Analysis of the Design and Performance of Microcomputer Fault Alarm System

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Abstract. The fault detection and alarm system designed in this paper, which can be used in home, including a series of structures such as fault detector, cooling plate, support plate, controller, voice chip, voice player, alarm lamp, cooling fin, etc, is convenient for users to obtain fault alarm information effectively and carry out maintenance.

Keywords: fault detector; voice chip; controller; voice player

1. Introduction

When microcomputer failure occurs, relevant prompt information will be displayed on the display screen, with which professional maintenance personnel can carry out maintenance. However, ordinary users need to move the mainframe to the repair shop for repair, which makes the operation complicated, inconvenient to carry and easy to damage other components during transportation. Therefore, this paper provides a system of fault detection and alarm that can be used in the home, which pays attention to the intuitive accuracy of the alarm system, so that the automatic control operator can effectively obtain the fault alarm information and carry out maintenance.

2. Method

2.1. Design of fault alarm system

The fault alarm system designed in this paper includes a cabinet and a fault detector. The left and right sides inside the box body are respectively fixedly connected with a radiating plate, and the upper and lower ends of one side face of the radiating plate far away from the side wall of the box body are respectively fixedly connected with a supporting plate. The left lower support plate is fixedly connected with a fault detector, the left upper support plate fixedly connected with a reactor, the right lower support plate fixedly connected with a controller, and the right upper support plate fixedly connected with a voice chip. The left side of the upper side wall of the box body is fixedly...
connected with an alarm lamp and the right side of the upper side wall of the box body is fixedly connected with a voice player. One side surface of the radiating plate near the side wall of the box body is uniformly and fixedly connected with radiating fins. The left and right side walls of the box body are provided with first radiating holes at positions corresponding to the radiating fins. The middle position of the rear side inside the box body is fixedly connected with a mounting frame, and a cooling fan is fixedly connected with the mounting frame, and the second radiating holes are uniformly formed on the rear side wall of the box body at positions corresponding to the cooling fan. The front side wall of the box body is rotatably connected with a box door through a hinge, and a handle is fixedly connected with the box door. A first dustproof net is fixedly connected to the left and right outer side walls of the box body at positions corresponding to the first radiating holes, and a second dustproof net is fixedly connected to the rear side wall of the box body at positions corresponding to the second radiating holes. The lower side end of the supporting plate is fixedly connected with a supporting rod, and the other end of the supporting rod is fixedly connected with the radiating plate. A rubber gasket is fixedly adhered to the contact part between the front side of the box body and the box door. The fault detector, the reactor, the alarm lamp and the cooling fan are all electrically connected with the controller, while the voice player is electrically connected with the reactor through the voice chip [1-3].

2.2. The technical program of specific implementation

The specific implementation of the fault alarm system is shown in fig. 1-3, which includes a box body 1 and a fault detector 5. The left and right sides of the inside of the box body 1 are respectively fixedly connected with the radiating plate 2, and the upper and lower ends of one side of the radiator plate 2 far away from the side wall of the box body 1 are respectively fixedly connected with the support plates 3. Therefore, by arranging a plurality of support plates 3 on the radiating plate 2, electrical components in the fault alarm device can be installed on the left and right sides of the box body 1 respectively. The lower left support plate 3 is fixedly connected with a fault detector 5, which can detect the computer in time when the computer fails. The upper left support plate 3 is fixedly connected with a reactor 7, which can reflect the cause of computer failure to the alarm element. A controller 6 is fixedly connected to the lower right support plate 3, which can control the whole fault alarm device and facilitate maintenance management. A voice chip 8 is fixedly connected to the support plate 3 on the upper right side, through which the fault cause and maintenance technical points can be converted into text prompts so as to facilitate the maintenance of the computer. The left side of the upper side wall of the box body 1 is fixedly connected with an alarm lamp 12, which can continuously flash to remind when a fault occurs. A voice player 13 is fixedly connected to the right side of the upper side wall of the box body 1, which can transmit fault causes and fault solutions by voice, making the operation simpler and more convenient. On one side of the radiating plate 2 near the side wall of the box body 1, radiating fins 9 are uniformly and fixedly connected, which can transfer the heat generated by the electrical components in the box body 1. The left and right side walls of the box body 1 are uniformly provided with first radiating holes 10 at positions corresponding to the cooling fins 9, which can quickly dissipate the heat in the box body 1 to reduce the temperature of the box body 1. A mounting bracket 14 is fixedly connected to the middle of the rear side of the box 1, and a cooling fan 15 is fixedly connected to the mounting bracket 14. Second radiating holes 16 are uniformly formed on the rear side wall of the box body 1 at positions corresponding to the cooling fans 15. The cooling fans 15 can discharge the heat in the box body 1 along with the airflow generated by the cooling fans 15, while the second radiating holes 16 can make the airflow normally enter and exit, which is convenient for discharging heat. The box door 18 is rotatably connected to the front side wall of the box body 1 through a hinge, with a handle 19 fixedly connected, and the box body 1 can be closed to avoid damage to electrical components in the box body 1 by it. A first dust-proof net 11 is fixedly connected to the left and right outer side walls of the box 1 at positions corresponding to the first radiating holes 10, while a second dust-proof net 17 is fixedly connected to the rear side wall of the box 1 at positions corresponding to the second
radiating holes 16. The first dust-proof net 11 and the second dust-proof net 17 can block outside the first and second radiating holes 10 and 16 to prevent foreign dust from entering the box 1 through the first and second radiating holes 10 and 16, thus causing electrical appliances in the box 1. The lower side end of the support plate 3 is fixedly connected with a support rod 4, and the other end of the support rod 4 is fixedly connected with the heat dissipation plate 2, so that the support plate 3 can be supported by setting the support rod 4, so as to prevent the end of the support plate 3 from inclining downwards, thereby causing damage to components. A rubber gasket is fixedly adhered to the contact part between the front side of the box body 1 and the box door 18, which can make the connection between the box door 18 and the box body 1 tighter. The fault detector 5, the reactor 7, the alarm lamp 12 and the cooling fan 15 are all electrically connected with the controller 6, while the voice player 13 is electrically connected with the reactor 7 through the voice chip 8 [4–6].

