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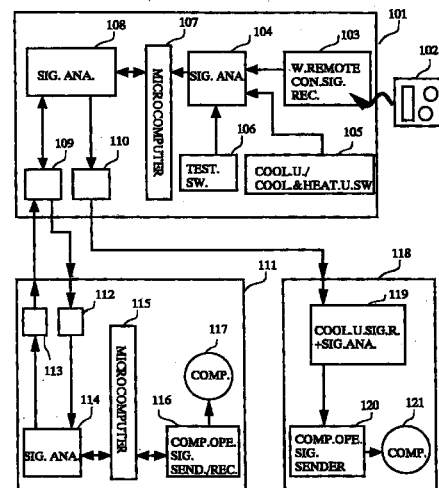
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(54) An air conditioner

(57) This invention provides a separate type air conditioner separated into an indoor unit and an outdoor unit which includes a controller having a microcomputer in which a program for a cooling machine and a program for a cooling-and-heating machine are stored and a program switch for switching the program for the cooling machine and the program for the cooling-and-heating machine.

FIG.1



- 101 : INTEGRATED INDOOR UNIT(COOLING/COOLING&HEATING)
- 102 : WIRELESS REMOTE CONTROLLER
- 103 : WIRELESS REMOTE CONTROL SIGNAL RECEIVER
- 104 : COOL & HEAT. MAC. SIGNAL(SERIAL SIGNAL) SENDER/RECEIVER
- 105 : COOLING MACHINE SIGNAL SENDER
- 106 : TEST SW.
- 107 : MICROCOMPUTER
- 108 : COOL & HEAT. MAC. SIGNAL(SERIAL SIGNAL) SENDER
- 109 : COOL & HEAT. MAC. SIGNAL(SERIAL SIGNAL) SENDER/RECEIVER
- 110 : COOLING MACHINE SIGNAL SENDER
- 111 : OUTDOOR UNIT(COOLING&HEATING)
- 112 : COOL & HEAT. MAC. SIGNAL(SERIAL SIGNAL) RECEIVER
- 113 : COOL & HEAT. MAC. SIGNAL(SERIAL SIGNAL) SENDER
- 114 : COOL & HEAT. MAC. SIGNAL(SERIAL SIGNAL) SENDER/RECEIVER
- 115 : MICROCOMPUTER
- 116 : COMP. OPE. SIG. SEND./REC.
- 117 : COMP.
- 118 : OUTDOOR UNIT(COOLING)
- 119 : COOL.U.SIG.R.+SIG.ANA.
- 120 : COMP. OPE. SIG. SENDER
- 121 : COMP.

Description

Background of the Invention

Field of the Invention

[0001] This invention relates to a controller of a separate type air conditioner for providing a common indoor unit for a machine specialized in cooling and a machine for cooling and heating.

Description of the related Art

[0002] Japanese Unexamined Published Patent Application Hei 9 - 14781 discloses an air conditioner which can cope with both an outdoor unit specialized in cooling and an outdoor unit for cooling and heating. A heating kit including a parallel circuit of a check valve and a heating throttle mechanism is detachably mounted to an indoor unit specialized in cooling, in order for reducing a manufacturing cost by commonly setting specifications of the indoor unit specialized in cooling and an indoor unit for cooling and heating.

[0003] In a separate type air conditioner according to the related art, the controller and the indoor unit for the machine specialized in cooling (cooling machine, hereinafter) were different from the ones for the machine for cooling and heating (cooling-and-heating machine, hereinafter). Therefore, it was impossible to provide the common controller and indoor unit.

[0004] Only the indoor unit modified for the cooling-and-heating machine by detachably mounting the heating kit is disclosed. Therefore, the disclosed invention has several disadvantages, such that a control in manufacturing becomes complex, a number of service parts increases, and a company who installs the machine has to make a unit control. So far, it has been impossible to provide the common controller and indoor unit without detaching any component.

Summary of the Invention

[0005] It is one of objects of this invention to solve the above-stated problems. Namely, it is one of the objects of this invention to reduce a cost by decreasing a number of parts controlled and ordered by providing a common indoor unit and a common controller for the separate type cooling machine and the separate type cooling-and-heating machine. It is another object of this invention to reduce work of the company who installs the machine in the unit control (i.e., stock control) and installation work.

[0006] According to one aspect of this invention, a separate type air conditioner separated into an indoor unit and an outdoor unit includes a controller having a microcomputer in which a program for a cooling machine and a program for a cooling-and-heating machine are stored, and a program switching mecha-

nism for switching the program for the cooling machine and the program for the cooling-and-heating machine.

[0007] Further features and applications of the present invention will become apparent from the detailed description given hereinafter. However, it should be understood that the detailed description and specific examples, while indicating preferred embodiments of the invention, are given by way of illustration only, since various changes and modifications within the spirit and scope of the invention will become apparent to those skilled in the art from this detailed description.

[0008] Other objects features, and advantages of the invention will be apparent from the following description when taken in conjunction with the accompany drawings.

Brief Description of the Drawings

[0009]

Fig. 1 shows a block chart of an air conditioner in Embodiment 1;

Fig. 2 shows a flow chart of operations in Embodiment 1;

Fig. 3 shows a block chart of an air conditioner in Embodiment 2 and Embodiment 5;

Fig. 4 shows a block chart of an air conditioner in Embodiment 3; and

Fig. 5 shows a block chart of an air conditioner in Embodiment 4.

Detailed Description of the Preferred Embodiments

Embodiment 1.

[0010] Embodiment 1 of this invention is explained with reference to drawings.

[0011] Fig. 1 shows a block chart of an air conditioner in Embodiment 1 of this invention. Explanations are made on a case in which an integrated indoor unit 101 functioning both for cooling machine and cooling-and-heating machine (an integrated indoor unit, hereinafter) and an outdoor unit 111 (cooling-and-heating machine) of the air conditioner are installed. A cooling machine / cooling-and-heating machine switch 105, which is an example of a program switching mechanism, is set to a cooling-and-heating machine before an electric power is supplied. The cooling machine / cooling-and-heating machine switch 105 sends a signal identifying the cooling and heating machine (a cooling-and-heating machine signal, hereinafter) to a signal analyzer 104. The signal analyzer 104 receives the signal, and analyzes the signal. Then, the signal analyzer 104 sends the cooling-and-heating machine signal to a microcomputer 107. When the microcomputer 107 receives the signal without accident, the integrated indoor unit 101 of the air conditioner functions as the cooling-and-heating machine.

[0012] A wireless remote controller 102 sends an operation signal, and a wireless remote controller signal receiver 103 receives the operation signal, and sends the operation signal to the signal analyzer 104. The signal analyzer 104 receives and analyzes the operation signal. The signal analyzer 104 sends the operation signal to the microcomputer 107. After the microcomputer 107 receives the operation signal, if the microcomputer 107 judges that the integrated indoor unit 101 in the air conditioner works normally, the integrated indoor unit 101 of the air conditioner performs an operation in accordance with the signal sent from the wireless remote controller 102.

[0013] When at least three minutes have passed after supplying the electric power, the microcomputer 107 sends a compressor operation signal to a signal analyzer 108. When the signal analyzer 108 judges that the compressor operation signal is transmitted normally, the signal analyzer 108 sends the signal to a cooling-and-heating machine signal (serial signal) sender-receiver 109. The cooling-and-heating machine signal (serial signal) sender-receiver 109 sends the compressor operation signal to an indoor unit / outdoor unit connecting line (connecting line, hereinafter). The signal is sent to a cooling-and-heating machine signal (serial signal) receiver 112 of the outdoor unit 111 (cooling-and-heating machine) in the air conditioner. The signal is received by the cooling-and-heating machine signal (serial signal) receiver 112, then sent to a signal analyzer 114. The signal is received and analyzed by the signal analyzer 114. Then, the signal is sent to a microcomputer 115. When the microcomputer 115 receives the signal and judges that the outdoor unit 111 (cooling-and-heating machine) of the air conditioner is normal, the microcomputer 115 sends a compressor operation signal to a compressor operation signal sender-receiver 116. The compressor operation signal sender-receiver 116 receives the compressor operation signal, and sends the compressor operation signal to a compressor 117. When the compressor 117 receives the compressor operation signal normally, the compressor 117 operates.

[0014] The microcomputer 115 sends the compressor operation signal to the compressor operation signal sender-receiver 116 and an outdoor unit operating signal to the signal analyzer 114 at the same time. When the signal analyzer 114 judges that the signal is transmitted normally, the signal analyzer 114 sends the signal to a cooling-and-heating machine signal (serial signal) receiver 113. The cooling-and-heating machine signal (serial signal) receiver 113 receives the signal, and sends the signal to the connecting line. The signal is transmitted through the connecting line, and received by the cooling-and-heating machine signal (serial signal) sender-receiver 109. Later, the signal is sent to the signal analyzer 108 by the cooling-and-heating unit signal (serial signal) sender-receiver 109. The signal analyzer 108 analyzes the signal, and sends the signal to

the microcomputer 107. The microcomputer 107 receives the signal, and judges if the outdoor unit 111 (cooling-and-heating machine) of the air conditioner is operating normally.

5 **[0015]** When a test operation switch 106 is pushed, a test operation signal is sent from the test operation switch 106 to the signal analyzer 104. The signal analyzer 104 receives the signal, and analyzes the signal. Then, the signal analyzer 104 sends the test operation signal to the microcomputer 107. When the microcomputer 107 receives the test operation signal, if the microcomputer 107 judges that the integrated indoor unit 101 of the air conditioner is normal, the integrated indoor unit 101 of the air conditioner performs a test operation.

10 **[0016]** When at least three minutes have passed after the electric power being supplied, the microcomputer 107 sends the compressor operation signal to the signal analyzer 108. When the signal analyzer 108 analyzes the compressor operation signal is transmitted normally, the signal analyzer 108 sends the signal to the cooling-and-heating machine signal (serial signal) sender-receiver 109. The cooling-and-heating machine signal (serial signal) sender-receiver 109 sends the compressor operation signal to the connecting line. The signal is sent to the cooling-and-heating machine signal (serial signal) receiver 112 of the outdoor unit 111 (cooling-and-heating machine) of the air conditioner. The signal is received by the cooling-and-heating machine signal (serial signal) receiver 112, then sent to the signal analyzer 114. The signal is received and analyzed by the signal analyzer 114. Then, the signal is sent to the microcomputer 115. Then the microcomputer 115 receives the signal and judges that the outdoor unit 111 (cooling-and-heating machine) of the air conditioner is normal, the microcomputer 115 sends the compressor operation signal to the compressor operation signal sender-receiver 116. The compressor operation signal sender-receiver 116 receives the compressor operation signal, and sends the compressor operation signal to the compressor 117. When the compressor 117 receives the compressor operation signal normally, the compressor 117 operates.

