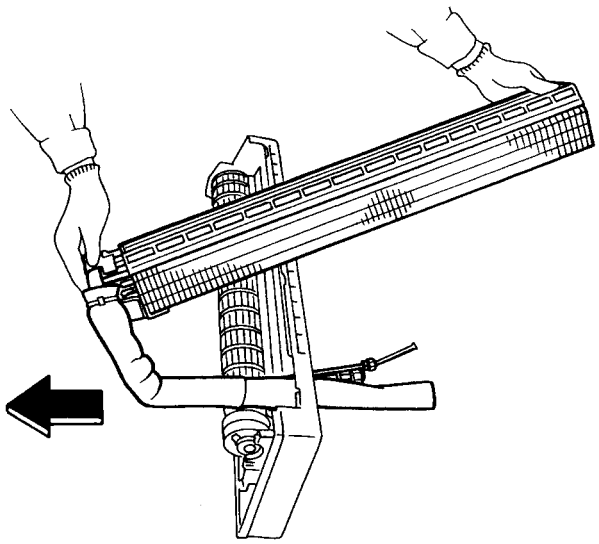
Procedure		Points
2. Remove the heet exchange from the right side plate. ① There are hooks on right side plate.	 	

Removal of heat exchanger (4/5)

Warning! Be sure to turn off all power supplies before disarrangement work.

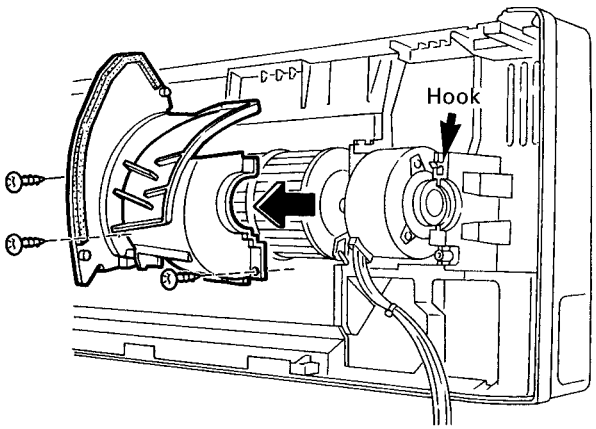
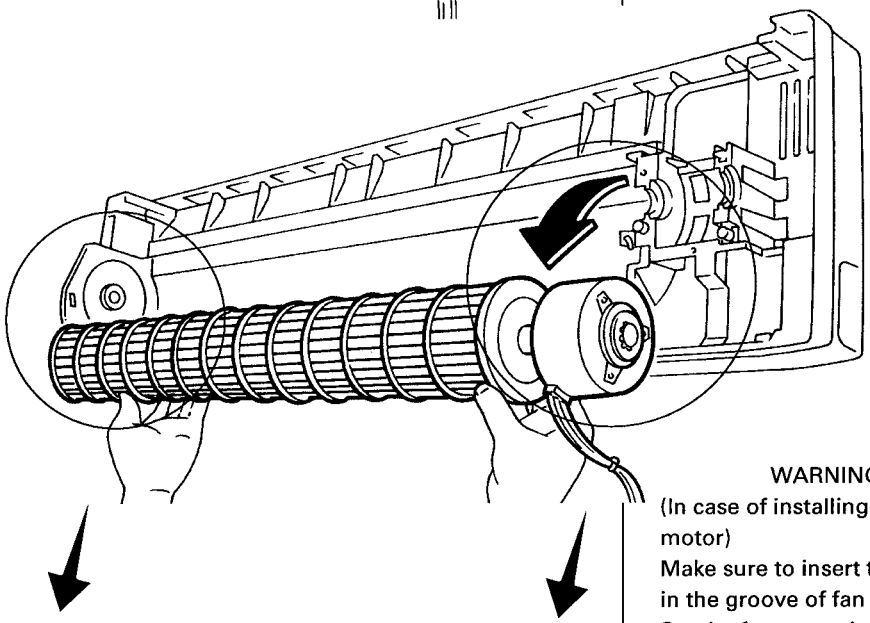
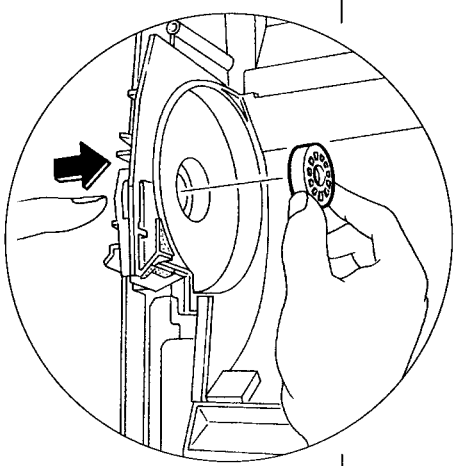
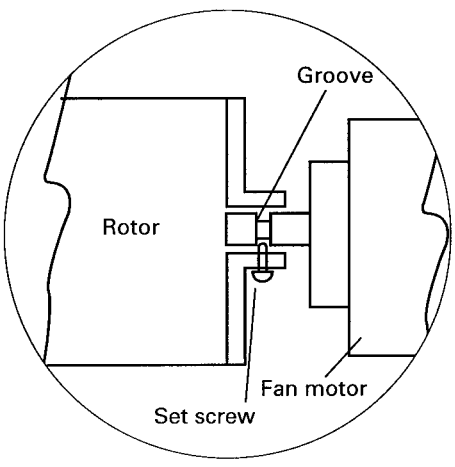
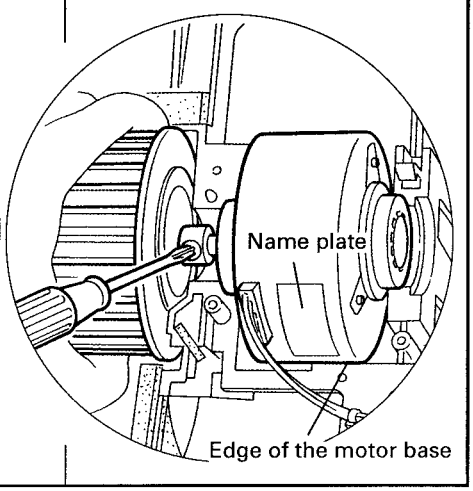
Procedure	Points
3. Loosening pipe retaining plate ① Disengage hook on pipe retaining plate.  ② Pull auxiliary pipe forward to an angle of 10 to 20 degree.  ③ Pull out heat exchanger toward front. 	* Be careful to prevent pipe deformation.

Removal of heat exchanger (5/5)	**Warning! Be sure to turn off all power supplies before disarrangement work.**

Procedure		Points
④ Pull out the heat exchanger along the pipe from the unit.		Warning! Do not mix any gas (including air) other than the specified refrigerant (R22) into refrigerating cycle. (Mixing of air or other gas causes abnormal temperature rise in refrigerating cycle, and this results in pipe rupture or personal injuries.) Warning! If gas leaks, repair the leak location, then collect all refrigerant from the unit. Conduct vacuum drying, and charge proper amount of refrigerant. Caution! When removing or re-installing heat exchanger, be sure to wear protective gloves or wrap heat exchanger with cloths. (Fins can cut fingers.)

Removal of fan rotor and motor

Warning! Be sure to turn off all power supplies before disarrangement work.

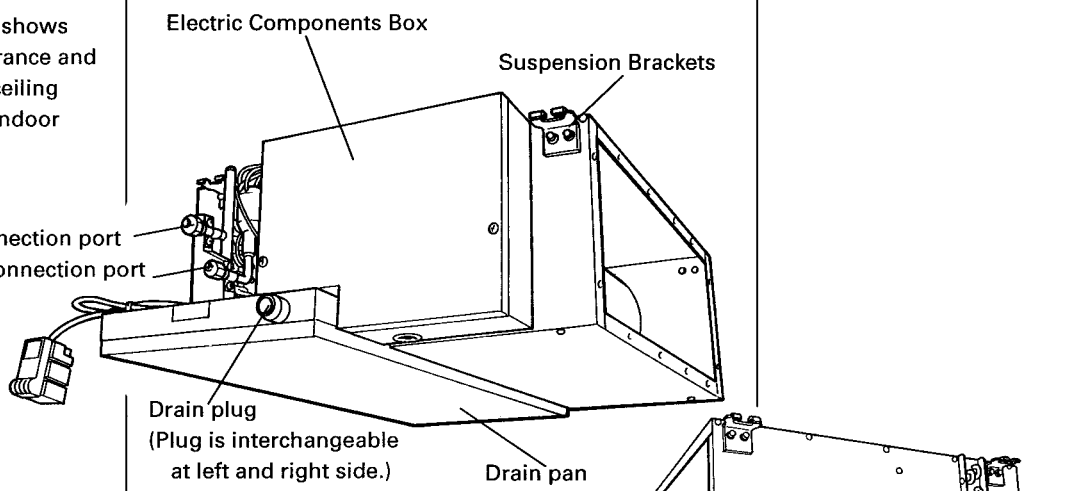
Procedure	Points
* Remove front panel, drain pan,electrical parts box and heat exchanger from the unit. ① Remove three screws on right side panel.	
② Remove fan rotor and motor together from the unit.	
③ Loosen the hexagon head set screw on the fan rotor,and remove the motor. ⊕ screwdriver can be also used.	
④ Press the bearing with finger from the outside to remove it.	WARNING (In case of installing fan rotor and motor) Make sure to insert the set screw in the groove of fan motor shaft. Set the fan motor in right. * Set the bottom of motor name plate to the edge of motor base.
	
	

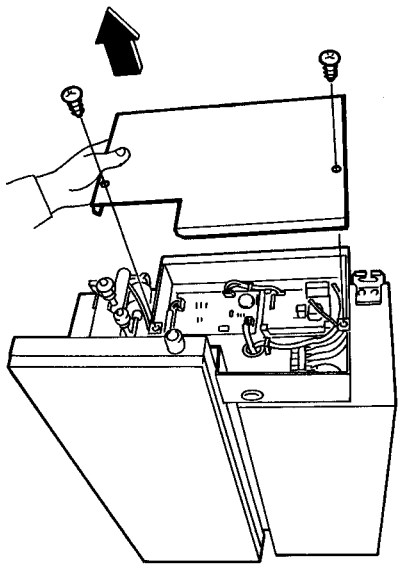
(3) For CDK25~60H Series and CDX25~60H Series

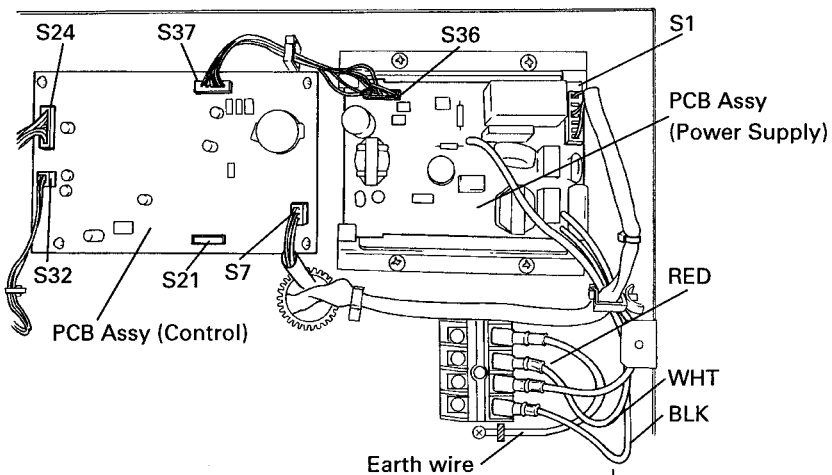
External appearance and removal of electrical box cover

Warning! Be sure to turn off all power supplies before disarrangement work.

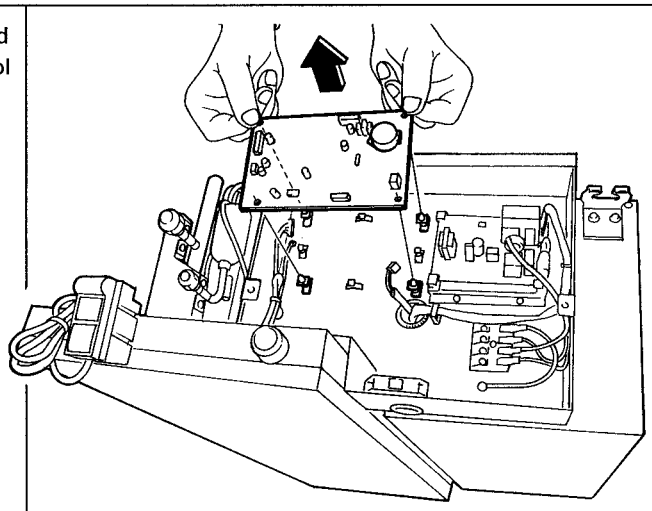
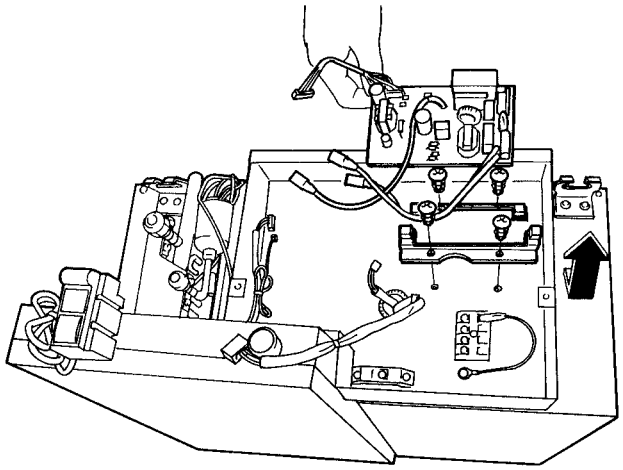
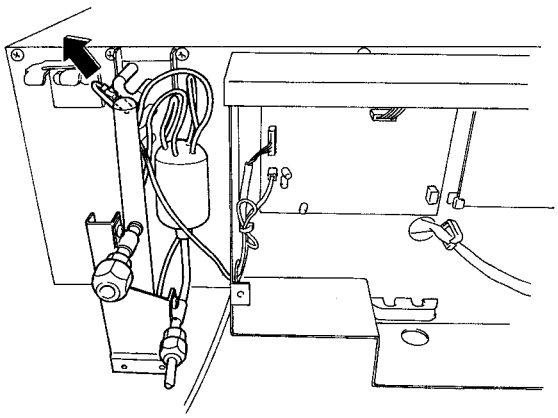
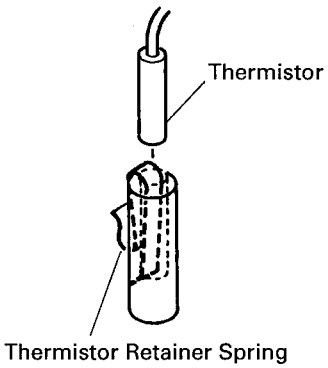
Procedure	Points
① The illustration shows external appearance and parts name of ceiling mounted type indoor unit.	
② Remove two screws to remove electrical box cover.	
③ Procedure of PCB connection with wire harness and parts name are shown in the illustration on the right.	Terminal strip of CDX(K) - HVET model consists with three terminals.





