**TOSHIBA**

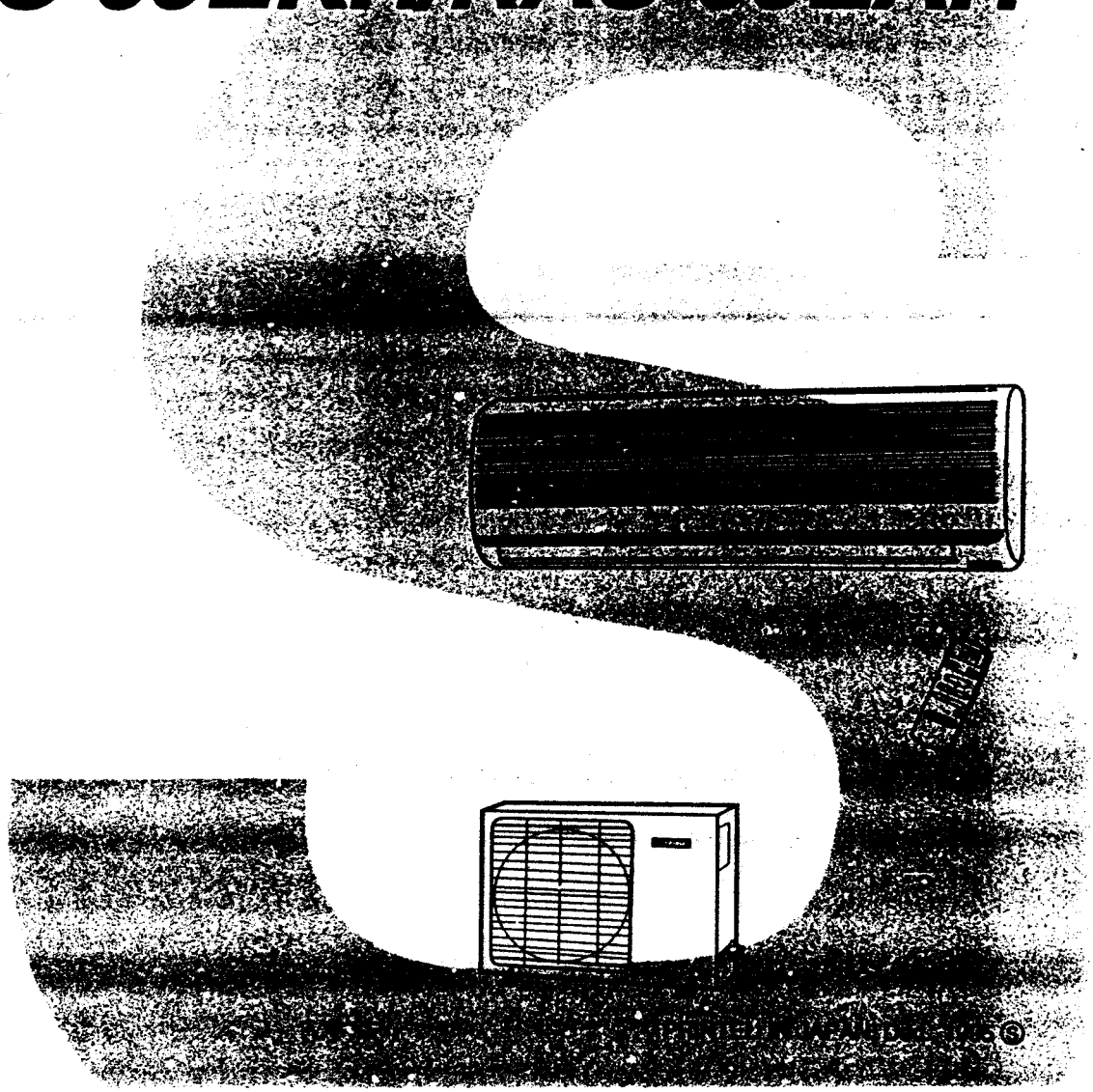
FILE NO. A00-9508

# SERVICE MANUAL

# AIR-CONDITIONER

## SPLIT WALL TYPE

## *RAS-07EKH/RAS-07EAH*
## *RAS-09EKH/RAS-09EAH*



# CONTENTS

# 1. SPECIFICATIONS

| Item | | Model | RAS-07EKH/EAH | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Cooling | | | Heating | | |
| Capacity | *1 | kW | 220V | 230V | 240V | 220V | 230V | 240V |
| | | | 1.78 | 1.80 | 1.82 | 1.83 | 1.85 | 1.87 |
| | | Btu/h | 6070 | 6140 | 6210 | 6240 | 6310 | 6380 |
| Power source | | Phase | Single | | | | | |
| | | V | 220/230/240 | | | | | |
| | | Hz | 50 | | | | | |
| Power consumption | | W | 560/570/580 | | | 490/500/510 | | |
| Power factor | | % | 100/100/99 | | | 100/100/100 | | |
| Running current | | A Indor/Outdoor | 220V | 230V | 240V | 220V | 230V | 240V |
| | | | 0.19/2.36 | 0.20/2.28 | 0.22/2.22 | 0.19/2.04 | 0.20/1.97 | 0.22/1.91 |
| Starting current | | A | 10 | | | | | |
| Moisture removal | | lit/h | 0.8 | | | | | |
| Noise | Indoor (H/M/L) | dB | 43/36/31 | | | | | |
| | Outdoor (220/230/240V) | dB | 47/48/49 | | | | | |
| Refrigerant | Name of refrigerant | | R22 | | | | | |
| | Rated volume | kg (oz) | 0.65 (22.9) | | | | | |
| Refrigerant control | | | Capillary tube | | | | | |
| | Gas side size | mm (in) | 9.52 (3/8) | | | | | |
| | Connection type | | Flare connection | | | | | |
| Interconnection pipe | Liquid side size | mm (in) | 6.35 (1/4) | | | | | |
| | Connection type | | Flare connection | | | | | |
| | Maximum length (of one way) | m (ft) *2 | 10 (32.8) | | | | | |
| | Maximum height<br>Indoor unit higher | m (ft) | 5 (16.4) | | | | | |
| | Outdoor unit higher | m (ft) | 5 (16.4) | | | | | |
| Condensate drain pipe | Outer diameter | mm (in) | 16 (5/8) | | | | | |
| INDOOR UNIT | | RAS- | 07EKH | | | | | |
| Dimensions | Height | mm (in) | 265 (10.4) | | | | | |
| | Width | mm (in) | 790 (31.1) | | | | | |
| | Depth | mm (in) | 155 (6.1) | | | | | |
| Net weight | | kg (lbs) | 8 (17.6) | | | | | |
| Evaporator type | | | Finned tube | | | | | |
| Indoor fan type | | | Cross flow fan | | | | | |
| Air volume | High fan | $m^3/h$ (CFM) | 462 (274) | | | | | |
| | Medium fan | $m^3/h$ (CFM) | 370 (215) | | | | | |
| | Low fan | $m^3/h$ (CFM) | 300 (175) | | | | | |
| Fan motor output | - | W | | | | | | |
| Air filter | | | Polypropylene net filter (Washable) | | | | | |
| OUTDOOR UNIT | | RAS- | 07EAH | | | | | |
| Dimensions | Height | mm (in) | 530 (20.9) | | | | | |
| | Width | mm (in) | 770 (30.3) | | | | | |
| | Depth | mm (in) | 200 (7.9) | | | | | |
| Net weight | | kg (lbs) | 29 (63.9) | | | | | |
| Condenser type | | | Finned tube | | | | | |
| Outdoor fan type | | | Propeller | | | | | |
| Air flow volume | | $m^3/h$ (CFM) | 1500 (890) | | | | | |
| Fan motor output | | W | 18 | | | | | |
| Compressor | Model | | $PH70T_1$-4C | | | | | |
| | Output | W | 500 | | | | | |
| Safety device | | | Fuse, Overload relay | | | | | |
| Auto louver | | | Yes | | | | | |
| Usable outdoor temperature range | | °C | 21 – 43 | | | -10 – 21 | | |

Specifications are subject to change without notice.

| Item | | Model | RAS-09EKH/EAH | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Cooling | | | Heating | | |
| Capacity | | kW | 220V | 230V | 240V | 220V | 230V | 240V |
| | *1 | | 2.28 | 2.30 | 2.32 | 2.47 | 2.50 | 2.53 |
| | | Btu/h | 7780 | 7850 | 7920 | 8430 | 8530 | 8630 |
| Power source | | Phase | Single | | | | | |
| | | V | 220/230/240 | | | | | |
| | | Hz | 50 | | | | | |
| Power consumption | | W | 740/750/760 | | | 670/680/690 | | |
| Power factor | | % | 95/94/92 | | | 94/92/89 | | |
| Running current | | A Indoor/Outdoor | 220V | 230V | 240V | 220V | 230V | 240V |
| | | | 0.19/3.34 | 0.20/3.27 | 0.22/3.22 | 0.19/3.05 | 0.20/3.03 | 0.22/3.00 |
| Starting current | | A | 14 | | | | | |
| Moisture removal | | lit/h | 1.2 | | | | | |
| Noise | Indoor (H/M/L) | dB | 43/36/31 | | | | | |
| | Outdoor (220/230/240V) | dB | 47/48/49 | | | | | |
| Refrigerant | Name of refrigerant | | R22 | | | | | |
| | Rated volume | kg (oz) | 0.67 (23.6) | | | | | |
| Refrigerant control | | | Capillary tube | | | | | |
| Interconnection pipe | Gas side size | mm (in) | 9.52 (3/8) | | | | | |
| | Connection type | | Flare connection | | | | | |
| | Liquid side size | mm (in) | 6.35 (1/4) | | | | | |
| | Connection type | | Flare connection | | | | | |
| | Maximum length (of one way) | m (ft) *2 | 10 (32.8) | | | | | |
| | Maximum height Indoor unit higher | m (ft) | 5 (16.4) | | | | | |
| | Outdoor unit higher | m (ft) | 5 (16.4) | | | | | |
| Condensale drain pipe | Outer diameter | mm (in) | 16 (5/8) | | | | | |
| INDOOR UNIT | | RAS- | 09EKH | | | | | |
| Dimensions | Height | mm (in) | 265 (10.4) | | | | | |
| | Width | mm (in) | 790 (31.1) | | | | | |
| | Depth | mm (in) | 155 (6.1) | | | | | |
| Net weight | | kg (lbs) | 8 (17.6) | | | | | |
| Evaporator type | | | Finned tube | | | | | |
| Indoor fan type | | | Cross flow fan | | | | | |
| Air volume | High fan | $m^3/h$ (CFM) | 462 (274) | | | | | |
| | Medium fan | $m^3/h$ (CFM) | 370 (215) | | | | | |
| | Low fan | $m^3/h$ (CFM) | 300 (175) | | | | | |
| Fan motor output | | W | | | | | | |
| Air filter | | | Polypropylene net filter (Washable) | | | | | |
| OUTDOOR UNIT | | RAS- | 09EAH | | | | | |
| Dimensions | Height | mm (in) | 530 (20.9) | | | | | |
| | Width | mm (in) | 770 (30.3) | | | | | |
| | Depth | mm (in) | 200 (7.9) | | | | | |
| Net weight | | kg (lbs) | 29 (63.9) | | | | | |
| Condenser type | | | Finned tube | | | | | |
| Outdoor fan type | | | Propeller | | | | | |
| Air flow volume | | $m^3/h$ (CFM) | 1500 (890) | | | | | |
| Fan motor output | | W | 18 | | | | | |
| Compressor | Model | | PH94T$_1$-4C | | | | | |
| | Output | W | 750 | | | | | |
| Safety device | | | Fuse, Overload relay | | | | | |
| Auto louver | | | Yes | | | | | |
| Usable outdoor temperature range | | °C | 21 – 43 | | | –10 – 21 | | |

Specifications are subject to change without notice.

**Note: *1**

- Capacity is based on the following temperature conditions.

| | | JIS C9612-1994 | |
|---|---|---|---|
| | | Cooling | Heating |
| Indoor unit inlet air temperature | (DB) | 27°C | 20°C |
| | (WB) | 19°C | – |
| Outdoor unit inlet air temperature | (DB) | 35°C | 7°C |
| | (WB) | 24°C | 6°C |

**Note: *2 CHARGELESS**

- No additional refrigerant required.
- This air conditioner accepts a connection piping length of up to 10m and a head of up to 5m.
- There is no need to add the refrigerant as long as the total length of the connection piping is up to 10m.

# 2. CONSTRUCTION VIEWS

## 2-1. Indoor Unit

**RAS 07EKH**
**RAS-09EKH**

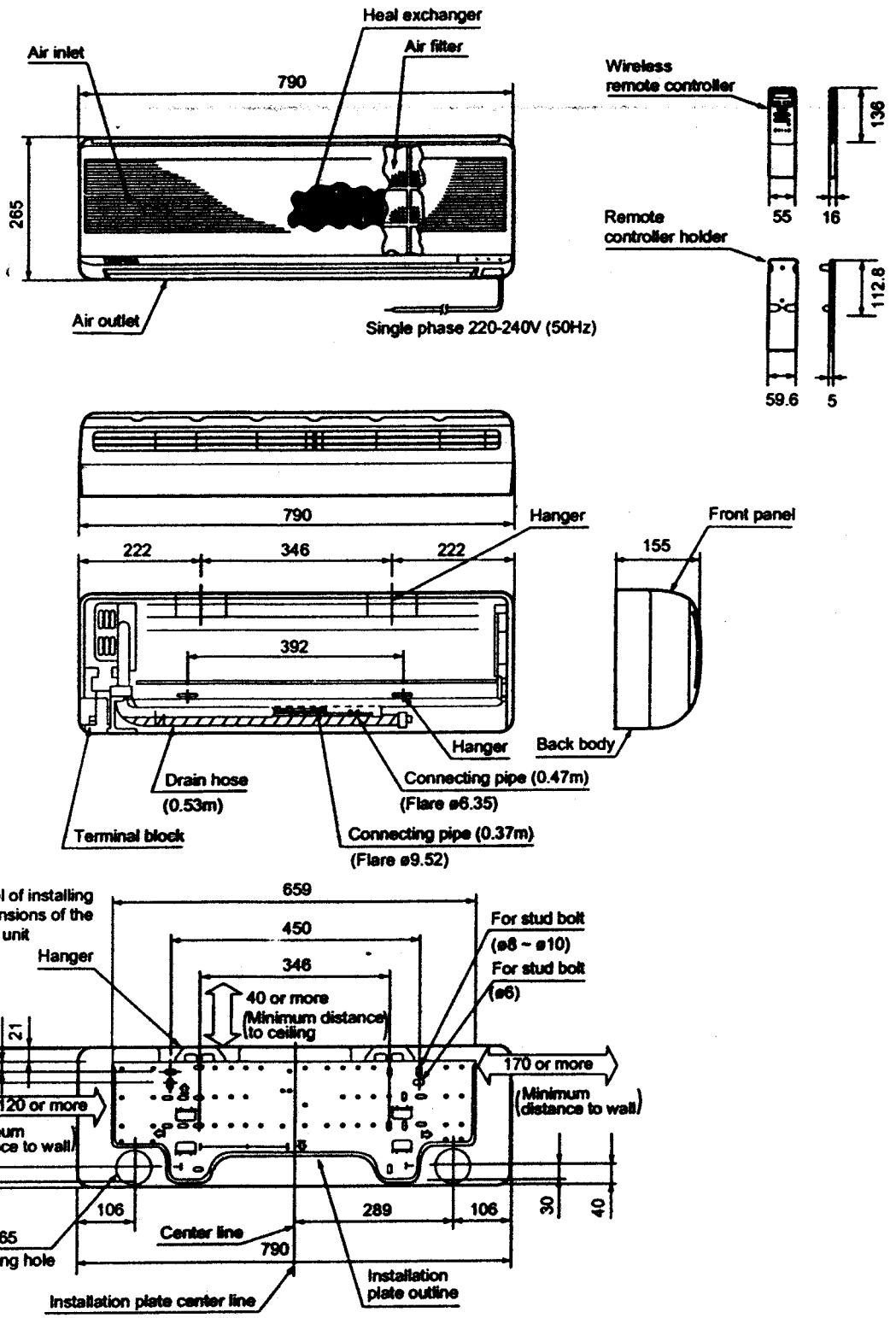



Fig. 2-1

## 2-2. Outdoor Unit

**RAS-07EAH**

**RAS-09EAH**

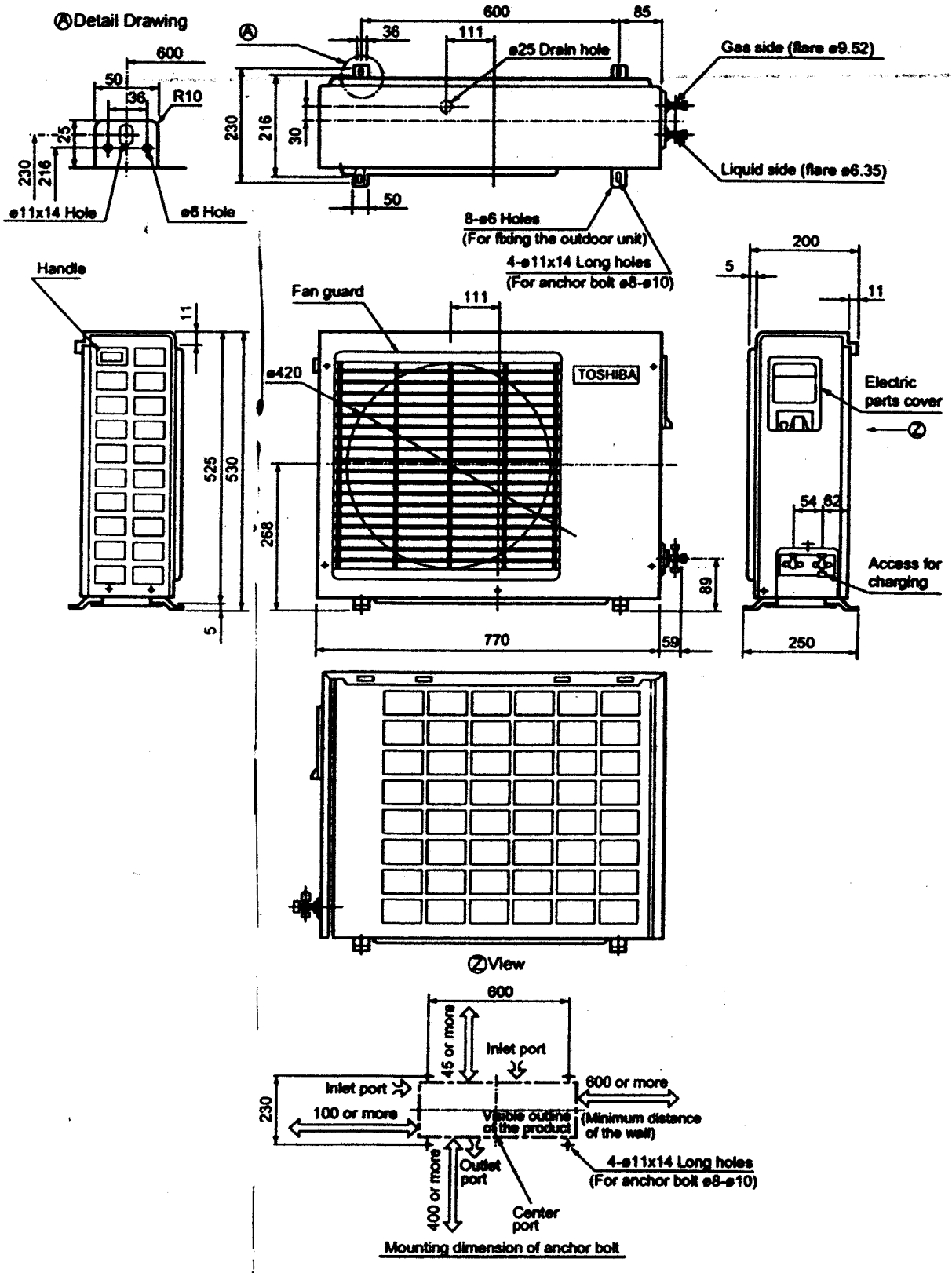



**Fig. 2-2**

# 3. CAUTION IN INSTALLATION

## 3-1. Installation of Indoor Unit

### 3-1-1. Removing the Front Panel

(1) Open the screw caps and remove the two screws securing the front panel.

