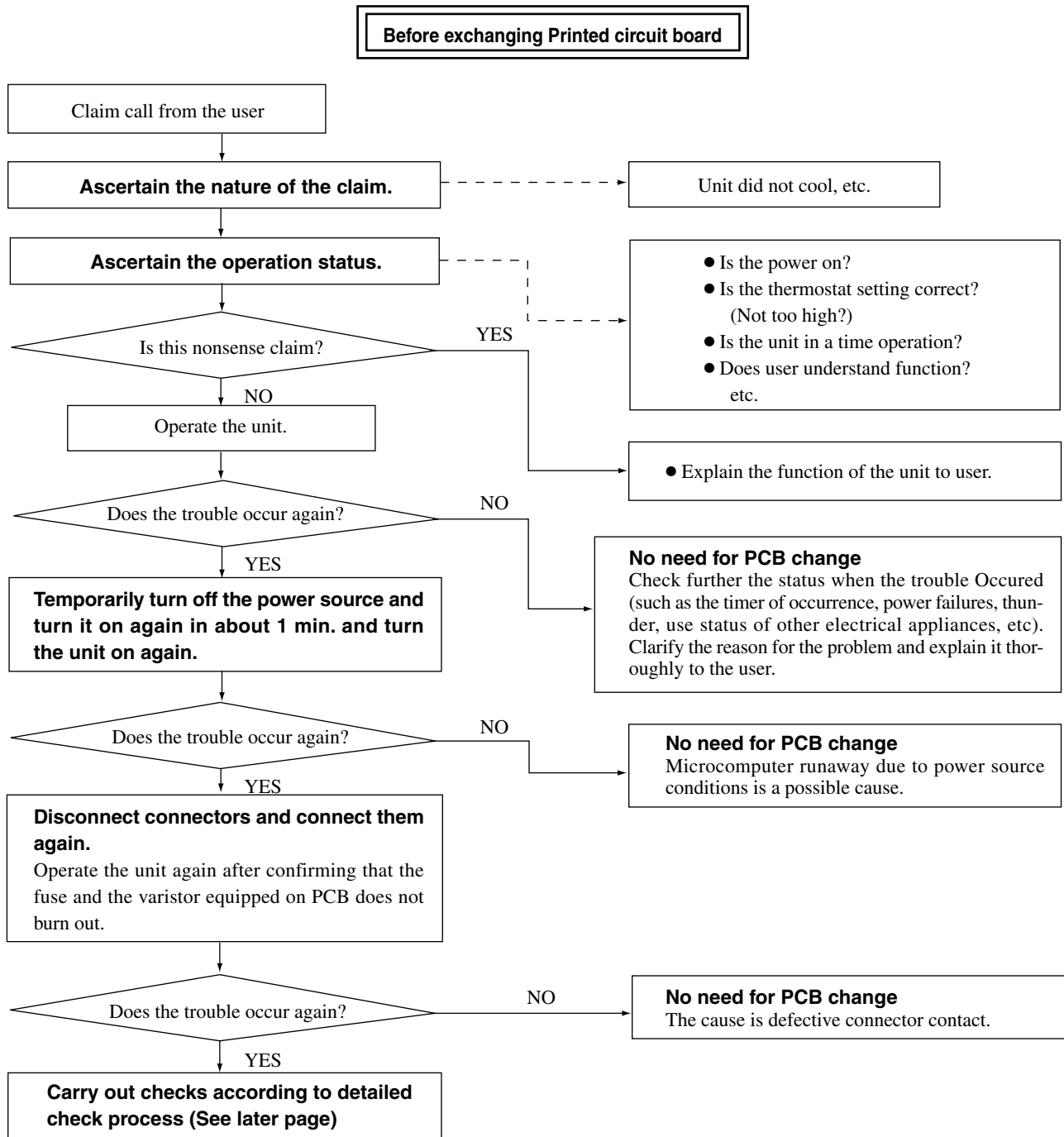


3.6 MAINTENANCE DATA

3.6.1 Trouble shooting

(1) Trouble shooting to be performed prior to exchanging PCB, (Printed circuit board)

All the models described in this chapter are controlled by a microcomputer. When providing maintenance service to customers it is necessary to understand the function controlled by a micro computer thoroughly, so as not to mistakenly identify correct operations as mis-operations. It is also necessary to perform the following simple checks before conducting detailed checks or exchanging printed circuit board.