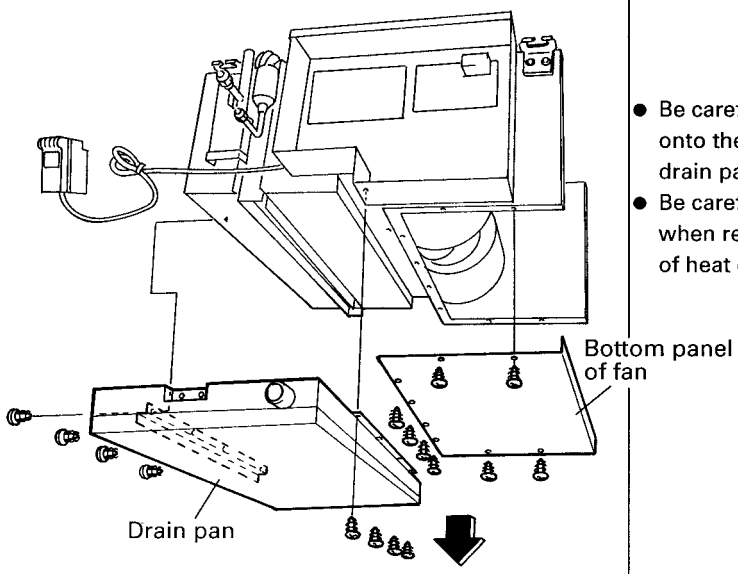
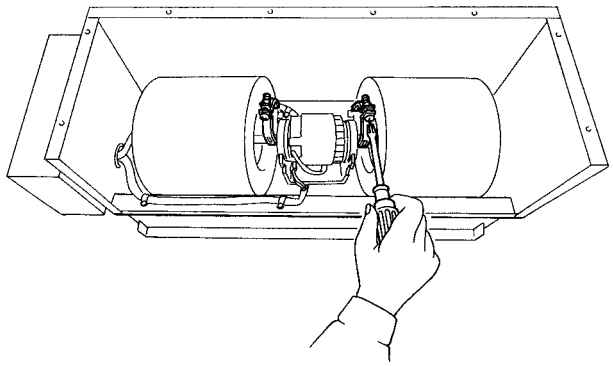
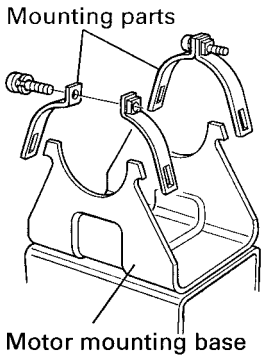
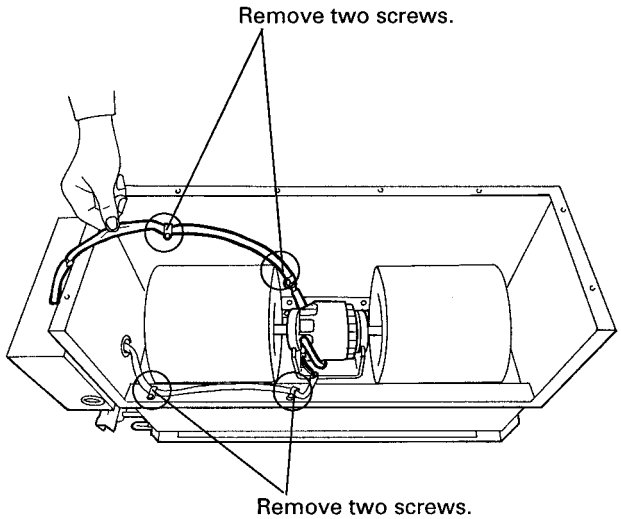


Removal of PCB and heat exchanger thermistor	**Warning! Be sure to turn off all power supplies before disarrangement work.**

Procedure		Points
① Remove four locking card spacers to remove control PCB.		
② Remove two screws of mounting parts to remove power supply PCB.		Be careful not to lose thermistor retaining spring.
③ Remove heat exchanger thermistor.		

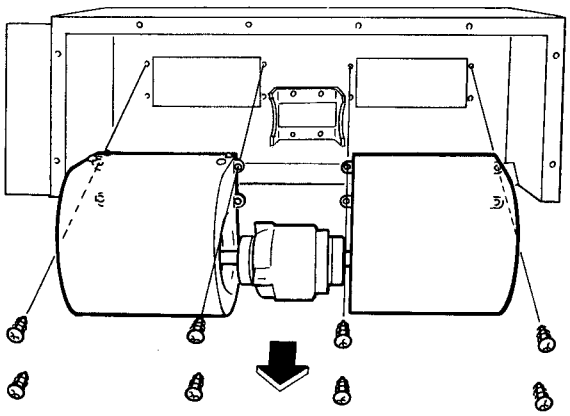
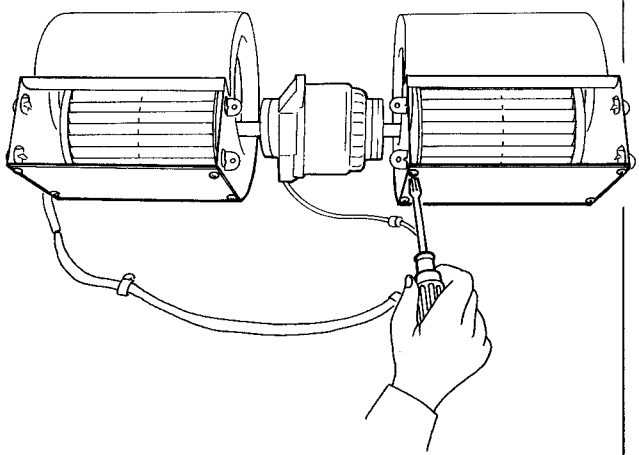
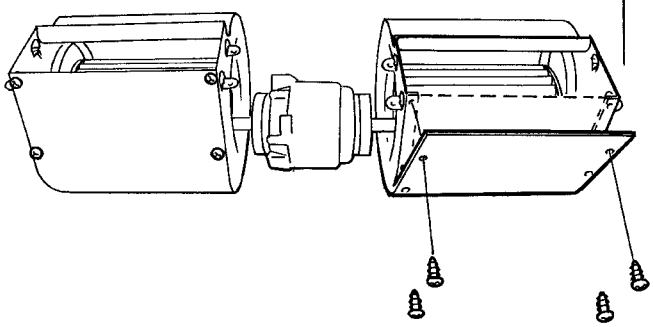
Removal of drain pan and fan motor

Warning! Be sure to turn off all power supplies before disarrangement work.

Procedure		Points
① Remove eight screws to remove bottom panel. Remove eight screws to remove drain pan.		● Be careful not to spill drain water onto the floor during removal of drain pan. ● Be careful not to fall drain pan when removing the bottom panel of heat exchanger.
② Remove two mounting parts of fan motor.		
③ Disconnect wire harness.		● Be sure to check the motors are reinstalled in correct position when reassembling work.

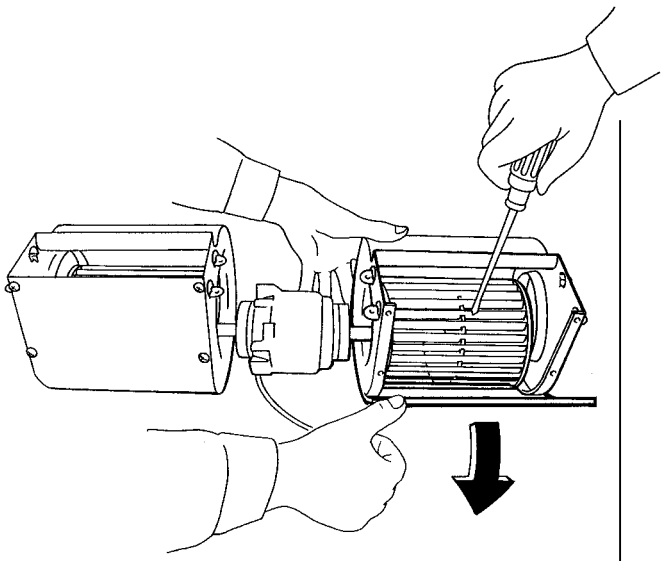
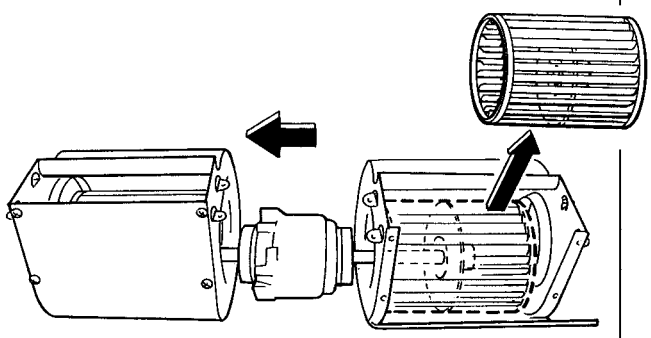
Removal of fan motor and fan rotor (1/2)

Warning! Be sure to turn off all power supplies before disarrangement work.

Procedure		Points
① To remove fan assembly, remove eight screws and pull forward.		For safety, this service work should be done by two persons. **Caution!** When removing or reinstalling heat exchanger, be sure to wear protective gloves or wrap heat exchanger with cloths. (Fins can cut fingers.)
② To remove fan housing, remove four screws.	 	

Removal of fan motor and fan rotor (2/2)

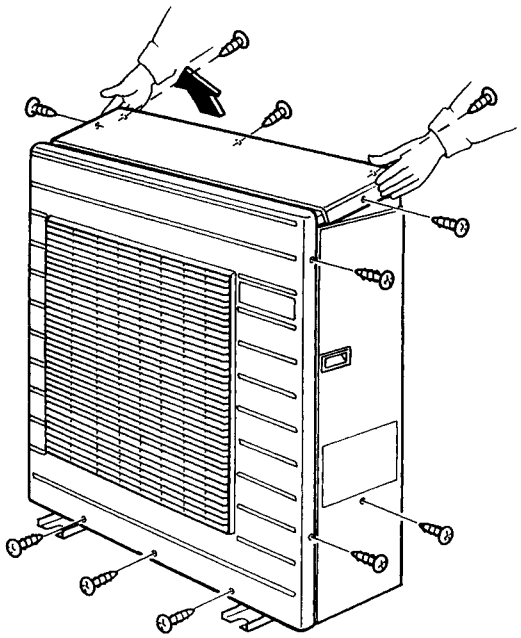
Warning! Be sure to turn off all power supplies before disarrangement work.

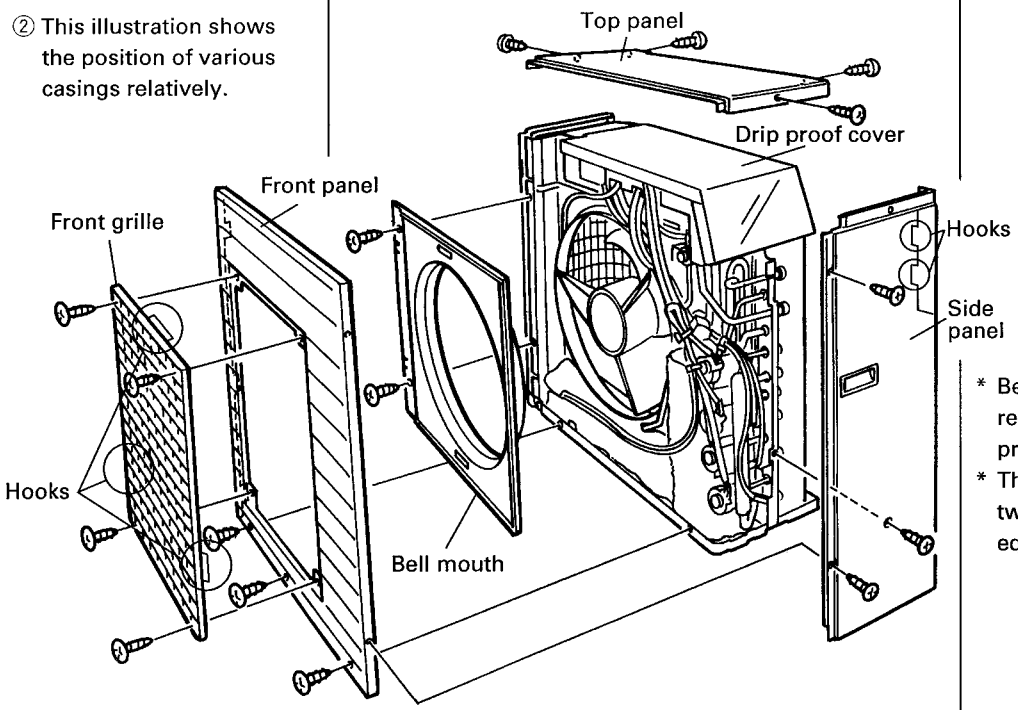
Procedure		Points
③ Loosen boss screws using hexagon wrench and open fan housing.		
④ Slide fan motor to left side and remove fan rotor. ⑤ Remove another fan rotor by using the same way before removing fan motors.		

(4) Outdoor Unit for all models

Removal of outer panels (1/2)	**Warning! Be sure to turn off all power supplies before disarrangement work.**

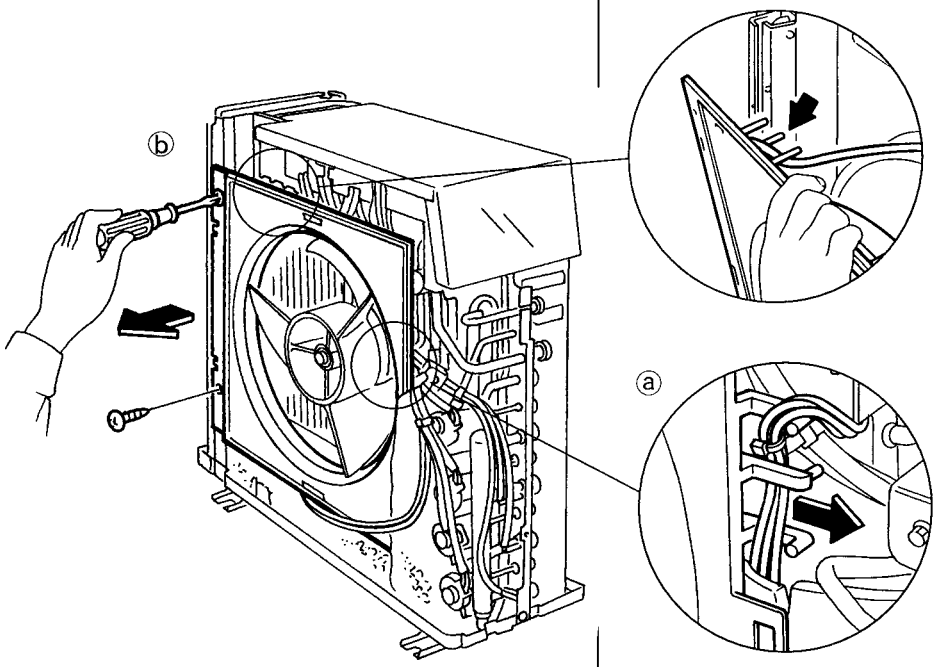
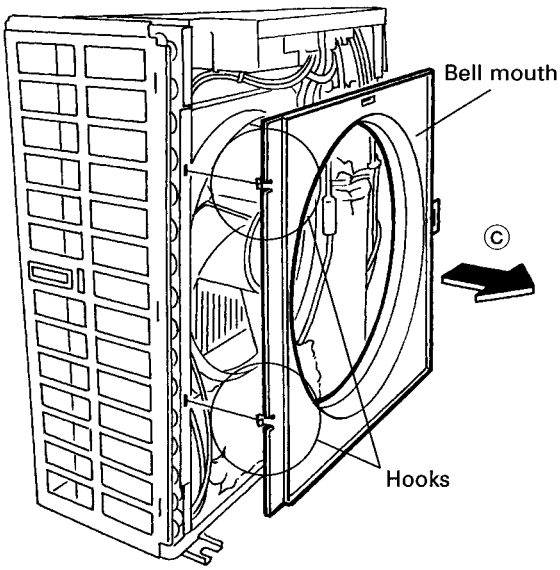
Procedure	Points
① To disconnect top panel, remove four mounting screws.	* Top panel can be removed individually.
② This illustration shows the position of various casings relatively.	* Be careful not to forget reinstalling, lose or break the drip proof cover. * Three hooks on front panel and two hooks on right side panel are equipped.