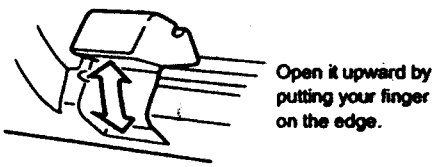



Fig. 3-1 Opening the screw cap

(2) Close the screw caps as behind.

(3) Open the air outlet direction (up-down) louver horizontally by hand.

(4) Slightly open the lower part of the front panel, then pull the upper part of the front panel toward you to remove it from the rear plate.

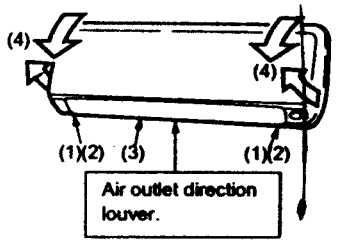



Fig. 3-2 Removing the front panel

### *Caution When Connecting the Connecting Cable*

When connecting the connective cable, follow the instructions below.

(1) Remove the front panel.

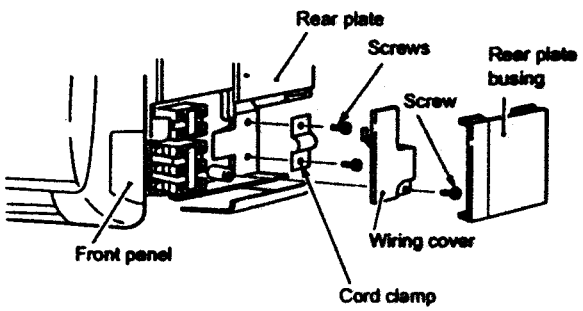



Fig. 3-3

**Note:**

- Connect the indoor and outdoor units with a connective cable over the shortest distance as possible.

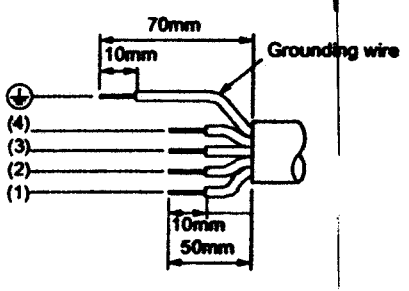



Fig. 3-4

(2) Insert the connective cable fully into the terminal block and secure it by screw tightly.

(3) Secure the connective cable with the cord clamp.

(4) Tightening torque should be 1.2 N.m (12 kgf.cm)

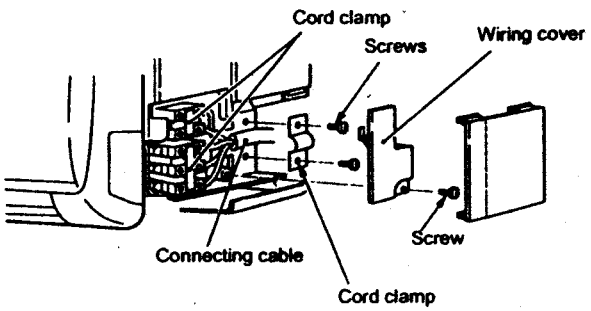



Fig. 3-5

(5) Fix the wiring cover, rear plate bushing and front panel on the indoor unit.

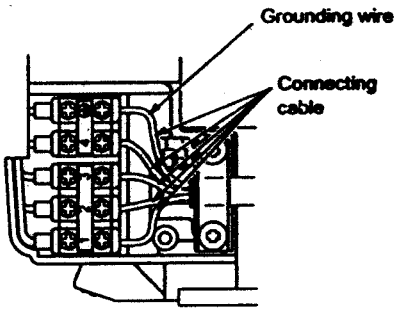



Fig. 3-6

### 3-1-2. Caution in Mounting the Front Panel

When the panel is removed and mounted again, follow the step described below.

(1) After fastening two screws, be sure to hook the inside clicks (1) and (2) of the front panel shown in Fig. 3-7, right gap is left between the front panel and the rear plate.

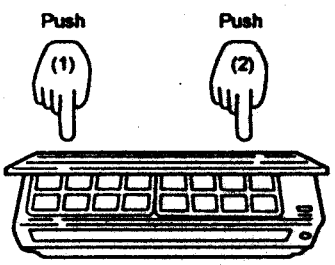



Fig. 3-7

**Note:**

- If cooling (dry) operation is made without pushing the air outlet, dew can be attached on the front panel surface. In addition, a gap between the front panel and the body will become wider, spoiling the appearance.

### 3-1-3. Precautions for Refrigerant Piping

**(1) Under-side connection with piping**

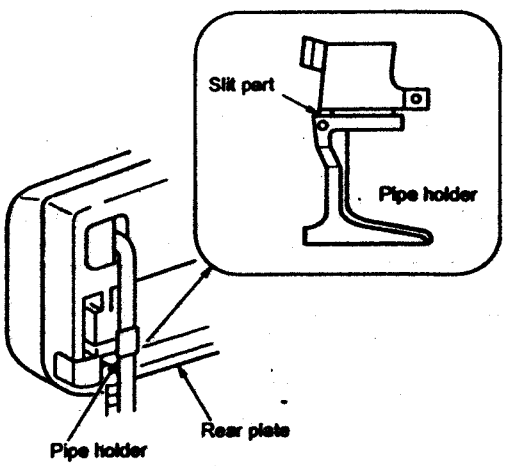



Fig. 3-8

(1) Cut out the knockout piece from the right below of the rear plate with a knife, etc. Smooth the cut edge.

(2) Set the drain hose in the inner part of the indoor unit and connecting cable in lower part of it.

(3) Wind the tape round them.

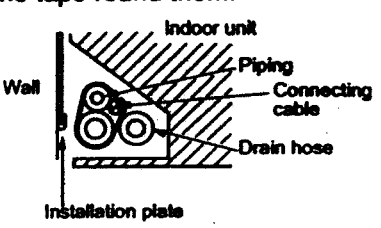



Fig. 3-9

### (2) Left-hand connection with piping

When the piping runs to the left, be sure to use a tool such as a pipe bender to bend the pipe.

**Note:**

- If the pipe is bent incorrectly, the air conditioner could be raised.

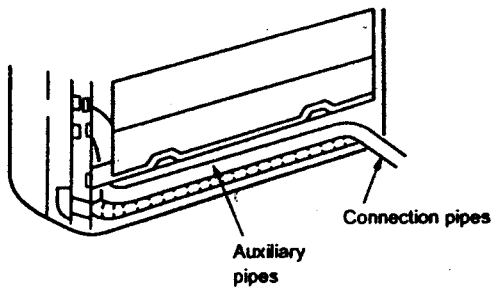



Fig. 3-10

(1) When the piping runs to the left, remove the left side body bushing of the rear panel. You may need the body bushing when you relocate the unit, so be sure make the customer keep it in a safe place.

(2) After passing the connection pipe through the pipe hole, connect the connection pipe to the auxiliary pipes and wrap covering tape around them.

(3) For left-hand connection with piping, bend the pipes as shown in Fig. 3-11.

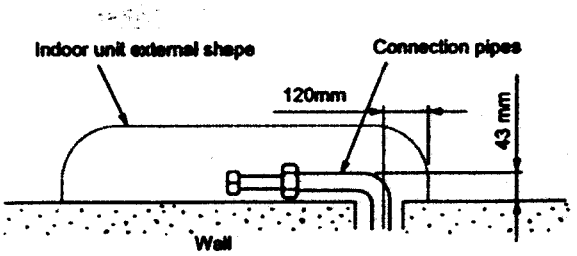



Fig. 3-11

**Note:**

- Bend the connection pipe so that the distance between the pipe and the wall be 43 mm or less.

## 3-2. Flaring

### 3-2-1. Pipe Cutting

(1) Cut the pipe little by little advancing the blade of pipe cutter slowly.

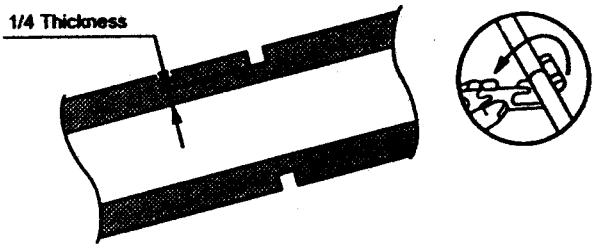



Fig. 3-12

**Note:**

- For fine work, do not advance the blade by force in order to prevent distortion of the pipe, and extra burrs.
- Cut the pipe a little longer than required.

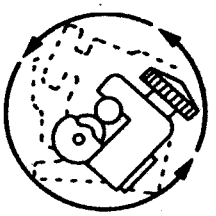


Fig. 3-13

### 3-2-2. Burr Removal

(1) Raise burrs with the burr stick or the burr remover. (Hold the flaring end down to prevent burrs from dropping inside pipe)

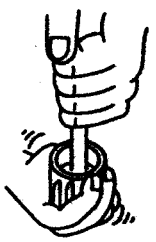


Fig. 3-14

**Note:**

- Be sure to remove burrs to avoid unevenness on the flare face which will cause gas leaks.
- Cover the pipe end with a polyethylene bag and on sheet.

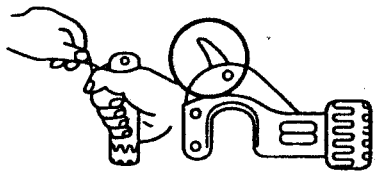


Fig. 3-15

### 3-2-3. Point of Flaring

(1) The exact length of pipe protruding from the face of the flare die is determined by the flaring, too.

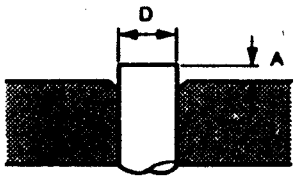



Fig. 3-16

**Note:**

- Too long a protrusion of pipe from the flaring tool will result in too long a flare; If this happens, the flare nut will not tighten and the joint will not seat.
- Too small a protrusion will cause gas leaks.

***CAUTION:***

- Too large protrusion of pipe results in impossible tightening of the flare nut.
- Too small a protrusion of pipe will cause gas leaks due to insufficient flare surface.

- Table 3-1 shows the use of an imperial die and a rigid die.

**Table 3-1**

| Type of pipe | D (mm) | A (mm) | |
|---|---|---|---|
| | | Imperial | Rigid |
| 1/4" | 6.35 | 1.3 | 0.7 |
| 3/8" | 9.52 | 1.6 | 1.0 |

- Fine flaring work shows even brightness on the flared surface and uniform thickness of pipe.
- Unsuccessful flaring work causes gas leaks, therefore rework it.

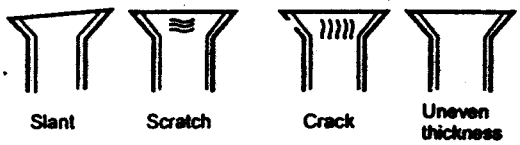



Fig. 3-17

- The above faulty flaring will cause gas leaks.

### 3-2-4. Finishing Work

(1) Fix the pipe firmly on the flare die. Match the centers of both the flare die and the flaring punch, and tighten flaring punch fully.

## 3-3. Pipe Process Points

### 3-3-1. Pipe Bending

(1) Carefully bend by hand.

**Note:**

- Collapsed pipe cause cooling failure.

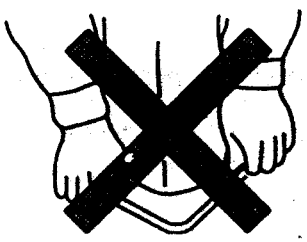


Fig. 3-18

(2) Bend with pipe bender. (Since the insulation is wound on, use the bender by sliding the insulation to one side, or cutting it halfway.)

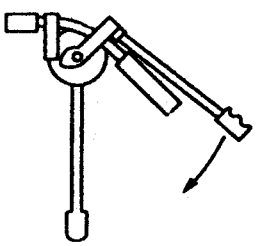


Fig. 3-19

(3) The radius of the pipe bend should be 100 mm or more.

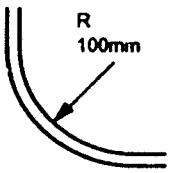



Fig. 3-20

(4) Too small a radius causes collapse of pipe.

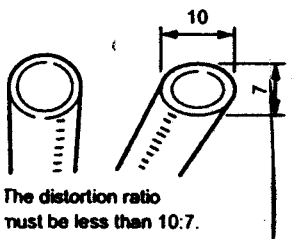



Fig. 3-21

### 3-3-2. Pipe Connection

(1) Connect the flare pipe close to the air conditioner unit so both faces fit well.

**Note:**

- Forcing to tighten the nut without the center axis coincided causes gas leaks.

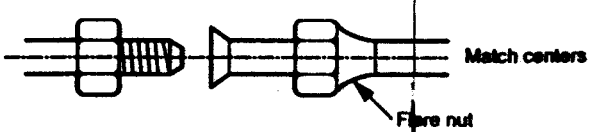



Fig. 3-22

(2) Use a torque wrench and spanner to tighten or untighten the flare nut. Tightening should be done by finger first, then use the torque wrench. A torque wrench helps to provide adequate torque for tightening.

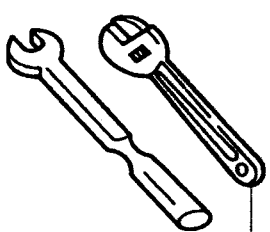


Fig. 3-23

**Note:**

- Insufficient tightening causes gas leaks. Over tightening results in cracks the flared surface.

***CAUTION:***

- Do not use the spanner from the beginning of tightening.
- When processing 1/4 inch pipe, tighten lightly with spanner and then tighten additionally by 90 – 120 degree with torque wrench and spanner.

**Table 3-2 Tightening torque of flare nut**

| Pipe size | 6.35 mm (1.4") | 9.52 mm (3/8") |
|---|---|---|
| Standard torque | 15.7 (160) | 29.4 (300) |

(Unit: N.m (kgf.cm))

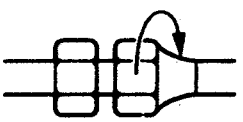


Fig. 3-24

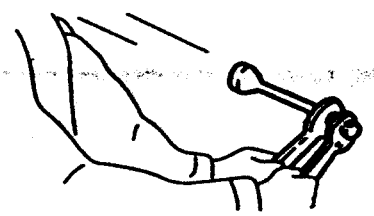


Fig. 3-25

# 4. WIRING DIAGRAM

**RAS-07EKH/RAS-07EAH**

**RAS-09EKH/RAS-09EAH**

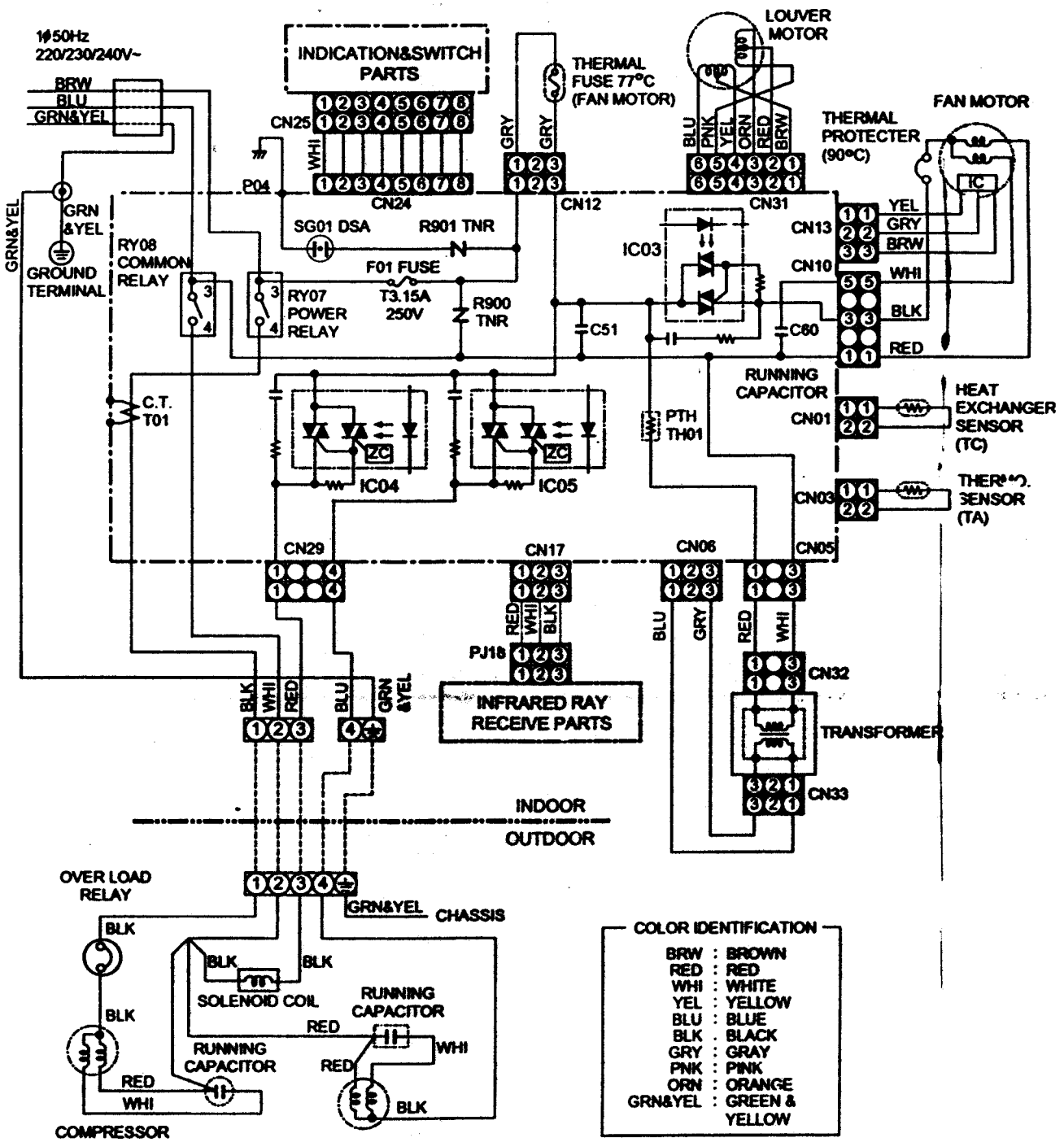



Fig. 4-1

# 5. SPECIFICATIONS OF ELECTRICAL PARTS

## 5-1. RAS-07EKH, RAS-09EKH (Indoor Unit)

| No. | Parts name | Type | Specifications | | |
|---|---|---|---|---|---|
| 1 | Fan motor (For indoor) | MMF-200-18-2C | Output (Rated) 18W, 2 pole, 1 phase, 220 – 240V, 50 Hz | | |
| | | | Winding resistance (Ω) (at 20°C) | Red-Black | White-Black |
| | | | | 101.6 | 209.4 |
| 2 | Thermo sensor (TA sensor) | (microporcessor) | Adjustable range: 17 – 30°C | | |
| 3 | Runing capacitor for indoor fan motor | EVN40M105UL1 | 400WV, 1μF | | |
| 4 | Transformer | TTZ-200/240-1 | Primary 200 – 240V, Secondary 15V | | |
| 5 | Microcomputer | TMP87CH40N | | | |
| 6 | Power relay, Common relay | G4A-1A | Coil: 12V 90mA, Rated 250V 20A | | |
| 7 | Heat exchanger sensor (TC-sensor) | (microprocessor) | 10 KΩ at 25 °C | | |

