



The Fire Alarm Challenge

You are to build and program a fire alarm. The fire alarm will have two pull boxes, one on each floor. There is also a Piezo speaker for the alarm. The terminal is used to display the state of the system as follows:

“System Normal” is displayed when all is well.

“Trouble!” is displayed if a wire is broken.

“First Floor” is displayed if the first floor pull box has been activated.

“Second Floor” is displayed if the second floor pull box has been activated.

How it functions:

Button 1 represents a “pull box” on the first floor.

Button 2 represents a “pull box” on the second floor.

Each of the buttons is wired so that when it is pushed it shorts out a resistor, reducing the total resistance in a series circuit which is monitored by the alarm control.

When there is a fire, someone pushes button 1 or button 2. That begins the alarm cycle.

Requirements:

1. The ONLY red jumper wires are the jumper wires which connect the buttons and resistors to the processor. NO other wires may be red. Pulling out a red wire would cause the controller to recognize a problem condition.
2. When no button has been pressed, a steady green light indicates all is well. “System Normal” is displayed on the terminal.
3. When button 1 is pressed, “First Floor” is displayed on the terminal, the green LED goes off, a red led blinks and an alarm sounds intermittently.
4. If button 2 is pressed, “Second Floor” is displayed on the terminal, the green LED goes off, a red led blinks and an alarm sounds intermittently.
5. If the circuit is broken (one of the red wires is pulled out) the controller recognizes a problem condition. The green LED goes off, the red LED goes on continuously and an alarm sounds continuously. “Trouble!” is displayed on the terminal.
6. If you wish to do so, you may substitute a single bicolor LED for the red and green LEDs mentioned above, assuming it displays as indicated above. You MAY add a reset button, but that is not necessary. Once the system enters an alarm or trouble state you reset it by simply reloading the program.

Summary:

Normal State: Green led is on, “System Normal” on the terminal, no audible alarm.

Problem State: Green led is off, Red LED is continuously on, alarm sounds continuously. “Trouble!” is on the terminal.

Alarm State: Green led is off, Red LED is blinking, alarm sounds intermittently, Terminal indicates which pull box has activated the alarm.