PROTECTING METHOD FOR AN AIR CONDITIONER IN A BUS

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BACKGROUND OF THE INENTION

1. Field of the Invention

This invention relates to a protecting method for an air conditioner in a bus, particularly to one using a calculating and treating circuit with the power of an air conditioner fixed in a bus, for preventing the air conditioner from gotten damaged by insufficient power.

2. Description of the Prior Art

The power of a bus comes from a battery provided on the bus, and also electrifies a generator to produce electricity to replenish the power of the battery at the same time. An air conditioner fixed in a bus uses the electricity coming from the battery, sharing it with other appliances,

However, if the battery or the generator becomes out of order to lower the normal voltage value 24V to a lower value (normally 22,7V), the electromagnetic coil of the electromagnetic clutch reduces magnetism, resulting in loose meshing of the transmitting disc with the clutch and producing interactive rotary friction by sliding movement and giving rise to hot heat, which may be transmitted to and burn the electromagnetic coil. So the air compressor cannot operate at the same time. Similarly, when the power to the heat dispersing motor

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becomes to get the power with the voltage insufficient, the heat-dispersing motor rotates with a slower speed, causing lower heat dispersing function and subsequent rising of the coolant pressure to result in damage of the relative components of the air compressor. Therefore, when the battery or the generator breaks down, the air conditioner using its power may be damaged at the same time, taking much expense and time for its repair, and making up a great loss for the owner.

SUMMARY OF THE INVENTION

This invention has been devised to offer a protecting method for an air conditioner in a bus, for preventing the air conditioner from damaged by insufficient power supplied by the battery in a bus.

The main feature of the invention is to use a voltage checking circuit, a calculating and treating circuit and a control circuit connected in series orderly. The voltage checking circuit is connected with the power of the battery in a bus for detecting the output voltage value of the power and sends a checked signal to the calculating and treating circuit, which then calculates and treats it and sends a treated signal to the control circuit in case of the output voltage value found to be a preset lower one than the normal one 24V. Then the control circuit may cut off immediately the power to the engine and the electromagnetic clutch of the air compressor so that the transmitting disc of the

electromagnetic clutch may not engage with the pressing plate of the clutch, letting the electromagnetic coil of the transmitting dice burnt up, damaging the electromagnetic clutch.

BRIEF DESCRIPTION OF A DRAWING

This invention will be better understood by referring to the accompanying drawing, wherein:

Figure 1 is a block diagram of a protecting method for an air conditioner in a bus in the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

A preferred embodiment of a protecting method for an air conditioner in a bus in the present invention, as shown in Fig. 1, uses a voltage checking circuit 10a, and a calculating treatment circuit 10b and a control circuit 10c connected in series.

The voltage checking circuit 10a is also connected with a battery 20 originally installed in a bus, checking the output voltage value of the power gotten from the battery 20 and sending a signal of the detected voltage value to the calculating and treating circuit 10b.

The calculating treatment circuit 10b performs calculation and treating the signal received, and then sends the signal treated to the control circuit 10c if the output voltage value is found to be a preset lower one (in this embodiment being 22.7V) than the normal one 24V.

The control circuit 10c is also connected with the

power supplying circuit of an electromagnetic clutch 50 of the compressor 40 and the engine 30 of the bus for cutting off timely the power of the electromagnetic clutch 50. If the calculating and treating circuit 1 calculates and treats the signal received and the output voltage value to be found the preset lower one (22.7V), the calculating and treatment circuit 10b sends out immediately a signal to the control circuit 10c after a stand-by time preset (in this embodiment 15 seconds) has passed, with the lower voltage value continuing. Then the control circuit 10c cuts off at once the power to the electromagnetic clutch 50. In this way, the stand-by time 15 seconds is set for preventing a potential mistake from happening in case of the unstable condition of the power of the bus.

Next, the control circuit 10c can also be connected at the same time with a heat dispersing motor 60 and a blower motor 71 in a evaporator 70 in the air conditioner so that the heat dispersing motor 60 and the evaporator 70 may be cut off immediately the power by means of the voltage checking circuit 10a, which detects out the preset lower voltage value than the normal one 24V. In this way, the main load of the air conditioner, or the electromagnetic clutch 50 mentioned above, the heat dispersing motor 60 and the blower motor 71 can be cut off at the same time, with the power in the battery avoided from completely used up.