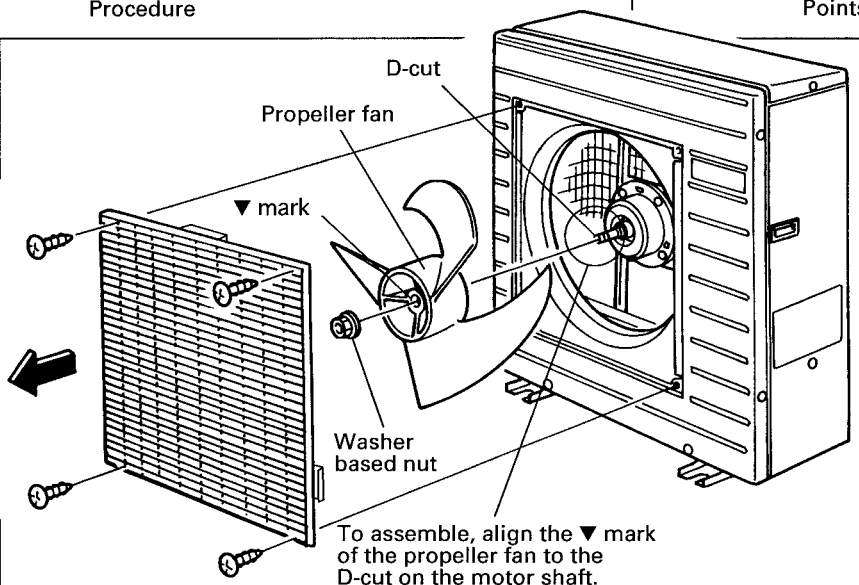
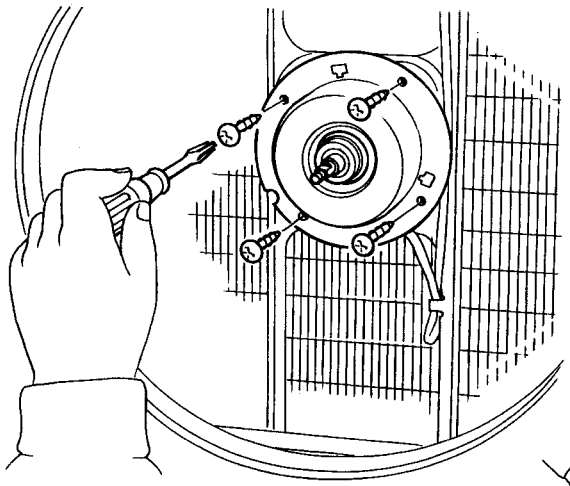
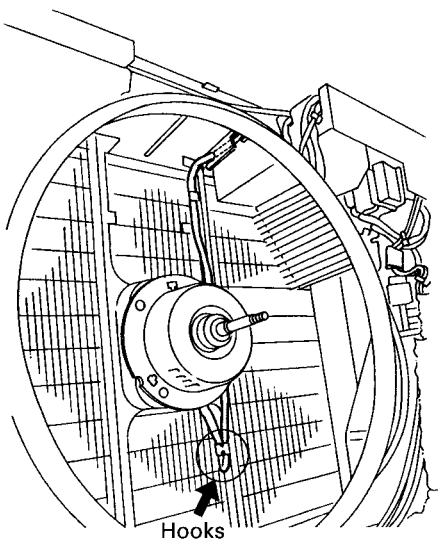
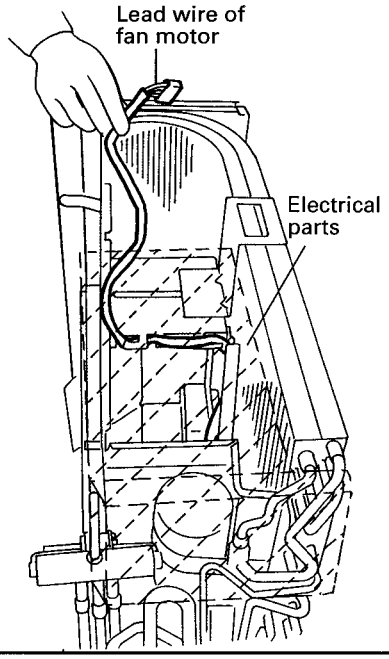
Removal of outer panels (2/2)

Warning! Be sure to turn off all power supplies before disarrangement work.

Procedure		Points
③ How to remove bell mouth ⓐ Unclamp lead wire at right side of compressor. ⓑ Remove two screws. ⓒ Disengage two hooks at left side	 	**Warning!** Do not touch the charged part in which high voltage remains for about 15 minutes after power-supply is turned off.

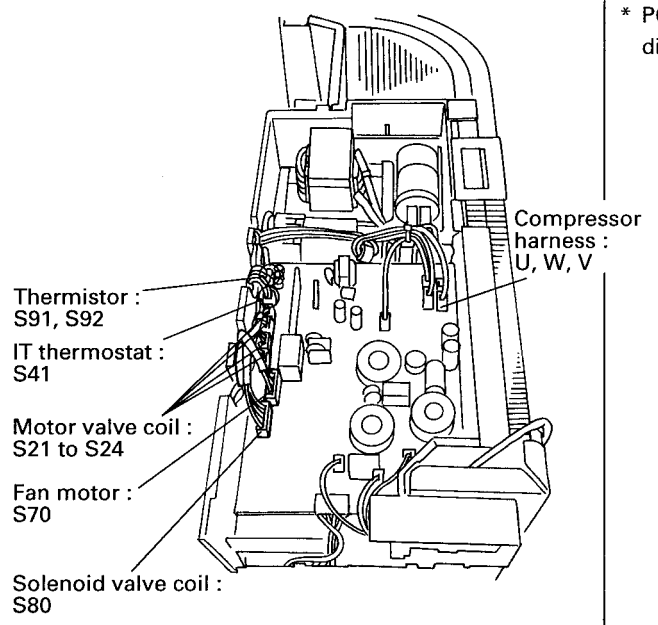
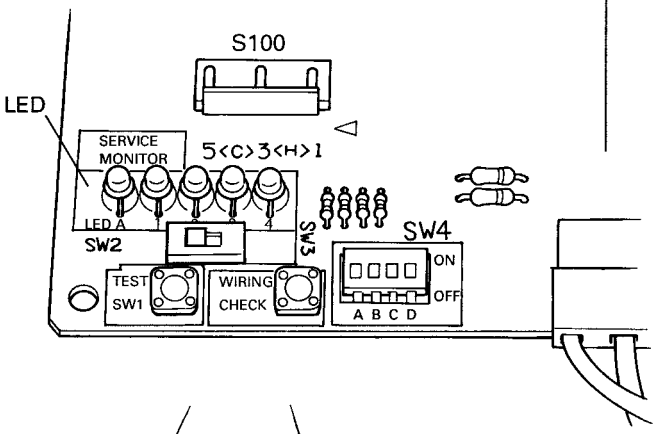
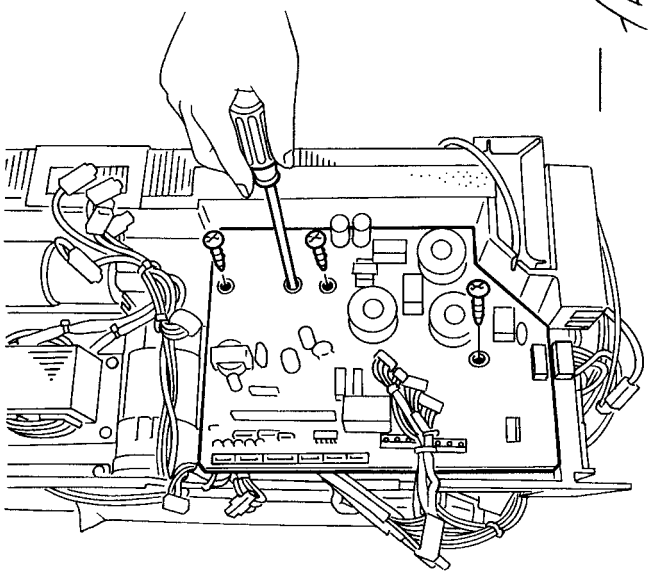
Removal of propeller fan motor

Warning! Be sure to turn off all power supplies before disarrangement work.

Procedure	Points
* Remove front grille to disconnect propeller fan. ① Dismount four mounting screws to remove front grille. ② Remove washer based nut to disconnect propeller fan.	
* Casings, bell mouth and electrical parts box should be removed before removing fan motor. ③ Remove four mounting screws to dismount fan motor.	
④ Open clamping claw to unclamp lead wire of fan motor.	 

Removal of PCB (1/2)

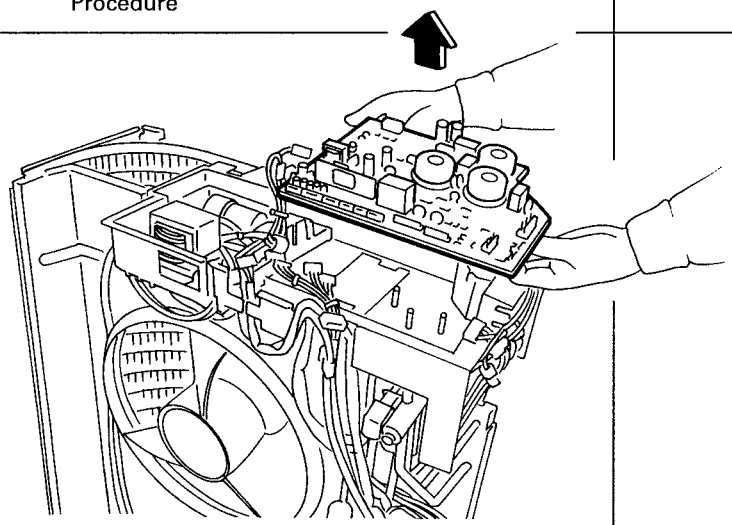
Warning! Be sure to turn off all power supplies before disarrangement work.

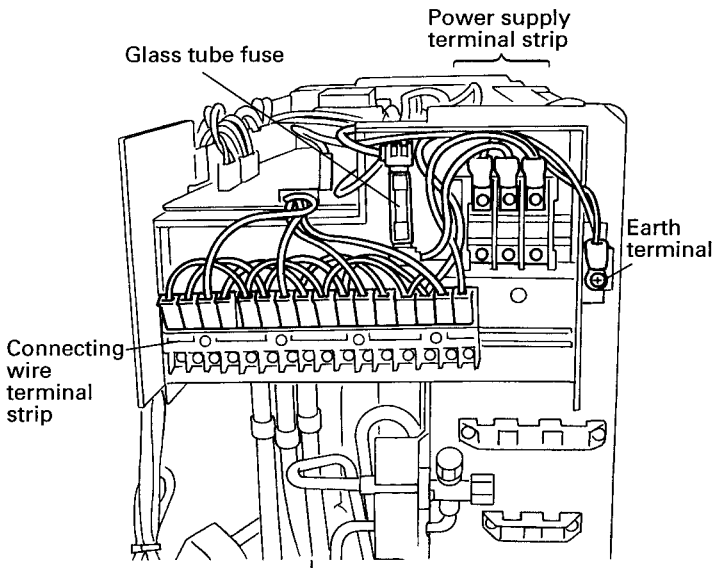
Procedure		Points
* Remove side panel and top panel by following "Removal of outer panels". ① Disconnect connectors and wire harness of PCB. Thermistor : S91, S92 IT thermostat : S41 Electronic expansion valve coil : S21 to S24 Fan motor : S70 Solenoid valve coil : S80 Compressor harness : U, W, V		* PCB can be removed by dismounting top panel.
② The right illustration shows switches and LED lamps on PCB.		
③ Remove four mounting screws to disconnect PCB.		

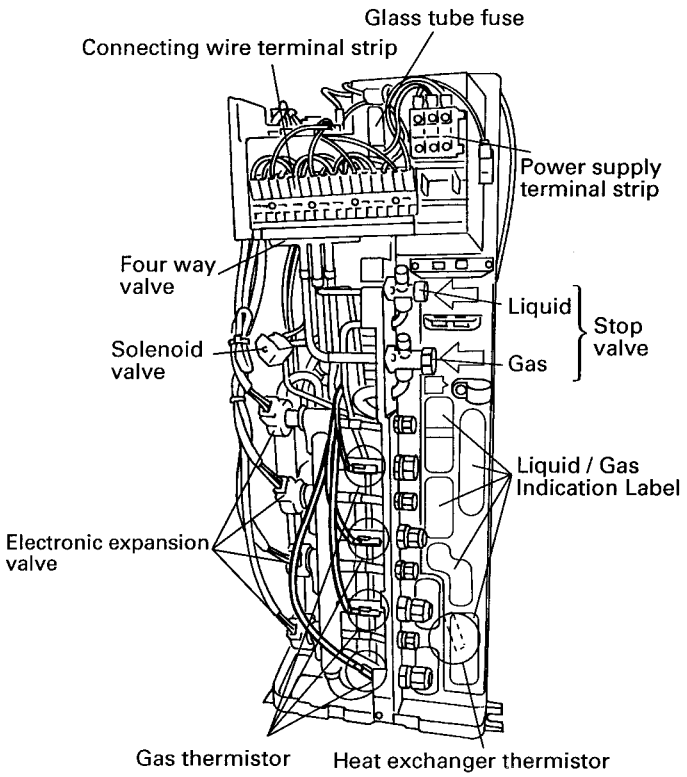
Removal of PCB (2/2)

Warning! Be sure to turn off all power supplies before disarrangement work.

Procedure	Points
④ Remove PCB.	
⑤ The below illustration shows the location of terminal strips of power supply and connecting wires.	* Remove connectors and harness on PCB to disconnect PCB.
⑥ The right illustration shows the location of various electronic expansion valve coils and thermistor.	

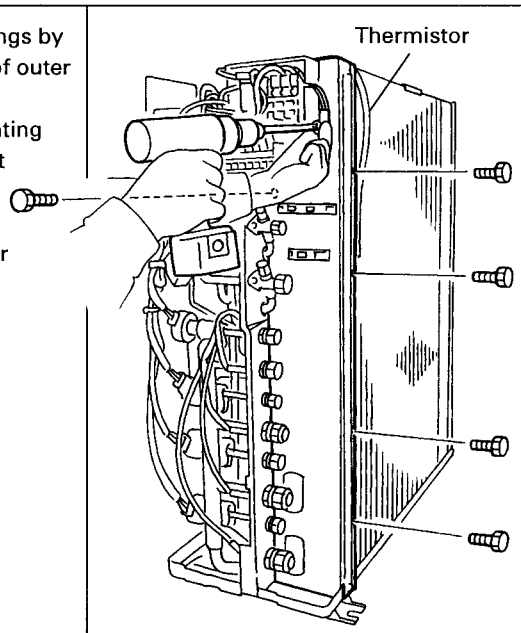
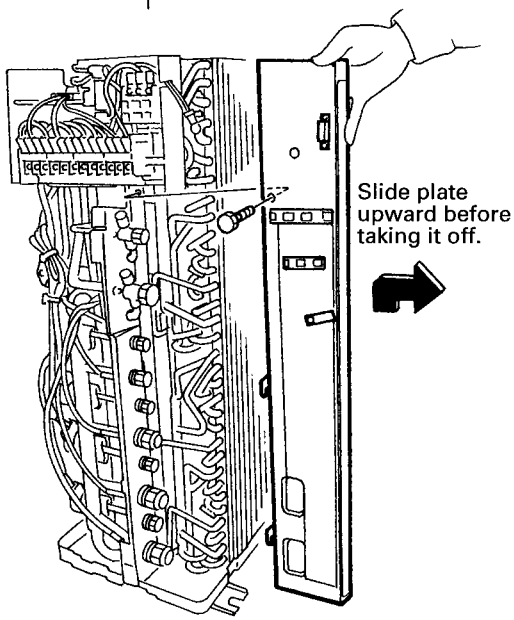
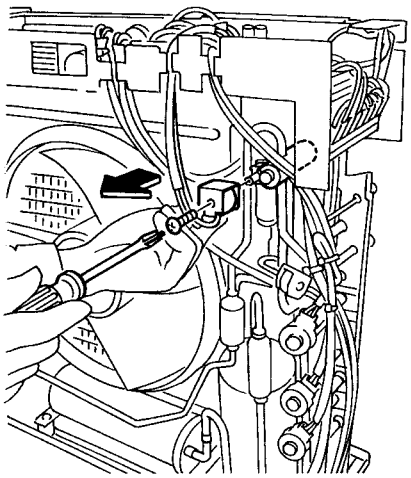
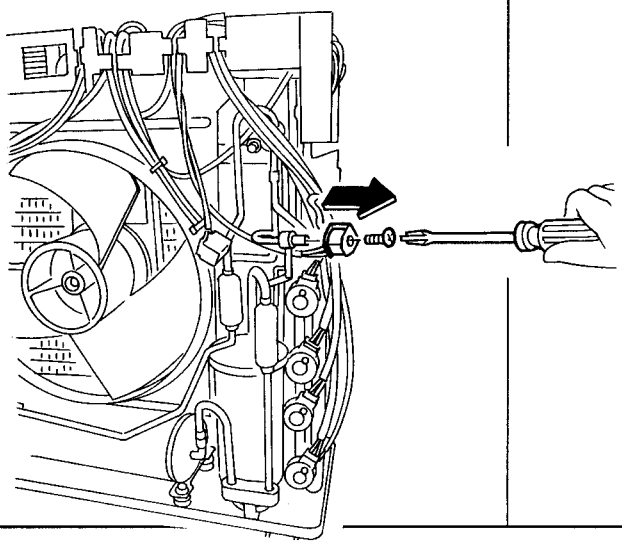