(2) Indication of self diagnosis

Indoor unit indicator		Outdoor unit indicator (LED5)	Description of trouble	Cause	Conditions of flashing
RUN lamp	TIMER lamp				
1 time flash	Comes on	Stays off	Indoor heat exchanger thermistor error	<ul style="list-style-type: none"> Broken heat exchanger thermistor wire Connector poor connection 	When heat exchanger thermistor temperature of -20°C or under continued for more than 3 seconds while operation is stopped. (This is not displayed during operation.)
2 time flash	Comes on	Stays off	Room temperature thermistor error	<ul style="list-style-type: none"> Broken room temperature thermistor wire Connector poor connection 	When room temperature thermistor temperature of -20°C or under continued for more than 3 seconds while operation is stopped. (This is not displayed during operation.)
5 time flash	Comes on	Stays off	Drain abnormality ⁽¹⁾	<ul style="list-style-type: none"> Drain at reverse gradient Float switch defective 	Float switch motion
6 time flash	Comes on	Stays off	Indoor fan motor error ⁽²⁾	<ul style="list-style-type: none"> Defective fan motor Connector poor connection 	When air conditioner is operating and indoor fan motor is turned ON, indoor fan motor speed of 400 rpm or under continued for more than 30 seconds. (Air conditioner stops.)
Keeps flashing	1 time flash	Stays off	Outdoor temperature thermistor error	<ul style="list-style-type: none"> Broken outdoor thermistor wire Poor connector connection 	When outdoor temperature sensor temperature of -40°C or under continued for more than 3 seconds while operation is stopped. (This is not displayed during operation.)
Keeps flashing	2 time flash	Stays off	Outdoor heat exchanger gas pipe thermistor error	<ul style="list-style-type: none"> Broken heat exchanger gas pipe thermistor wire Poor connector connection 	When heat exchanger entrance thermistor temperature of -50°C or under continued for more than 3 seconds while operation is stopped. (This is not displayed during operation.)
Comes on	1 time flash	1 time flash	Current cut	<ul style="list-style-type: none"> Compressor locking Open phase on compressor output Shortcircuit on power transformer 	When converter output current which exceeds setting value is detected. (Compressor stops.)
Comes on	2 time flash	2 time flash	Trouble of outdoor unit	<ul style="list-style-type: none"> Broken power transformer Broken compressor wire Compressor blockage 	When the input current of 1 A or less is detected for 30 continuous seconds or more. (Compressor stops.)
Comes on	2 time flash	On for 4 seconds and off for 4 seconds	Discharge pipe thermistor error	<ul style="list-style-type: none"> Broken discharge pipe thermistor wire Connector poor connection 	When the discharge pipe thermistor temperature measures an interrupted signal (less than 7°C) of 10 seconds or more.
Comes on	3 time flash	3 time flash	Over current	<ul style="list-style-type: none"> Overload operation Overcharge 	When the input current value exceeds the set value. (Compressor stops)
Comes on	4 time flash	4 time flash	Over heat of power transistor	<ul style="list-style-type: none"> Cooling problem 	When power transistor temperature exceeds setting value. (Compressor Stops.)
Comes on	5 time flash	5 time flash	Over heat of compressor	<ul style="list-style-type: none"> Gas shortage Defective discharge pipe thermistor 	When discharge pipe thermistor value exceeds setting value. (Compressor Stops.)
Comes on	6 time flash	6 time flash ⁽³⁾	Error of signal transmission	<ul style="list-style-type: none"> Defective power supply Broken signal wire Defective indoor/outdoor unit circuit boards 	If serial signal cannot be sent or received for 1 minute and 55 seconds continuously.

Notes (1) Ceiling recessed type only

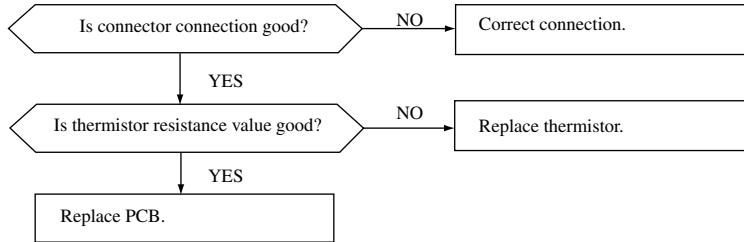
(2) Wall mounted type only

(3) LED 5 will go out when even one unit is operating properly or there is an abnormality with the outdoor unit power supply. It will also go out during normal operation.