Further, a panel 80 can also be provided to be connected with the calculating and treatment circuit 10b, and an indicator lamp 81 is fixed on the panel 80 for lit up on-and-off in case of the battery detected to have the preset lower voltage than the normal one. Moreover, a sound warning can also be added to remind a user of the condition at once together with the indicator lamp 81.

In using, as shown in Fig. 1, the voltage checking circuit 10a can begin to carry out checking function after the power of a bus is closed. If the preset standby time 15 seconds has passed after the power of the battery 20 is found out to have the lower voltage value of 22,7V than the normal one 24V by the voltage checking circuit 10a, the calculating and treatment circuit 10b may send out a treated signal to the control circuit 10c, which then cuts off immediately the power to the electromagnetic clutch 50 or the heat dispersing motor 60 or the blower motor 71. In this way the relative components of the air conditioner may not be damaged by insufficient power of the battery, especially preventing the electromagnetic coil of the electromagnetic clutch 50 from burned up. Here it has to be mentioned that once the output voltage recovers its normal value within the standby time 15 seconds, the standby condition can be gotten rid of, letting the air conditioner operate as usual again. Thus a misjudgment or mistake may be avoided.

Besides, when the battery 20 has its output voltage

returning normal by reducing its load by power interruption of the electromagnetic clutch 50 by means of the control circuit 10c, the air conditioner is still kept in the non-operating condition. So a user has to cut off the power of the panel 80 first and then turns on the power again to let the air conditioner operate again. This means that there happened a disorder or something like that, beneficial for a subsequent repair.

While the preferred embodiment of the invention has been described above, it will be recognized and understood that various modifications may be made therein and the appended claims are intended to cover all such modifications that may fall within the spirit and scope of the invention.

WHAT IS CLAIMED IS:

1. A protecting method for an air conditioner in a bus, said protecting method using:

A voltage checking circuit connected with a power of a bus for detecting output voltage of said power and sending a detected signal to a calculating and treatment circuit;

Said calculating circuit treating the signal coming from said voltage checking circuit and sending a treated signal to a control circuit in case of the signal of the output voltage value of the power found to be a preset lower one than that the normal value 24V; and,

Said control circuit cutting off the power to both an engine of a bus and an electromagnetic clutch of an air conditioner immediately at the moment when it receives the treated signal from said calculating and treatment circuit so that an transmitting disc of a pressing plate of said electromagnetic clutch may not be able to engage with each other to produce mutual friction to cause hot heat by insufficient voltage, the hot heat which possible to burn up the electromagnetic coil on said transmitting disc and damaging said electromagnetic clutch.

2. The protecting method for an air conditioner in a bus as claimed in Claim 1, wherein said preset lower voltage value is 22.7V.

3. The protecting method for an air conditioner in

a bus as claimed in Claim 1, wherein said control circuit cuts off the power to a heat dispersing motor and a blower motor of an evaporator of the air conditioner in case the detected output voltage value is the preset lower one than the normal voltage value 24V.

4. The protecting method for an air conditioner in a bus as claimed in Claim 1, wherein said power is a battery possible to be replenished with power by a generator.

5. The protecting method for an air conditioner in a bus as claimed in Claim 1, wherein a panel is further provided to said calculating and treating circuit, and an indicating lamp is fixed on said panel for being lit up in case of the preset lower voltage value is detected by said voltage checking circuit.

6. The protecting method for an air conditioner in a bus as claimed in Claim 1, wherein a standby time is preset for the case that the output voltage checked by said voltage checking circuit is found to be the preset lower one than the normal voltage 24V, and if the output voltage is still kept as the preset lower one even after the standby time has passed, said calculating and treating circuit sends a treated signal to said control circuit, which then cuts off the power for preventing a misjudgment or mistake from happening.

7. The protecting method for an air conditioner in a bus as claimed in Claim 1, wherein said preset standby

time is fifteen seconds.