15 **[0017]** The microcomputer 115 sends the compressor operation signal to the compressor operation signal sender-receiver 116 and the outdoor unit operating signal to the signal analyzer 114 at the same time. When the signal analyzer 114 judges that the signal is transmitted normally, the signal analyzer 114 sends the signal to the cooling-and-heating machine signal (serial signal) receiver 113. The cooling-and-heating machine signal (serial signal) receiver 113 receives the signal, and sends the signal to the connecting line. The signal is transmitted through the connecting line, and received by the cooling-and-heating machine signal (serial signal) sender-receiver 109. Later, the signal is sent to the signal analyzer 108 by the cooling-and-heating unit signal (serial signal) sender-receiver 109. The signal analyzer 108 analyzes the signal, and sends the signal to

the microcomputer 107. The microcomputer 107 receives the signal, and judges if the outdoor unit 111 (cooling-and-heating machine) of the air conditioner is operating normally.

[0018] Explanations are made on a case in which an outdoor unit 118 (cooling machine) is installed for the integrated indoor unit 101 of the air conditioner. The cooling machine / cooling-and-heating machine switch 105 is set to a cooling machine, and the electric power is supplied. The cooling machine / cooling-and-heating machine switch 105 sends a signal identifying the cooling machine (a cooling machine signal, hereinafter) to the signal analyzer 104. The signal analyzer 104 receives and analyzes the cooling machine signal. Then, the signal analyzer 104 sends the cooling machine signal to the microcomputer 107. When the microcomputer 107 receives the signal normally, the integrated indoor unit 101 of the air conditioner functions as the cooling machine.

[0019] The wireless remote controller 102 sends an operation signal. The wireless remote controller signal receiver 103 receives the operation signal, and sends the operation signal to the signal analyzer 104. The signal analyzer 104 receives and analyzes the operation signal. The signal analyzer 104 sends the operation signal to the microcomputer 107. After the microcomputer 107 receives the operation signal, if the microcomputer 107 judges that the integrated indoor unit 101 of the air conditioner works normally, the integrated indoor unit 101 of the air conditioner performs an operation in line with the signal sent from the wireless remote controller 102.

[0020] When at least three minutes have passed after supplying the electric power, the microcomputer 107 sends the compressor operation signal to the signal analyzer 108. When the signal analyzer 108 judges that the compressor operation signal is transmitted normally, the signal analyzer 108 sends the signal to a cooling machine signal sender 110. The cooling machine signal sender 110 receives the compressor operation signal, and sends the compressor operation signal to the connecting line. The signal is transmitted through the connecting line, and received by a cooling machine signal receiver + signal analyzer 119 of the outdoor unit 118 (cooling machine) in the air conditioner. When the compressor operation signal is judged as a normal signal by the signal analyzer, the compressor operation signal is sent to a compressor operation signal sender 120. The compressor operation signal sender 120 receives the signal, and sends the signal to a compressor 121. If the compressor 121 receives the compressor operation signal normally, the compressor 121 operates. Thus, the air conditioner operates normally.

[0021] Explanations are made on a case in which the outdoor unit 118 (cooling machine) is installed (or connected) to the integrated indoor unit 101 of the air conditioner. After installation, the cooling machine / cooling-and-heating machine switch 105 in the inte-

grated indoor unit 101 of the air conditioner is turned on. Then, when the electric power is supplied, the signal analyzer 104 recognizes the operation of cooling machine is selected, and sends a cooling machine signal to the microcomputer 107. Then, the microcomputer 107 instructs the integrated indoor unit 101 to operate as the cooling machine.

[0022] The wireless remote controller sends an air conditioner operation signal (for example, cooling operation, set temperature at 25°C, and air velocity at Hi; a provided room temperature is 26°C or higher in this case), and the wireless remote controller signal receiver 103 in the integrated indoor unit 101 of the air conditioner receives the air conditioner operation signal. Then, the wireless remote controller signal receiver 103 sends the air conditioner operation signal to the signal analyzer 104. When the signal analyzer 104 judges that the air conditioner operation signal is transmitted normally, the signal analyzer 104 sends the air conditioner operation signal to the microcomputer 107. When the microcomputer 107 receives the air conditioner operation signal and at least three minutes have passed after supplying the electric power, and a fan motor and other components (elements), etc. are operating normally, the microcomputer 107 sends the cooling machine signal to the signal analyzer 108. The signal analyzer 108 receives the cooling machine signal, and sends the cooling machine signal to the cooling machine signal sender 110. The cooling machine signal sender 110 sends the cooling machine signal to the cooling machine signal receiver + signal analyzer 119 in the outdoor unit 118 (cooling machine) of the air conditioner. The cooling machine signal receiver + signal analyzer 119 receives the signal, and analyzes the signal. Then, the cooling machine signal receiver + signal analyzer 119 sends a compressor operation signal to a compressor operation signal sender 120. The compressor operation signal sender 120 receives the compressor operation signal, and sends the compressor operation signal to the compressor 121. The compressor 121 receives the compressor operation signal, and the compressor operates. Hence, the integrated indoor unit 101 operates as the cooling machine.

[0023] Explanations are made on a case in which the outdoor unit 111 (cooling-and-heating machine) of the air conditioner is installed (or connected) to the integrated indoor unit of the air conditioner. After installation, the cooling machine / cooling-and-heating machine switch 105 in the integrated indoor unit 101 of the air conditioner is turned off. Then, when the electric power is supplied, the signal analyzer 104 recognizes the cooling-and-heating machine, and sends a cooling-and-heating machine signal to the microcomputer 107. Then, the microcomputer 107 instructs the integrated indoor unit 101 to operate as the cooling-and-heating machine.

[0024] The wireless remote controller 102 sends an air conditioner operation signal (for example, heating

operation, set temperature at 25°C, and air velocity at Hi; a provided room temperature is 24°C or lower in this case), and the wireless remote controller signal receiver 103 in the integrated indoor unit 101 of the air conditioner receives the air conditioner operation signal. Then, the wireless remote controller signal receiver 103 sends the air conditioner operation signal to the signal analyzer 104. If the signal analyzer 104 judges that the air conditioner operation signal is normal, the signal analyzer 104 sends the air conditioner operation signal to the microcomputer 107. When the microcomputer 107 receives the air conditioner operation signal, if at least three minutes have passed after supplying the electric power, and a fan motor and other components (elements) are operating normally, the microcomputer 107 sends a cooling-and-heating machine signal to the signal analyzer 108. When the signal analyzer 108 receives the cooling-and-heating machine signal, the signal analyzer 108 sends a serial signal to the cooling-and-heating machine signal sender-receiver 109. The cooling-and-heating machine signal sender-receiver 109 sends the serial signal to the cooling-and-heating machine signal (serial signal) receiver 112 in the outdoor unit 111 (cooling-and-heating machine) in the air conditioner. When the signal analyzer 114 receives the serial signal, if the serial signal is transmitted normally, the signal analyzer 114 sends the serial signal to the microcomputer 115. The microcomputer 115 receives the serial signal. If the air conditioner is prepared to operate normally, the microcomputer 115 sends a compressor operation signal to the compressor operation signal sender-receiver 116. The compressor operation signal sender-receiver 116 sends the operation signal to the compressor 117. When the compressor 117 receives the signal, the compressor operates. Thus, the indoor unit operates as the cooling-and-heating machine.

[0025] The cooling machine and the cooling-and-heating machine operate normally in the above-described steps. Next, a case is explained in which an error occurs in the operation.

[0026] While the outdoor unit 111 (cooling-and-heating machine) of the air conditioner is connected (or installed) to the integrated indoor unit 101 of the air conditioner, the cooling machine / cooling-and-heating machine switch 105 is turned on by mistake, and the electric power is supplied. The signal analyzer 104 recognizes that the outdoor unit is the cooling machine, and sends the cooling machine signal to the microcomputer 107. The microcomputer 107 recognizes that the outdoor unit is for the cooling machine. Therefore, the serial signal is not transmitted. A microcomputer 115 judges that the operation is in error. Therefore, the microcomputer 115 does not start the operation of the compressor 117. Hence, a normal operation is not made. (In this case, since the microcomputer 115 recognizes that the outdoor unit is for the cooling machine, a display monitor of the indoor unit does not display that

the operation is in error. However, since the compressor 117 does not operate and air conditioning does not start, it is possible to judge that the operation is in error).

[0027] Explanations are made on a case in which the outdoor unit 118 (cooling-and-heating machine) of the air conditioner is (installed to be) connected to the integrated indoor unit 101 of the air conditioner, the cooling machine / cooling-and-heating machine switch 105 is turned off by mistake, and the electric power is supplied. The signal analyzer 104 recognizes that the outdoor unit is the cooling-and-heating machine, and sends the cooling-and-heating machine signal to the microcomputer 107. The microcomputer 107 recognizes that the outdoor unit is the cooling-and-heating machine. The microcomputer 107 sends a serial signal to the outdoor unit 118 (cooling machine) of the air conditioner, but a serial signal is not returned. Therefore, the microcomputer 107 judges that the operation is in error. The microcomputer 107 displays that the operation is in error on the display monitor of the integrated indoor unit 101 of the air conditioner, so that it is possible to avoid further mistake.

[0028] Above-stated operations are explained with reference to Fig. 2. In step 202, the outdoor unit is connected (or installed) to the integrated indoor unit of the air conditioner. In step 203, a judgement is made whether or not the outdoor unit is the cooling machine. If it is judged that the outdoor unit is the cooling machine, the cooling machine / cooling-and-heating machine switch, which is located in the controller of the integrated indoor unit in the air conditioner, is turned on in step 204. Then, in step 205, the electric power is supplied (a rated voltage is supplied). Consequently, the air conditioner functions as the cooling machine (step 206). Then, an air conditioner normal operation signal is sent from the wireless remote controller. When the controller in the integrated indoor unit of the air conditioner receives the signal from the wireless remote controller normally and at least three minutes have passed after the electric power is supplied, the compressor in the outdoor unit (cooling machine) of the air conditioner starts to operate. Thus, the air conditioner operates normally (step 210).