(3) Inspection procedures corresponding to detail of trouble

Thermistor error

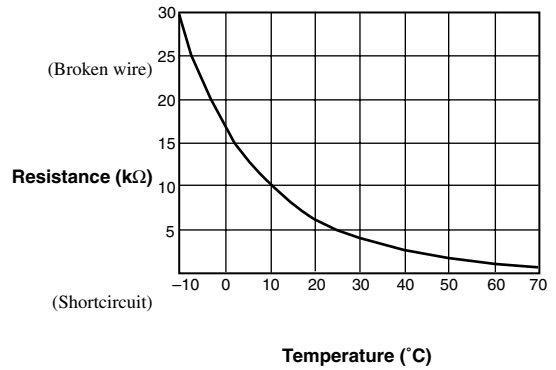
[Broken thermistor wire, connector poor connection]



◆ Discharge pipe thermistor temperature characteristics

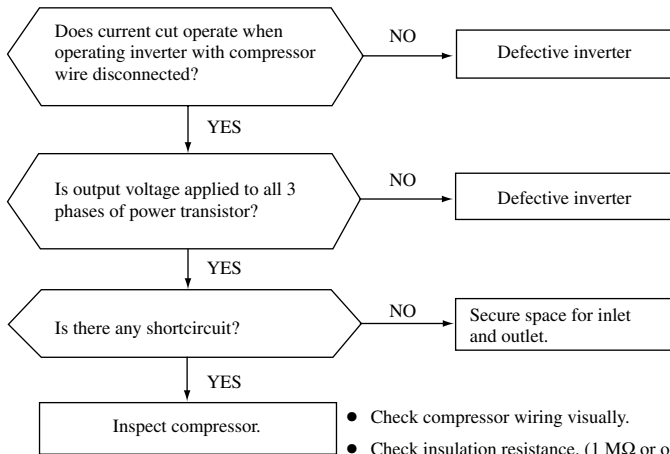
Temperature (°C)	Resistance (kΩ)	Temperature (°C)	Resistance (kΩ)
0	164	70	8.7
5	127	75	7.3
10	99	80	6.2
15	78	85	5.3
20	62	90	4.5
25	50	95	3.9
30	40	100	3.3
35	32	105	2.9
40	26	110	2.5
45	21	115	2.2
50	17	120	1.9
55	14	125	1.6
60	12	130	1.4
65	10	135	1.3

◆ Thermistor temperature characteristics (Room temp., indoor and outdoor unit heat exchanger temp., outdoor temp.)



Current cut

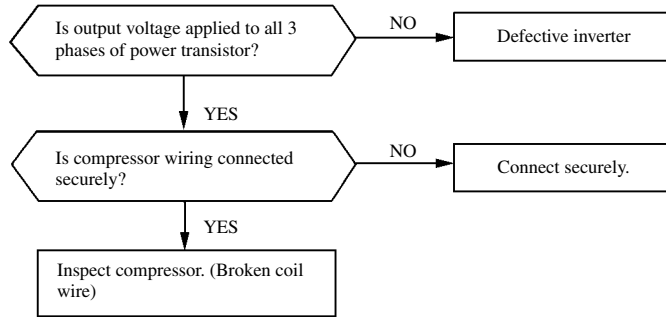
[Open phase on compressor output terminal, compressor lock]



- Check compressor wiring visually.
 - Check insulation resistance. (1 MΩ or over)
 - Check coil wire resistance. (Few Ω)
- If check results are normal, compressor is locked.

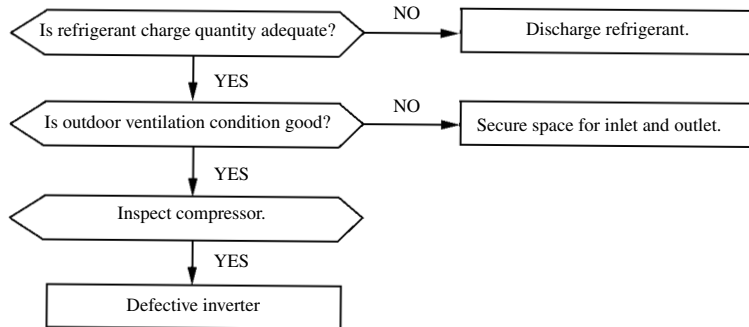
Outdoor unit error

[Broken power transistor, broken compressor wire]



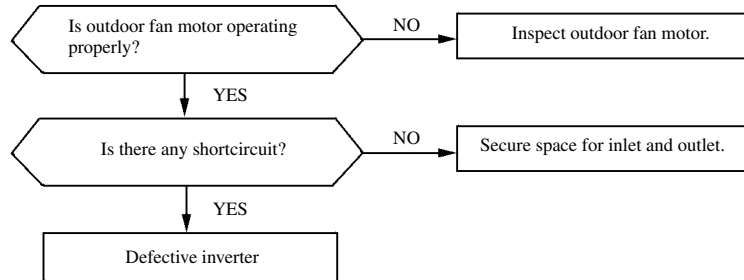
Over current

[Overload operation, compressor lock, overcharge]