## 5-2. RAS-07EAH (Outdoor Unit)

| No. | Parts name | Type | Specifications | | |
|---|---|---|---|---|---|
| 1 | Compressor | PH70T$_1$-4C | Output (Rated) 500W, 2 pole, 1 phase, 220 – 240V, 50 Hz | | |
| | | | Winding resistance (Ω) (at 20°C) | Red-Black | White-Black |
| | | | | 4.46 | 6.55 |
| 2 | Fan motor (For outdoor) | UE6-21A5P | Output (Rated) 18W, 6 pole, 1 phase, 220 – 240V, 50 Hz | | |
| | | | Winding resistance (Ω) (at 20°C) | Red-Black | White-Black |
| | | | | 366.2 | 368.5 |
| 3 | Running capacitor (For fan motor) | EEP2G155HQA104 | 400V AC, 1.5μF | | |
| 4 | Running capacitor (For compressor) | SK-40CMF15UT | 400VAC, 15μF | | |
| 5 | Solenoid coil | LB60012 | AC: 200/240V | | |
| 6 | Overload relay | J-MRA99259-9201 | AC: 200/240V | | |

## 5-3. RAS-09EAH (Outdoor Unit)

| No. | Parts name | Type | Specifications | | |
|---|---|---|---|---|---|
| 1 | Compressor | PH940T$_1$-4C | Output (Rated) 750W, 2 pole, 1 phase, 220 – 240V, 50 Hz | | |
| | | | Winding resistance (Ω) (at 20°C) | Red-Black | White-Black |
| | | | | 4.53 | 8.73 |
| 2 | Fan motor (For outdoor) | UE6-21A5P | Output (Rated) 18W, 6 pole, 1 phase, 220 – 240V, 50 Hz | | |
| | | | Winding resistance (Ω) (at 20°C) | Red-Black | White-Black |
| | | | | 366.2 | 368.5 |
| 3 | Running capacitor (For fan motor) | EEP2G155HQA104 | 400V AC, 1.5μF | | |
| 4 | Running capacitor (For compressor) | EAG40M206UF2 | 400V AC, 15μF | | |
| 5 | Solenoid coil | LB60012 | AC: 200/240V | | |
| 6 | Overload relay | J-MRA99260-9200 | AC: 200/240V | | |

# 6. REFRIGERANT CYCLE DIAGRAM

**RAS-07EKH/RAS-07EAH**

**RAS-09EKH/RAS-09EAH**

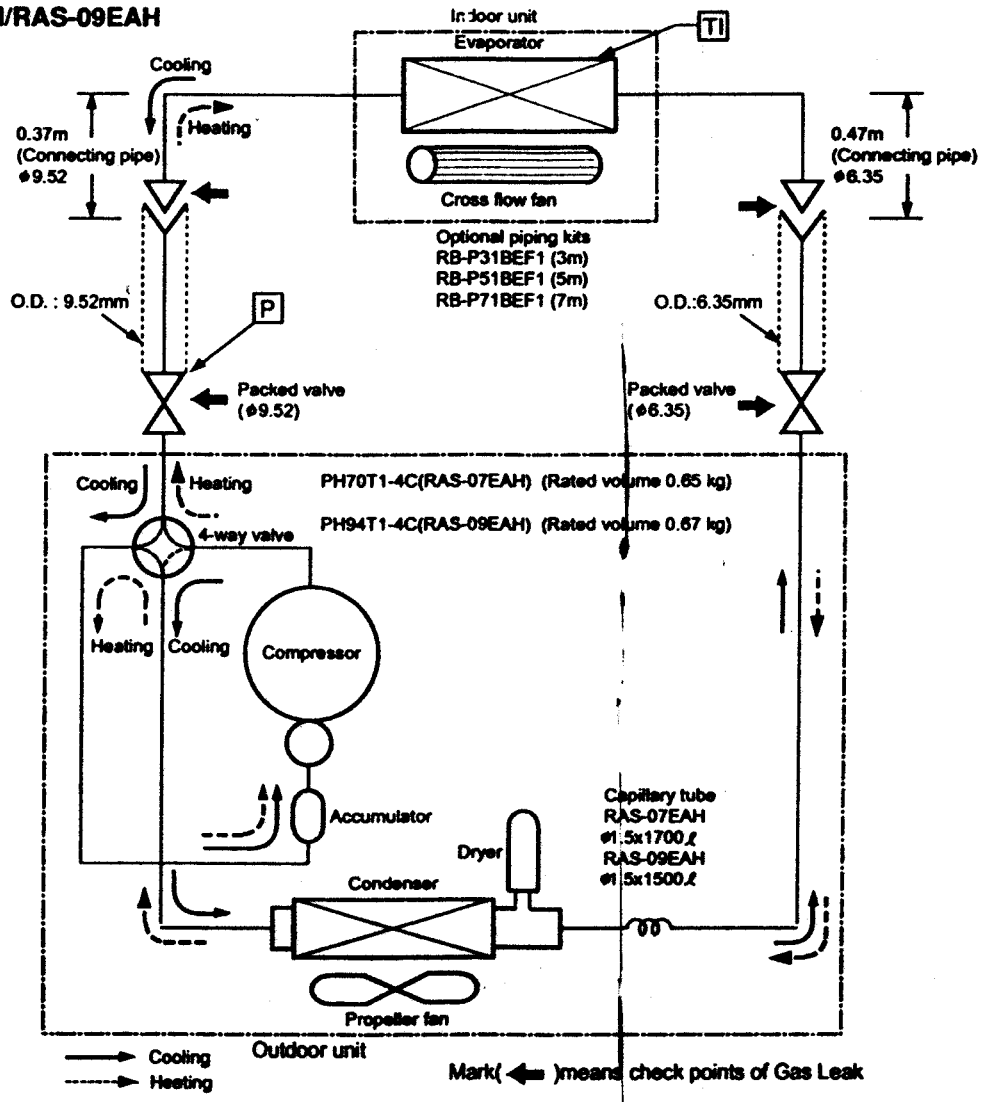



**Fig. 6-1**

**Table 6-1**

| | 50Hz | Standard pressure P (kg/cm²G) | | Surface temp. of heat exchanger interchanging pipe T1 (°C) | | Fan speed (Indoor) | Ambient temp. conditions DB/WB (°C) | |
|---|---|---|---|---|---|---|---|---|
| | Model | RAS-07EKH | RAS-09EKH | RAS-07EKH | RAS-09EKH | | Indoor | Outdoor |
| Heating | Standard | 12.6 | 14.2 | 34.5 | 38.5 | High | 20/– | 7/6 |
| | High temperature | 17.1 ~ 19.9 | 19.8 ~ 22.8 | 45.5 ~ 52.0 | 52.0 ~ 59.0 | Low | 27/– | 21/15 |
| | Low temperature | 10.4 | 11.9 | 29.5 | 34.1 | High | 20/– | –10/–10 |
| Cooling | Standard | 6.5 | 6.2 | 12.5 | 11.4 | High | 27/19 | 35/24 |
| | High temperature | 6.2 | 6.9 | 18.5 | 14.6 | High | 32/23 | 43/26 |
| | Low temperature | 4.6 | 4.5 | 3.0 | 2.4 | Low | 21/15 | 21/15 |

**Note:**

- Measure the heat exchanger temperature at the center of U-bend (By means of thermistor thermometer.) During heating overload, the high temperature limit control operation is included.

# 7. MICRO-COMPUTER BLOCK DIAGRAM

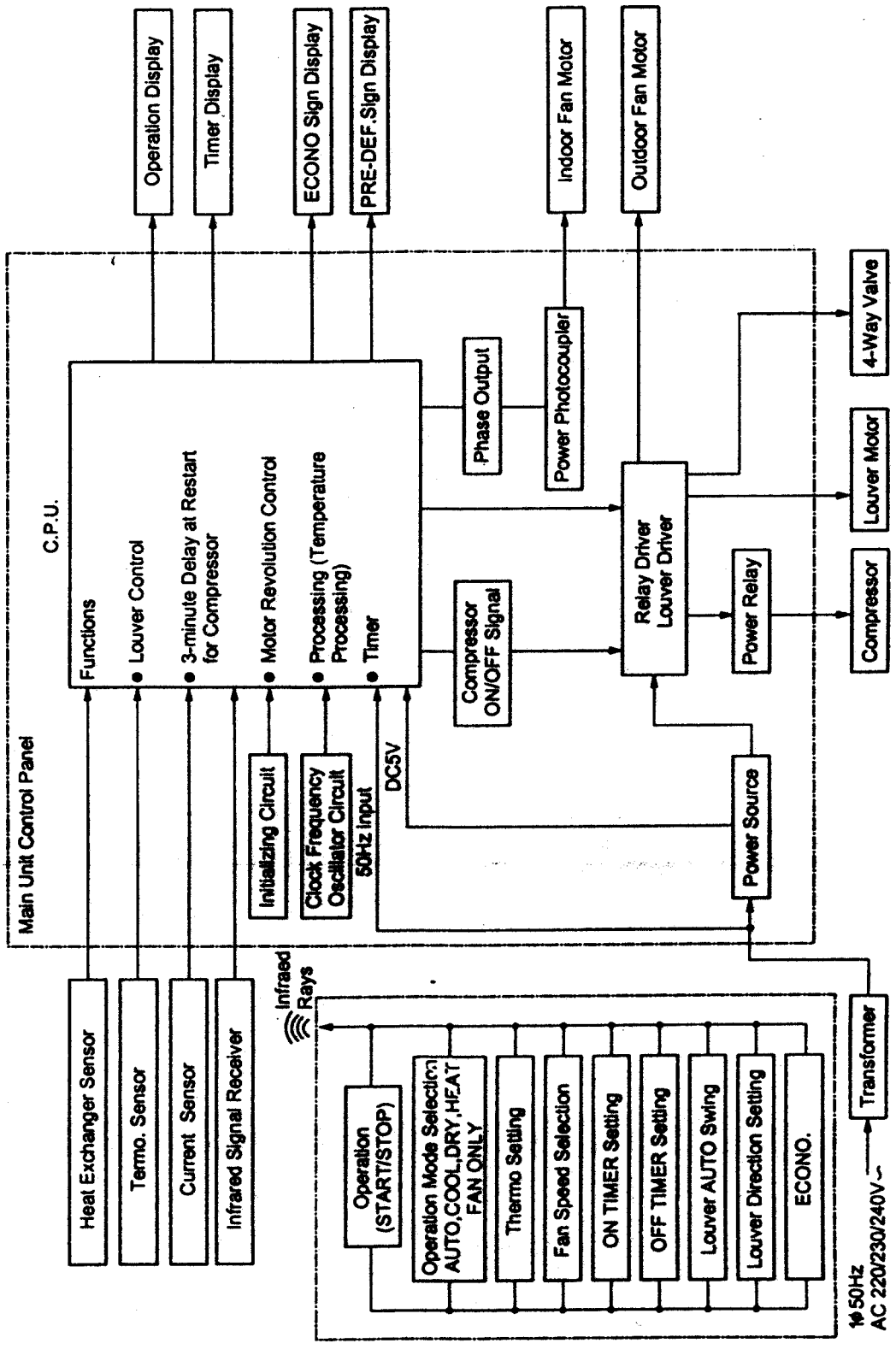


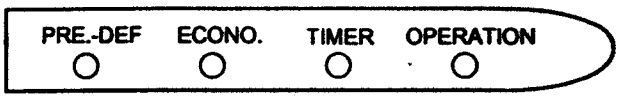

Fig. 7-1

# 8. OPERATION DESCRIPTIONS

## 8-1. Names and Functions of Indicators and Controls on Indoor Unit

### 8-1-1. Display Panel

The operating conditions are indicated below.




- OPERATION lamp (green)
- TIMER lamp (yellow)
- ECONO. lamp (green)
- PRE.-DEF lamp (red)

Fig. 8-1

### 8-1-2. Control Panel

Lift the front panel to perform control panel setting.

**(1) Opening the front panel**

1) Push the PUSH on both lower corners of the front panel.
2) Open the panel. You can lift the panel up to an angle where it will remain fixed.
   Do not lift the panel any further when it stops with a clicking sound.

**(2) Closing the front panel**

1) Push the PUSH on both lower ends of the front panel.
2) Close the panel firmly.

**(3) If the TEMPORARY switch is set to AUTO**

1) The air conditioner operates automatically by selecting the cooling, dry, fan only mode depending on the room temperature.

**(4) If the TEMPORARY switch is set to COOL**

1) The air conditioner operates in the cooling mode (at a low fan speed).

**Note:**

- If the TEMPORARY switch is set to AUTO or COOL, the remote controller is not usable.

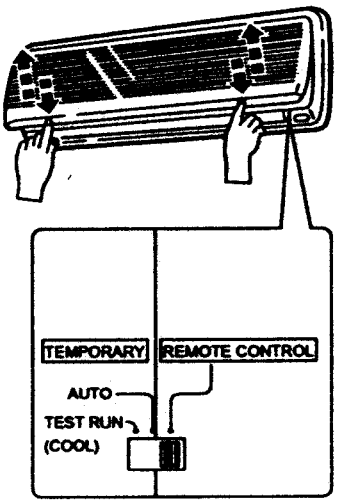



Fig. 8-2

## 8-2. Functions on Remote Controller

**(a) Infrared signal emitter**

Transmits a signal to the indoor unit.

**(b) START/STOP button**

- Push the button to start operation. (A receiving beep is heard.)
- Push the button again to stop operation. (A receiving beep is heard.)
- If no receiving sound is heard from the indoor unit, push the button twice.

**(c) Mode select button (MODE)**

Push this button to select modes. Each time you push the button, a mode is selected in a sequence that goes from AUTO, COOL, DRY, HEAT, FAN ONLY, and back to AUTO. (A receiving beep is heard).

**(d) Temperature button (TEMP.)**

▲ The set temperature is increased to 30°C.
▼ The set temperature is decreased to 17°C.
(A receiving beep is heard.)

**(e) Fan speed button (FAN)**

- Push this button to select fan speed.
- When you select AUTO, the fan speed is automatically adjusted according to the room temperature. You can also manually select the desired fan speed from three settings. (A receiving beep is heard.)

**(f) Auto louver button (AUTO)**

- Push this button to swing the louver. (A receiving beep is heard.)
- Push this button again to stop louver swinging. (A receiving beep is heard.)

**(g) Set louver button (SET)**

- To adjust the air flow direction by the wireless REMOTE CONTROLLER during the air conditioner operation, push this button. (A receiving beep is heard.)
- While this button is kept depressed, the receiving tone continuously sounds.

**(h) Off timer button (OFF)**

- Push this button to set the OFF timer.

**(i) On timer button (ON)**

- Push this button to set the ON timer.

**(j) Reserve button (RSV)**

- Push this button to reserve timer settings. (A receiving beep is heard.)

**(k) Cancel button (CNL)**

- Push this button to cancel on timer and off timer. (A receiving beep is heard.)

**(l) Economy button (ECONO.)**

- Push this button to set the economical operation mode of the air conditioner. (A receiving beep is heard.)

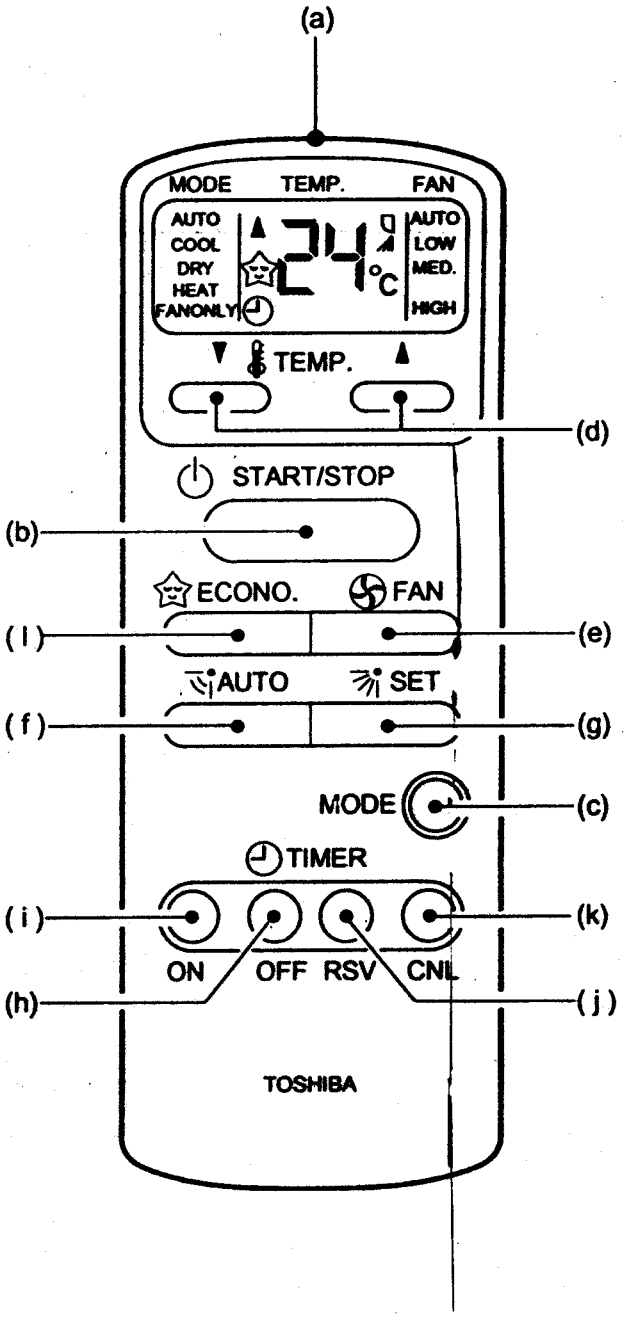



Fig. 8-3

## 8-3. Names and Functions of Indicators on Remote Controller

**(a) Transmission indicator**

- This transmission indicator lights when remote controller transmits signals to the indoor unit.