[0029] In case that the outdoor unit of the air conditioner is the cooling-and-heating machine, in step 203 in which a judgement is made if the outdoor unit is the cooling machine, since the outdoor unit is cooling-and-heating machine, the judgement is "NO." Therefore, in step 207, the cooling machine / cooling-and-heating machine switch in the controller of the integrated indoor unit of the air conditioner is turned off. Then, in step 208, the electric power is supplied (the rated voltage is supplied), and the air conditioner functions as the cooling-and-heating machine (step 209). Then, the air conditioner normal operation signal is sent from the wireless remote controller. When the controller in the integrated indoor unit of the air conditioner receives the signal from the wireless remote controller normally and at least

three minutes have passed after the electric power is supplied, the compressor in the outdoor unit (cooling machine) of the air conditioner starts to operate. Thus, the air conditioner operates normally (step 210).

[0030] As stated, in Embodiment 1, the indoor unit (including controller) of the cooling machine and the indoor unit of the air conditioner of the cooling-and-heating machine are integrated. Therefore, a manufacturer can produce a common indoor unit. Hence, a mass production becomes possible, and a cost can be reduced. Additionally, since service parts can be unified, a control system can be simplified. Besides, the installation company does not mistake a combination of the outdoor unit and the indoor unit. Thus, the control can be simplified.

Embodiment 2.

[0031] Explanations are made on Embodiment 2 of this invention with reference to the drawings.

[0032] Fig. 3 shows a block chart of the air conditioner in Embodiment 2 of this invention.

[0033] An integrated indoor unit 301 of the air conditioner and an outdoor unit 311 (cooling-and-heating machine) of the air conditioner are installed, and the electric power is supplied. A wireless remote controller 302 sends a cooling-and-heating machine signal and an operation signal, and a wireless remote controller signal receiver 303 receives the cooling-and-heating machine signal and the operation signal, and sends the signals to a signal analyzer 304. The signal analyzer 304 receives the cooling-and-heating machine signal and the operation signal, and analyzes the signals. The signal analyzer 304 sends the cooling-and-heating machine signal and the operation signal to a microcomputer 307. After the microcomputer 307 receives the signals, when the microcomputer 307 judges that the integrated indoor unit 301 in the air conditioner is set for the cooling machine and the integrated indoor unit 301 of the air conditioner works normally, the integrated indoor unit 301 of the air conditioner performs in accordance with the signal sent from the wireless remote controller 302.

[0034] When at least three minutes have passed after supplying the electric power, the microcomputer 307 sends a compressor operation signal to a signal analyzer 308. When the signal analyzer 308 judges that the compressor operation signal is transmitted normally, the signal analyzer 308 sends the signal to a cooling-and-heating machine signal (serial signal) sender-receiver 309. The cooling-and-heating machine signal (serial signal) sender-receiver 309 sends the compressor operation signal to the connecting line. Then, the signal is sent to a cooling-and-heating machine signal (serial signal) receiver 312 of the outdoor unit 311 (cooling-and-heating machine) of the air conditioner. The signal is received by the cooling-and-heating machine signal (serial signal) receiver 312, then sent to a signal analyzer 314. The signal is received and analyzed by the signal analyzer 314. Then, the signal is sent to a

microcomputer 315. When the microcomputer 315 receives the signal, if the microcomputer 315 judges that the outdoor unit 311 (cooling-and-heating machine) of the air conditioner is normal, the microcomputer 315 sends the compressor operation signal to a compressor operation signal sender-receiver 316. The compressor operation signal sender-receiver 316 receives the compressor operation signal, and sends the compressor operation signal to a compressor 317. When the compressor 317 receives the compressor operation signal normally, the compressor 317 starts to operate.

[0035] The microcomputer 315 sends the compressor operation signal to the compressor operation signal sender-receiver 316 and an outdoor unit operating signal to the signal analyzer 314 at the same time. When the signal analyzer 314 judges that the signal is transmitted normally, the signal analyzer 314 sends the signal to a cooling-and-heating machine signal (serial signal) receiver 313. The cooling-and-heating machine signal (serial signal) receiver 313 receives the signal, and sends the signal to the connecting line. The signal is transmitted through the connecting line, and received by the cooling-and-heating machine signal (serial signal) sender-receiver 309. Later, the signal is sent to the signal analyzer 308 by the cooling-and-heating unit signal (serial signal) sender-receiver 309. The signal analyzer 308 analyzes the signal, and sends the signal to the microcomputer 307. The microcomputer 307 receives the signal, and judges if the outdoor unit 311 (cooling-and-heating machine) of the air conditioner is operating normally.

[0036] Explanations are made on a case in which the integrated indoor unit 301 of the air conditioner and an outdoor unit 318 (cooling machine) of the air conditioner are installed. The wireless remote controller 302 sends a cooling machine signal and an operation signal. The wireless remote control receiver 303 receives the cooling machine signal and the operation signal, and sends the signals to the signal analyzer 304. The signal analyzer 304 receives and analyzes the cooling machine signal and the operation signal. The signal analyzer 304 sends the cooling machine signal and the operation signal to the microcomputer 307. When the microcomputer 307 receives the signals and judges that the integrated indoor unit 301 of the air conditioner is set for the cooling machine and the integrated indoor unit 301 of the air conditioner works normally, the integrated indoor unit 301 of the air conditioner performs in accordance with the signal sent from the wireless remote controller 302.

[0037] When at least three minutes have passed after supplying the electric power, the microcomputer 307 sends the compressor operation signal to the signal analyzer 308. When the signal analyzer 308 analyzes that the compressor operation signal is transmitted normally, the signal analyzer 308 sends the signal to a cooling machine signal sender 310. The signal is received by the cooling machine signal sender 310. The signal is

sent to the connecting line of the air conditioner. The signal is transmitted through the connecting line, and received by a cooling machine signal receiver + signal analyzer 319 of an outdoor unit 318 (cooling machine) of the air conditioner. When the cooling machine signal receiver + signal analyzer 319 receives and analyzes that the signal is transmitted normally, the cooling machine signal receiver + signal analyzer 319 sends the compressor operation signal to a compressor operation signal sender 320. The compressor operation signal sender 320 receives the signal, and sends the signal to a compressor 321. When the compressor 321 receives the compressor operation signal normally, the compressor 321 starts to operate. Thus, the air conditioner operates normally.

[0038] Explanations are made on a case in which the outdoor unit 318 (cooling machine) of the air conditioner is installed (or connected) to the integrated indoor unit 301 of the air conditioner. The electric power is supplied after the installation. The wireless remote controller 302 sends a cooling machine signal and an air conditioner operation signal (for example, cooling operation, set temperature at 25°C, and air velocity at Hi; a provided room temperature is 26°C or higher in this case). The wireless remote controller signal receiver 303 receives the cooling machine signal and the air conditioner operation signal, and the wireless remote controller signal receiver 303 sends the signals to the signal analyzer 304. The signal analyzer 304 receives and analyzes the cooling machine signal and the air conditioner operation signal. Then, the signal analyzer 304 sends the cooling machine signal and the air conditioner operation signal to the microcomputer 307. The microcomputer 307 instructs the integrated indoor unit to fulfill a cooling machine operation and an air conditioner operation. (A wireless remote controller signal for distinguishing the cooling machine and the cooling-and-heating machine is received only once after the electric power is supplied. For example, if the above-stated cooling machine signal is received as a first signal after the electric power is supplied and a cooling-and-heating machine signal is sent as a second or later signal, the wireless remote controller signal receiver 303 receives the cooling-and-heating machine signal from the wireless remote controller. However the signal analyzer 304 cancels the cooling-and-heating machine signal, and does not send the cooling-and-heating machine signal to the microcomputer 307. However, if the second or later signal from the wireless remote controller is the cooling machine signal which is same as the first signal, the signal analyzer 304 judges that the second or later signal is same as the first signal, and sends the second or later signal to the microcomputer 307).

[0039] When at least three minutes have passed after supplying the electric power, and the fan motor and other components (elements) are operating normally, the microcomputer 307 sends the cooling machine signal to the signal analyzer 308. When the signal analyzer

308 receives the cooling machine signal, the signal analyzer 308 sends the cooling machine signal to the cooling machine signal sender 310. The cooling machine signal sender 310 sends the cooling machine signal to the cooling machine signal receiver + signal analyzer 319 of the outdoor unit 318 (cooling machine) in the air conditioner. The cooling machine signal receiver + signal analyzer 319 receives and analyzes the signal. Then, the cooling machine signal receiver + signal analyzer 319 sends a compressor operation signal to the compressor operation signal sender 320. The compressor operation signal sender 320 receives the compressor operation signal, and sends the compressor operation signal to the compressor 321. When the compressor 321 receives the compressor operation signal, the compressor starts to operate. Thus, the indoor unit operates as the cooling machine.

[0040] Explanations are made on a case in which the outdoor unit 311 (cooling-and-heating machine) of the air conditioner is installed (or connected) to the integrated indoor unit 301 of the air conditioner. The electric power is supplied after the installation. The wireless remote controller 302 sends a cooling-and-heating machine signal and an air conditioner operation signal (for example, heating operation, set temperature at 25°C, and air velocity at Hi; a provided room temperature is 24°C or lower in this case). When the wireless remote controller signal receiver 303 receives the cooling-and-heating machine signal and the air conditioner operation signal, the wireless remote controller signal receiver 303 sends the signals to the signal analyzer 304. The signal analyzer 304 receives and analyzes the cooling-and-heating machine signal and the air conditioner operation signal. Then, the signal analyzer 304 sends the cooling-and-heating machine signal and the air conditioner operation signal to the microcomputer 307. The microcomputer 307 instructs the integrated indoor unit to fulfill the cooling-and-heating machine operation and the air conditioner operation.