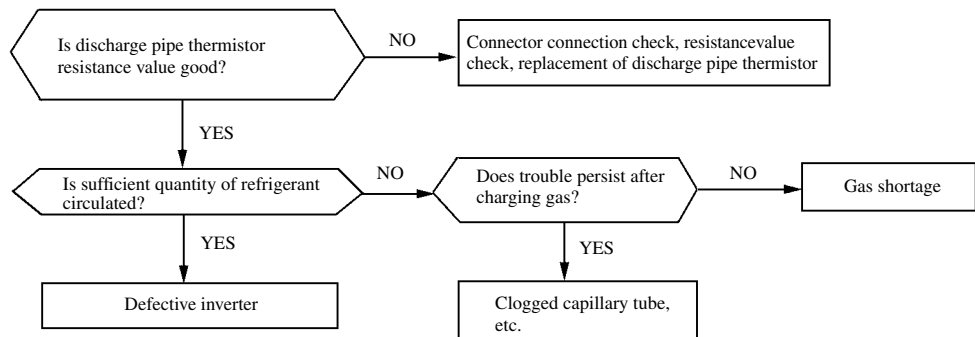
Power transistor overheating

[Poor cooling]



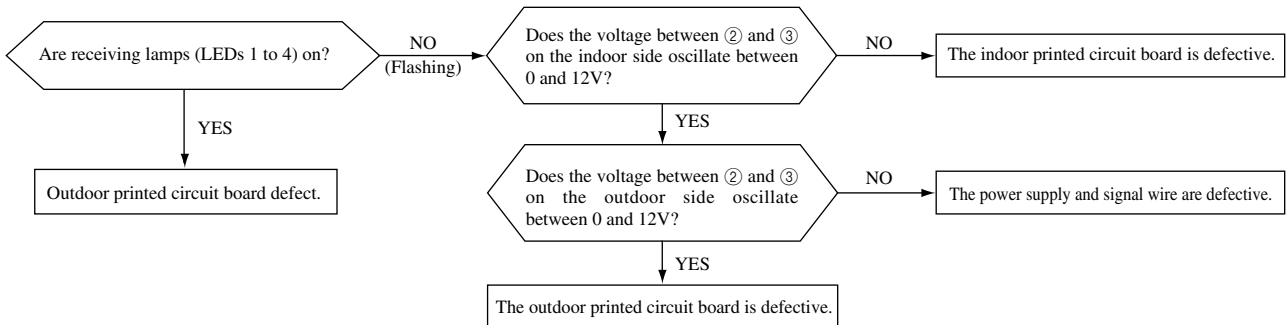
Compressor overheating

[Gas shortage, defective discharge pipe thermistor]



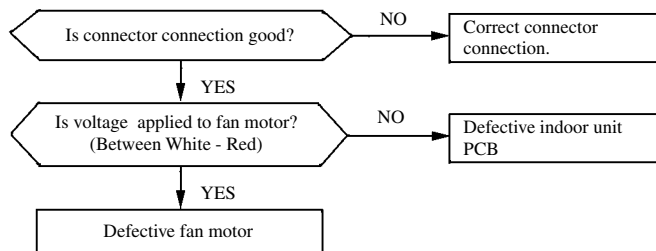
Serial signal transmission abnormality

[Indoor/outdoor printed circuit board defect
Outdoor power source abnormality]



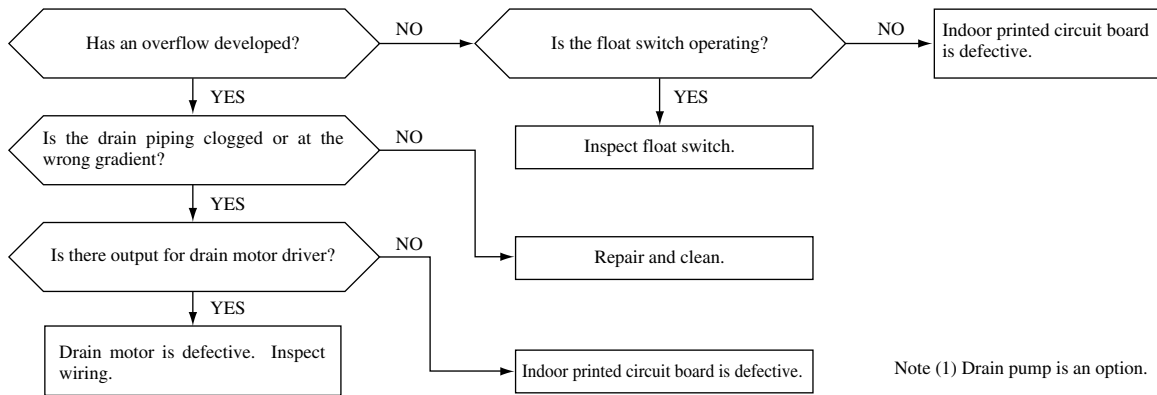
Indoor fan motor error

[Defective fan motor,
defective PCB]



Drain abnormality

[Drain piping defective,
pump defect]



Note (1) Drain pump is an option.