**(b) ON/OFF display**

- Displayed by pushing the START/STOP button.
- Push the START/STOP button again to disappear.

**(c) MODE display**

- Displays the current operation mode.

**(d) TEMP. display**

- Displays the temperature setting (17°C to 30°C)
- When you set the operating mode to FAN ONLY, no temperature setting is displayed.

**(e) ECONO. display**

- Displayed by pushing the ECONO. button.
- Push the ECONO. button again to disappear.

**(f) FAN speed display**

- Displays the selected fan speed. AUTO and three fan speed levels "LOW", "MED", "HIGH" can be indicated.
- Displays AUTO when the operating mode is either AUTO or DRY.

**(g) TIMER display**

The time set for timer operation is indicated.

**Note:**

In Fig. 8-4, all displays are indicated for the sake of clarity. During operation, only the relevant displays will be shown on the remote controller.

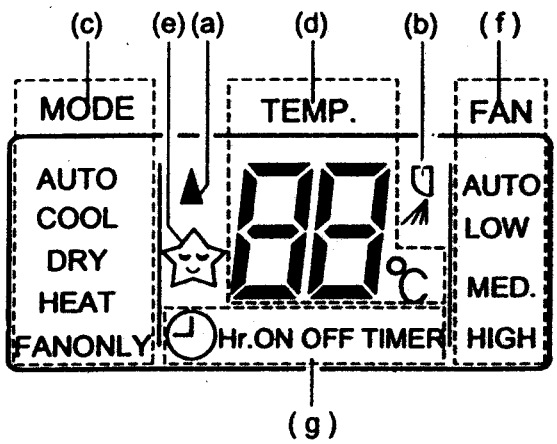



Fig. 8-4

## 8-4. Handling the Remote Controller

### 8-4-1. Location of the Remote Controller

Keep the remote controller where its signals can reach the receiver of the air conditioner (a distance of 7m is allowed.)

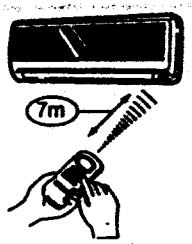



Fig. 8-5

### 8-4-2. Remote Controller Mounting Fixture

A mounting fixture for the remote controller is supplied with it.

**(1) Installing the mounting fixture**

Before you actually install the mounting fixture on a wall or the pillar, check whether the remote control unit signals from the location where you will install the fixture can be received by the indoor unit.

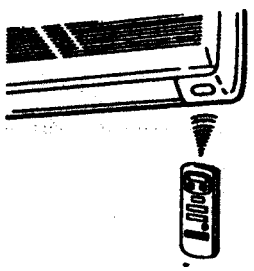


Fig. 8-6

**(2) Mounting and removing the remote controller**

To mount, hold the remote controller parallel to the mounting fixture and push it in fully. To remove, slide the remote controller upwards and out from the mounting fixture.

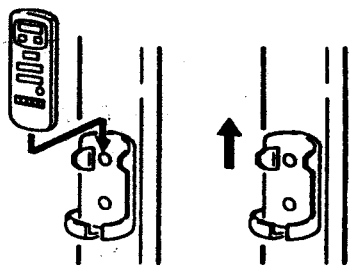


Fig. 8-7

### 8-4-3. Replacing Batteries

The remote controller uses two alkaline dry batteries (LR03).

(1) Remove the cover of the battery compartment at the back of the remote controller by sliding it out in the direction of the arrow.

Remove the used batteries and insert new batteries.

(2) Press a coin or the similar object against the unit to reset, and perform resetting. Then, close the rear lid.

(Once the cell has been replaced, the controller may malfunction. Perform resetting (ACL) accordingly.)

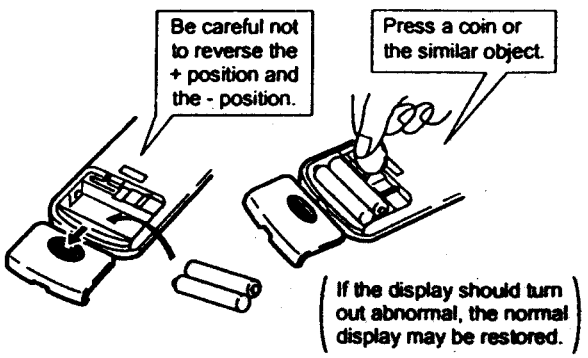



Fig. 8-8

**Notes:**

- When replacing batteries, do not use used batteries or batteries of a different type. Such use may cause the remote controller to malfunction.
- If you do not use the remote controller over a long period, remove the batteries. Otherwise, battery leakage may damage the remote controller.
- The average battery life during normal use is approximately one year.
- Replace the batteries when there is no receiving beep from the indoor unit or if the transmission indication lamp on the remote control unit fails to light.

***CAUTIONS:***

- The air conditioner will not operate if curtains doors or other materials block the signal from the remote controller to the indoor unit.
- Prevent any liquid from failing into the remote controller.

  Do not expose the remote controller to direct sunlight or heat.
- If the infrared signal receiver at the indoor unit is exposed to direct sunlight, the air conditioner may not function properly. Use curtains to prevent the sunlight from falling on the receiver.
- If the room using the air conditioner has fluorescent lighting with electronic starters, signals may not be properly received. If you are planning to use such florescent lamps, consult your local dealer.
- If other electrical appliances react to the remote control, either move these appliances or consult your local dealer.

## *OPERATING MODE:*

Once you select the operating mode, the operating conditions are saved in the unit's microcomputer memory.

Thereafter, the air conditioner will start operating under the same conditions when you simply push the START/STOP button of the remote controller.

## 8-5. Automatic Operation

When you set the air conditioner in AUTO mode, it will automatically select cooling, or fan only operation depending on the room temperature.

### 8-5-1. Operation Steps

**Start**

- The OPERATION lamp (green) on the display panel of the indoor unit starts flashing.

**(1) Mode button**

- Select AUTO.

**(2) TEMP. button**

- Push the TEMP. button.
- Normally, set it between 21°C to 28°C.

**(3) START/STOP button**

- Push this button to start the air conditioner.
- The OPERATION lamp (green) on the display panel of the indoor unit lights. The operating mode is selected in accordance with the room temperature and operation starts after approximately 3 minutes.

**Stop: START/STOP button**

- Push this button again to stop the air conditioner.

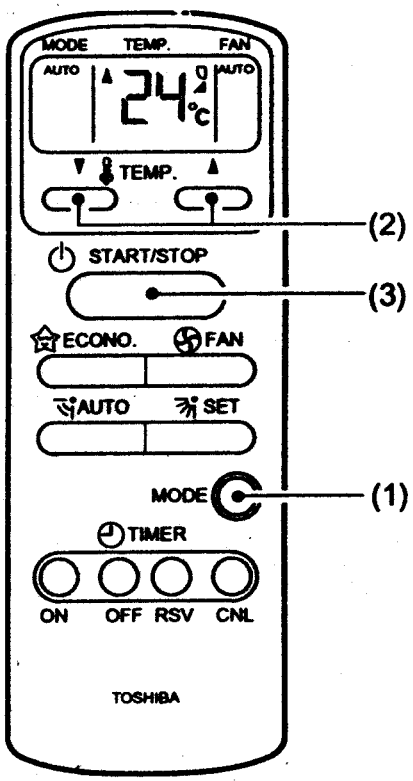



Fig. 8-9

**Note:**

- If the AUTO mode is uncomfortable, you can select the desired conditions manually.
- When you select the AUTO mode, you do not have to set the fan speed. The FAN speed display will show AUTO and the fan speed will be automatically controlled.

**Table 8-1**

| Room temperature of operation | Operating conditions | |
|---|---|---|
| The set temperature +1°C or higher (when hot) | Cooling operation | Performs the cooling operation at a temperature 1°C higher than the setting. |
| The set temperature −1°C to +1°C | Fan only operation | Performs the fan only oepration (low speed) while monitoring the room temperature. When the room temperature changes, the air conditioner will select the cooling or heating mode. |
| The set temperature −1°C or lower (when cool) | Heating operation | Performs the heating operation at a temperature 1°C lower than the setting. |

## 8-6. Heating/Cooling/Fan Only Operation

### 8-6-1. Operation Steps

**Start**

- The OPERATION lamp (green) on the display panel of the indoor unit starts flashing.

**(1) Mode button**

- Select HEAT, COOL or FAN ONLY.

**(2) TEMP. button**

- Push the TEMP. button.
- Cooling 21°C or higher.

**(3) FAN button**

- Select any of the "AUTO", "LOW", "MED" and "HIGH".

**(4) START/STOP button**

- Push this button again to stop the air conditioner.
- The OPERATION lamp (green) on the display panel of the indoor unit lights. The operating mode is selected in accordance with the room temperature and operation starts after approximately 3 minutes. (If you select FAN ONLY mode, the unit will start immediately.)

**Stop: START/STOP button**

- Push this button again to stop the air conditioner.

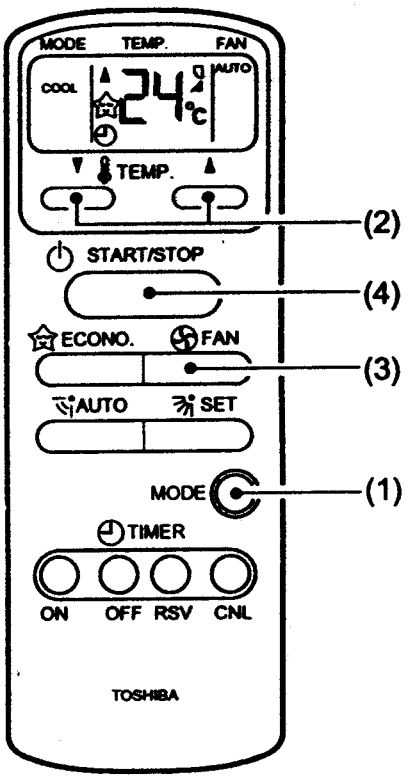



Fig. 8-10

**Note:**

- The FAN ONLY mode does not control temperature. Therefore, perform only steps (1), (3) and (4) to select this mode.

## 8-7. Dry Operation

### 8-7-1. Operation Steps

**Start**

- The OPERATION lamp (green) on the display panel of the indoor unit starts flashing.

**(1) Mode button**

- Select DRY.

**(2) TEMP. button**

- Push the TEMP. button.
- The fan speed indicator displays AUTO.
- The indoor fan speed will be automatically selected low.

**(4) START/STOP button**

- Push this button again to stop the air conditioner.
- The OPERATION lamp (green) on the display panel of the indoor unit lights, and operation starts after approximately 3 minutes.

**Stop: START/STOP button**

- Push this button again to stop the air conditioner.

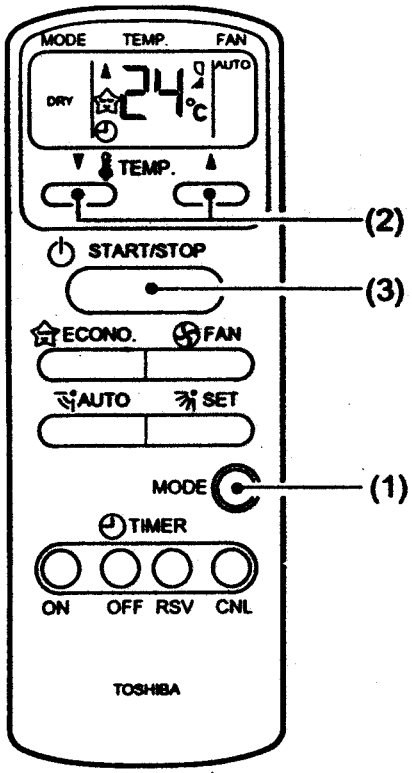



Fig. 8-11

## 8-8. Timer Operation

### 8-8-1. Operation Steps

The timer-reserved time indicates the time remaining available. The time indicated on the remote controller changes accordingly.

**(1) ON or OFF TIMER button**

- Push the ON or OFF TIMER buttons as required.
- Each time the button is pressed, the timer setting changes and set time flashes.
- The indication changes as follows: 0.5 → 1.0 → 1.5 → 2.0 → 3.0 → ... → 23 → 24 Hr.

**(2) Reserve button (RSV)**

- Push this button. Check that the TIMER lamp (yellow) on the display panel of the indoor unit is lit.
- Push the button once more and you will be able to confirm the available remaining time in the timer.

**(3) Cancel button (CNL)**

- Push the CNL button to cancel the timer setting.

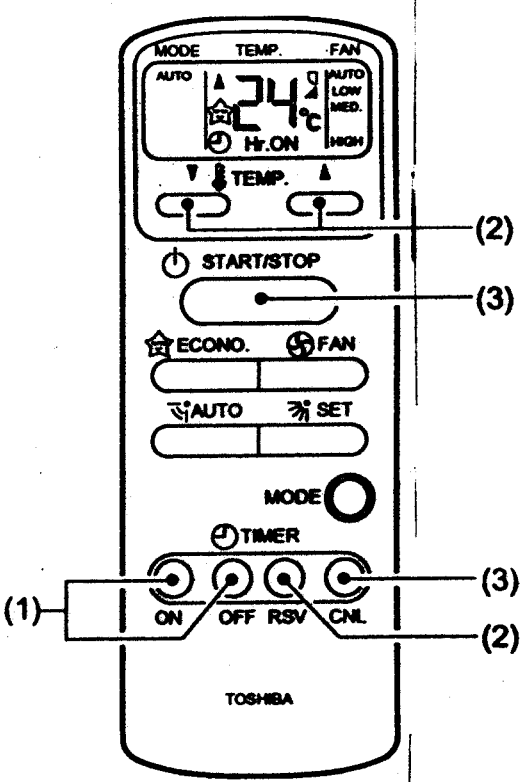



Fig. 8-12

**CAUTION:**

When you select the timer operation, the remote controller automatically transmits the timer signal to the indoor unit at the specified time. Therefore, keep the remote controller in a location from which it can transmit the signal to the indoor unit properly.

**Changing**

- Push the ON or OFF TIMER button once.
- The indication of set time will start flashing.
- Perform steps (1) and (2) to change the setting.

### 8-8-2. Example of Timer Setting

**(1) OFF TIMER (Operation → Stop)**

The OFF TIMER feature is useful when you go to sleep. The air conditioner will stop automatically at the time set.

**Example:**

To turn off the air conditioner 7 hours later.

1) Continue pushing the "OFF" TIMER button until you get "7.0".
2) Push the RSV button.

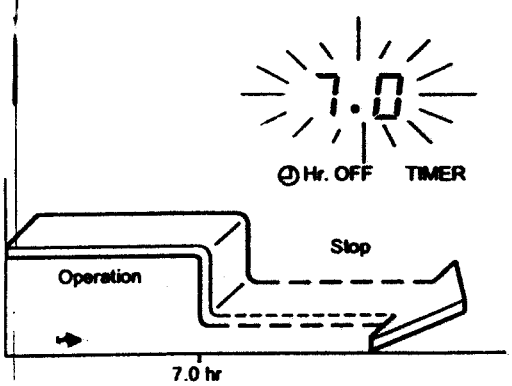



Fig. 8-13

**(2) ON TIMER (Stop Ø Operation)**

The ON TIMER feature is useful when you wake up in the morning or when you return home. The air conditioner will automatically start operating at the time set.

**Example:**

To turn on the air conditioner 5 hours later.

1) Continue pushing the "ON" TIMER button until you get "5.0".
2) Push the RSV button.

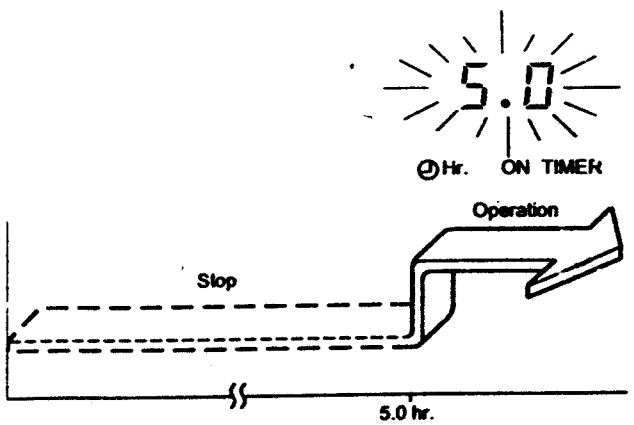



Fig. 8-14

## 8-9. ADJUSTING AIR FLOW DIRECTION

### 8-9-1. Adjustment of Vertical Air Flow Direction

(1) When using the wireless auto louver, the air flow direction is automatically set to the desired position of the last time adjusted during operation.

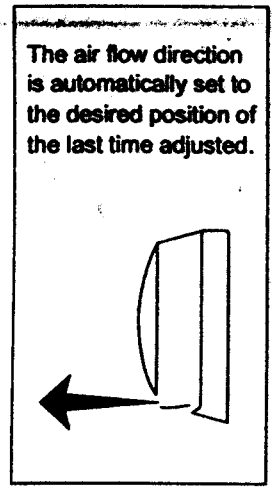



Fig. 8-15

(2) When you stop operation using the remote controller, the louver is closed.

Fig. 8-16

(3) When setting the air flow direction to your preference, hold down the SET LOUVER button of the remote controller and set the air flow in the direction you desire.

(4) During cool and dry operation, change the air flow direction within the range indicated.