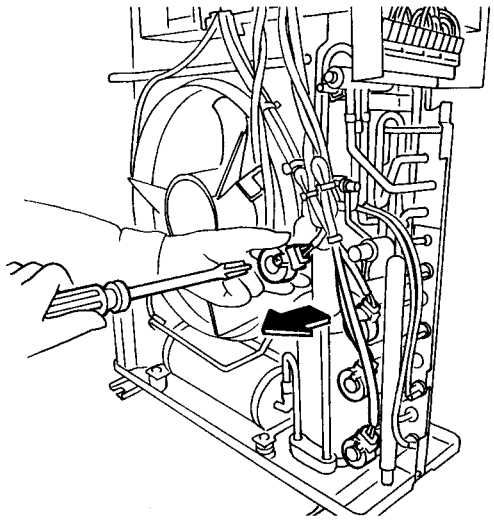
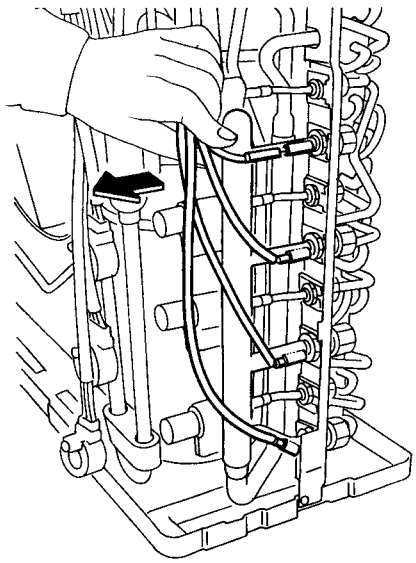
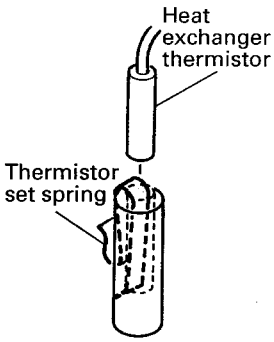
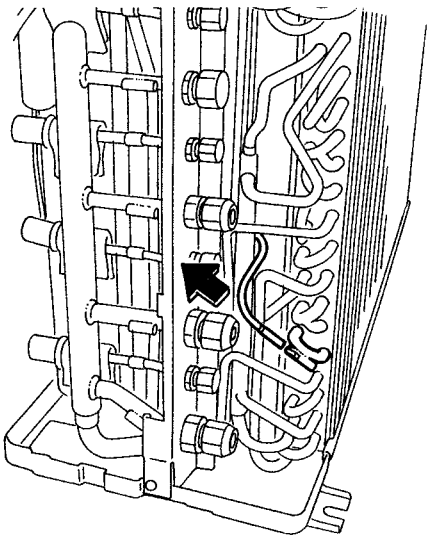
Removal of four way valve (1/3)

Warning! Be sure to turn off all power supplies before disarrangement work.

Procedure	Points
* Remove various casings by following "Removal of outer panels". ① Remove four mounting screws to dismount partition plate. ② Remove outdoor air thermistor.  	
③ Remove a mounting screw to dismount four way valve coil. 	* Coils, thermistors and wire harness should be removed before dismounting four way valve, solenoid valve and electronic expansion valve in order to protect them from the flame of torch.
④ Remove a mounting screw to dismount solenoid valve coil. 	

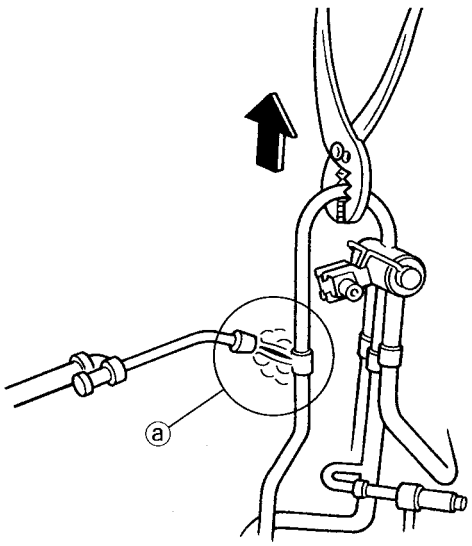
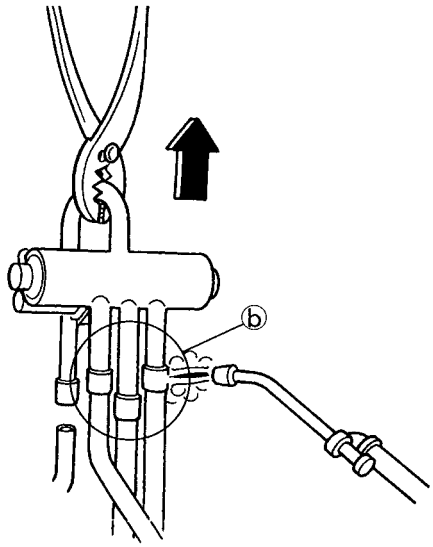
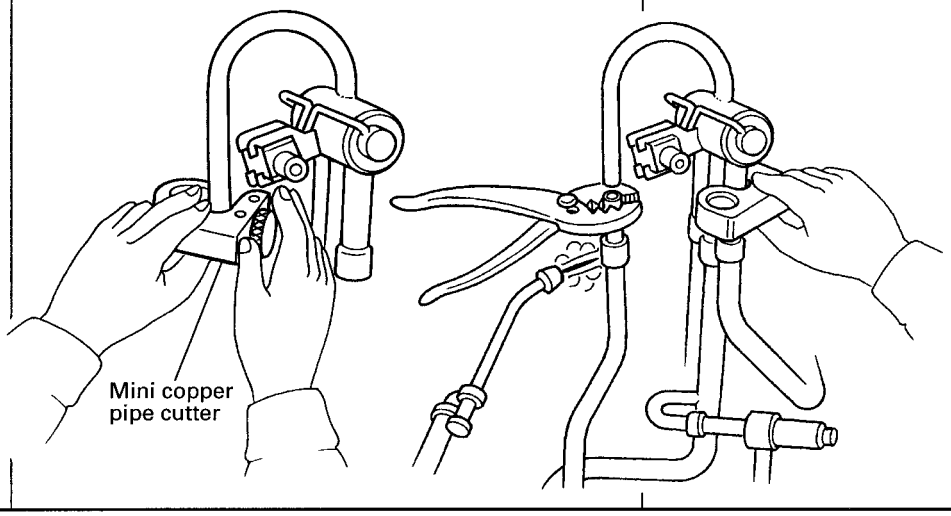
Removal of four way valve (2/3)

Warning! Be sure to turn off all power supplies before disarrangement work.

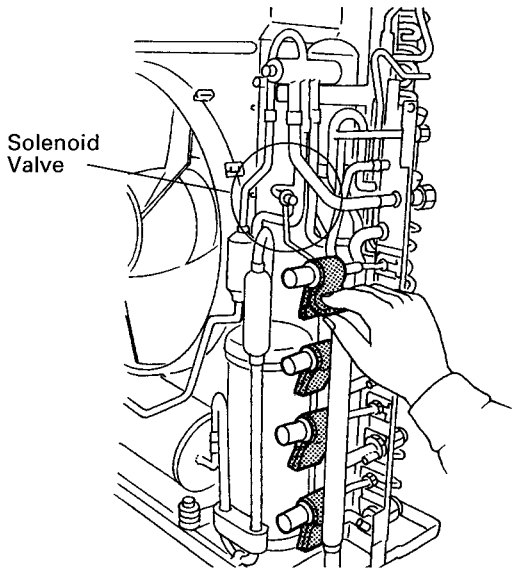
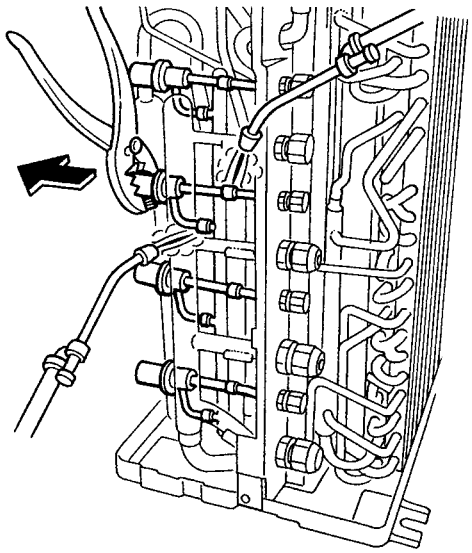
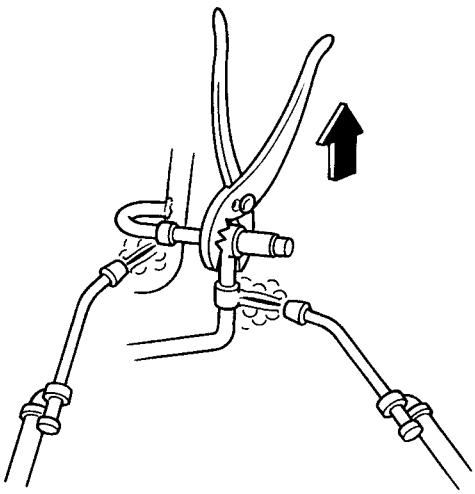
Procedure		Points
⑤ Remove electronic expansion valve coil.		* To dismount electronic expansion valve coil, pull the coil while turning coil lever.
⑥ Remove four gas pipe thermistors.		 * Be careful not to drop the thermistor set spring.
⑦ Remove a heat exchanger thermistor.		

Removal of four way valve (3/3)

Warning! Be sure to turn off all power supplies before disarrangement work.

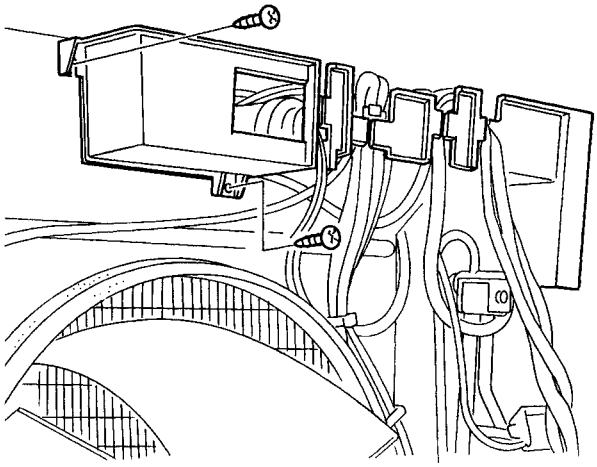
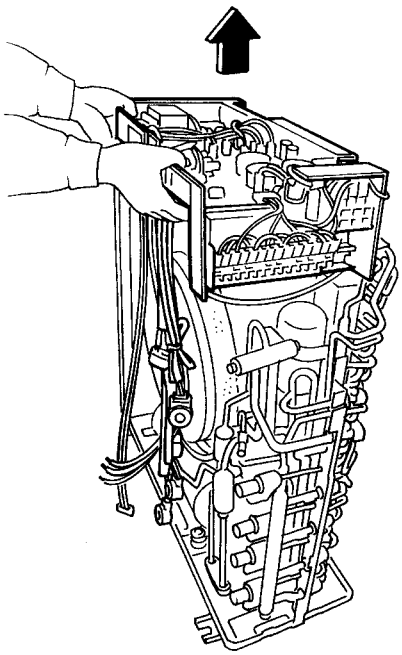
Procedure		Points
* Make sure that there is no refrigerant in the unit before disassembling. * Make sure to purge refrigerant with nitrogen before heating up brazed section. ① Heat brazed ⓐ-section of four way valve, fix lower part of pipe with pliers, and then pull upper section with pliers to disconnect pipes. ② After disconnecting ⓐ-section, heat three of brazed ⓑ-section at the same time to remove four way valve. <u>If it is difficult to use gas welding in the removal operation:</u> 1. Disconnect the pipe joints(brazed sections/ that are easy to remove and reconnect. 2. Cut the main pipe using a mini copper pipe cutter to facilitate removal. Note:Do not use a hack-saw since it produces metal particles during cutting.	  	**Warning!** If refrigerant gas leaks during servicing work, ventilate the area. (If refrigerant gas contacts flames, hazardous gas can generate.) **Caution!** Be careful to prevent burn with hot four way valve or piping. Caution in reassembly ① Use an oxidizing prevention measure during brazing. If a nitrogen gas cannot be used,conduct brazing as quickly as possible. ② It is necessary to prevent packing deterioration caused by heat and carbonization of oil inside the four way valve. <u>Cover the four way valve body with a wet cloth,and keep it moist by continuously supplying water to prevent the valve</u> from heating. (Maintain the unit temterature below +120°C.)

Removal of solenoid valve and motorized valve	**Warning! Be sure to turn off all power supplies before disarrangement work.**

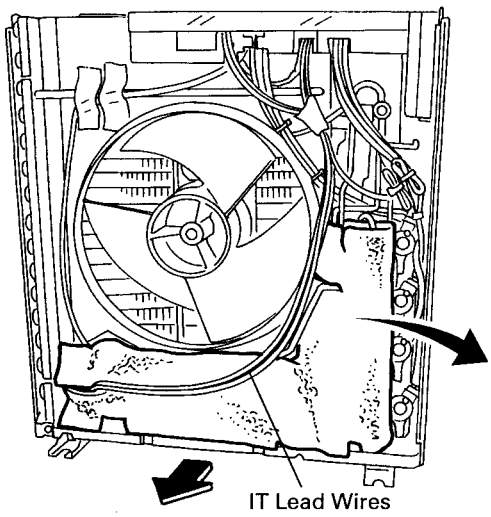
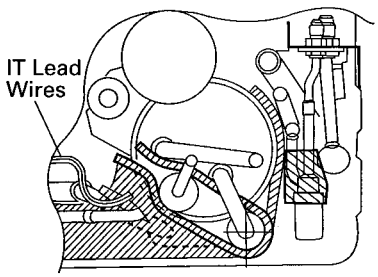
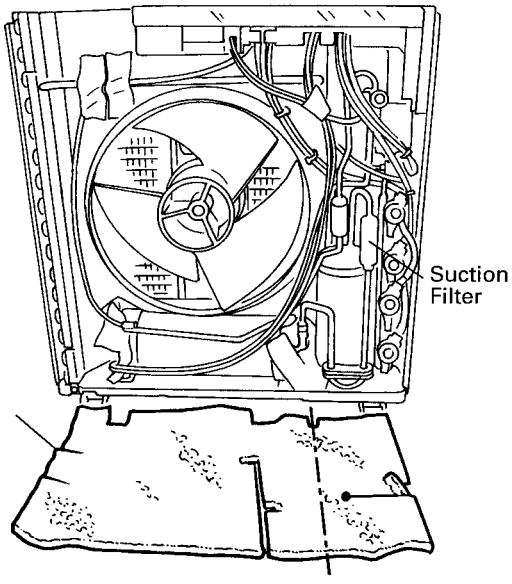
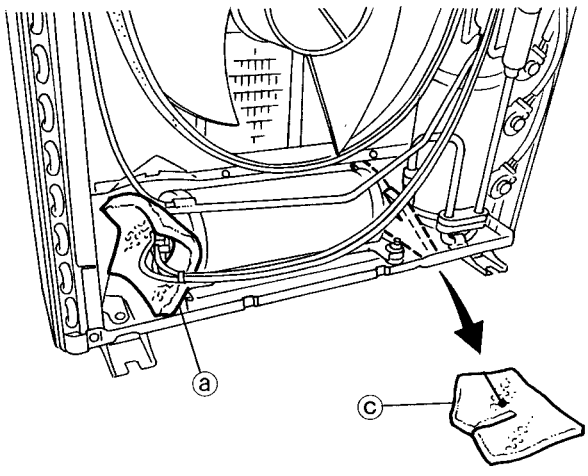
Procedure		Points
* Remove four way valve coil, etc. in order to prevent from heating. ① Remove putty of electronic expansion valve.		**Warning!** If refrigerant gas leaks during servicing work, ventilate the area. (If refrigerant gas contacts flames, hazardous gas can generate.)
② Heat and disconnect brazed sections to remove electronic expansion valve.		* To prevent the solenoid valve from heat effect due to the flame of gas torch, cover the equipment with welding protective sheet or steel sheet. **Caution in reassembly** ①Use an oxidizing prevention measure during brazing. If a nitrogen gas can not be used, conduct brazing as quickly as possible. ②Cover the body of motorized valve with wet cloth, and keep it moist by continuously supplying water to prevent the valve from heating.
③ Heat and disconnect brazed sections to remove solenoid valve.		**Caution!** Be careful to prevent burn with hot four way valve or piping.