[0041] When at least three minutes have passed after supplying the electric power, and the fan motor and other components (elements) are operating normally, the microcomputer 307 sends the cooling-and-heating machine signal to the signal analyzer 308. When the signal analyzer 308 receives the cooling-and-heating machine signal, the signal analyzer 308 sends a serial signal to the cooling-and-heating machine signal sender-receiver 309. The cooling-and-heating machine signal sender-receiver 309 sends the serial signal to the cooling-and-heating machine signal receiver 312 in the outdoor unit 311 (cooling-and-heating machine) in the air conditioner. When the signal analyzer 314 receives the serial signal and judges the signal is a normal signal, the signal analyzer 314 sends the serial signal to the microcomputer 315. When the microcomputer 315 receives the serial signal, if the air conditioner is prepared to operate normally, the microcomputer 315 sends a compressor operation signal to the compressor

operation signal sender-receiver 316. The compressor operation signal sender-receiver 316 sends the operation signal to the compressor 317. When the compressor 317 receives the signal, the compressor 317 starts to operate. Thus, the indoor unit operates as the cooling-and-heating machine.

[0042] The cooling machine and the cooling-and-heating machine operate normally in the above-described steps. Next, a case is explained in which an error occurs in the operation.

[0043] While the outdoor unit 311 (cooling-and-heating machine) of the air conditioner is connected (or installed) to the integrated indoor unit 301 of the air conditioner, a cooling machine signal is sent from the wireless remote controller 302 by mistake. In this case, the microcomputer 307 judges that the outdoor unit is for the cooling machine, the serial signal is not transmitted. The microcomputer 315 judges that the operation is in error, and does not start the operation of the compressor 117. Hence, a normal operation is not made. (In this case, since the microcomputer 315 judges that the outdoor unit is for the cooling machine, a display monitor of the indoor unit does not display that the operation is in error. However, since the compressor 317 does not operate and air conditioning does not start, it is possible to judge that the operation is in error).

[0044] Explanations are made on a case in which the outdoor unit 318 (cooling machine) of the air conditioner is connected (or installed) to the integrated indoor unit 301 of the air conditioner. When the wireless remote controller 302 sends the cooling-and-heating machine signal, if the microcomputer 307 judges that the outdoor unit is the cooling-and-heating machine, the microcomputer 307 sends a serial signal to the outdoor unit 318 (cooling machine) of the air conditioner. However, a serial signal is not returned. Therefore, the microcomputer 307 judges that the operation is in error. The microcomputer 307 displays that the operation is in error on the display monitor of the integrated indoor unit 301 of the air conditioner, so that it is possible to avoid further mistake.

[0045] As stated, in Embodiment 2, the indoor unit (including controller) of the air conditioner of the cooling machine and the indoor unit of the air conditioner of the cooling-and-heating machine are integrated. Therefore, a manufacturer can produce a common indoor unit for the cooling machine and the cooling-and-heating machine. Hence, a mass production becomes possible, and a cost can be reduced. Additionally, since service parts can be unified, a control system can be simplified. Besides, the installation company does not mistake a combination of the outdoor unit and the indoor unit, and the control can be simplified.

Embodiment 3.

[0046] Embodiment 3 of this invention is explained with reference to drawings.

[0047] Fig. 4 shows a block chart of an air conditioner in Embodiment 3 of this invention. Explanations are made on a case in which an integral indoor unit 401 of an air conditioner and an outdoor unit 411 (cooling-and-heating machine) of the air conditioner are installed. When the electric power is supplied, a microcomputer 415 of the outdoor unit 411 (cooling-and-heating machine) of the air conditioner sends a cooling-and-heating machine serial signal (cooling-and-heating machine signal, hereinafter) to a signal analyzer 414. The signal analyzer 414 receives and analyzes the signal. If the signal is transmitted normally, the signal analyzer 414 sends the signal to a cooling-and-heating machine signal sender 413. Then, the cooling-and-heating machine signal sender 413 sends the signal to the connecting line. The signal is transmitted through the connecting line, and received by a cooling-and-heating machine signal sender-receiver 409 of the integrated indoor unit 401 of the air conditioner. A signal analyzer 408 analyzes the cooling-and-heating machine signal, and sends the signal to a microcomputer 407. When the microcomputer 407 receives the signal normally, the integrated indoor unit 401 of the air conditioner operates as the cooling-and-heating machine.

[0048] A wireless remote controller 402 sends an operation signal. A wireless remote controller signal receiver 403 receives the operation signal, and sends the operation signal to a signal analyzer 404. The signal analyzer 404 receives the operation signal, and analyzes the operation signal. Then, the signal analyzer 404 sends the operation signal to the microcomputer 407. When the microcomputer 407 receives the operation signal and judges that the integrated indoor unit 401 in the air conditioner works normally, the integrated indoor unit 401 of the air conditioner performs in accordance with the signal sent from the wireless remote controller 402.

[0049] When at least three minutes have passed after supplying the electric power, the microcomputer 407 sends a compressor operation signal to the signal analyzer 408. When the signal analyzer 408 judges that the compressor operation signal is transmitted normally, the signal analyzer 408 sends the signal to the cooling-and-heating machine signal (serial signal) sender-receiver 409. The cooling-and-heating machine signal (serial signal) sender-receiver 409 sends the compressor operation signal to the connecting line of the air conditioner. Then, the signal is sent to a cooling-and-heating machine signal (serial signal) receiver 412 of the outdoor unit 411 (cooling-and-heating machine) of the air conditioner. The cooling-and-heating machine signal (serial signal) receiver 412 receives the signal, and sent to a signal analyzer 414. The signal analyzer 414 receives and analyzes the signal. Then, the signal analyzer 414 sends the signal to the microcomputer 415. When the microcomputer 415 receives the signal, if the microcomputer 415 judges that the outdoor unit

411 (cooling-and-heating machine) of the air conditioner works normally, the microcomputer 415 sends the compressor operation signal to a compressor operation signal sender-receiver 416. The compressor operation signal sender-receiver 416 receives the compressor operation signal, and sends the compressor operation signal to a compressor 417. When the compressor 417 receives the compressor operation signal normally, the compressor 417 starts to operate.

[0050] The microcomputer 415 sends the compressor operation signal to the compressor operation signal receiver 416 and an outdoor unit operating signal to the signal analyzer 414 at the same time. When the signal analyzer 414 judges that the signal is transmitted normally, the signal analyzer 414 sends the signal to the cooling-and-heating machine signal (serial signal) receiver 413. The cooling-and-heating machine signal (serial signal) receiver 413 receives the signal, and sends the signal to the connecting line. The signal is transmitted through the connecting line, and received by the cooling-and-heating machine signal (serial signal) sender-receiver 409. The signal is sent to the signal analyzer 408. The signal analyzer 408 analyzes the signal, and sends the signal to the microcomputer 407. The microcomputer 407 receives the signal, and judges if the outdoor unit 411 (cooling-and-heating machine) of the air conditioner is operating normally.

[0051] When a test operation switch 406 is pushed, a test operation signal is sent from the test operation switch 406 to a signal analyzer 404. The signal analyzer 404 receives and analyzes the signal. Then, the signal analyzer 404 sends the test operation signal to the microcomputer 407. When the microcomputer 407 receives the test operation signal and judges that the integrated indoor unit 401 of the air conditioner works normally, the integrated indoor unit 401 of the air conditioner performs a test operation.

[0052] When at least three minutes have passed after supplying the electric power, the microcomputer 407 sends the compressor operation signal to the signal analyzer 408. When the signal analyzer 408 judges that the compressor operation signal is transmitted normally, the signal analyzer 408 sends the signal to the cooling-and-heating machine signal (serial signal) sender-receiver 409. The cooling-and-heating machine signal (serial signal) sender-receiver 409 sends the compressor operation signal to the connecting line. The signal is sent to the cooling-and-heating machine signal (serial signal) receiver 412 of the outdoor unit 411 (cooling-and-heating machine) of the air conditioner, and received by the cooling-and-heating machine signal (serial signal) receiver 412. Then, the signal is sent to the signal analyzer 414. The signal is received and analyzed by the signal analyzer 414. Then, the signal is sent to the microcomputer 415. When the microcomputer 415 receives the signal and judges that the outdoor unit 411 (cooling-and-heating machine) of the air conditioner works normally, the microcomputer 415

sends the compressor operation signal to the compressor operation signal sender-receiver 416. The compressor operation signal sender-receiver 416 receives the compressor operation signal, and sends the compressor operation signal to the compressor 417. When the compressor 417 receives the compressor operation signal normally, the compressor 417 starts to operate.

[0053] The microcomputer 415 sends the compressor operation signal to the compressor operation signal sender-receiver 416 and the outdoor unit operating signal to the signal analyzer 414 at the same time. Then the signal analyzer 414 judges that the signal is transmitted normally, the signal analyzer 414 sends the signal to the cooling-and-heating machine signal (serial signal) receiver 413. The cooling-and-heating machine signal (serial signal) receiver 413 receives the signal, and sends the signal to the connecting line. The signal is transmitted through the connecting line, and received by the cooling-and-heating machine signal (serial signal) sender-receiver 409. The signal is sent to the signal analyzer 408. The signal analyzer 408 analyzes the signal, and sends the signal to the microcomputer 407. The microcomputer 407 receives the signal, and judges if the outdoor unit 411 (cooling-and-heating machine) of the air conditioner is operating normally.

[0054] Explanations are made on a case in which an outdoor unit 418 (cooling machine) of the air conditioner is installed to the integrated indoor unit 401 of the air conditioner. When the electric power is supplied, since a serial signal is not sent from the outdoor unit 418 (cooling machine) of the air conditioner, the microcomputer 407 judges that the outdoor unit is for the cooling machine, and the integrated indoor unit 401 of the air conditioner performs an operation for the cooling machine. The wireless remote controller sends an operation signal, and the wireless remote controller signal receiver 403 receives the operation signal. Then, the wireless remote controller signal receiver 403 sends the operation signal to the signal analyzer 404. The signal analyzer 404 receives and analyzes the operation signal. The signal analyzer 404 sends the operation signal to the microcomputer 407. When the microcomputer 407 receives the signal, if the microcomputer 407 judges that the integrated indoor unit 401 of the air conditioner works normally, the integrated indoor unit 401 of the air conditioner performs in accordance with the signal sent from the wireless remote controller 402.