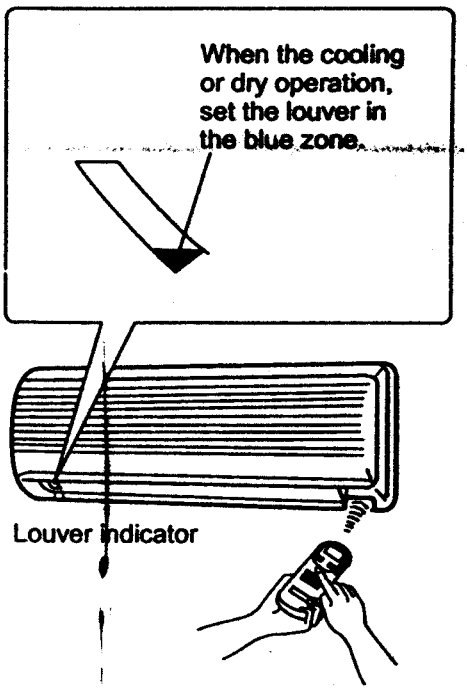



Fig. 8-17

**Note:**

- In the Cool or Dry operation, remember not to continue the downward air flowing for a long time to avoid conceivable dewing on the louver surface and resultant dripping trouble.
- It is also possible to adjust the air flow direction by the remote controller even when the wireless auto louver is in use, but once the air conditioner operation was stopped and restarted thereafter, the air flowing direction automatically becomes horizontal.
- The air flow cannot be adjusted with the remote controller when the air conditioner is stopped. (Also when the ON TIMER is indicated on the display.)

### 8-9-2. Adjusting the Horizontal Air Flow Direction

**Preparation:**

For the cooling or dry operation, move the vertical air flow louver downward using the SET button on the remote controller.

(1) Take hold of the lever on the horizontal air flow grilles and move them to adjust the air flow direction as required.

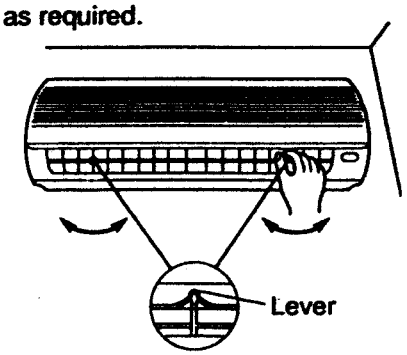



Fig. 8-18

(2) You can adjust the air flow at the left, right locations of the grilles.

(3) For the cooling or dry operation, return the vertical air flow louver to the original position using the SET button on the remote controller.

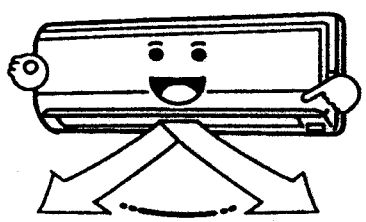


Fig. 8-19

### 8-9-3. Adjusting the Automatic Swing Air Flow Direction

Perform this function while the air conditioner is in operation.

(1) Push the AUTO button on the remote controller.

(2) To stop the function, push the AUTO button again.

(3) To change the swing direction, push the SET button.

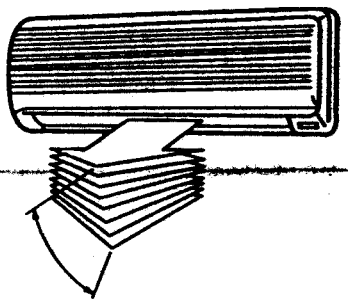


Fig. 8-20

***CAUTIONS:***

- The SET and AUTO buttons will be disabled when the air conditioner is not in operation (including when the ON TIMER is set).
- Do not operate the air conditioner for long hours with the air flow direction set downward during the cooling or dry operation. Otherwise, condensation may occur on the surface of the vertical louver and cause dew dripping.
- Do not move the vertical louver manually. Always use the SET button. If you move the louver manually, it may malfunction during operation. If the louver malfunctions, stop the air conditioner once, and restart.
- When the air conditioner is started immediately after it was stopped, the vertical louver might not move for 10 seconds or so.
- The angle of the two vertical louvers may differ when they move downward and upward.

***PREPARATION:***

- When the power plug (or cord) is connected to EKH:AC 220/230/240V (50 Hz) outlet, the OPERATION (ON) lamp starts flashing, indicating that power has been turned on (or that power failure occurred).
- Confirm that the remote control TEMPORARY switch is set to the REMOTE CONTROL position.
- When the remote controller's START/STOP button is pushed, a receive tone is heard from the main unit and the following operations are carried out.

## 8-10. FAN ONLY Operation

(The remote controller's MODE button is set to the FAN ONLY position.)

(1) Once the setting is made, the operation mode is memorized in the microcomputer so that the same operation can be effected thereafter simply by pushing the START/STOP button.

(2) When the FAN SPEED button is set to the AUTO position, the indoor fan motor operates as shown in Fig. 8-21. When the FAN SPEED button is set to LOW, MED, or HIGH, the motor operates with a constant air volume as listed in Table 8-2. Power relay RY7 is turned off.

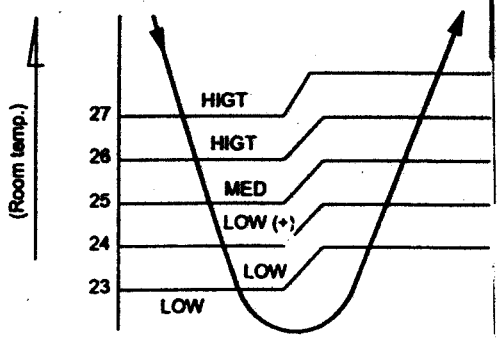



**Fig. 8-21 Auto setting of air volume**

**Table 8-2 Manual setting of FAN SPEED**

| Indication of FAN SPEED | Air volume |
|---|---|
| LOW | LOW |
| MED | MED |
| HIGH | HIGH |

## 8-11. COOL Operation

(The remote controller's MODE button is set to the COOL position)

(1) Once the setting is made, the operation mode is memorized in the microcomputer so that the same operation can be effected thereafter simply by pushing the START/STOP button.

(2) Relay RY07, RY08 is turned on to energize the outdoor unit, and a cool operation is carried out. The indoor fan motor operates as shown in Fig. 8-22 when FAN SPEED button is set to AUTO. The motor operates with a constant air volume as listed in Table 8-2, when the FAN SPEED button is set to LOW, MED, or HIGH.

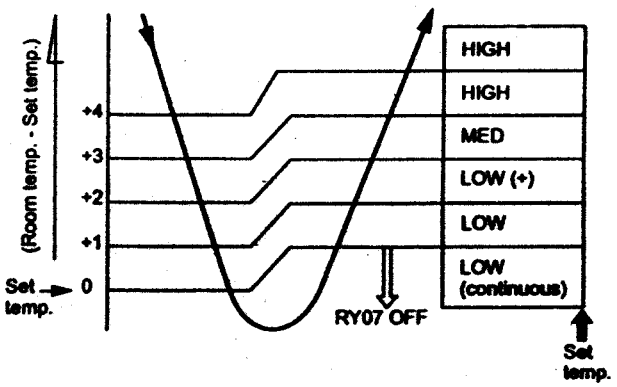



**Fig. 8-22 AUTO**

### 8-11-1. Louver control

(1) When the SET LOUVER button of the remote controller is pushed during the operation, the louver is automatically set to the desired position.

(2) When the SET button is pushed, the louver vertically swings within range of 25°.

(3) The louver position is stored in the microcomputer, and at the next operation, the louvers will be set to the position automatically.

## 8-12. HEAT Operation

(The remote control MODE button is set to the Heat position.)

(1) Once the setting is made, the operation mode is memorized in the microcomputer so that the same operation can be effected thereafter simply by pushing the START/STOP button.

(2) Relay RY07, RY08 are turned on to energize the outdoor unit, and a heat operation is carried out. The indoor fan motor operates as shown in Fig. 8-23, when FAN SPEED button is set to AUTO. The motor operates with a constant air volume as listed in table 8-2, when the FAN SPEED button is set to LOW, MED, or HIGH.

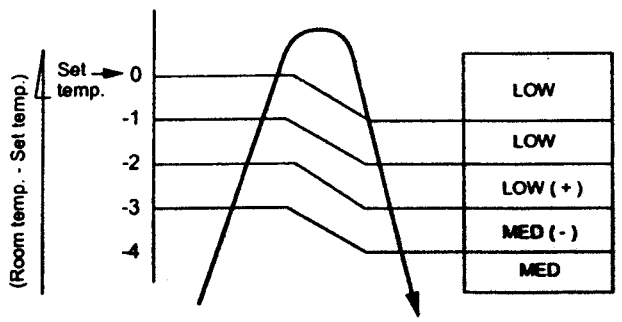



Fig. 8-23

### 8-12-1. Louver Control

(1) When the SET LOUVER button of the remote controller is pushed during the operation, the louver is automatically set to the desired position.

(2) When the SET LOUVER button is pushed, the louver vertically swings within range of 25°.

(3) The louver position is stored in the microcomputer, and at the next operation, the louvers will be set to the stored position automatically.

(4) When a temperature setting is changed during the heating operation, or when the room temperature becomes close to the temperature setting, the vertical louver might close once and then open again.

### 8-12-2. Cool Air Flow Control

(1) If the indoor heat-exchanger temperature detected by the indoor heat-exchanger sensor is 20°C or below, the indoor fan stops and if the temperature rises to 32°C or above, the fan is restarted.

## 8-13. ECONO. Mode

(The remote controller's ECONO. button is pushed and ECONO. display is lit.)

(1) When the ECONO. button is pushed, the indoor unit operates quietly and mildly with controlling airflow.

(2) In the ECONO. mode, the indoor unit will operate at set temperature for one hour from starting time, and next 1 hour, operate at temperature adding 1°C to set temperature, and then at temperature adding 2°C to set temperature since 2 ours ago.

(3) The airflow fan will operate in the Low position.

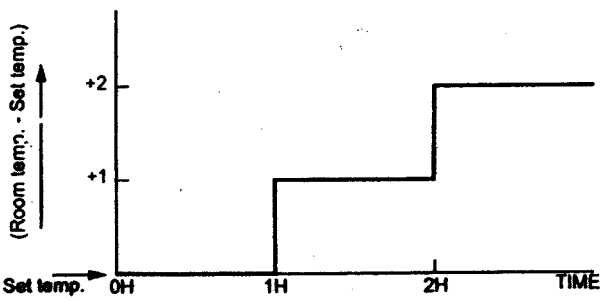



Fig. 8-24

(4) In the ECONO. mode, the indoor unit will operate at set temperature for one hour from starting time, and next 1 hour, operate at temperature lowering 1°C to set temperature, and then at temperature lowering 2°C to set temperature since 2 ours ago.

(5) The airflow fan will operate in the Low position.

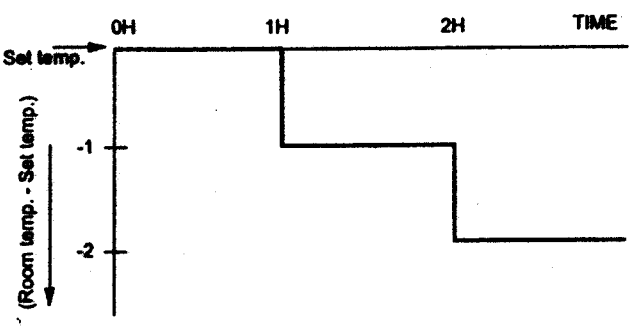



Fig. 8-25

## 8-14. DRY Operation

(The remote controller's MODE button is set to the DRY position.)

(1) In this mode, a microprocessor control lowers humidity while maintaining a constant temperature.

(2) The microprocessor turns the compressor on and off at regular intervals (4 to 6 minutes on and/or off). During the compressor off, the airflow fan will operate in the ultra low position.

(3) The compressor and airflow fan will operate independent of the temperature control, though the pattern of operation depends on the relation between room temperature ($T_A$) and set temperature (Ts), as shown below:

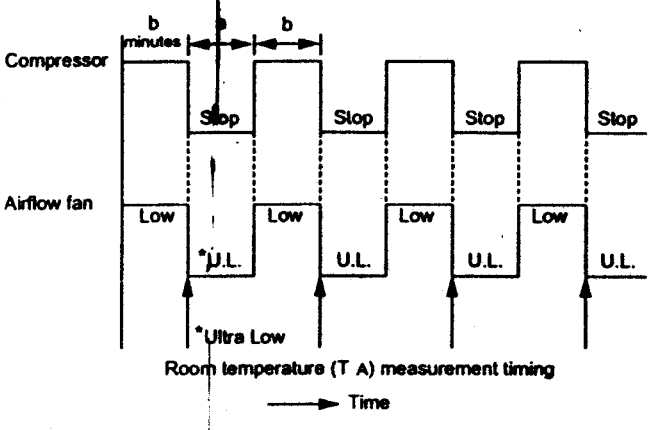



Fig. 8-26

Table 8-3

| Relation between room temp. ($T_A$) and set temp. (Ts) | OFF period a | ON period b |
|---|---|---|
| $T_A > T_S + 2$ | 4 min. | 6 min. |
| $T_S + 2 > T_A > T_S$ | 5 min. | 5 min. |
| $T_S > T_A$ | 6 min. | 4 min. |

- The airflow fan will operate in the Low position, independent of the position of the airflow setting control.

## 8-15. AUTO Operation

(The remote controller's MODE button is set to the AUTO position and AUTO display is lit.)

(1) One of the 3 modes, Cooling, Fan only and Heating is selected according to room temperature at which operation is to start, as shown in Fig. 8-27. The Fan mode will continue until room temperature reaches a level at which another mode is selected.

### 8-15-1. Temporary Auto

When the TEMPORARY switch is set to AUTO., the set temperature is fixed at 24°C and controlled in accordance with the chart shown in Fig. 8-27.

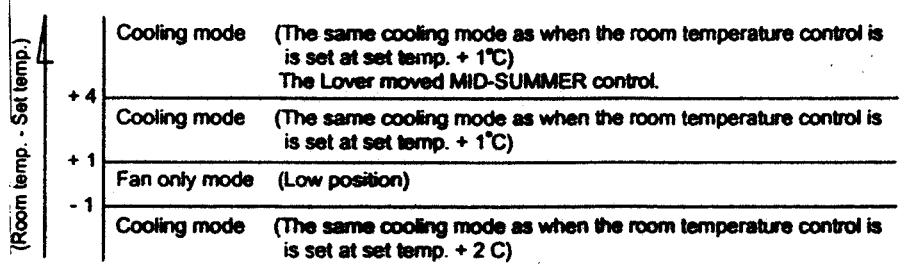



Fig. 8-27

**Note:**

- Operation is controlled at temperature above, independent on the position of the room temperature control.

### 8-15-2. Current Limit Control and High-temperature Limit Control (during Heating)

When the load increases (overload) or the line voltage drops during operation of the air conditioner, the operating current increases, and when the power capacity is exceeded, the circuit breaker is activated. This control is performed automatically when the current (heat exchanger temperature) exceeds a certain value so that it is decreased automatically to prevent overload to the supply. Control is performed as described in (1) and (2).

**(1) Current limit control**

Control is performed as shown below by detecting the compressor operation current with a current sensor.

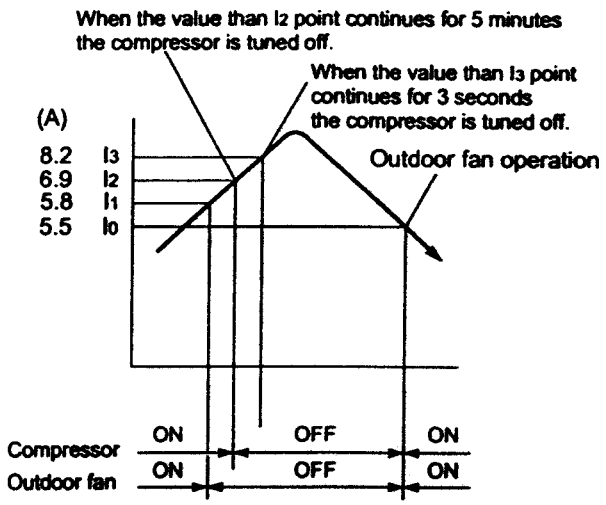



Fig. 8-28

**(2) High-temperature limit control**

Control is performed as shown in Fig. 8-29 by detecting the heat exchanger temperature with a heat exchanger sensor (TC).

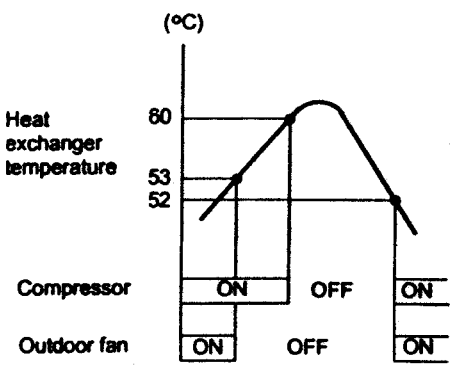



Fig. 8-29

## 8-16. Cool Airflow Prevention Control

(1) When control is performed with a thermostat, and the thermostat is set to off, the indoor fan stops operating, and restarts at the ultra low speed after 2 minutes and 20 seconds.

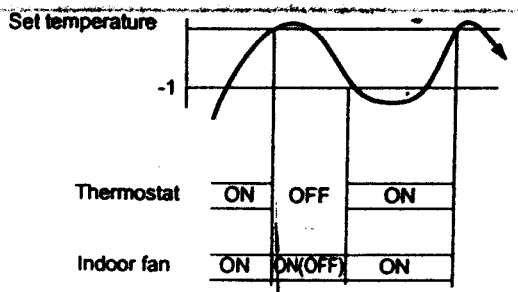



Fig. 8-30

(2) When the heat operation starts, the indoor fan is kept off until the indoor heat exchanger temperature reaches a set temperature.

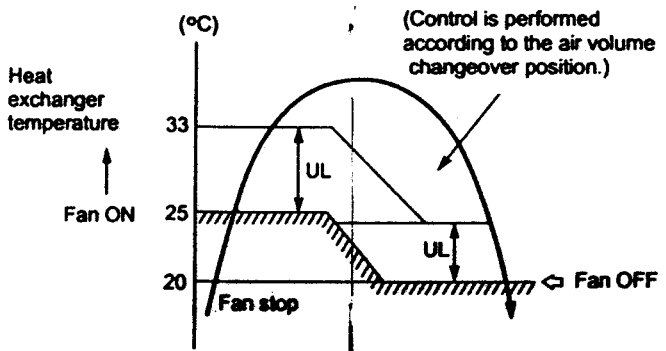



Fig. 8-31

(3) As soon as the defrost operation starts, the indoor fan stops.

## 8-17. Defrost Operation

### 8-17-1. Condition to Start the Defrost Operation

Defrost operation starts when the elapsed time is longer than 40 to 90 minutes, whichever specified.

**Note:**

- When the high-temperature limit control operation (with the outdoor fan OFF) is performed for a total of 90 minutes, defrost operation starts and continues for 10 minutes.

  The cumulative operation time is cleared only when the defrost operation is completed.