Removal of electrical parts box

Warning! Be sure to turn off all power supplies before disarrangement work.

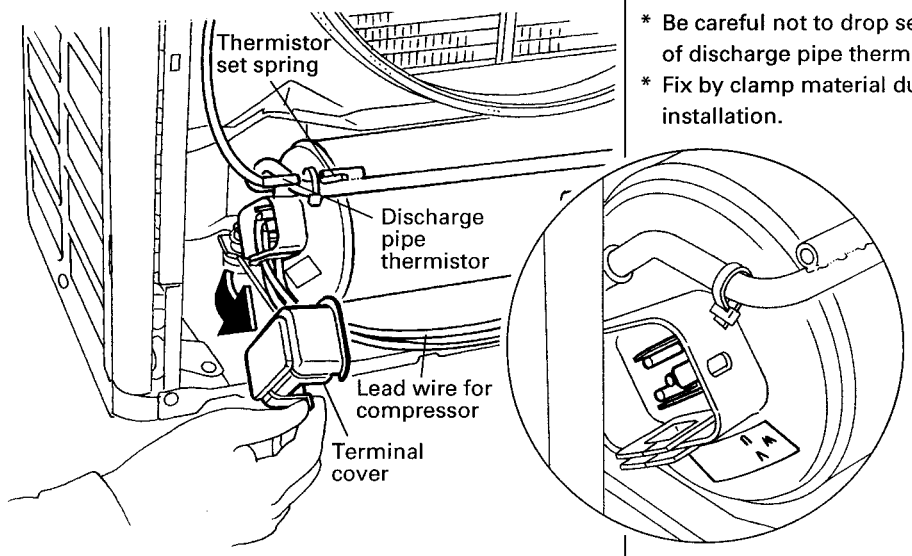
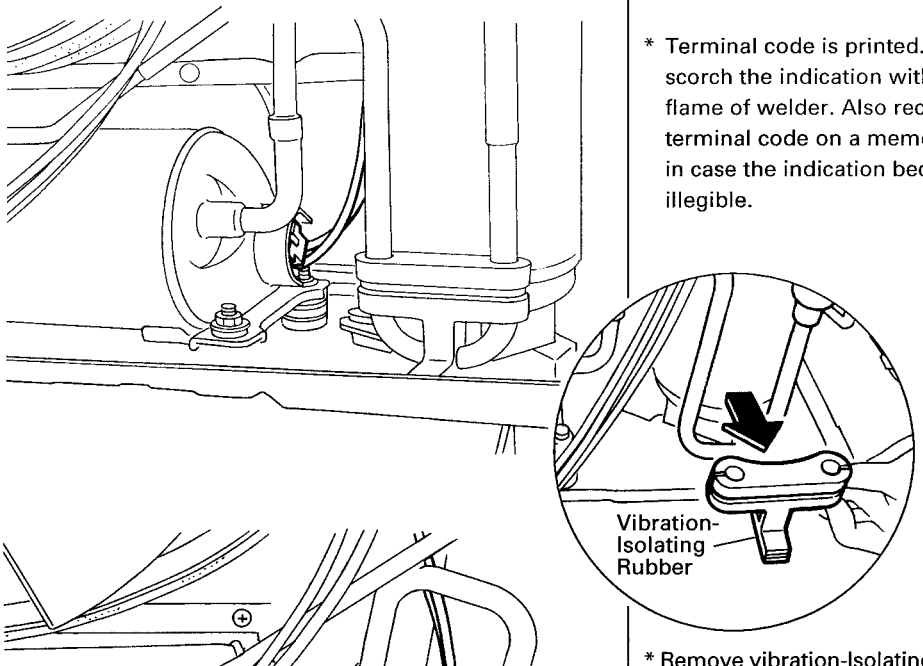
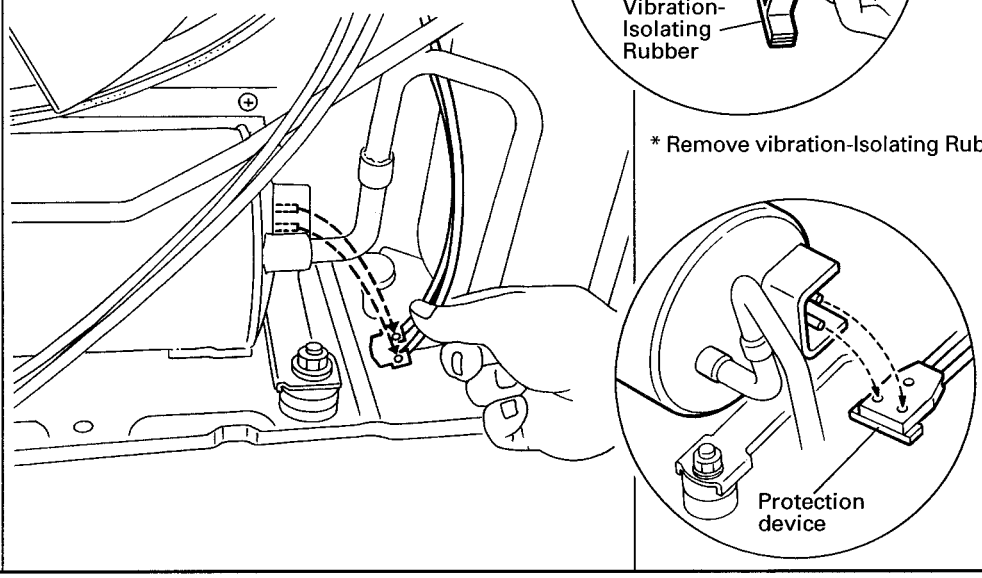
Procedure		Points
* Remove top panel, front panel, right side panel and drip proof cover by following "Removal of outer panels". * Disconnect each connector and wire harness by following "Removal of PCB". ① Remove 4 screws of electrical parts box. Front face....2 locations Side face.....1 location Side face earth wire .....1 location ② Lift electrical parts box and remove.	 	* Be careful not to forget reinstalling, lose and break drip proof cover.

Removal of noise insulation for compressor	**Warning! Be sure to turn off all power supplies before disarrangement work.**

Procedure		Points
① Remove sound insulation ⓐ.		* The noise insulation are inserted between pipings. Therefore, be careful not to split the insulation due to excessive force. * Make sure that IT lead wires should be outside the insulation.
		
		
② Remove left and right sound insulation (ⓑ & ⓒ). (When removing ⓑ, it is necessary to disconnect lead wire of compressor.)		* Coil noise insulation around the compressor to place suction filter inside. * When attaching noise insulation, make sure that no clearance is left.

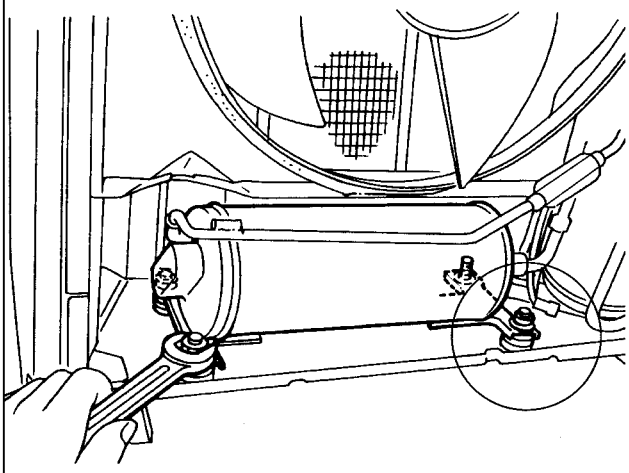
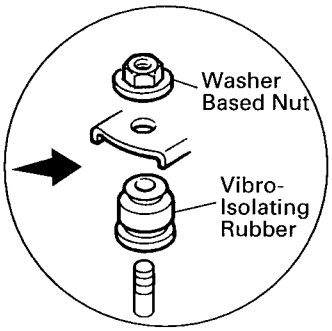
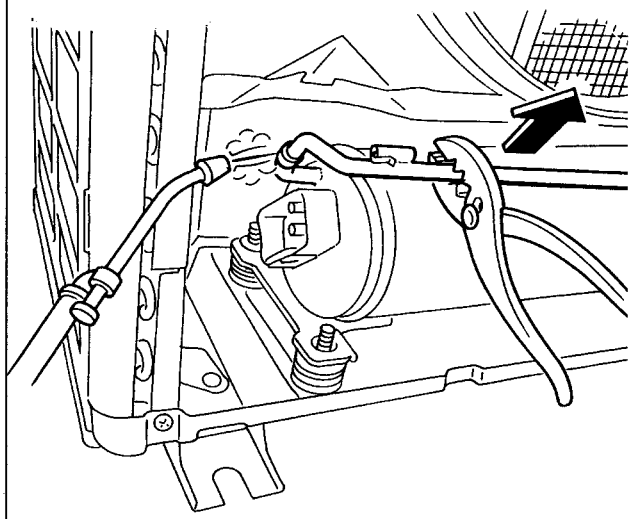
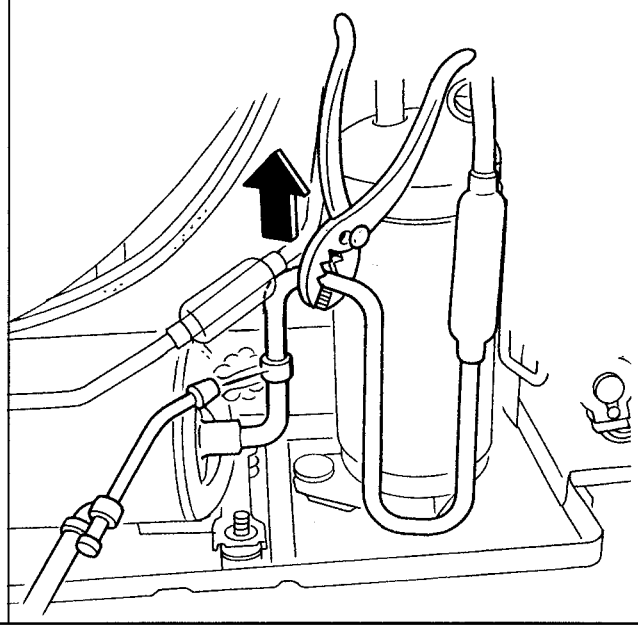
Removal of compressor (1/2)

Warning! Be sure to turn off all power supplies before disarrangement work.

Procedure		Points
① Remove terminal cover and disconnect compressor lead wire.		* Be careful not to drop set spring of discharge pipe thermistor. * Fix by clamp material during installation.
② Pull out thermistor from discharge pipe.		* Terminal code is printed. Do not scorch the indication with the flame of welder. Also record terminal code on a memo paper in case the indication becomes illegible.
③ Remove protection device.		* Remove vibration-Isolating Rubber.

Removal of compressor (2/2)

Warning! Be sure to turn off all power supplies before disarrangement work.

Procedure		Points
* Make sure that there is no refrigerant in the unit before disassembling. * Make sure to purge with nitrogen before heating up brazed section. ① Remove washer based nuts (3 pieces) which secure compressor.		* Washer based nut at the right back is not installed. 
② Heat brazed section at discharge pipe for disconnection.		**Caution!** Be careful to prevent burn with hot four way valve or piping. * Parts necessary to be protected from heat effect by gas torch flame should be disassembled or covered with welding protective sheet or steel sheet. * When using pliers to pull out pipe, be careful not to flatten pipe with excessive force.
③ Heat brazed section at suction pipe for disconnection. ④ When brazed section is disconnected, lift compressor and remove after making sure that pipes are cooled down enough.		**Warning!** Prepare wet cloth for quick fire extinguishing in case that refrigeration oil of compressor has caught fire. **Warning!** If refrigerant gas leaks during service work, ventilate the area. (If refrigerant gas contacts flames, hazardous gas can be generated.)

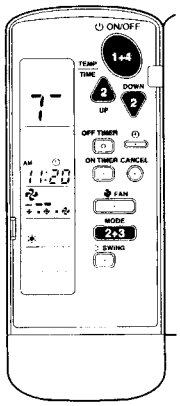
9. Others

9-1. Test Run from the Remote Controller (For Heat Pump Model Only)

This program is to test the air conditioner independent from the room temperature and the tempersture setting (i.e. as the thermostat of the indoor unit is bridged).
Carry out the test operation in accordance with the operation manual to ensure that all functions and parts, such as louvre movement, are working properly.

Using the remote controller for trial operation
(1) Press the ON/OFF button to turn on the system.
(2) Simultaneously press DOWN, UP and MODE buttons.
(3) Press the MODE button twice. ("7" appears on the display to indicate that the trial operation mode is selected.)
(4) Trial run mode terminates in approximately 30 minutes and switches into normal mode. To quit a trial operation, press the ON/OFF button.

Note:
The air conditioner requires a small amount of power in stand-by mode. If the system is not to be used for some time after installation, shut off the circuit breaker to eliminate unnecessary power consumption.

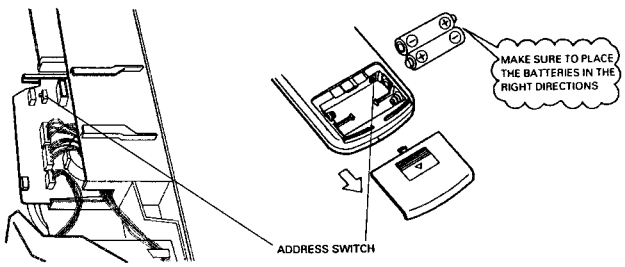


9-2. Method of Operating Air Conditioners Individually (When Two Units are Installed in One Room)

For Cooling Only and Heat Pump Model

Either of the units (including wireless remote controller) needs to be set as follows.

Setting of address switch on wireless remote controller	[1] → [2] [1] : Before delivery
Address switch in door PCB1	[1] → [2]



9-3. Centralized control (For KRC72, KRP411A1S and KRP410A11S)

For an explanation on usage, see the option handbook.
However, do the following when using the KRP410A11S (Contact connection centralized control PC board).

Cut jumper JC on the indoor PC Board.