(4) Phenomenon observed after shortcircuit, wire breakage on thermistors, etc.

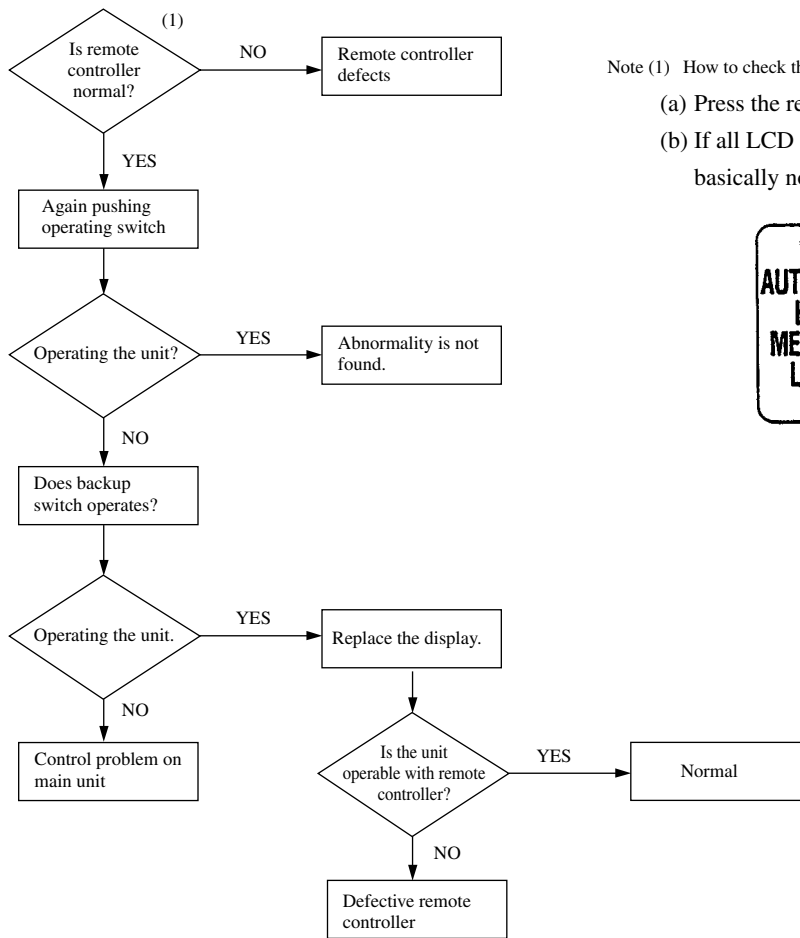
(a) Indoor unit

Thermistor	Operation mode	Phenomenon	
		Shortcircuit	Broken wire
Room temperature thermistor	Cooling	Release of continuous compressor operation command	Continuous compressor operation command is not released.
	Heating	Continuous compressor operation command is not released.	Release of continuous compressor operation command
Heat exchanger thermistor	Cooling	System can be operated normally.	Continuous compressor operation command is not released. (Anti-frosting)
	Heating	High pressure control mode (Inverter stop command)	Hot keep (Indoor fan stop)

(b) Outdoor unit

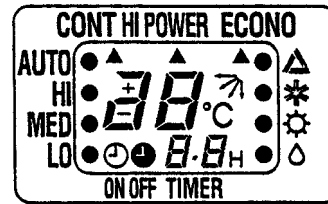
Thermistor	Operation mode	Phenomenon	
		Shortcircuit	Broken wire
Heat exchanger pipe thermistor	Cooling	System can be operated normally.	
	Heating	Defrosting is not performed.	Defrosting is performed for 10 minutes at approx. 30 minutes.
Outdoor temperature thermistor	Cooling	System can be operated normally.	
	Heating	Defrosting is not operated.	Defrosting is performed for 10 minutes at intervals of approx. 30 minutes.
Discharge pipe thermistor	All modes	Compressor overload protection is disabled. (Can be operated.)	Compressor stop (There is no inverter output.)