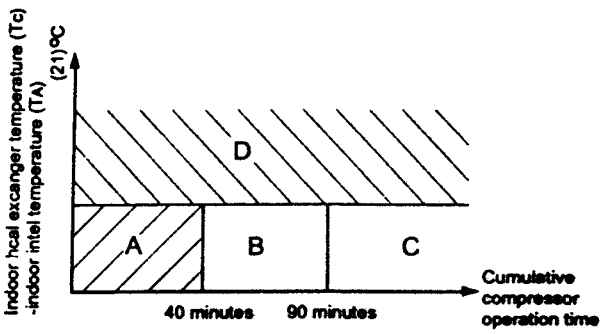



Fig. 8-32

### 8-17-2. Defrost Operation Time Control

(1) The heating operation is performed for at least 40 minutes.

(2) The maximum defrost operation time is 6 minutes. The defrost operation time for the 4th cycle is 10 minutes. (When the outdoor temperature is very lower, however, the defrost operation time is 10 minutes.)

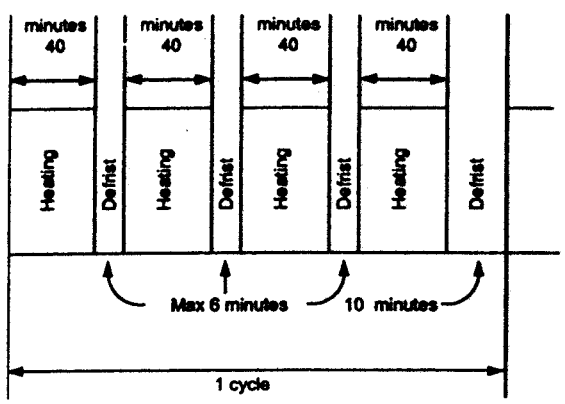



Fig. 8-33

### 8-17-3. Ending condition at Defrost Operation

When the compressor current becomes 5.5A or more during defrost operation, the defrost operation stops and the heat operation restarts. (The current sensor detects the compressor current.) The defrost operation continues for at most 6 minutes.

***DEFROST LAMP:***

- During defrost operation, the PRE-DEF. lamp is on and the indoor and outdoor fans are off.
- The compressor start protection timer is interlocked with the PRE-DEF. lamp. So the PRE-DEF. lamp is off (the fans stop) for about 3 minutes after the START/STOP button is turned on. When the compressor is turned on, the PRE-DEF. lamp comes on. After the heat exchanger is preheated to about 30°C or higher, the PRE-DEF. lamp goes off, and the indoor fan starts.

# 9. TROUBLESHOOTING CHART

***Troubleshooting Procedures:***

- Following details of "What to be prechecked first", make sure of the basic items.
- When there is no trouble corresponding to above, check in detail the faulty parts following "How to judge faulty parts by symptoms" later.

## 9-1. What to be Prechecked First

### 9-1-1. Power Supply Voltage

The line voltage must be AC 220/230/240V. If the line voltage is not within this range, this air conditioner may not work normally.

### 9-1-2. Incorrect Cable Connection between Indoor and Outdoor Units

The indoor unit is connected to the outdoor unit with 5 cables. Make certain that the indoor and outdoor units have been connected properly, with terminals assigned the same numbers wired to each other. If the connectors are not connected as specified, the outdoor unit will not operate normally. It should be noted that if terminals 1 and 3 or terminals 1 and 4 are connected together by mistake, some copper foil patterns on the control section PC board may be broken.

### 9-1-3. Misleading but Good Operations (Program Controlled Operation)

The microcomputer performs the operations listed in Table 9-1 to control the air conditioner. If a claim is made on the operation, check whether it corresponds to the contents in the Table 9-1. If it does, it is an indispensable operation for the control and maintenance of the air-conditioner: it is not a failure of the unit.

- **Misleading but good operations**

**Table 9-1**

| Operation of air-conditioner | Description |
|---|---|
| When the POWER plug socket of the indoor unit is inserted, the OPERATION lamp on the setting indication part flashes. | The OPERATION lamp flashes, indicating that power is turned on. If this happens, press the START/STOP button once to cause the lamp to stop flashing. A power outage also causes the lamp to flash. |
| Fan speed remains unchanged in teh dry mode. | Fan speed is fixed at Low in the dry mode. |
| Room temperature is in the range under which the compressor is turned off, but the compressor will not stop. | The compressor will not stop while the compressor on-hold timer (two-minute timer) is actuated. |
| The compressor will not switch on or off even when the thermo control is operated in the dry operation. | In the dry mode, the compressor goes on and off at regular intervals, independent of the Thermo control. |
| The PRE.-DEF. lamp comes on when the heating operation is started. | The PRE.-DEF. lamp comes on during defrost operation and when the indoor heat exchanger temperature is low when the heating operation is started. At this time, the indoor fan is stopped to prevent cold air from drifting into the room. |
| The outdoor fan stops once in a while during the heating operation. | • Whent eh indoor heat exchanger temperature is high, the outdoor fan may be stopped by teh high-temprature limit control operation.<br>• When the compressor current is large, the outdoor fan may be stopped by teh current control operation. |

## 9-2. Primary Judgement of Trouble Sources

### 9-2-1. Role of Indoor Unit Controller

The indoor unit controller receives the operation commands from the remote control and assumes the following functions.

- Measurement of the draft air temperature of the indoor heat exchanger by using the thermo. sensor ($T_A$)
- Louver motor control
- Control of the indoor fan motor operation
- Control of the LED display
- Control of the outdoor unit compressor and the outdoor fan motor.

### 9-2-2. Display of Abnormalities and Judgement of the Abnormal Spots

The indoor unit of this machine observes the operation condition of the air conditioner and displays the contents of the self-diagnosis as block displays on the display panel of the indoor unit.

Table 9-2

| Block display | Check code | Self-diagnosis | Check code |
|---|---|---|---|
| OPERATION display flashing (1 Hz) | – | Power failure (When power is on) | – |
| OPERATION display flashing (5 Hz) | 00 | Thermo sensor ($T_A$) short/break | 0C |
| OPERATION display flashing (5 Hz) | 00 | Heat exchanger sensor ($T_C$) short/break | 0d |
| OPERATION display flashing (5 Hz) | 00 | Indoor fan lock, abnormality of indoor fan, IC03, D15 short/break | 11 |
| OPERATION display flashing (5 Hz) | 00 | Indoor PC board failure | 12 |
| OPERATION and TIMER display flashing (5 Hz) | 01 | Thermal fuse is blown. (Indoor fan motor is overheat.) | 04 |
| OPERATION, TIMER and PRE.-DEF display flashing (5 Hz) | 03 | • Gas shortage, other refrigerant cycle trouble<br>• Heat exchanger sensor operan/short<br>• Overload relay trouble | 09 |
| OPERATION, TIMER and PRE.-DEF display flashing | 03 | • Compressor trouble | 1d |

### (1) Judgement from defective operation or abnormal operation

Table 9-3

| System | Check | | Primary judgement |
|---|---|---|---|
| No reaction on remote control operation | Turn off the power once, turn it on again and try to operate the remote control again. | Remote control is not possible. | The indoor part (including the remote control) is defective. |
| | | Remote control is possible. | O.K. |
| The outdoor fan does not rotate | The compressor operates. | | The outdoor part is defective (outdoor fan motor) |
| | The compressor does not operate. | | The inside part is defective. |

### (2) Self-diagnosis with remote controller

With the indoor unit controller, self-diagnosis of protective circuit action can be done by turning the remote controller operation into service mode, operating the remote controller, observing the remote controller indicators and checking whether OPERATION lamp flashes (5 Hz).

**Note:**

- To perform this self-diagnosis, the remote controller with the service code of 43069666 is required.

**<How to select remote controller operation mode>**

**1) Selecting service mode**

Push the switch button provided on rear bottom of the wireless remote control with a tip of pencil for more than 3 seconds. Make sure the setting temperature "00" is displayed on the display and other display is turned off.

**2) Selecting ordinary mode**

Push the all clear button (ACL) on the rear bottom of the wireless remote control with a tip of pencil for more than 3 seconds. Make sure the operation mode display, wind volume display, clock display and setting temperature display are turned on and " : " of the clock display is blinking.

**<Cautions when doing service>**

1) After completion of servicing, always push the all clear (ACL) button to return the operation mode to the normal mode.
2) After completion of servicing by the check code, turn off the power once and then turn on the power to reset memorized contents of the microcomputer to the initial status.

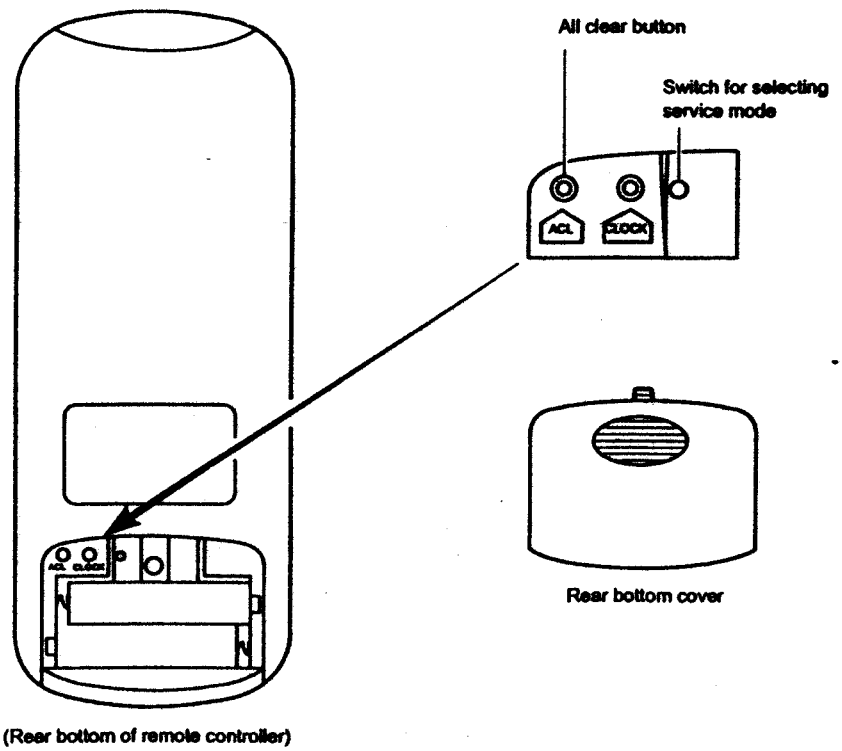



Fig. 9-1

**<Self-diagnosis by check codes>**

1) The self-diagnosis by the check codes is conducted under the block displays of item B-E.

2) Remote control key operation under the service mode is conducted by ON/OFF or TEMP. The remote control display by each key operation is varied as shown below. Two digit number is displayed in a hexadecimal number.

**Table 9-4**

| Operating key | Indication after operation |
|---|---|
| ON/OFF | "00" |
| TEMP. △ (Up) | 1 is added to data before operation. (Example) "02" → "03" |
| TEMP. ▽ (Down) | 1 is subtracted from data before operation. (Example) "02" → "01" |
| "AUTO" LOUVER | 10 is subtracted from data before operation. (Example) "02" → "12" |
| "SET" LOUVER | Data before operation is directly transferred. (Example) "02" → "02" |

3) The self-diagnosis by the check codes is conducted with procedures shown below.

a) Enter the service mode and make sure the off timer display of the remote control shows "00".

b) Operate the "ON/OFF" key and make sure the timer lamp on the display section is flashing (5 Hz).

c) At the same time, also make sure the operation lamp is also flashing. This shows that the protection circuit on the indoor PC board is working.

d) Operate the TEMP. △ key and make sure the remote control display shows "01" and flashing of the operation lamp. If the operation lamp is flashing, it shows the protection circuits for connecting cable is working or thermal fuse is blown.

e) In the same way, operate the TEMP. △ key so that the display is increased one by one to continue checks by the self-diagnosis as shown is the next table. From "00" up to "03" check operations of protection circuits for each block, and "04" to "1F" check operations of the typical protection circuits.

Table 9-5

| Block level | | Diagnosis function | | | | Judgement and action |
|---|---|---|---|---|---|---|
| Check code | Block | Check code | Symptom | Air conditioner status | Condition | |
| 00 | Indoor PC board | 08 | Thermo sensor short/break. | Continued operation | Indicated when detected abnormal. | • Check thermo sensor.<br>• If it is OK, check PC board. (Around sensor circuit) |
| | | 0d | Heat exchanger sensor short/ break. | Continued operation | Indicated when detected abnormal. | • Check heat exchanger sensor.<br>• If it is OK, check PC board. (Around sensor circuit) |
| | | 11 | Indoor fan lock, abnormality of indoor fan. | All off. | Indicated when detected abnormal. | • Check motor.<br>• Replace PC board, if the same failure occurs, after the motor check. |
| | | 12 | Abnormality of other indoor unit PC board. | Continued operation | Indicated when detected abnormal. | Replace PC board. |
| 01 | Cable connection/ Thermal fuse | 04 | • Thermal fuse cut off.<br>• Indoor fan lock, abnormality of indoor fan. | All off. | Indicated when detected abnormal. | • Check thermal fuse.<br>• If it is OK, check motor.<br>• If motor is OK, check PC board. (12V power circuit) |
| 03 | Refrigerant system | 09 | • Gas shortage. (gas leak)<br>• Other refrigerant cycle trouble.<br>• Heat exchanger sensor off/ break/short.<br>• Overload relay break | All off. | Indicated when detected abnormal. | • Check gas quantity. (Check gas leakage)<br>• If it is OK, check heat exchanger sensor.<br>• If heat exchanger sensor is OK, check overload relay.<br>• If overload relay is OK, check refrigerant cycle.<br>• If refrigerant cycle is OK, check PC board. |

## 9-3. Troubleshooting Flowcharts

### 9-3-1. Power cannot be Turned on (No Operation at All)

**<Preliminary checks>**

(1) Is the supply voltage normal?

(2) Is the connection to the AC output O.K.?

(3) Are the connection of the primary side and the secondary side of the power transformer inserted into the PC board?

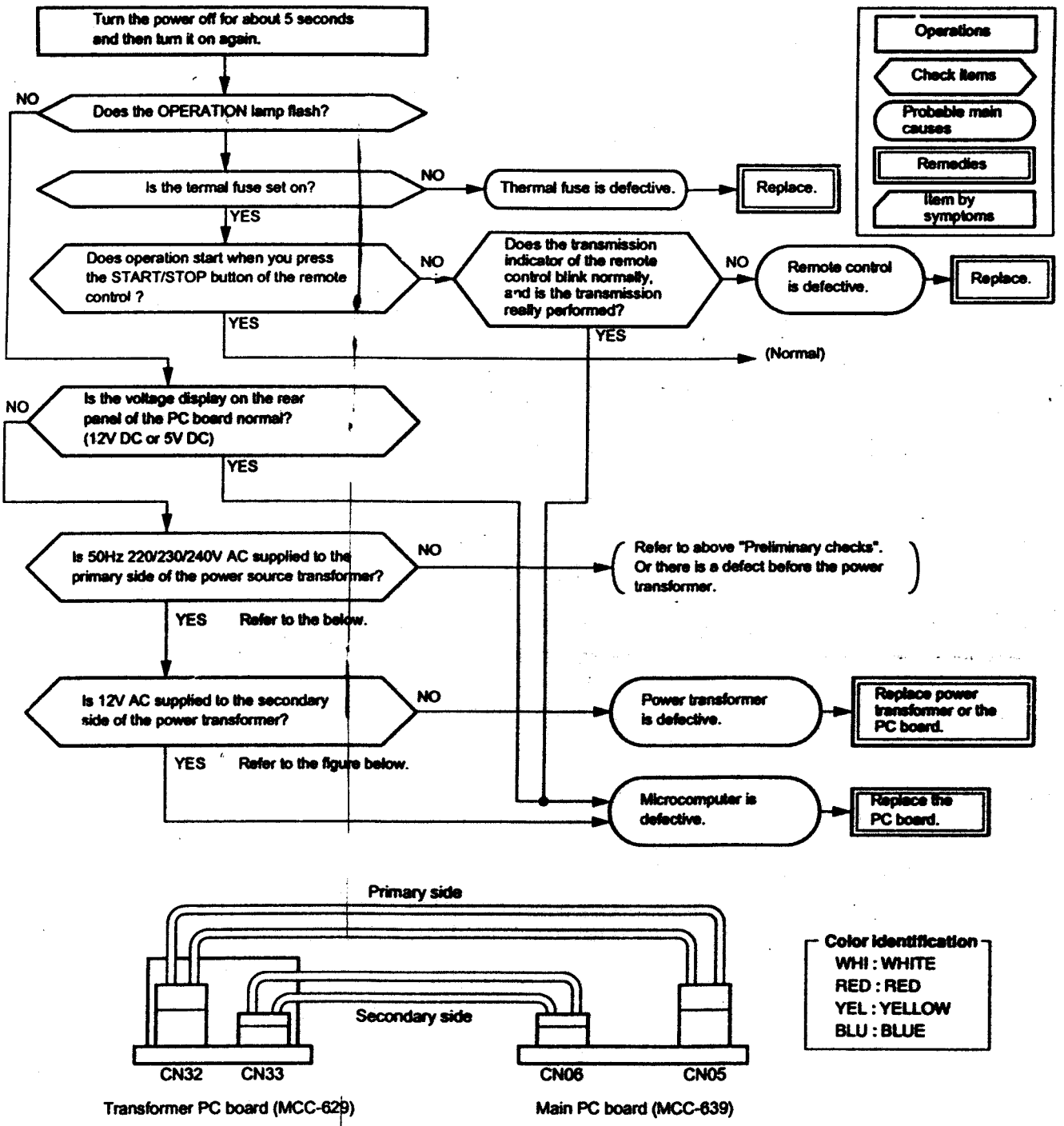


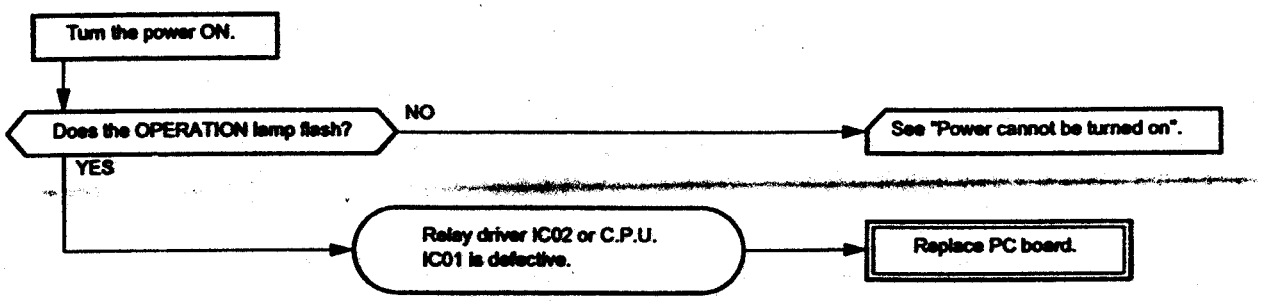




**Fig. 9-2 Power transformer connection diagram**

### 9-3-2. Relay RY07, RY08 do not Operate.

Louver is not controlled automatically.