Note :
1. The power failure recovery function is controlled by the ON signal from the centralized control PC Board. The following may occur if the unit is used without cutting jumper JC.
   - If the unit was running when a power failure occurred, it may not resume operation after recovering from a power failure.

9-4. Dry Keep Change-over Switch (All Indoor Models)

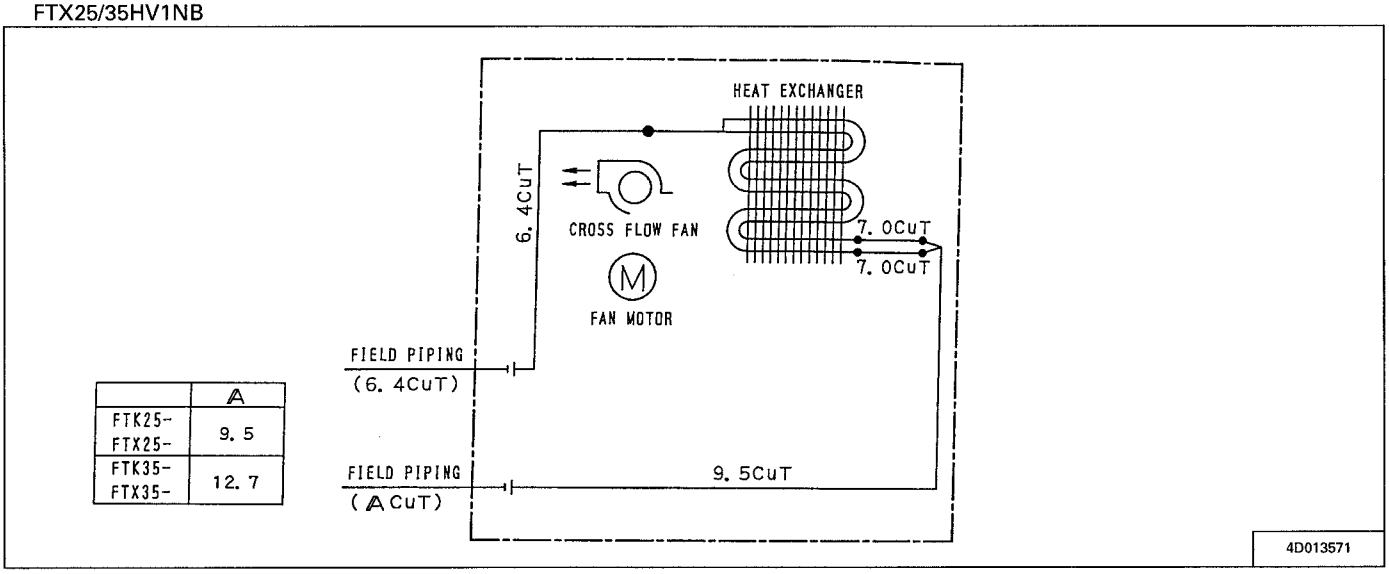
For Cooling Only and Heat Pump Model

Jumper (On indoor PC Board)	Function	When connected (factory set)	When cut
JC	Power failure recovery function	Auto start	Unit does not resume operation after recovering from a power failure. Timer ON-OFF settings are cleared.
JB	Fan speed setting when compressor is OFF on thermostat.	Fan speed setting ; Remote controller setting	Fan rpm is set to "0" <Fan stop>

10. Appendix

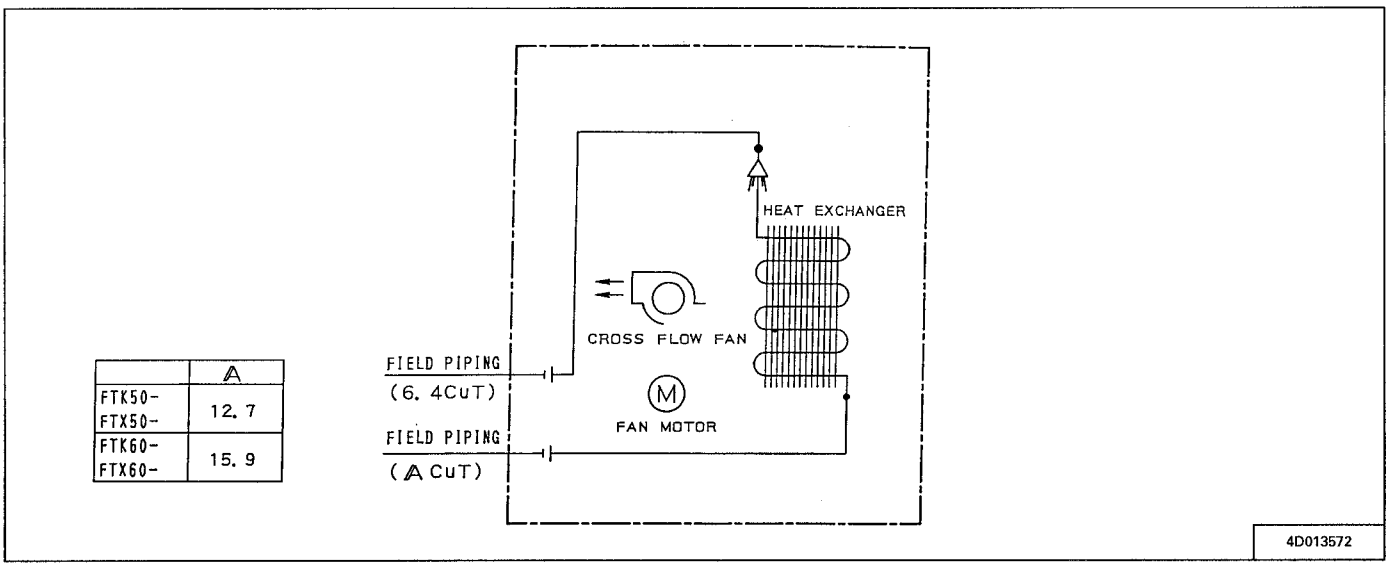
10-1. Piping Diagrams

1. FTK25/35HV1NB
   FTX25/35HV1NB



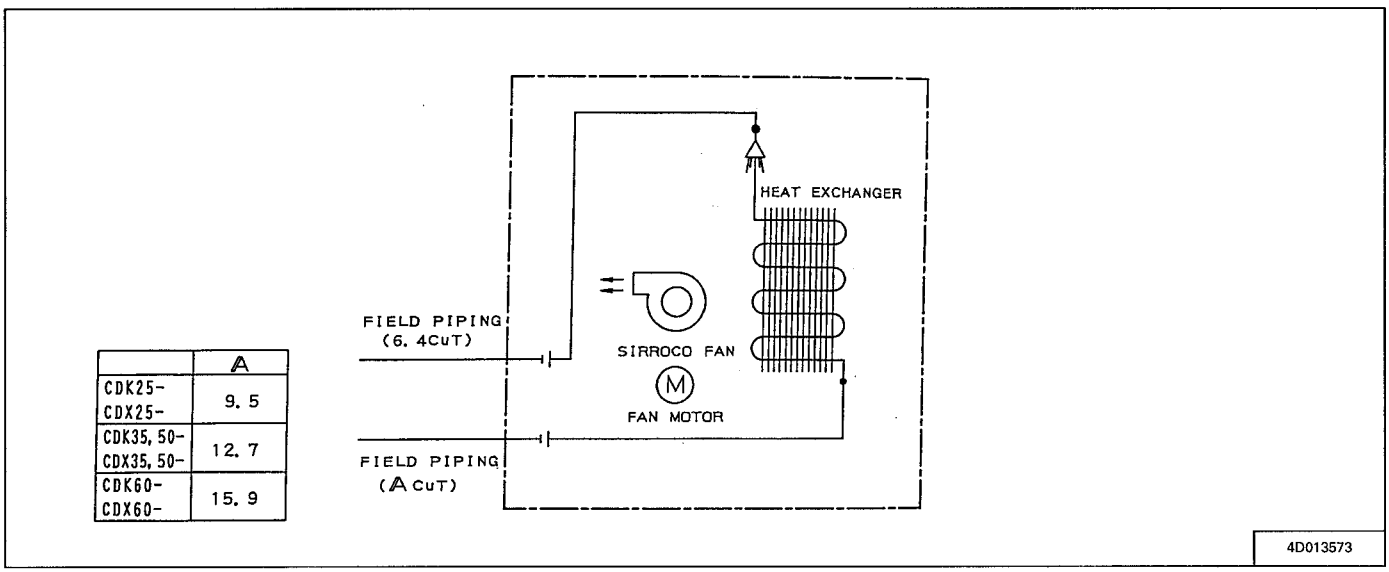
	Ⓐ
FTK25- FTX25-	9. 5
FTK35- FTX35-	12. 7

2. FTK50/60HV1NB
   FTX50/60HV1NB



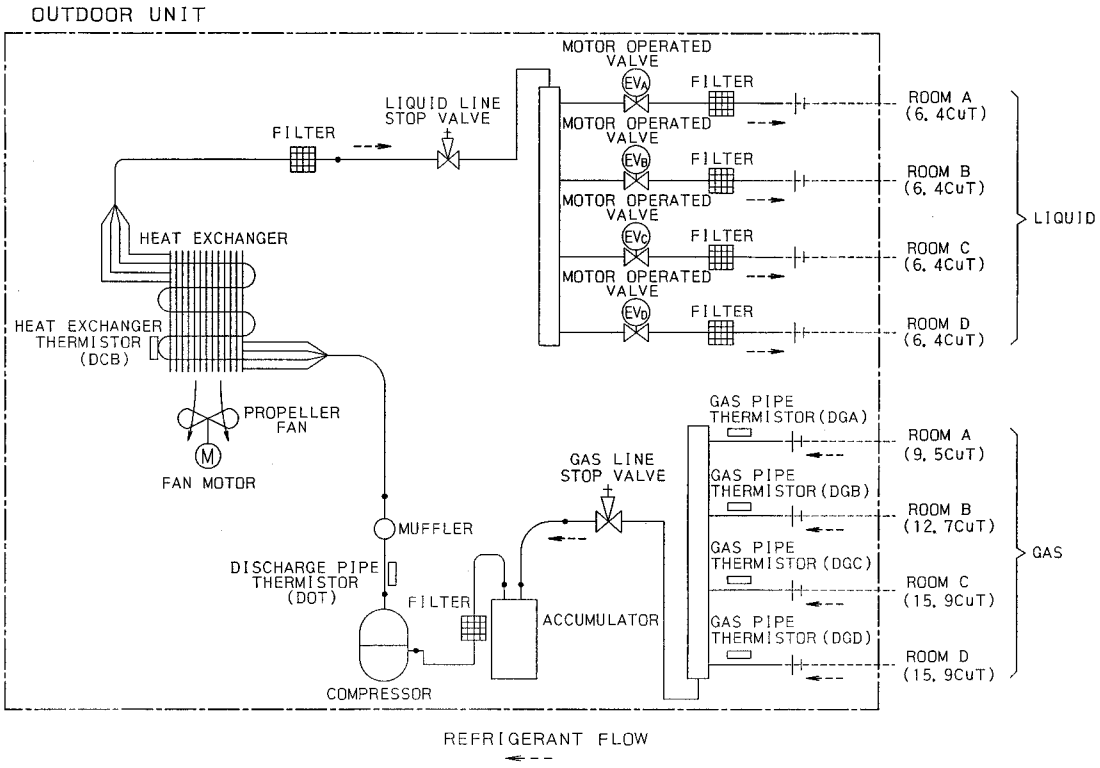
	Ⓐ
FTK50- FTX50-	12. 7
FTK60- FTX60-	15. 9