3. Experiment
The left and right sides of the box body 1 of the fault alarm system are respectively fixedly connected with the radiating plate 2, and a plurality of supporting plates 3 arranged on the radiating plate 2 can respectively install the electrical components in the fault alarm device on the left and right sides of the box body 1. The lower left support plate 3 is fixedly connected with a fault detector 5, which can detect the computer in time when the computer fails. The upper left support plate 3 is fixedly connected with a reactor 7, which can reflect the cause of computer failure to the alarm element. A controller 6 is fixedly connected to the right lower support plate 3, which can control the whole fault alarm device and facilitate maintenance management. A voice chip 8 is fixedly connected to the support plate 3 on the upper right side, through which the fault cause and maintenance technical points can be converted into text prompts so as to facilitate the maintenance of the computer. The left side of the upper side wall of the box body 1 is fixedly connected with an alarm lamp 12, which can continuously flash to remind when a fault occurs. A voice player 13 is fixedly connected to the right side of the upper side wall of the box body 1, which can transmit fault causes and fault solutions by voice, making the operation simpler and more convenient. On one side of the radiating plate 2 near the side wall of the box body 1, radiating fins 9 are uniformly and fixedly connected, which can transfer the heat generated by the electrical components in the box body 1. The left and right side walls of the box body 1 are uniformly provided with first radiating holes 10 at positions corresponding to the cooling fins 9, which can quickly dissipate the heat in the box body 1 to reduce the temperature of the box body 1. A cooling fan 15 is fixedly connected to the mounting frame 14, which enables the heat in the box body 1 to be discharged out of the box body 1 along with the airflow generated by the cooling fan 15, and the second radiating hole 16 enables the airflow to normally enter and exit to facilitate the heat to exit. A first dust-proof net 11 is fixedly connected to the left and right outer side walls of the box 1 at positions corresponding to the first radiating holes 10, while a second dust-proof net 17 is fixedly connected to the rear side wall of the box 1 at positions corresponding to the second radiating holes 16. The first dust-proof net 11 and the second dust-proof net 17 can block outside the first and second radiating holes 10 and 16 to prevent foreign dust from entering the box 1 through the first and second radiating holes 10 and 16, thus causing electrical appliances in the box 1 [7–9].
Fig 1. Schematic diagram of internal front structure of fault alarm device

Fig 2. Schematic diagram of internal side view structure of fault alarm device
Fig 3. Schematic diagram of module connection structure

The schematic diagram is marked as: 1. Box body; 2. Heat dissipation plate; 3. Support plate; 4. Support rods; 5. Fault detector; 6. Controller; 7. Reactor; 8. Voice chip; 9. Heat dissipation fins; 10. The first radiating hole; 11. The first dust-proof net; 12. Alarm lights; 13. Voice player; 14. Mounting frame; 15. Cooling fan; 16. The second radiating hole; 17. The second dust-proof net; 18. Box door; 19. Handle.

4. Results
Compared with the existing fault alarm system, the fault alarm system designed in this paper can install the electrical components in the device on the left and right sides of the box respectively by arranging a plurality of support plates on the cooling plate. The lower left support plate is fixedly connected with a fault detector, which can detect the computer in time when the computer fails. The upper left support plate is fixedly connected with a reactor, which can reflect the cause of computer failure to the alarm element. A controller is fixedly connected to the right lower support plate, which can control the whole fault alarm device and facilitate maintenance management. A voice chip is fixedly connected to the support plate on the upper right side, through which the fault cause and maintenance technical points can be converted into text prompts so as to facilitate the maintenance of the computer. The left side of the upper side wall of the box body is fixedly connected with an alarm lamp, which can continuously flash to remind when a fault occurs. A voice player is fixedly connected to the right side of the upper side wall of the box body, which can transmit fault causes and fault solutions by voice, making the operation simpler and more convenient. On one side of the radiating plate near the side wall of the box body, radiating fins are uniformly and fixedly connected, which can transfer the heat generated by the electrical components in the box body. The left and right side walls of the box body are uniformly provided with first radiating holes at positions corresponding to the cooling fins, which can quickly dissipate the heat in the box body to reduce the temperature of the box body. The mounting frame is fixedly connected with a cooling fan, which can enable the heat in the box body to be discharged out of the box body along with the airflow generated by the cooling fan, and meanwhile, the second radiating hole can enable the airflow to normally enter and exit, so as to facilitate the heat to go out. When the computer breaks down, the system will inform the administrator in time, and it can also broadcast the cause of the failure and the maintenance method by voice, which makes the use simple and convenient [10].
5. Conclusion
The fault alarm system designed in this paper is equipped with a series of structures, such as fault detector, heat dissipation plate, support plate, controller, voice chip, voice player, alarm lamp, cooling fin, etc. with the fault reason and maintenance method reported by voice broadcast, so as to facilitate the maintenance and management of the microcomputer.

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