**Note:**

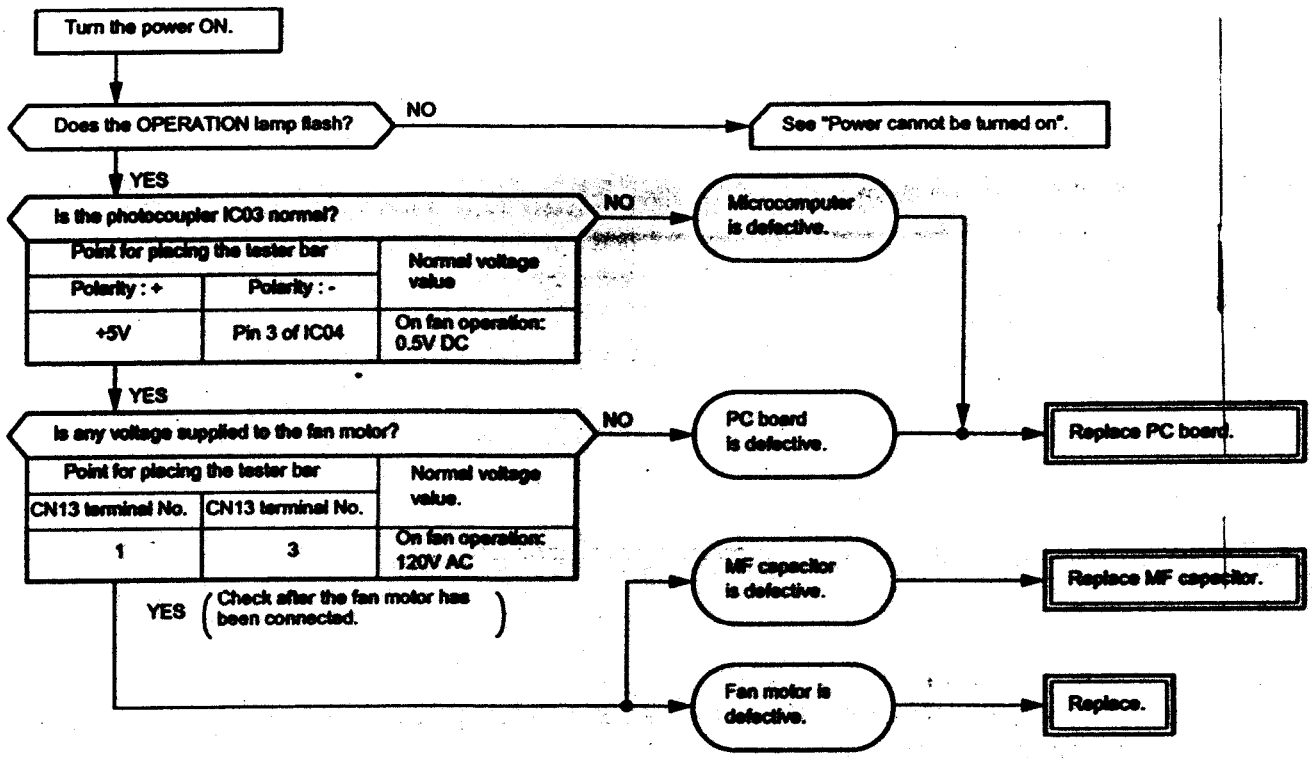
- When wiring to the thermal fuse has been broken, the timer lamp and operation lamp will flash with 5 Hz.

### 9-3-3. Only the Indoor Fan does not Operate.

**<Preliminary checks>**

Does it neither work in COOL or FAN ONLY operation?

**< Check procedure >**



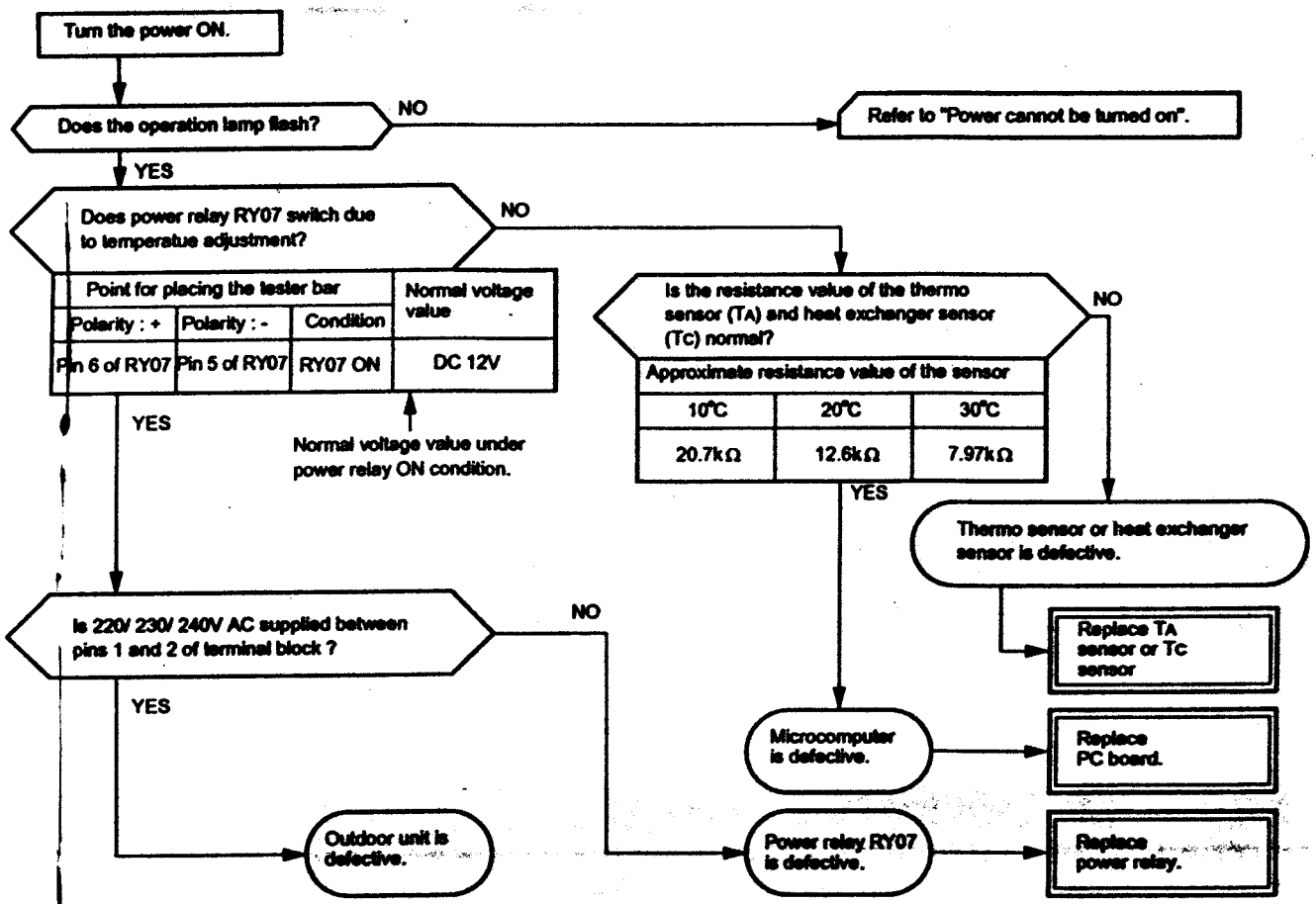
### 9-3-4. Compressor does not operate. (Indoor fan also does not turn.)

**< Preliminary checks >**

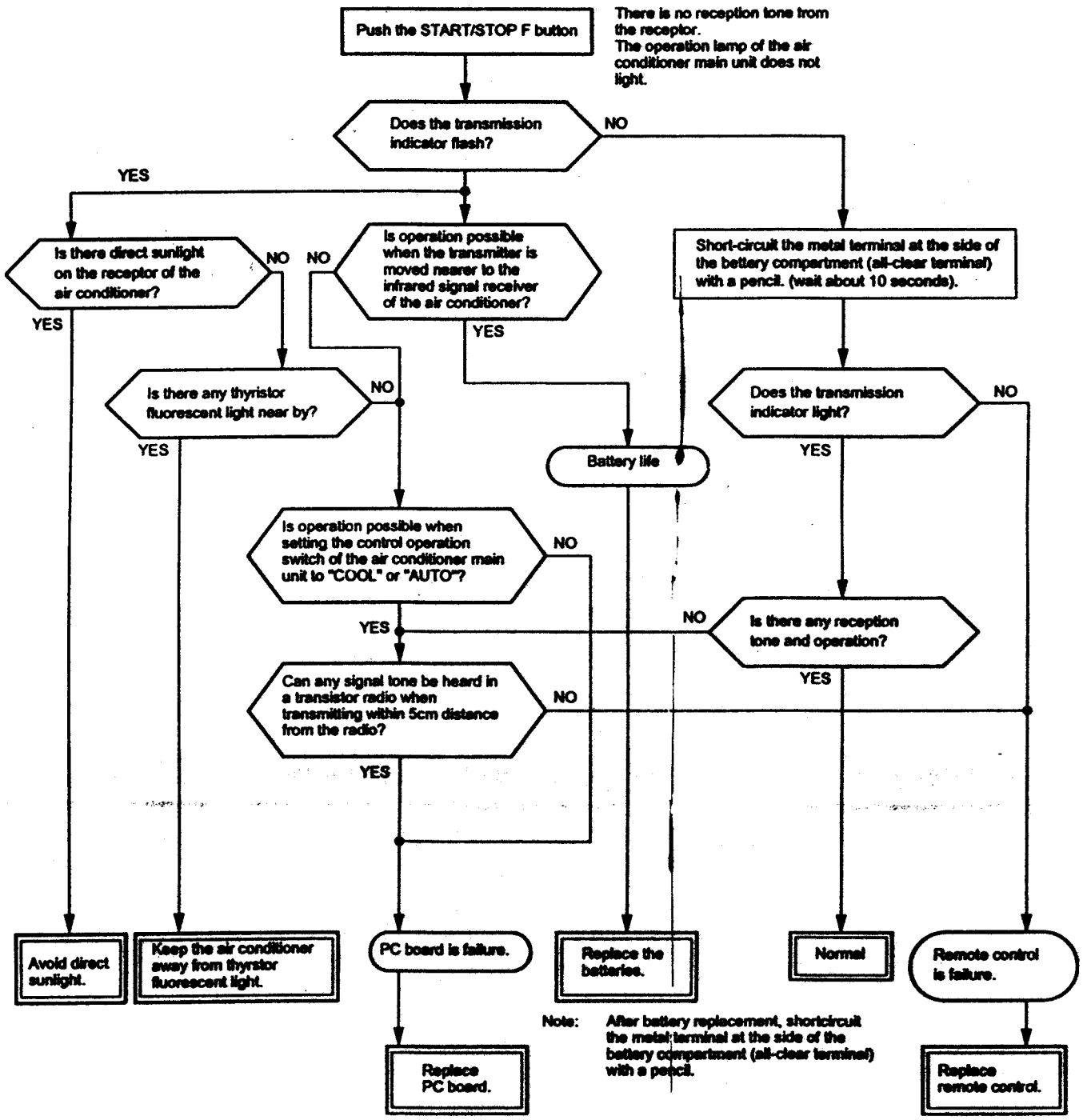
(1) Is the temperature set on the remote control higher than the room temperature in cool operation?

(2) Is contact of the crossing wiring O.K.?

**< Check procedure >**



## 9-5. How to Check the Remote Control (Including the Indoor PC Board)



### 9-5-1. How to check the PC board

**(1) Operating precautions**

1) When removing the front panel or the PC board, be sure to disconnect the power plug from the AC outlet.
2) When removing the PC board, hold the edge of the PC board and do not apply force to the parts.
3) When connecting or disconnecting the connectors on the PC board, hold the whole housing. Do not pull at the lead wire.

**(2) Inspection procedures**

1) When a PC board is judged to be defective, check for disconnection, burning, or discoloration of the copper foil pattern or this PC board.
2) The PC board consists of the following 4 parts:

**a. Main PC board part:**

Power relay, indoor fan motor drive circuit and control circuit, C.P.U. and peripheral circuits, buzzer drive circuit and buzzer.

**b. Light receiving unit:**

Light receiving circuit

**c. Display:** LED

**d. Switch PC board:**

Wireless-control, temporary switch

Check the defects of the PC board following the list below.

**(3) Checking procedure**

**Table 9-7**

| Procedure | Check point (Symptom) | Trouble cause |
|---|---|---|
| • Disconnect the power plug from the AC outlet and remove the PC board assembly from the electronic parts base.<br>• Remove the flat cable from the terminal plate. | Is the fuse blown? | • Application of shock voltage<br>• Short-circuit of the indoor fan motor |
| • Turn the power ON. | Check power supply voltage. | |
| • If the operation lamp flash (0.5 sec. ON, 0.5 sec. OFF), steps 1 – 3 in the right column are not necessary. | 1. Between pins 1 and 3 of CN01 (220/230/240V AC) | • Defective power cord, power switch, fuse or line filter, or wrong wiring |
| | 2. Between pins 1 and 3 of CN02 (12V AC) | • Defective power transformer |
| | 3. Between Q01 emitter and GND (5V DC) | • Defective power circuit or short-circuited load |
| | 4. Between Q03 emitter and GND (12V DC) | • Defective power circuit or short-circuited load |
| | 5. Between pin 1 and GND of CN11 (12V DC) | • Thermal fuse operation |
| Push the START/STOP button once to set in operation mode. (Do not set to the fan only or on-timer mode.) | Check power supply voltage. | |
| | 1. Power relay coil voltage (12V DC) (pins 5 and 6 of RY7) | • Relay coil cable is broken, relay driver (IC181) is defective. |
| | 2. Between pins 1 and 2 of PF terminals | • Relay contact is defective, PF terminal is defective. |
| Start operation by using the anti-restart timer. | • All LEDs of the operation lamp, the timer lamp and the FAN ONLY lamp light up.<br>• After 3 seconds, normal display does not appear. | Display is defective or defect in the 4P housing assembly. |

| Procedure | Check point (Symptom) | Trouble cause |
|---|---|---|
| Push the START/STOP button once to set in operation mode.<br>1. Setting the anti-resistor timer<br>2. Cooling operation<br>3. Fan speed: AUTO | 1. The compressor does not operate. | • The temperature of the Indoor heat exchange unit is extremely low. |
| | 2. The operation lamp flashes. | • Defective control PC board. |
| 4. Set the temperature sufficiently lower than the room temperature.<br>5. Continuous operation | | |
| Connect the motor connector to "MOTOR" and turn the power ON. Start operation as follows:<br>1. Set the operation mode to "FAN ONLY".<br>2. Set the fan speed to "HIGH".<br>3. Continuous operation | 1. There is a voltage of 120V or more between the red and black motor connector leads. | • Indoor fan motor is defective. |
| | 2. The motor does not rotate. (But the key operation of the remote control is accepted.) | • Contact of the motor connector is defective. |
| | 3. Motor rotates but vibrates hard. | • Main PC board is defective. |

**Table 9-8 Approximate value of the sensor (thermistor) resistance ($T_A$, $T_C$)** (= kΩ)

| Sensor \ Temperature | 0°C | 10°C | 20°C | 25°C | 30°C |
|---|---|---|---|---|---|
| Thermo Sensor | 35.8 | 20.7 | 12.6 | 10.0 | 7.92 |

### 9-5-2. How to Reduce the Operation Time of the Anti-restart Timer

- Drill 2 holes on the rear of the wireless remote control unit.
  Attach the diode (1S1555 or equivalent) to the rivet inside the unit.
- Push the START/STOP button to start operation with the diode attached.

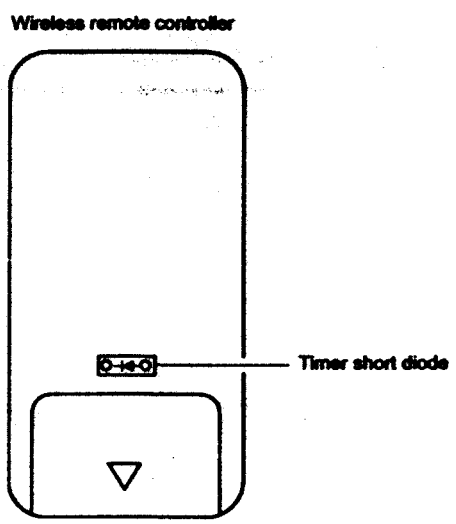
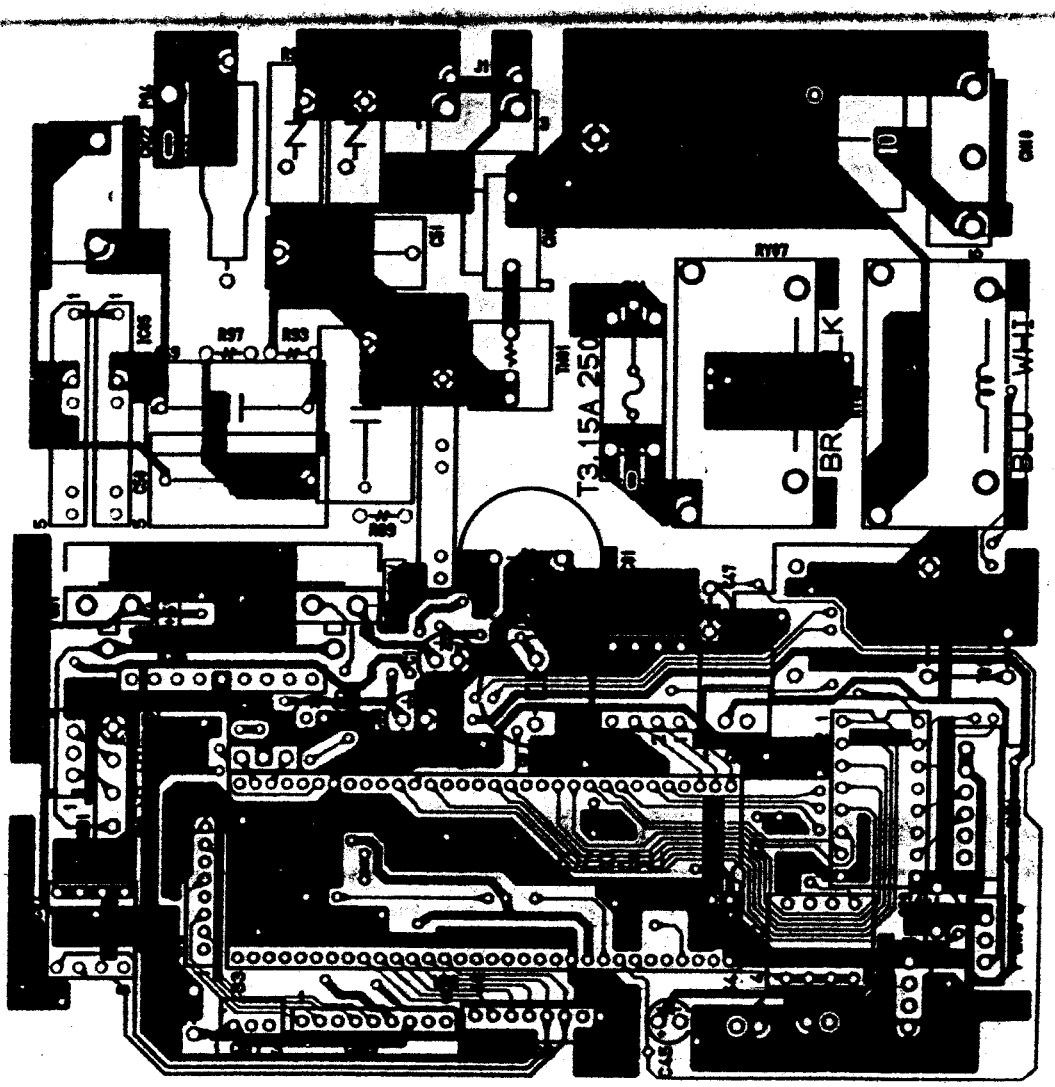