[0055] When at least three minutes have passed after supplying the electric power, the microcomputer 407 sends the compressor operation signal to the signal analyzer 408. Then the signal analyzer 408 judges that the compressor operation signal is transmitted normally, the signal analyzer 408 sends the signal to a cooling machine signal sender 410. The signal is received by the cooling machine signal sender 410. The signal is sent to the connecting line of the air conditioner. The signal is transmitted through the connecting line, and received by a cooling machine signal receiver + signal

analyzer 419 of the outdoor unit 418 (cooling machine) of the air conditioner. When the cooling machine signal receiver + signal analyzer 419 judges that the signal is transmitted normally, the cooling machine signal receiver + signal analyzer 419 sends the compressor operation signal to a compressor operation signal sender 420. The compressor operation signal sender 420 receives the signal, and sends the signal to a compressor 421. When the compressor 421 receives the compressor operation signal normally, the compressor 421 starts to operate. Thus, the air conditioner operates normally.

[0056] Explanations are made on a case in which the outdoor unit 418 (cooling machine) of the air conditioner is installed (or connected) to the integrated indoor unit 401 of the air conditioner. The electric power is supplied after the installation. The microcomputer 407 sends a serial signal to the signal analyzer 408, and the signal analyzer 408 sends the serial signal to the serial signal sender-receiver 409. However, since the outdoor unit 418 of the air conditioner is for the cooling machine, the serial signal is not returned. Therefore, the microcomputer 407 judges that the outdoor unit is for the cooling machine, and the indoor unit operate as the cooling machine.

[0057] Explanations are made on a case in which the outdoor unit 411 (cooling-and-heating machine) is installed (or connected) to the integrated indoor unit 401 of the air conditioner. After installation, the electric power is supplied, and the microcomputer 407 sends the serial signal to the signal analyzer 408. Then, the signal analyzer 408 sends the serial signal to the serial signal sender-receiver 409. The serial signal sender-receiver 409 sends the signal to the cooling-and-heating machine signal receiver 412 in the outdoor unit 411 (cooling-and-heating machine) of the air conditioner, and the cooling-and-heating machine signal receiver 412 receives the signal. Then, the signal analyzer 414 receives and analyzes the signal. If the signal analyzer 414 can analyze the serial signal correctly, the signal analyzer 414 sends the signal to the microcomputer 415. The microcomputer 415 receives the signal, and sends an answer signal of the serial signal to the signal analyzer 414. Then, the signal analyzer 414 sends the answer signal to the cooling-and-heating machine signal sender 413. The cooling-and-heating machine signal sender 413 sends the answer serial signal to the cooling-and-heating machine signal sender-receiver 409 in the integrated indoor unit 401 of the air conditioner. The cooling-and-heating machine signal sender-receiver 409 sends the answer signal to the signal analyzer 408. When the signal analyzer 408 receives the answer signal and judges that the answer serial signal is transmitted normally, the signal analyzer 408 sends the answer signal to the microcomputer 407. When the microcomputer 407 receives the answer serial signal, the microcomputer 407 selects a software for the cooling-and-heating machine. Hence, the air conditioner

operates as the cooling-and-heating machine.

[0058] As stated, the cooling machine / cooling-and-heating machine switch is not necessary in Embodiment 3. Therefore, switching of the cooling machine and the cooling-and-heating machine can be made with a low cost.

Embodiment 4.

[0059] Explanations are made on Embodiment 4 of this invention with reference to the drawings.

[0060] Fig. 5 shows a block chart of the air conditioner in Embodiment 4 of this invention. In Fig. 5, an integrated indoor unit 501 of the air conditioner and an outdoor unit 511 (cooling-and-heating machine) of the air conditioner are installed. When the electric power is supplied, the integrated indoor unit 501 of the air conditioner functions as the cooling-and-heating machine. Then, a wireless remote controller 502 sends an operation signal. A wireless remote controller signal receiver 503 receives the operation signal, and sends the operation signal to a signal analyzer 504. The signal analyzer 504 receives and analyzes the operation signal. The signal analyzer 504 sends the operation signal to a microcomputer 507. When the microcomputer 507 receives the operation signal and judges that the integrated indoor unit 501 in the air conditioner works normally, the integrate indoor unit 501 of the air conditioner performs in accordance with the signal sent from the wireless remote controller 502.

[0061] When at least three minutes have passed after supplying the electric power, the microcomputer 507 sends a compressor operation signal to a signal analyzer 508. If the signal analyzer 508 judges that the compressor operation signal is transmitted normally, the signal analyzer 508 sends the signal to a cooling-and-heating machine signal (serial signal) sender-receiver 509. The cooling-and-heating machine signal (serial signal) sender-receiver 509 sends the compressor operation signal to the connecting line. The signal is sent to and received by a cooling-and-heating machine signal (serial signal) receiver 512 of the outdoor unit 511 (cooling-and-heating machine) of the air conditioner. Then, the signal is sent to a signal analyzer 514. The signal is received and analyzed by the signal analyzer 514. Then, the signal is sent to a microcomputer 515. When the microcomputer 515 receives the signal and judges that the outdoor unit 511 (cooling-and-heating machine) of the air conditioner works normally, the microcomputer 515 sends the compressor operation signal to a compressor operation signal sender-receiver 516. The compressor operation signal sender-receiver 516 receives the compressor operation signal, and sends the compressor operation signal to a compressor 517. When the compressor 517 receives the compressor operation signal normally, the compressor 517 starts to operate.

[0062] The microcomputer 515 sends the compres-

sor operation signal to the compressor operation signal sender-receiver 516 and an outdoor unit operating signal to the signal analyzer 514 at the same time. If the signal analyzer 514 judges that the signal is normal, the signal analyzer 514 sends the signal to a cooling-and-heating machine signal (serial signal) receiver 513. The cooling-and-heating machine signal (serial signal) receiver 513 receives the signal, and sends the signal to the connecting line. The signal is transmitted through the connecting line, and received by the cooling-and-heating machine signal (serial signal) sender-receiver 509. The signal is sent to the signal analyzer 508. The signal analyzer 508 analyzes the signal, and sends the signal to the microcomputer 507. The microcomputer 507 receives the signal, and judges if the outdoor unit 511 (cooling-and-heating machine) of the air conditioner is operating normally.

[0063] When a quick start operation switch 506 is pushed, an emergency operation signal is sent from the emergency operation switch 506 to the signal analyzer 504. The signal analyzer 504 receives and analyzes the signal. Then, the signal analyzer 504 sends the emergency operation signal to the microcomputer 507, and the microcomputer 507 receives the emergency operation signal. Then, if the microcomputer 507 judges that the integrated indoor unit 501 of the air conditioner works normally, the integrated indoor unit 501 of the air conditioner performs a quick start operation.

[0064] When at least three minutes have passed after supplying the electric power, the microcomputer 507 sends the compressor operation signal to the signal analyzer 508. When the signal analyzer 508 judges that the compressor operation signal is transmitted normally, the signal analyzer 508 sends the signal to the cooling-and-heating machine signal (serial signal) sender-receiver 509. The cooling-and-heating machine signal (serial signal) sender-receiver 509 sends the compressor operation signal to the connecting line. The signal is sent to the cooling-and-heating machine signal (serial signal) receiver 512 of the outdoor unit 511 (cooling-and-heating machine) of the air conditioner, and received by the cooling-and-heating machine signal (serial signal) receiver 512. The signal is sent to the signal analyzer 514. The signal is received and analyzed by the signal analyzer 514. Then, the signal is sent to the microcomputer 515. When the microcomputer 515 receives the signal and judges that the outdoor unit 511 (cooling-and-heating machine) of the air conditioner works normally, the microcomputer 515 sends the compressor operation signal to the compressor operation signal sender-receiver 516. The compressor operation signal sender-receiver 516 receives the compressor operation signal, and sends the compressor operation signal to the compressor 517. When the compressor 517 receives the compressor operation signal normally, the compressor 517 starts to operate.

[0065] The microcomputer 515 sends the compressor operation signal to the compressor operation signal

sender-receiver 516 and the outdoor unit operation signal to the signal analyzer 514 at the same time. When the signal analyzer 514 judges that the signal is transmitted normally, the signal analyzer 514 sends the signal to the cooling-and-heating machine signal (serial signal) receiver 513. The cooling-and-heating machine signal (serial signal) receiver 513 receives the signal, and sends the signal to the connecting line. The signal is transmitted through the connecting line, and received by the cooling-and-heating machine signal (serial signal) sender-receiver 509. The signal is sent to the signal analyzer 508. The signal analyzer 508 analyzes the signal, and sends the signal to the microcomputer 507. The microcomputer 507 receives the signal, and judges if the outdoor unit 511 (cooling-and-heating machine) of the air conditioner is operating normally.

[0066] Explanations are made on a case in which the integrated indoor unit 501 of the air conditioner and an outdoor unit 518 (cooling machine) of the air conditioner are installed. The electric power is supplied while the quick start operation switch is being pushed. In this case, a cooling machine signal is sent from the quick start operation switch 506 to the signal analyzer 504. The signal is received and analyzed by the signal analyzer 504. When the signal analyzer judges that the signal is transmitted normally, the signal analyzer 504 sends the signal to the microcomputer 507. When the microcomputer 507 receives the signal normally, the integrated indoor unit 501 of the air conditioner functions as the cooling machine.

[0067] The wireless remote controller 502 sends an operation signal, and the wireless remote controller signal receiver 503 receives the operation signal. The wireless remote controller signal receiver 503 sends the operation signal to the signal analyzer 504. The signal analyzer 504 receives and analyzes the operation signal. The signal analyzer 504 sends the operation signal to the microcomputer 507. When the microcomputer 507 receives the operation signal and judges that the integrated indoor unit 501 in the air conditioner works normally, the integrated indoor unit 501 of the air conditioner performs in accordance with the signal sent from the wireless remote controller 502.

[0068] When at least three minutes have passed after supplying the electric power, the microcomputer 507 sends the compressor operation signal to the signal analyzer 508. When the signal analyzer 508 judges that the compressor operation signal is normal, the signal analyzer 508 sends the signal to a cooling machine signal sender 510. The cooling machine signal sender 510 receives the compressor operation signal, and sends the compressor operation signal to the connecting line. The signal is transmitted through the connecting line, and received by a cooling machine signal receiver + signal analyzer 519 of the outdoor unit 518 (cooling machine) of the air conditioner. When the cooling machine signal receiver + signal analyzer 519 judges that the compressor operation signal is normal, the

cooling machine signal receiver + signal analyzer 519 sends the compressor operation signal to a compressor operation signal sender 520. The compressor operation signal sender 520 receives the signal, and sends the signal to a compressor 521. When the compressor 521 receives the compressor operation signal normally, the compressor 521 starts to operate. Thus, the air conditioner operates normally.