(5) How to make sure of remote controller

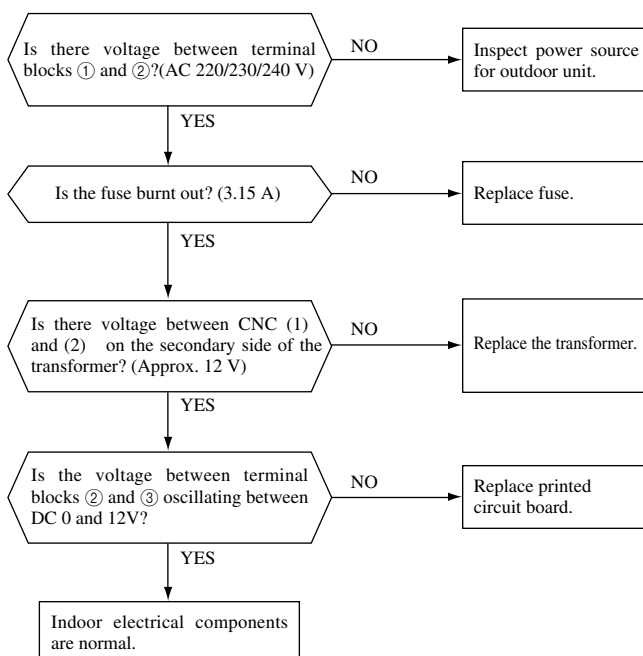


Note (1) How to check the remote controller

- (a) Press the reset switch of the remote controller.
- (b) If all LCD are displayed after zero (0) display, it is basically normal.