Fig. 9-3

## 9-6. PC Board Layout

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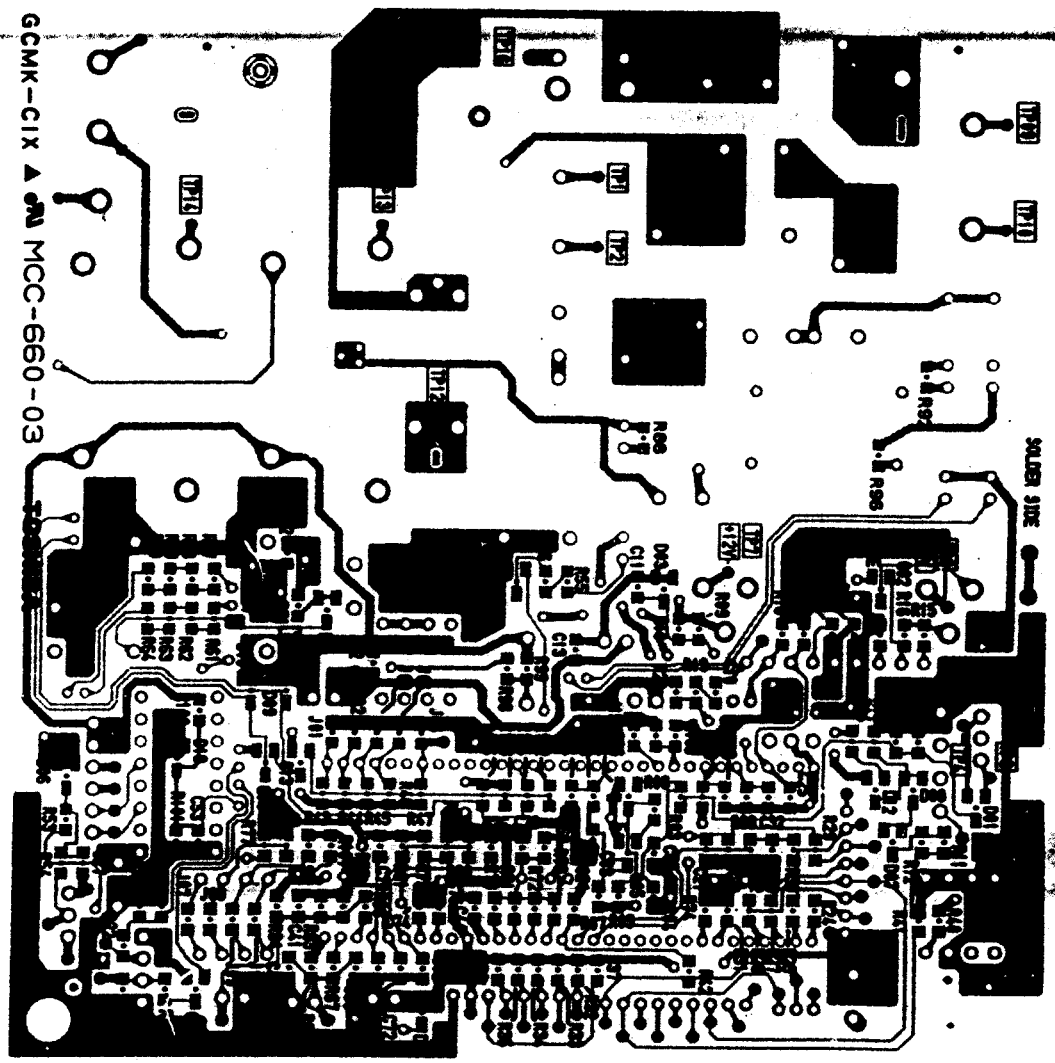
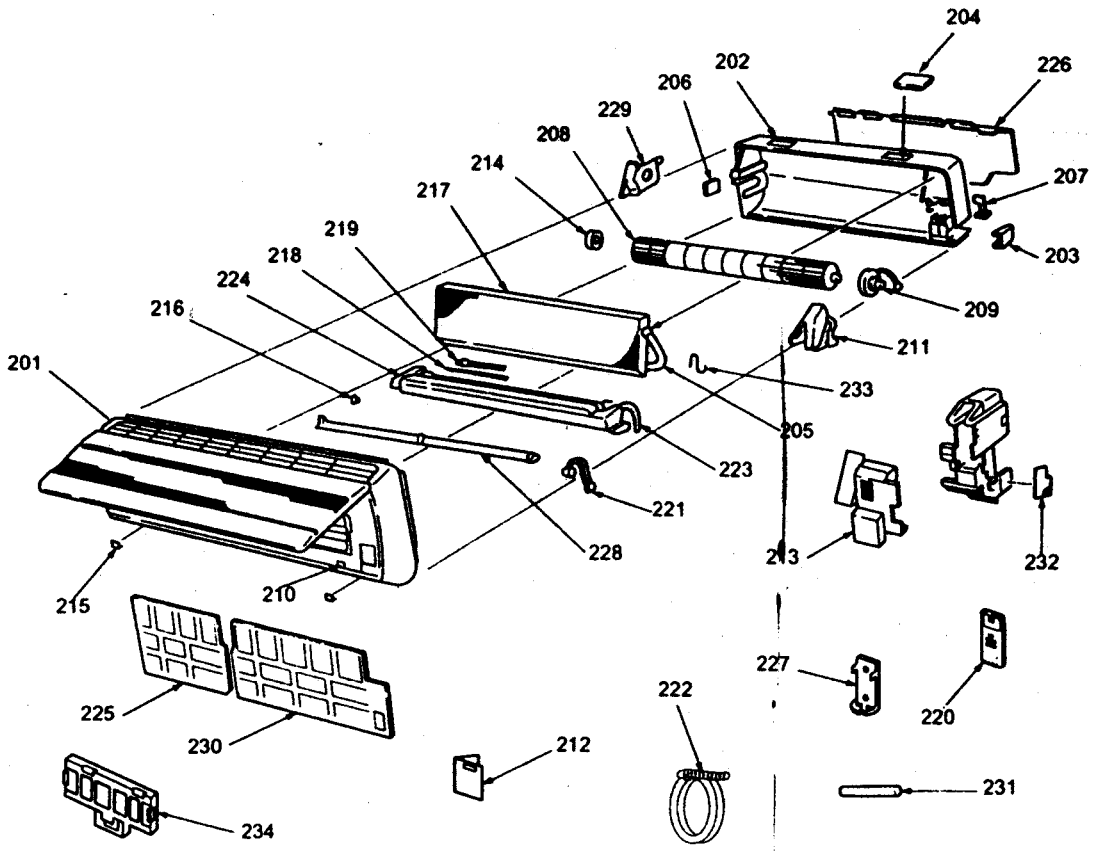
**Top view**




**Bottom view**

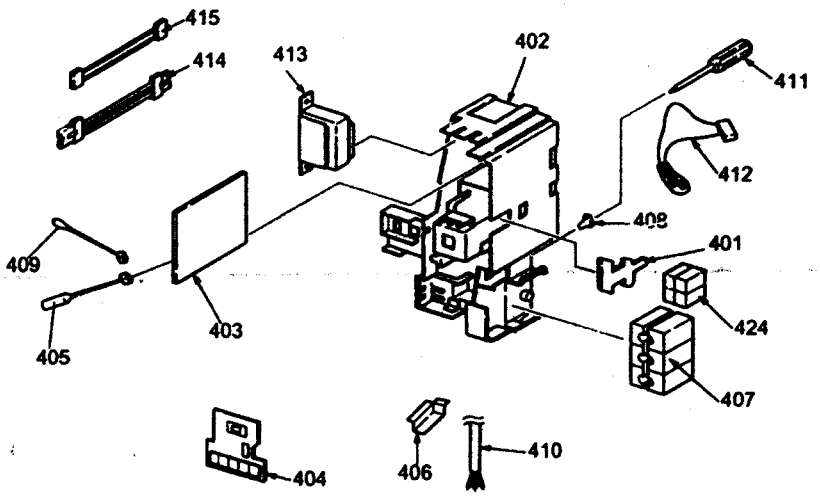
# 10. EXPLODED VIEWS AND PARTS LIST

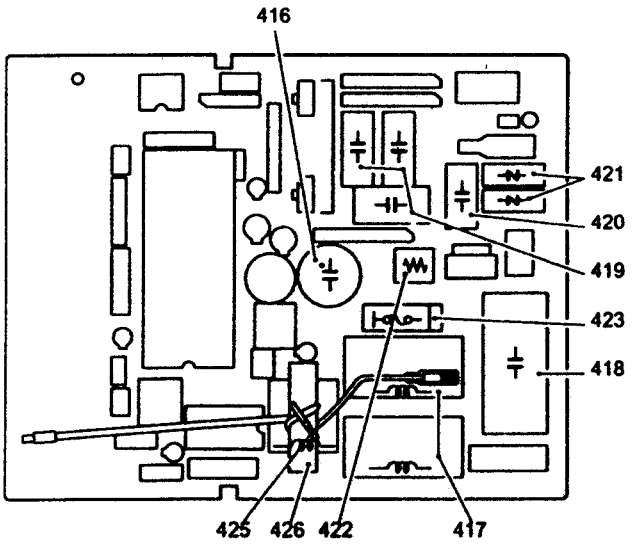
## 10-1. Indoor Unit




| Location No. | Part No. | Description |
|---|---|---|
| 201 | 43005210 | Front Panel (EKH) |
| 202 | 43003218 | Rear Plate |
| 203 | 43007963 | Bush, Rear Plate, Right |
| 204 | 43007967 | Lid, Rear Plate |
| 205 | 43011503 | Pipe Sealed |
| 206 | 43007964 | Bush, Rear Plate, Left |
| 207 | 43019836 | Holder Pipe |
| 208 | 43020244 | Fan, Cross Flow |
| 209 | 43021990 | Fan Motor, AFP-200-18-2B |
| 210 | 43007842 | Latch |
| 211 | 43039250 | Motor Band Left |
| 212 | 43086989 | Owner's Manual (EKH) |
| 213 | 43006216 | Cover, E-Parts (EK) |
| 214 | 43022321 | Bearing |
| 215 | 43007098 | Cap Screw |
| 216 | 43007843 | Bushing |
| 217 | 43044559 | Evaporator |

| Location No. | Part No. | Description |
|---|---|---|
| 218 | 43047331 | Pipe, Delivery |
| 219 | 43047332 | Pipe, Suction |
| 220 | 43069858 | Remote Controller |
| 221 | 43021794 | Motor, Louver |
| 222 | 43070090 | Hose, 3M, Drain |
| 223 | 43070140 | Hose, Drain |
| 224 | 43009450 | Drain Pan and Grill |
| 225 | 43080359 | Air-Filter, Left |
| 226 | 43082271 | Plate, Inst, Assembly |
| 227 | 43063278 | Holder, Remote Controller |
| 228 | 43009498 | Grille |
| 229 | 43039251 | Base Bearing |
| 230 | 43080358 | Air-Filter, Right |
| 231 | 43011499 | Pipe Sealed |
| 232 | 43008691 | Terminal Cover |
| 233 | 43019822 | Holder, Sensor |
| 234 | 43080349 | Frame Filter |

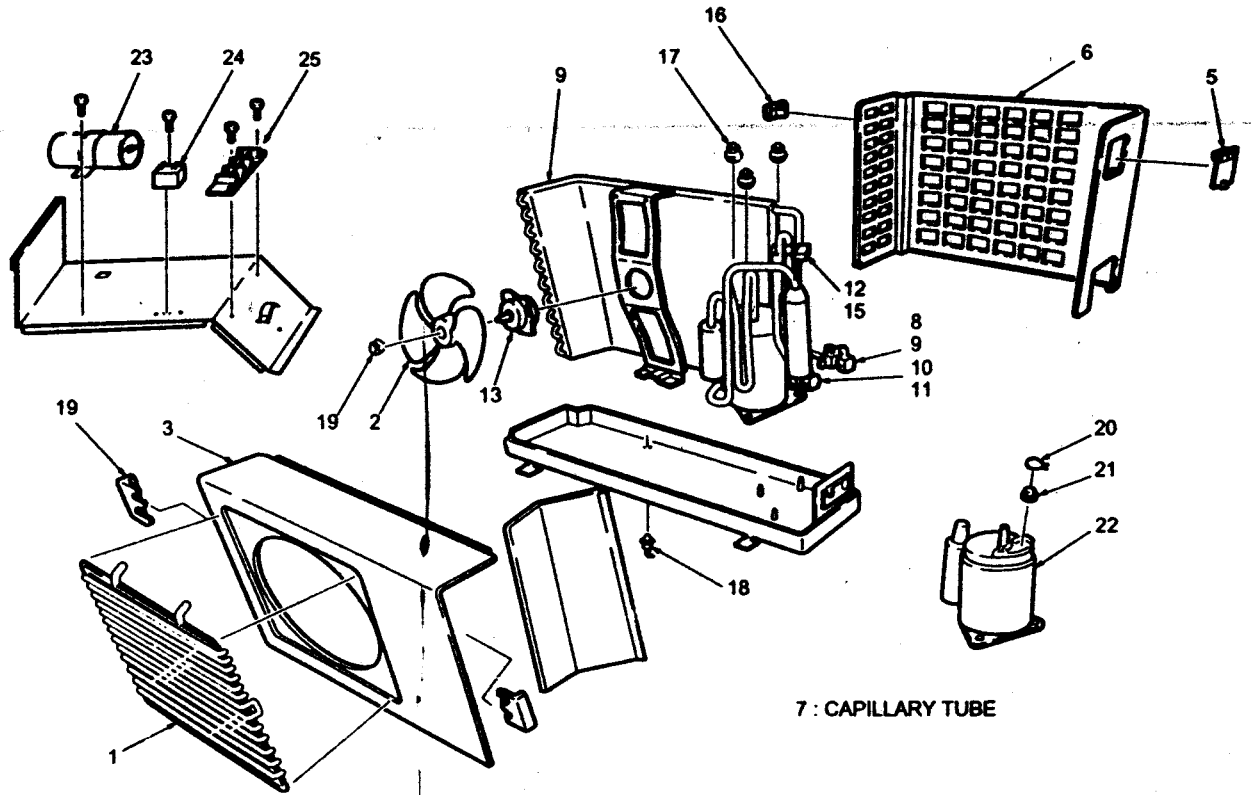



| Location No. | Part No. | Description |
|---|---|---|
| 401 | 43063286 | Holder-P.C. Board |
| 402 | 43061195 | Base, E-Parts |
| 403 | 43068418 | P.C. Board Assembly |
| 404 | 43068419 | P.C. Board Assembly Switch |
| 405 | 43068011 | Sensor, Heat Exchanger |
| 406 | 43069573 | Receiver, Infrared Rays |
| 407 | 43060794 | Terminal-Block |
| 408 | 43097195 | Tamper-Proof-Screw |
| 409 | 43069627 | SS-Sensor, Thermostat |
| 410 | 43060023 | Cord, Power |
| 411 | 43082263 | Screw-Driver |
| 412 | 43060007 | Thermal Fuse Set |
| 413 | 43068355 | P.C. Board Assembly, Trans |
| 414 | 43060025 | Lead Assembly (Transformer Primary) |

| Location No. | Part No. | Description |
|---|---|---|
| 415 | 43060026 | Lead Assembly (Transformer Secondary) |
| 416 | 43033182 | Capacitor, Electrolytic |
| 417 | 43054399 | Relay Power |
| 418 | 43055412 | Capacitor, 1.0MFD, 400V |
| 419 | 43033211 | Capacitor, Film |
| 420 | 43033213 | Capacitor, ECQ-UV, 0.1MFD, 250V |
| 421 | 43055284 | Toshiba Non Linear Resistor |
| 422 | 43032488 | Posistor, 820HM |
| 423 | 43060013 | Fuse, Time Delay |
| 424 | 43060778 | Terminal-Block |
| 425 | 43060548 | Nylon Tie |
| 426 | 43058193 | CT, Current-Trans |

## 10-2. Outdoor unit




| Location No. | Part No. | Description |
|---|---|---|
| 1 | 43019769 | Guard; Fan |
| 2 | 43020223 | Fan, Propeller |
| 3 | 43005037 | Front Cabinet |
| 4 | 43043548 | Condenser |
| 5 | 43062194 | Cover, E-Parts |
| 6 | 43005038 | Back Cabinet |
| 7 | 43047491 | Capillary Tube 1.5DIA |
| 8 | 43046229 | Packed Valve, 3/8 |
| 9 | 43047401 | Bonnet, 3/8 |
| 10 | 43046228 | Packed Valve, 6.35 |
| 11 | 43147196 | Bonnet, 6.35DIA |
| 12 | 43046248 | 4 Way-Valve, VH7100D |
| 13 | 43021928 | Fan-Motor, UE6-21A5P |
| 14 | 43047549 | Flange, Nut |
| 15 | 43046255 | Solenoid Coil |
| 16 | 43019727 | Handle |

| Location No. | Part No. | Description |
|---|---|---|
| 17 | 43049643 | Rubber-Cushion |
| 18 | 43032441 | Nipple, Drain |
| 19 | 43019770 | Stopper, Guard |
| 20 | 43069988 | Holder, OL-Relay |
| 21 | 43054400 | Relay, Overload (RAS-07EAH) |
| 21 | 43054401 | Relay, Overload (RAS-09EAH) |
| 22 | 43041142 | Compressor, PH70T1-4C (RAS-07EAH) |
| 22 | 43041564 | Compressor, PH94T1-4C (RAS-09EAH) |
| 23 | 43055470 | Capacitor, Plastic Film, 15MFD, 400V |
| 24 | 43055409 | Capacitor, 1.5MHD, 400V |
| 25 | 43060049 | Terminal Block, 5P |

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