[0069] Explanations are made on a case in which the integrated indoor unit 501 of the air conditioner and the outdoor unit 518 (cooling machine) of the air conditioner are installed. The electric power is supplied while the quick start operation switch is being pushed. In this case, a signal is sent from the emergency operation switch 506 to the signal analyzer 504. Since a condition of supplying the electric power + turning the quick start operation switch on is fulfilled, the signal analyzer 504 sends the cooling machine signal to the microcomputer 507. When the microcomputer 507 receives the cooling machine signal, the integrated indoor unit 501 of the air conditioner functions as the cooling machine.

[0070] In case of the cooling-and-heating machine, if the outdoor unit 511 (cooling-and-heating machine) of the air conditioner is installed (or connected) to the integrated indoor unit 501 of the air conditioner and the electric power is supplied, the integrated indoor unit functions as the cooling-and-heating machine. (An original setting is the cooling-and-heating machine, and the electric power is supplied while the quick start operation switch is being pushed. Therefore, software of the microcomputer 507 is switched).

[0071] As stated, in Embodiment 4, the emergency operation switch 506 can be used for switching programs. Therefore, switching of the cooling machine and the cooling-and-heating machine can be produced with a low cost.

Embodiment 5.

[0072] Explanations are made on Embodiment 5 of this invention with reference to Fig. 3. (Fig. 3 was already explained in Embodiment 2).

[0073] The outdoor unit 318 (cooling machine) of the air conditioner is installed (or connected) to the integrated indoor unit 301 of the air conditioner, and the electric power is supplied after the installation. The wireless remote controller 302 sends a cooling machine signal and an air conditioner operation signal (for example, cooling operation, set temperature at 25°C, and air velocity at Hi; a provided room temperature is 26°C or higher in this case). When the wireless remote controller signal receiver 303 receives the cooling machine signal and the air conditioner operation signal, the wireless remote controller signal receiver 303 sends the signals to the signal analyzer 304. The signal analyzer 304 receives and analyzes the cooling machine signal and the air conditioner operation signal. Then, the signal analyzer 304 sends the cooling machine signal and the

air conditioner operation signal to the microcomputer 307. The microcomputer 307 instructs the indoor unit to perform a cooling machine operation and an air conditioner operation.

[0074] The outdoor unit 311 (cooling-and-heating machine) of the air conditioner is installed (or connected) to the integrated indoor unit 301 of the air conditioner, and the electric power is supplied after the installation. The wireless remote controller 302 sends a cooling-and-heating machine signal and an air conditioner operation signal (for example, heating operation, set temperature at 25°C, and air velocity at Hi; a provided room temperature is 24°C or lower in this case). When the wireless remote controller signal receiver 303 receives the cooling-and-heating machine signal and the air conditioner operation signal, the wireless remote controller signal receiver 303 sends the signals to the signal analyzer 304. The signal analyzer 304 receives and judges the cooling-and-heating machine signal and the air conditioner operation signal. Then, the signal analyzer 304 sends the cooling-and-heating machine signal and the air conditioner operation signal to the microcomputer 307. The microcomputer 307 instructs the indoor unit to perform the cooling-and-heating machine operation and the air conditioner operation.

[0075] As stated, in Embodiment 5, a possibility of a mistake in switching software for the cooling machine and software for the cooling-and-heating machine decreases. Further, the indoor can surely be set as either the cooling machine or the cooling-and-heating machine without a mistake.

Embodiment 6.

[0076] Embodiment 1 and Embodiment 2 can be combined, that is the cooling machine and the cooling-and-heating machine can be switched by using either the cooling machine / cooling-and-heating machine switch or the wireless remote controller.

Embodiment 7.

[0077] For the sale of the cooling machine, a wireless remote controller for the cooling machine is packaged with the outdoor unit for the cooling machine. For the sale of the cooling-and-heating machine, a wireless remote controller for the cooling-and-heating machine is packaged with the outdoor unit for the cooling-and-heating machine. However, for the sale of the integrated indoor unit of the air conditioner, a wireless remote controller is not packaged.

[0078] In Embodiment 7, either the wireless remote controller for the cooling machine or the wireless remote controller for the cooling-and-heating machine is not packaged with / attached to the indoor unit of the air conditioner. Therefore, the cost can be reduced, and a sale price can be lowered. Further, a wrong operation of the air conditioner due to a usage of a wrong wireless

remote controller can be prevented.

[0079] According to this invention, a separate type air conditioner for being separated into the indoor unit and the outdoor unit includes a controller having a microcomputer storing a program for the cooling machine and a program for the cooling-and-heating machine, and a switching mechanism for switching the program for the cooling machine and the program for the cooling-and-heating machine. Therefore, the indoor unit (including the controller) of the air conditioner for the cooling machine and the cooling-and-heating machine can be integrated. Hence, the manufacturer can provide a common indoor unit, and it leads to a mass production and a cost reduction. Besides, since service parts are rationalized, a control system can be simplified. Further, the company who installs the air conditioner does not mistake a combination of the outdoor unit and the indoor unit, and the control can be simplified.

[0080] The program switching mechanism is a mechanism for switching the program for the cooling machine and the program for the cooling-and-heating machine by the cooling machine signal and the cooling-and-heating machine signal from the wireless remote controller. Therefore, a switch for switching the cooling machine and cooling-and-heating machine is not necessary, and the cooling machine and the cooling-and-heating machine can be switched with a low cost.

[0081] The program switching mechanism is a mechanism for switching the program for the cooling machine and the program for the cooling-and-heating machine based on whether or not a serial signal is transmitted from the outdoor unit to the indoor unit. Therefore, the cooling machine and the cooling-and-heating machine can be switched with a low cost.

[0082] The program switching mechanism is a mechanism for switching the program for the cooling machine and the program for the cooling-and-heating machine based on whether or not a quick start operation switch is operated at the time of supplying the electric power. Since the emergency operation switch can be used for switching the programs, the cooling machine and the cooling-and-heating machine can be switched with a low cost.

[0083] The wireless remote controller for the cooling machine and the wireless remote controller for the cooling-and-heating machine are provided. The program switching mechanism is the mechanism for receiving a signal from each of the wireless remote controllers after the electric power is supplied and switching the program for the cooling machine and the program for the cooling-and-heating machine based on the received signal. Therefore, a possibility of a mistake in switching the above programs becomes lower. Further, the indoor unit can surely be set for either the cooling machine or the cooling-and-heating machine correctly.

[0084] The wireless remote controller for the cooling machine is packaged with the outdoor unit of the

cooling machine, and the wireless remote controller for the cooling-and-heating machine is packaged with the outdoor unit of the cooling-and-heating machine. Therefore, reductions both on the cost and the sales price can be expected. Further a wrong operation due to a usage of a wrong wireless remote controller can be prevented.

[0085] Having thus described several particular embodiments of the invention, various alterations, modifications, and improvements will readily occur to those skilled in the art. Such alterations, modifications, and improvements are intended to be part of this disclosure, and are intended to be within the spirit and scope of the invention. Accordingly, the foregoing description is by way of example only and is limited only as defined in the following claims and the equivalents thereto.

Claims

1. A separate type air conditioner separated into an indoor unit and an outdoor unit comprising a controller including a microcomputer in which a program for a cooling machine and a program for a cooling-and-heating machine are stored, and a program switching mechanism for switching the program for the cooling machine and the program for the cooling-and-heating machine.
2. The air conditioner in claim 1, wherein the program switching mechanism is a cooling machine / cooling-and-heating machine switch provided in the indoor unit.
3. The air conditioner in claim 1 comprising a wireless remote controller, wherein the program switching mechanism is a mechanism for switching the program for the cooling machine and the program for the cooling-and-heating machine based on a cooling machine signal and a cooling-and-heating machine signal from the wireless remote controller.
4. The air conditioner in claim 1, wherein the program switching mechanism is a mechanism for switching the program for the cooling machine and the program for the cooling-and-heating machine based on whether or not a serial signal is transmitted from the outdoor unit to the indoor unit.
5. The air conditioner in claim 1 comprising a quick start operation switch, wherein the program switching mechanism is a mechanism for switching the program for the cooling machine and the program for the cooling-and-heating machine based on whether or not the emergency operation switch is operated when an electric power is supplied.
6. The air conditioner in claim 1 comprising a wireless remote controller for the cooling machine and a wireless remote controller for the cooling-and-heating machine.

ing machine, wherein the program switching mechanism is a mechanism for receiving a signal from each of the wireless remote controllers after an electric power being supplied and switching the program for the cooling machine and the program for the cooling-and-heating machine based on the received signal. 5

- 7. The air conditioner in claim 6, wherein the wireless remote controller for the cooling machine is packaged with the outdoor unit of the cooling machine, wherein the wireless remote controller for the cooling-and-heating machine is packaged with the outdoor unit of the cooling-and-heating machine. 10