(6) Indoor electrical components inspection flow-chart

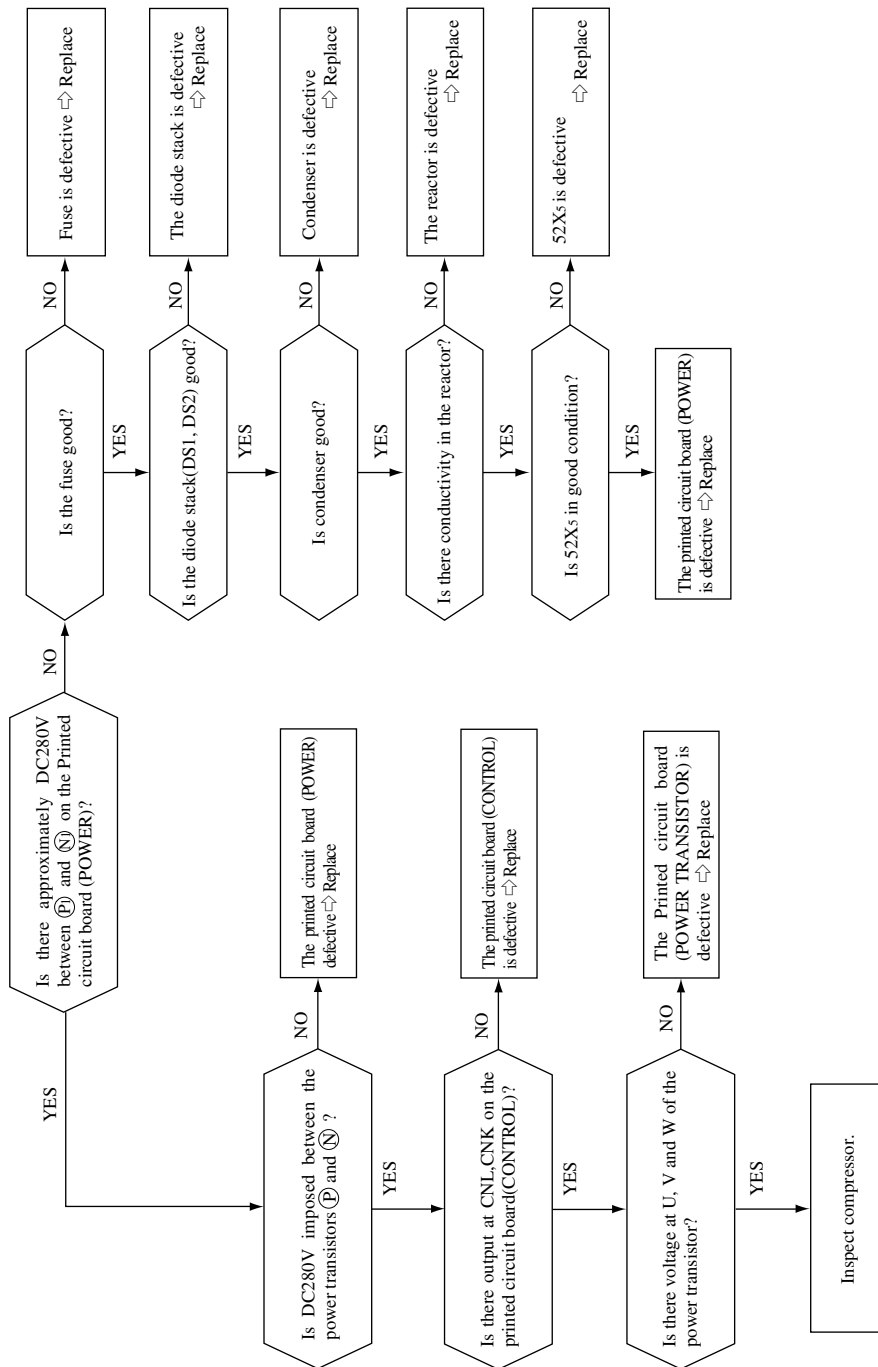


Note (1) Excepted 50 model

(7) Inverter failure diagnosis

If the results of the diagnosis in Item (3) indicate that the inverter is defective, perform the following inspection on the inverter.

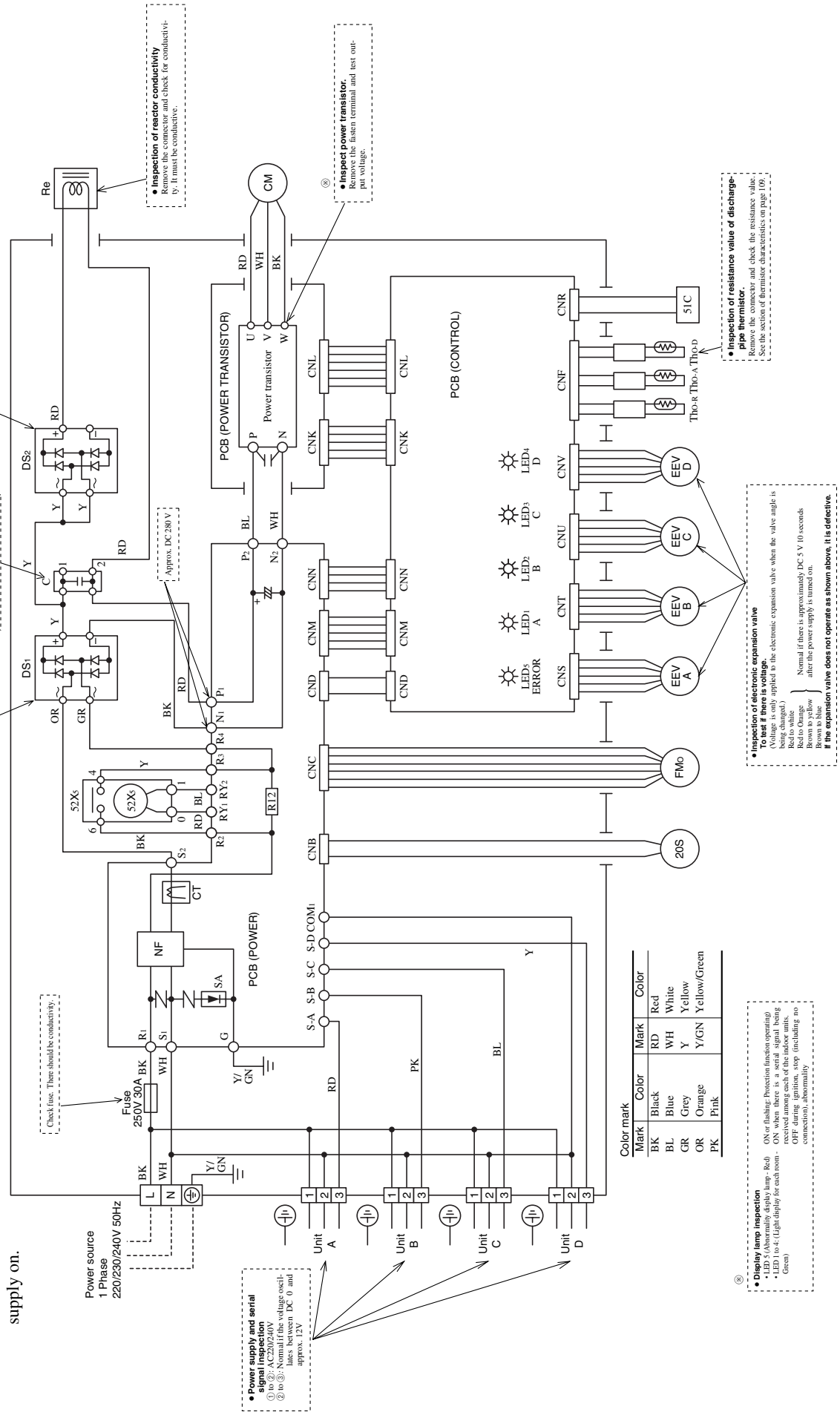
(a) Diagnosis procedure



(b) Outdoor unit inspection points

CAUTION – HIGH VOLTAGE
 High voltage is produced in the control box. Don't touch electrical parts in the control box for 5 minutes after the unit is stopped.