3. CDK25~60HV1NB
   CDX25~60HV1NB

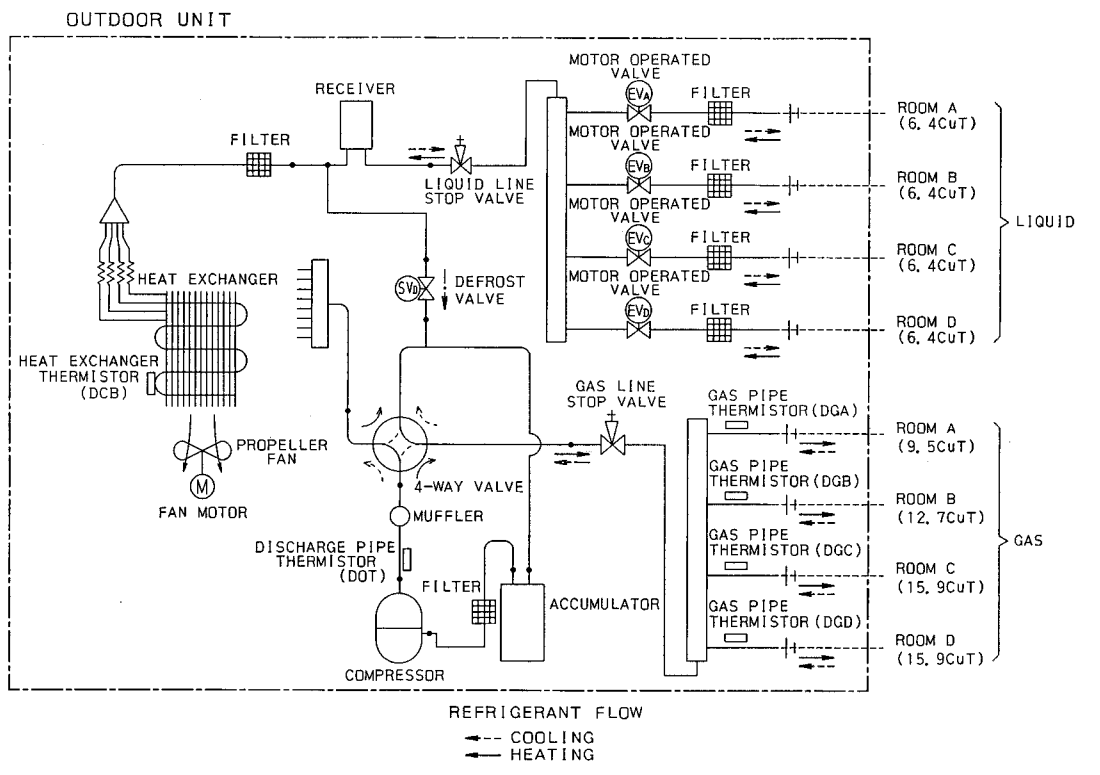


	Ⓐ
CDK25- CDX25-	9. 5
CDK35, 50- CDX35, 50-	12. 7
CDK60- CDX60-	15. 9

4. 4MK90HV1NB

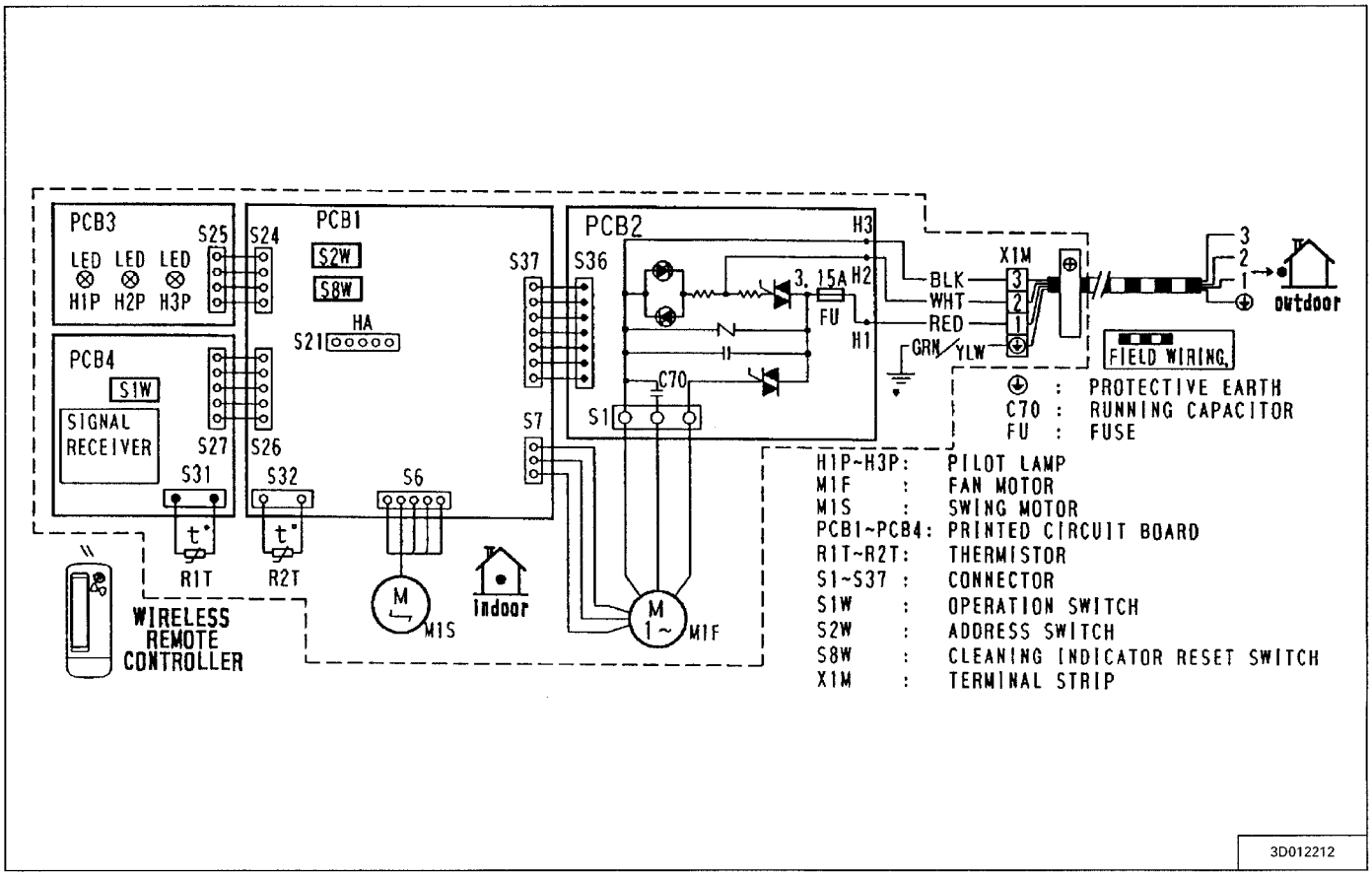


5. 4MX80HV1NB

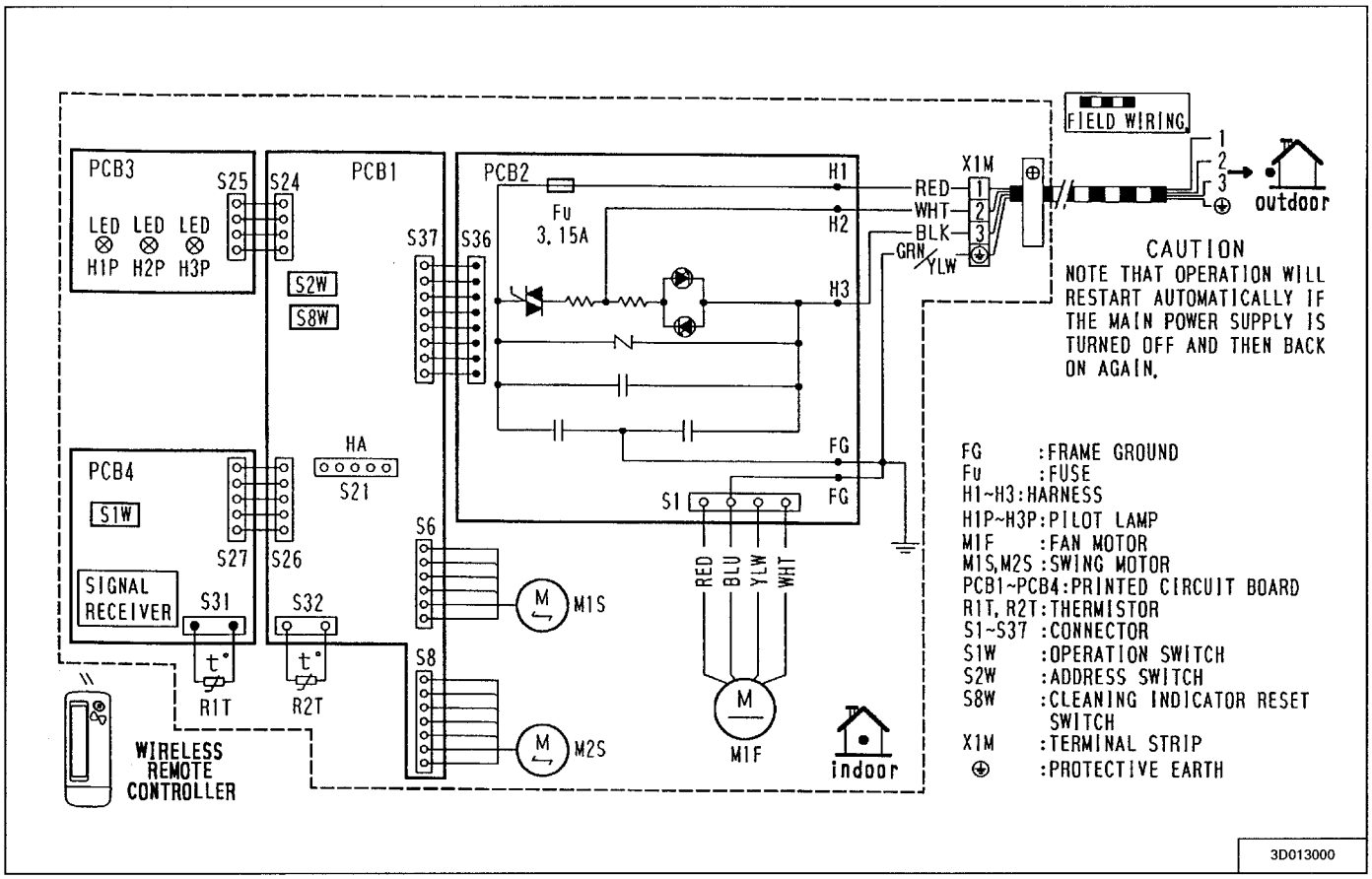


10-2. Wiring Diagrams

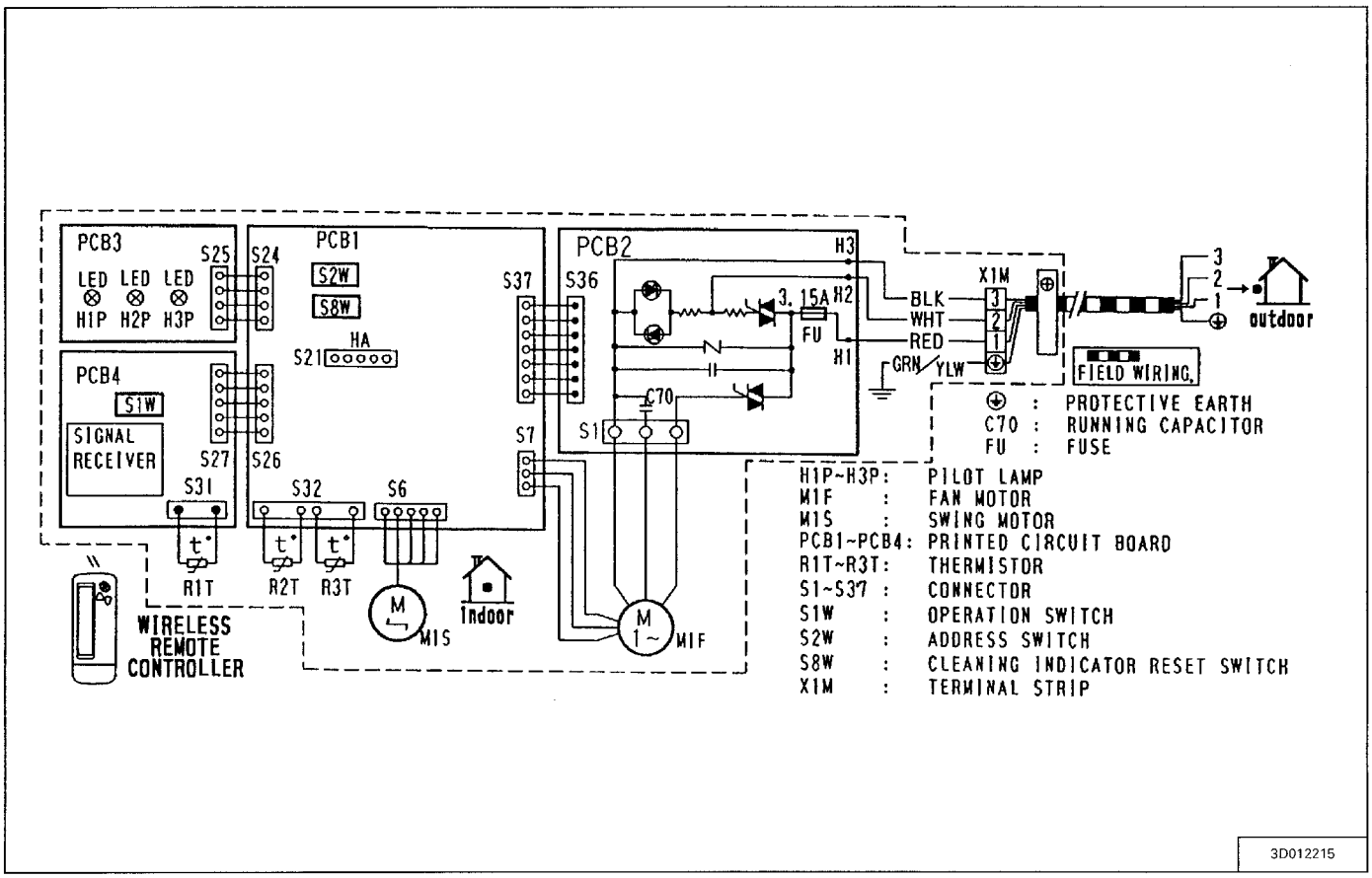
1. FTK25/35HV1NB



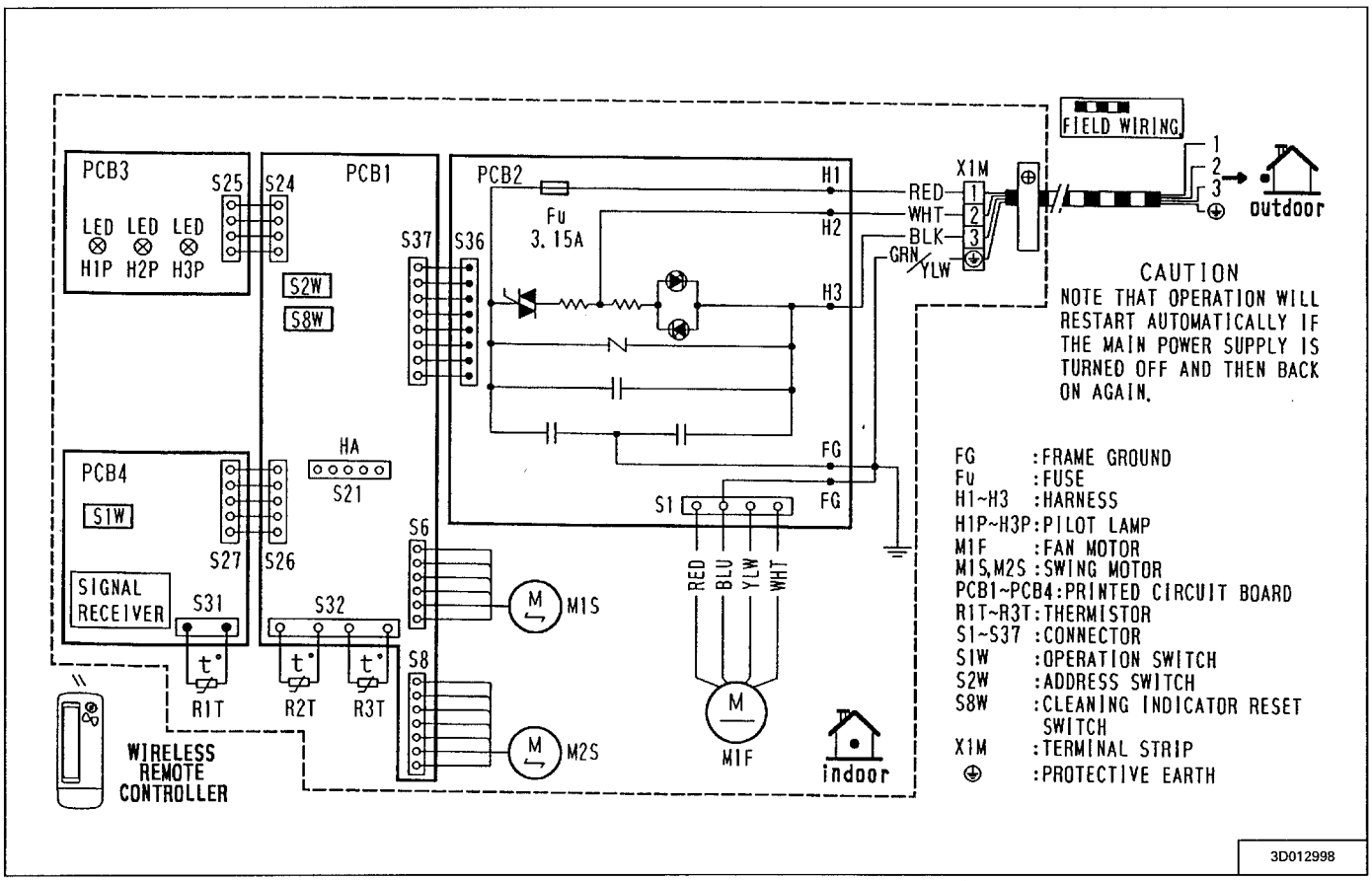
2. FTK50/60HV1NB



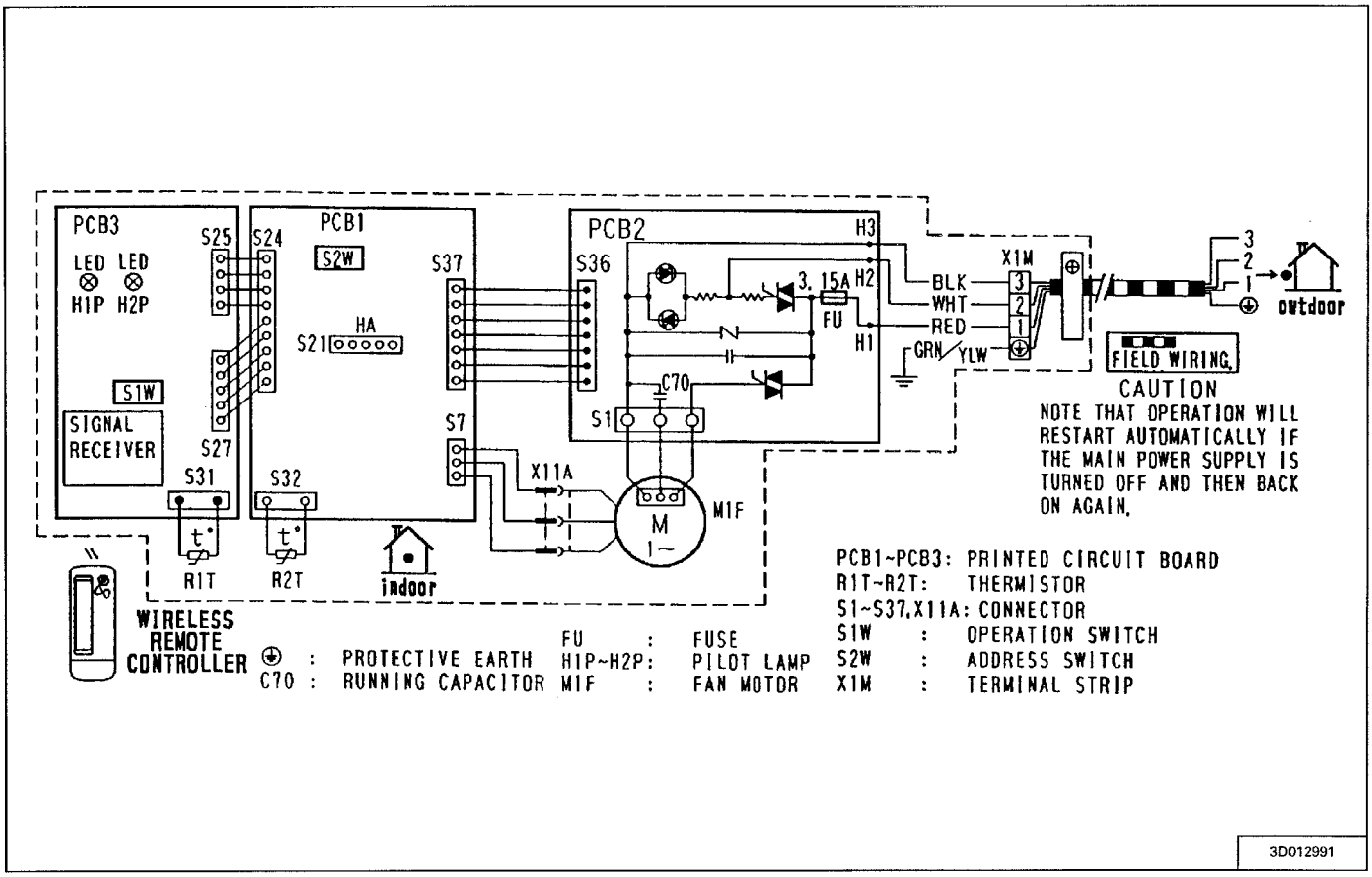
3. FTX25/35HV1NB



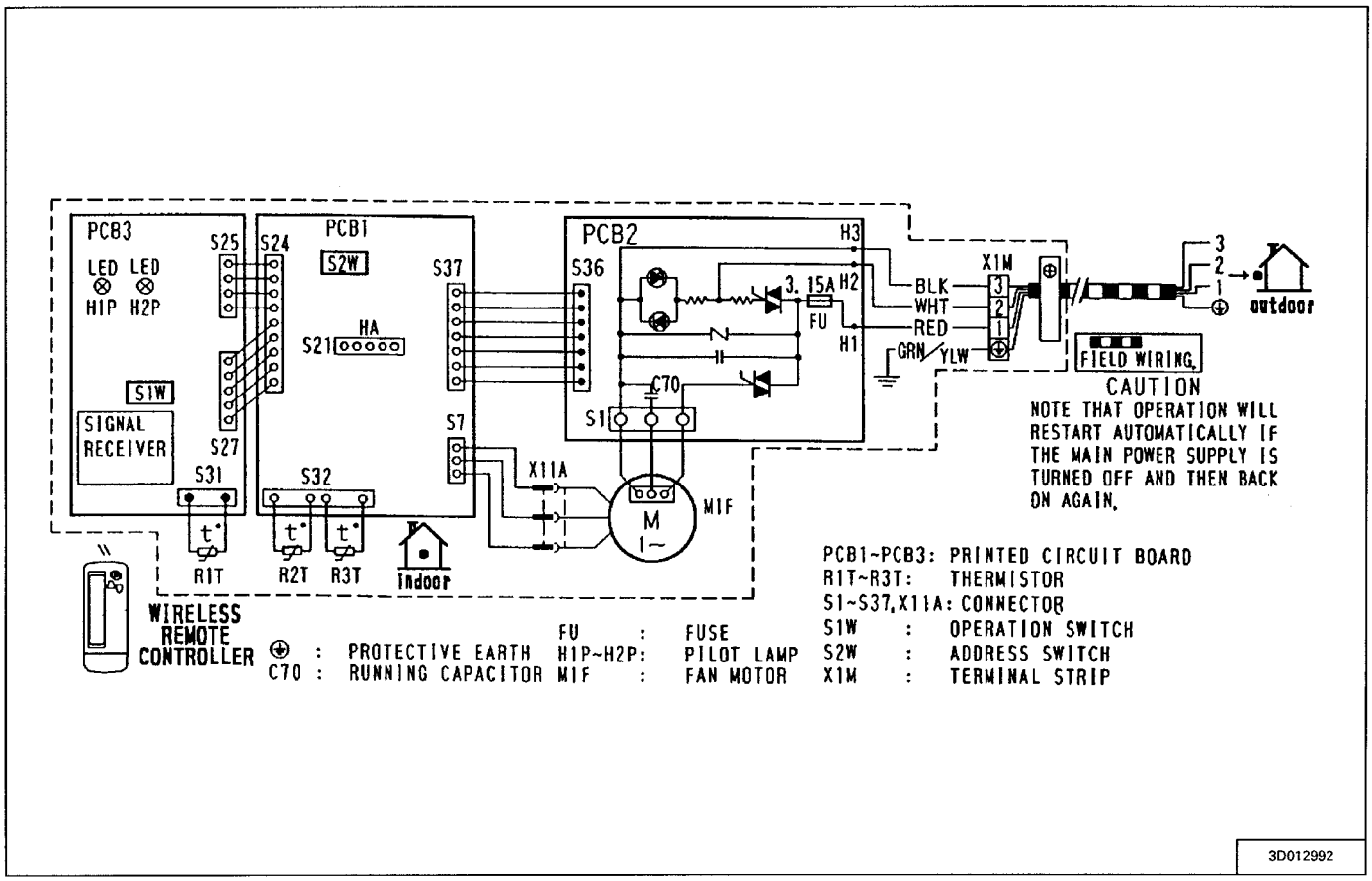
4. FTX50/60HV1NB



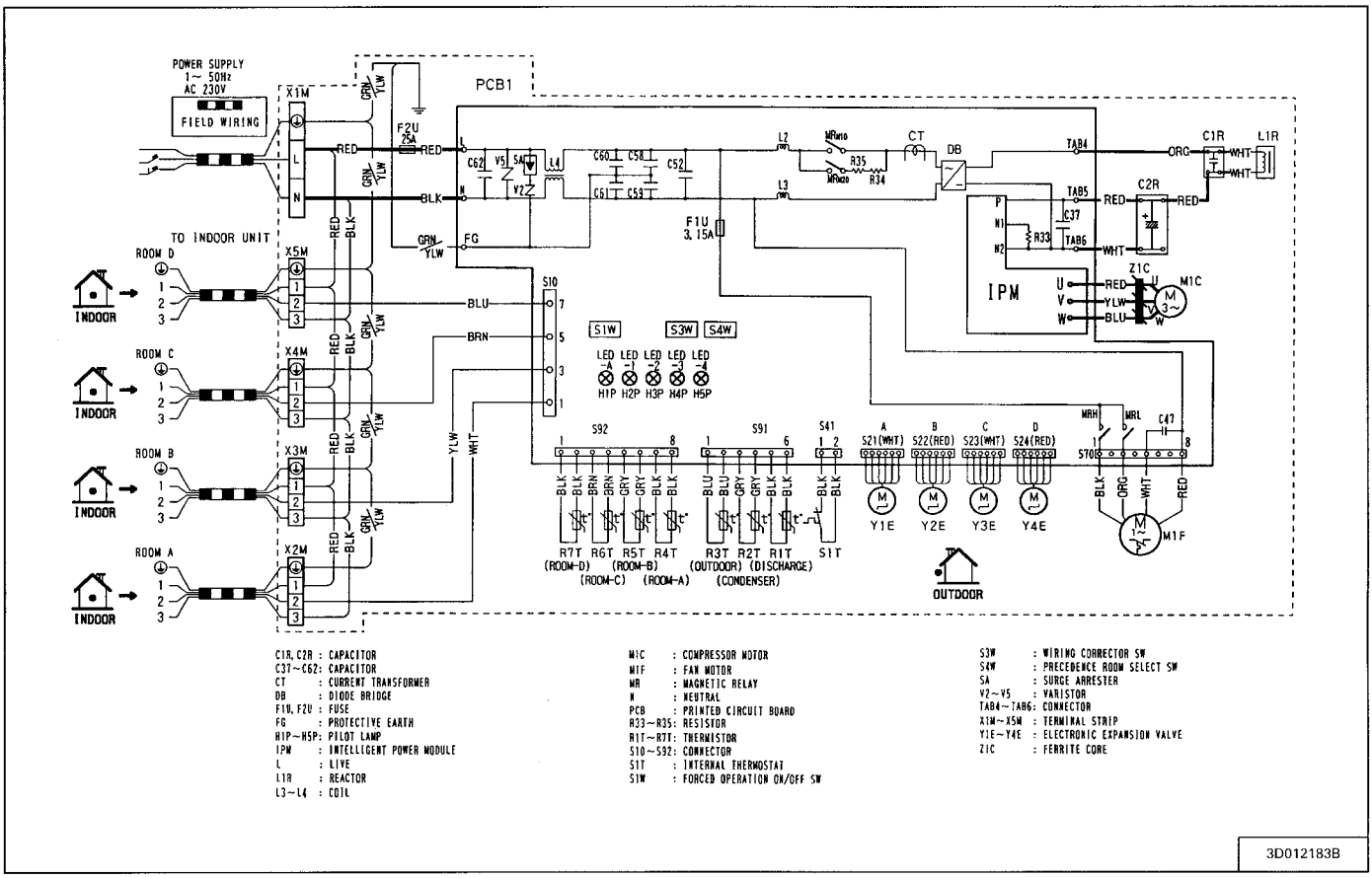
5. CDK25~60HV1NB



6. CDX25~60HV1NB



7. 4MK90HV1NB



C1R, C2R : CAPACITOR
C37~C62: CAPACITOR
CT : CURRENT TRANSFORMER
DB : DIODE BRIDGE
F1U, F2U : FUSE
FG : PROTECTIVE EARTH
H1P~H5P: PILOT LAMP
IPM : INTELLIGENT POWER MODULE
L : LIVE
L1R : REACTOR
L3~L4 : COIL

M1C : COMPRESSOR MOTOR
M1F : FAN MOTOR
MR : MAGNETIC RELAY
N : NEUTRAL
PCB : PRINTED CIRCUIT BOARD
R33~R35: RESISTOR
R1T~R7T: THERMISTOR
S10~S92: CONNECTOR
S1T : INTERNAL THERMOSTAT
S1W : FORCED OPERATION ON/OFF SW

S3W : WIRING CORRECTOR SW