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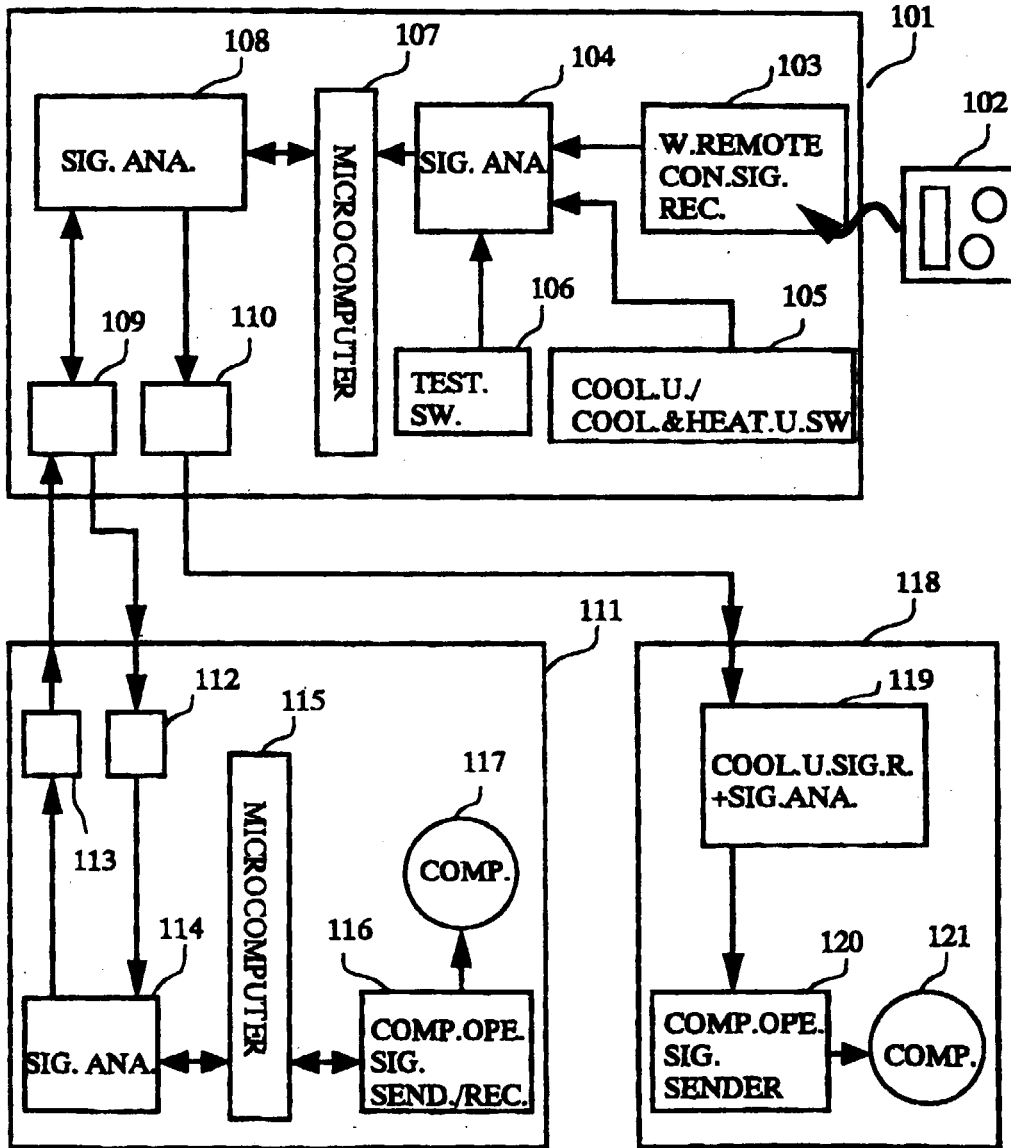
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FIG.1



- 101 : INTEGRATED INDOOR UNIT(COOLING/COOLING&HEATING)
- 102 : WIRELESS REMOTE CONTROLLER
- 109 : COOL.&HEAT. MAC. SIGNAL(SERIAL SIGNAL) SENDER/RECEIVER
- 110 : COOLING MACHINE SIGNAL SENDER
- 111 : OUTDOOR UNIT(COOLING&HEATING)
- 112 : COOL.&HEAT. MAC. SIGNAL(SERIAL SIGNAL) RECEIVER
- 113 : COOL.&HEAT. MAC. SIGNAL(SERIAL SIGNAL) SENDER
- 118 : OUTDOOR UNIT(COOLING)

FIG.2

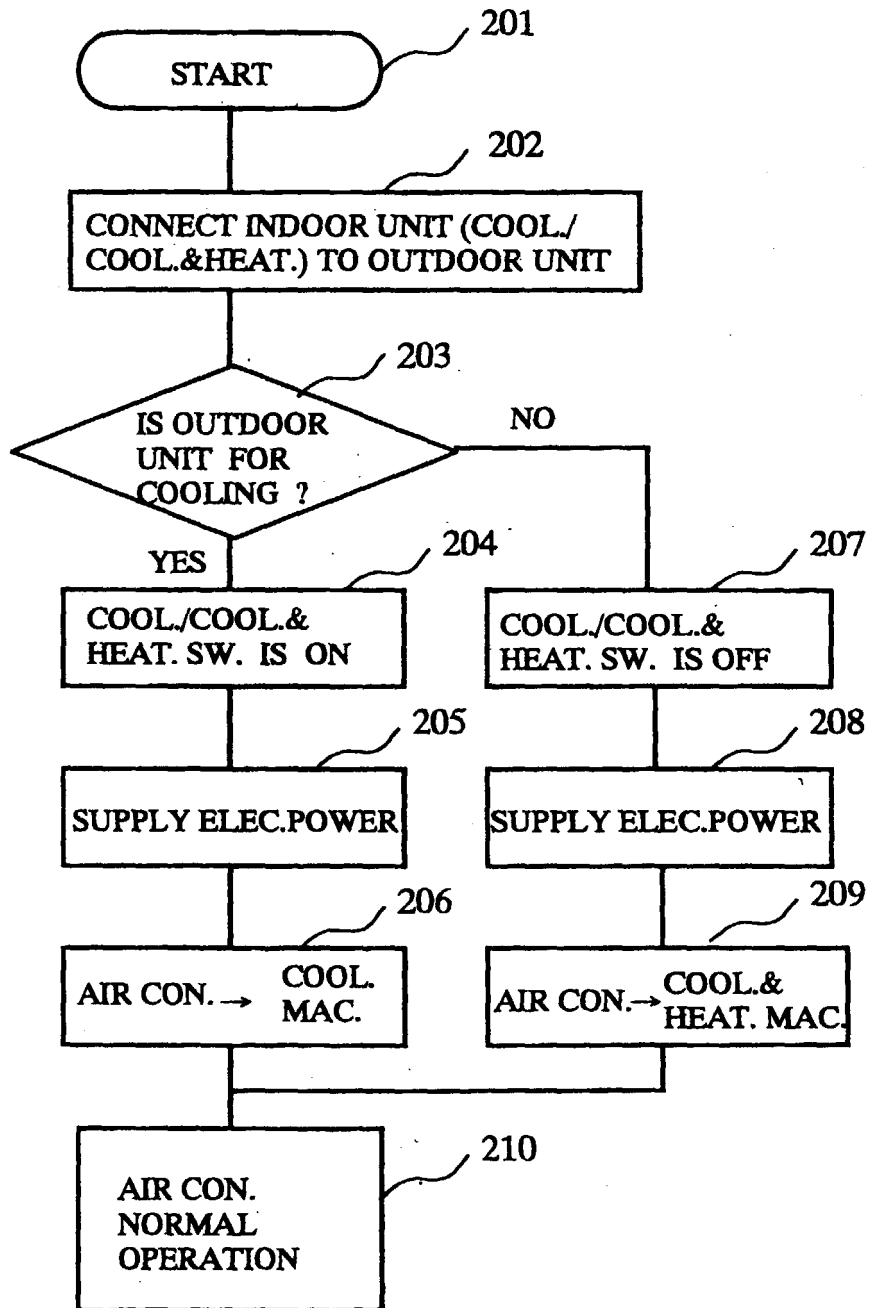
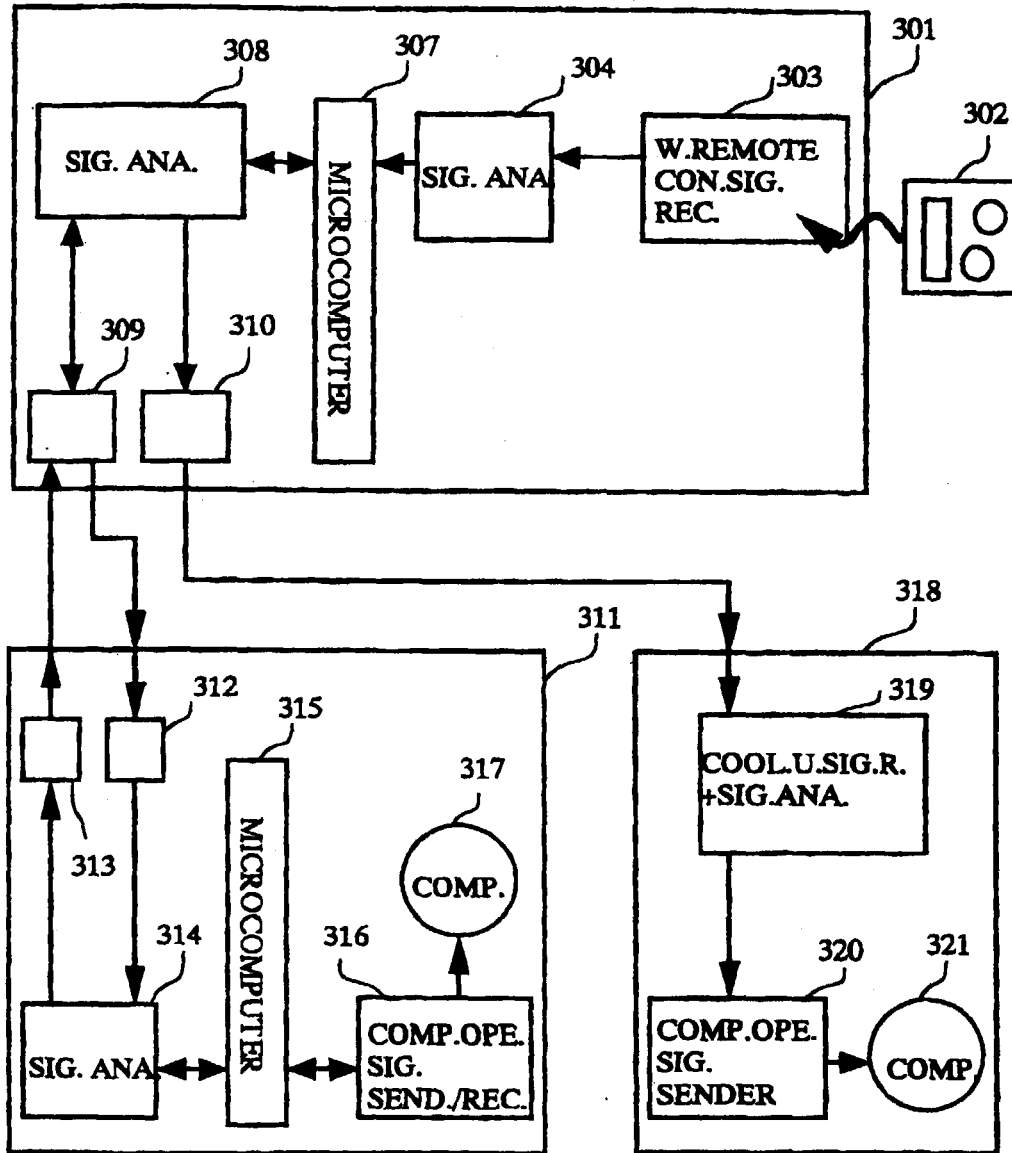
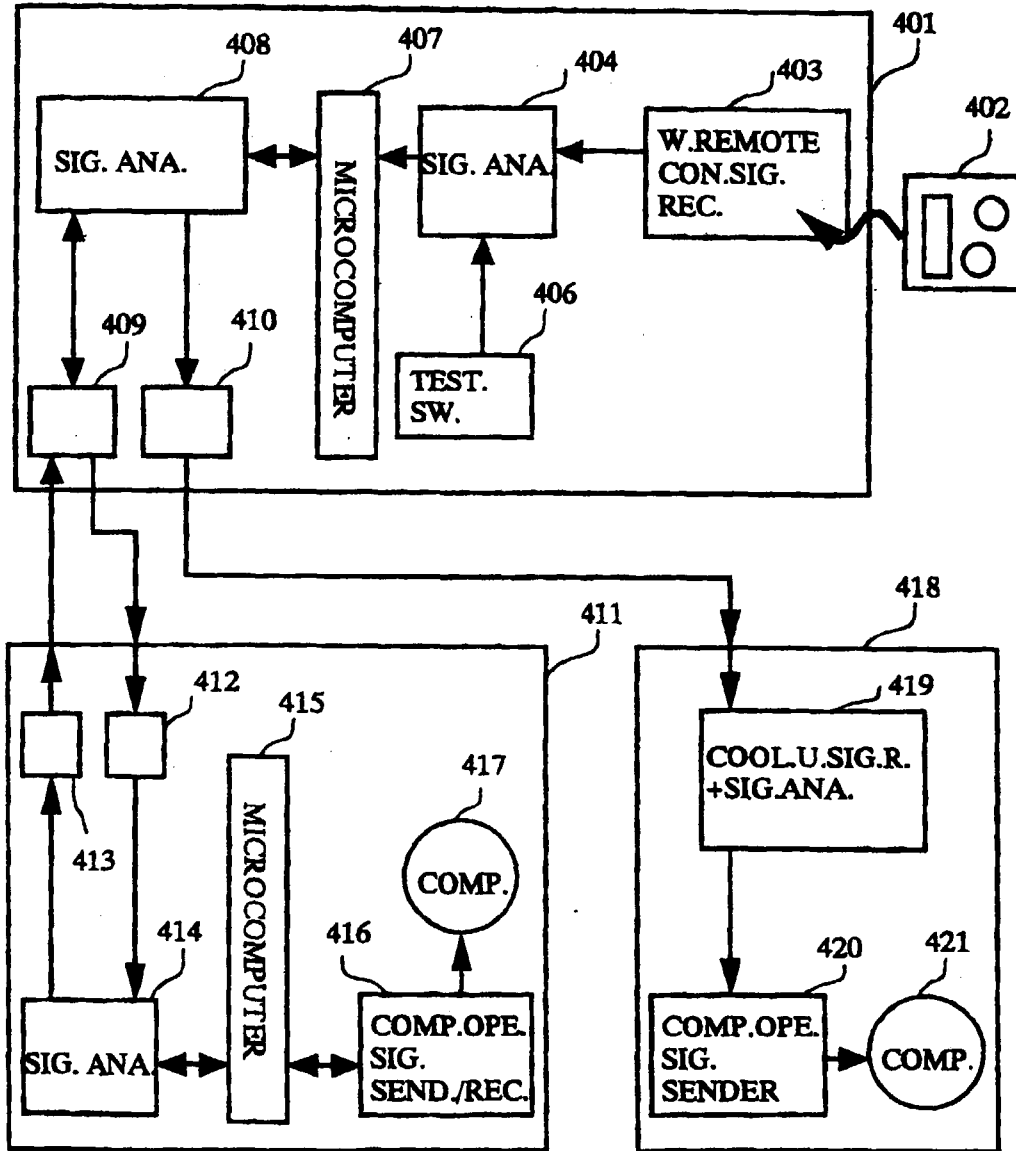