▷ ⊗ Check these points with the power supply on.



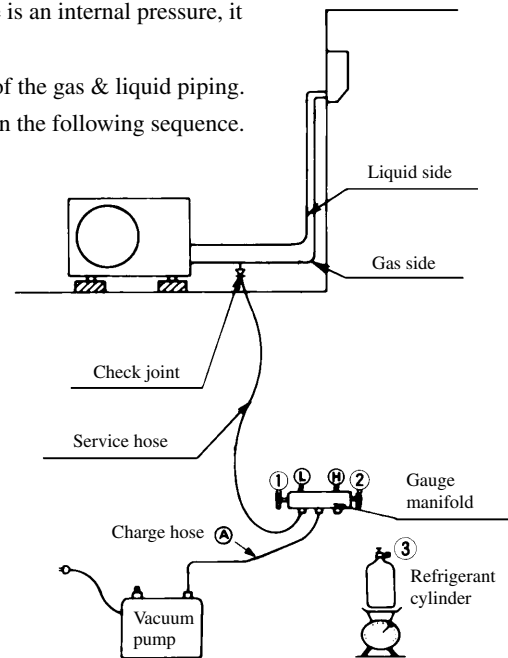
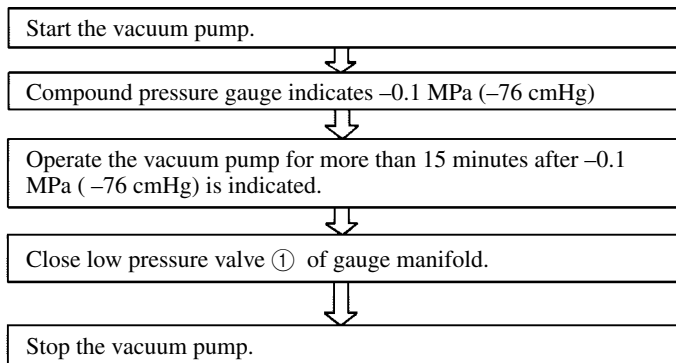
3.6.2 Servicing

(1) Evacuation

The evacuation is an procedure to purge impurities.....noncondensable gas, air, moisture from the refrigerant equipment by using a vacuum pump. Since the refrigerant R22 is very insoluble in water, even a small amount of moisture left in the refrigerant equipment will freeze, causing what is called water clogging.

● Evacuation procedure

- Check to ensure that there is no internal pressure in the unit. If there is an internal pressure, it should be relieved through the check joint.
- Connect the service hoses of the gauge manifold to the check joint of the gas & liquid piping.
- Connect a vacuum pump to the charge hose (A). Repeat evacuation in the following sequence.



- Notes
- Do not use the refrigerant pressure to expel air.
 - Do not use the compressor for evacuation.
 - Do not operate the compressor in the vacuum condition.

(2) Refrigerant charge

- Discharge refrigerant entirely from the unit and evacuate the unit.
Note: Addition of refrigerant without evacuation is unreasonable, because it will result in low charge or overcharge.
- Keep the gauge manifold and connect a refrigerant cylinder to the unit.
- Record the weight of the refrigerant cylinder on the balance. This is necessary for making sure of the charged refrigerant amount.
- Purge air from the charge hose (A)
Firstly loose the connecting portion of the charge hose (A) at the gauge manifold side and open the valve (3) for a few seconds, and then immediately retighten it after observing that gas is blow out from the loosened portion.
- Open the valve (1) and (3) after discharging air from the charge hose (A), then the gas refrigerant begins flowing from the cylinder into the unit. Be sure to erect the refrigerant cylinder upright to let gas refrigerant flow into the unit.
- When refrigerant has been charged into the system to some extent, refrigerant flow becomes stagnant, when that happens, start the compressor in cooling cycle until the unit is filled with gas to the specified weight.
- Making sure of the refrigerant amount, close the valve (3)
- Disconnect the charge hose from the unit. Cover the valve ports of the refrigerant piping with caps and tighten them securely.
- Check for gas leakage applying a gas leak detector along the piping line.
- Start the air conditioner and make sure of its operating condition.....high side and low side pressures and temperature difference between suction air and outlet air.