S4W : PRECEDENCE ROOM SELECT SW
SA : SURGE ARRESTER
V2~V5 : VARISTOR
TAB4~TAB6: CONNECTOR
X1M~X5M : TERMINAL STRIP
Y1E~Y4E : ELECTRONIC EXPANSION VALVE
Z1C : FERRITE CORE

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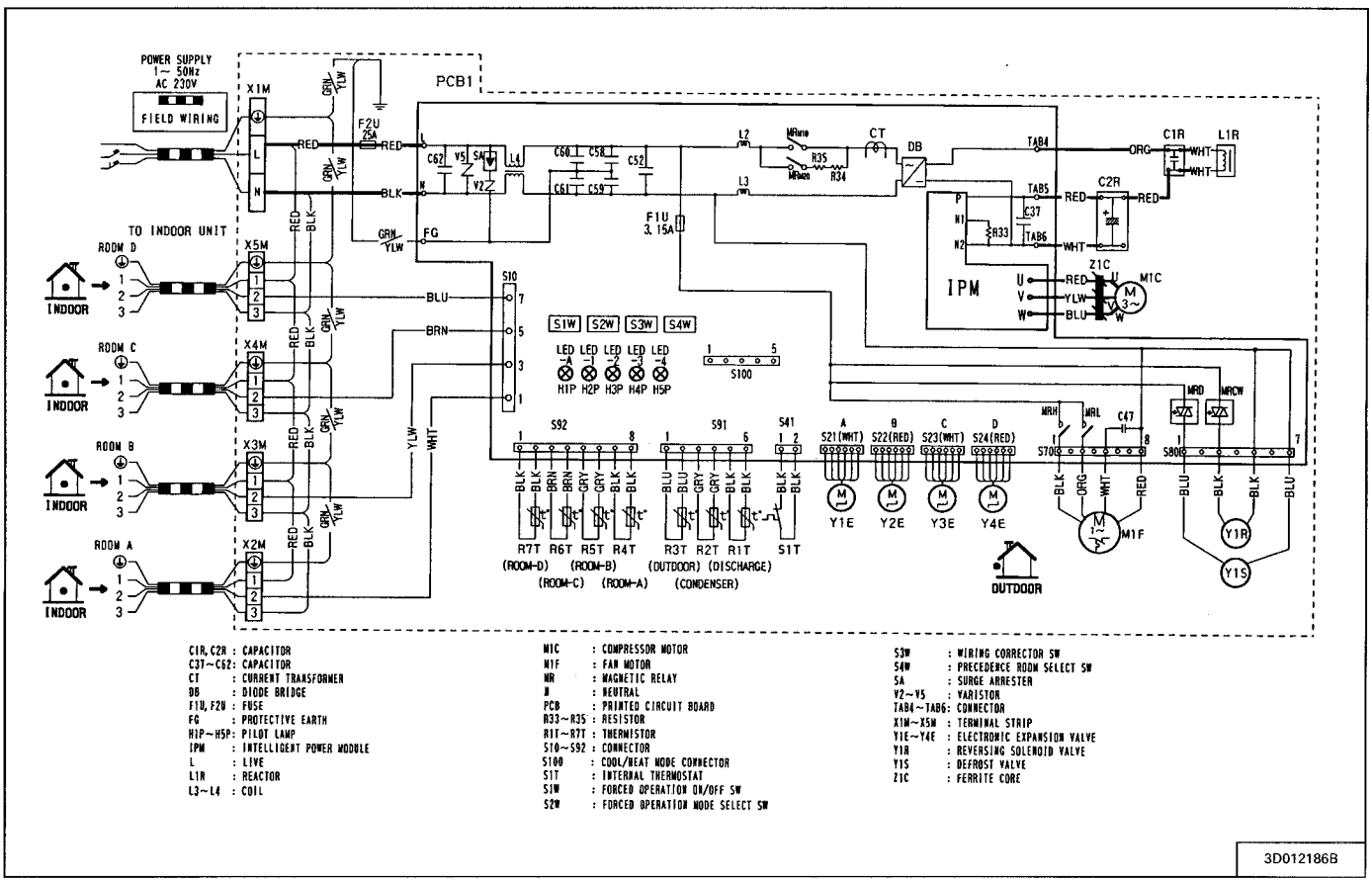
8. 4MX80HV1NB



C1R, C2R : CAPACITOR
C37~C62: CAPACITOR
CT : CURRENT TRANSFORMER
DB : DIODE BRIDGE
F1U, F2U : FUSE
FG : PROTECTIVE EARTH
H1P~H5P: PILOT LAMP
IPM : INTELLIGENT POWER MODULE
L : LIVE
L1R : REACTOR
L3~L4 : COIL

M1C : COMPRESSOR MOTOR
M1F : FAN MOTOR
MR : MAGNETIC RELAY
N : NEUTRAL
PCB : PRINTED CIRCUIT BOARD
R33~R35 : RESISTOR
R1T~R7T : THERMISTOR
S10~S92 : CONNECTOR
S100 : COOL/HEAT MODE CONNECTOR
S1T : INTERNAL THERMOSTAT
S1W : FORCED OPERATION ON/OFF SW
S2W : FORCED OPERATION MODE SELECT SW

S3W : WIRING CORRECTOR SW
S4W : PRECEDENCE ROOM SELECT SW
SA : SURGE ARRESTER
V2~V5 : VARISTOR
TAB4~TAB6: CONNECTOR
X1M~X5M : TERMINAL STRIP
Y1E~Y4E : ELECTRONIC EXPANSION VALVE
Y1R : REVERSING SOLENOID VALVE
Y1S : DEFROST VALVE
Z1C : FERRITE CORE

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