FIG.3



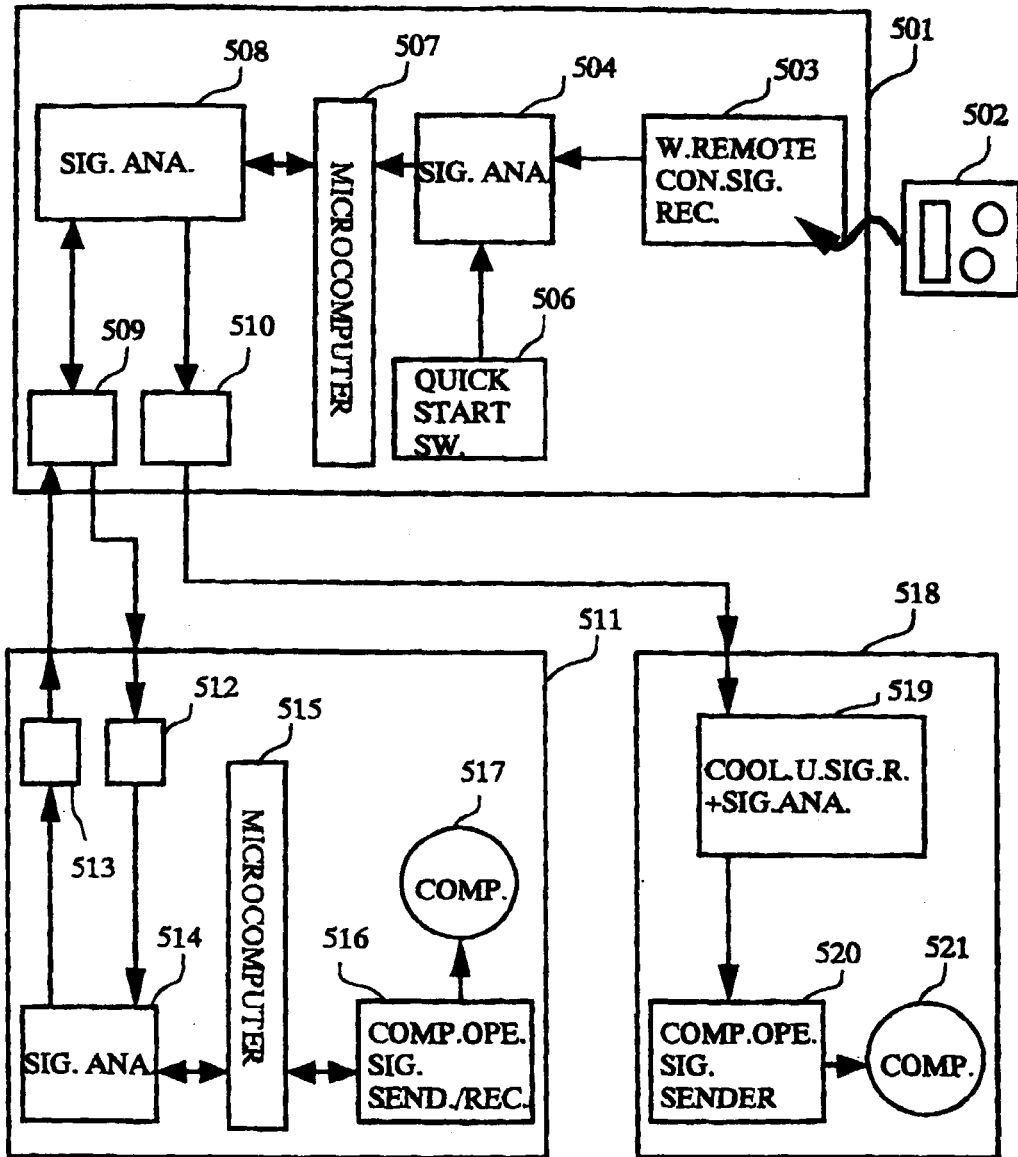
- 301 : INTEGRATED INDOOR UNIT(COOLING/COOLING&HEATING)
- 302 : WIRELESS REMOTE CONTROLLER
- 309 : COOL.&HEAT. MAC. SIGNAL(SERIAL SIGNAL) SENDER/RECEIVER
- 310 : COOLING MACHINE SIGNAL SENDER
- 311 : OUTDOOR UNIT(COOLING&HEATING)
- 312 : COOL.&HEAT. MAC. SIGNAL(SERIAL SIGNAL) RECEIVER
- 313 : COOL.&HEAT. MAC. SIGNAL(SERIAL SIGNAL) SENDER
- 318 : OUTDOOR UNIT(COOLING)

FIG.4



- 401 : INTEGRATED INDOOR UNIT(COOLING/COOLING&HEATING)
- 402 : WIRELESS REMOTE CONTROLLER
- 409 : COOL.&HEAT. MAC. SIGNAL(SERIAL SIGNAL) SENDER/RECEIVER
- 410 : COOLING MACHINE SIGNAL SENDER
- 411 : OUTDOOR UNIT(COOLING&HEATING)
- 412 : COOL.&HEAT. MAC. SIGNAL(SERIAL SIGNAL) RECEIVER
- 413 : COOL.&HEAT. MAC. SIGNAL(SERIAL SIGNAL) SENDER
- 418 : OUTDOOR UNIT(COOLING)

FIG.5



- 501 : INTEGRATED INDOOR UNIT(COOLING/COOLING&HEATING)
- 502 : WIRELESS REMOTE CONTROLLER
- 509 : COOL.&HEAT. MAC. SIGNAL(SERIAL SIGNAL) SENDER/RECEIVER
- 510 : COOLING MACHINE SIGNAL SENDER
- 511 : OUTDOOR UNIT(COOLING&HEATING)
- 512 : COOL.&HEAT. MAC. SIGNAL(SERIAL SIGNAL) RECEIVER
- 513 : COOL.&HEAT. MAC. SIGNAL(SERIAL SIGNAL) SENDER
- 518 : OUTDOOR UNIT(COOLING)