



Invisible Brokenwire Detector

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ABSTRACT: A circuit to detect the exact location of breakage inside the pvc cover we employ our circuit with a hex inverter CMOS which uses its actions to control an oscillator which in return detects the presence of an ac current and shows the location till which the current is passing .

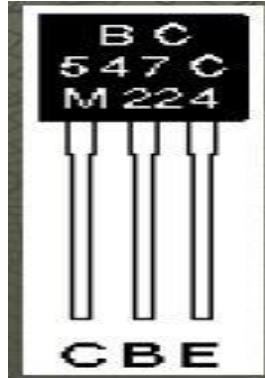
KEYWORDS: LED, LCD, CMOS, PVC.

I. INTRODUCTION

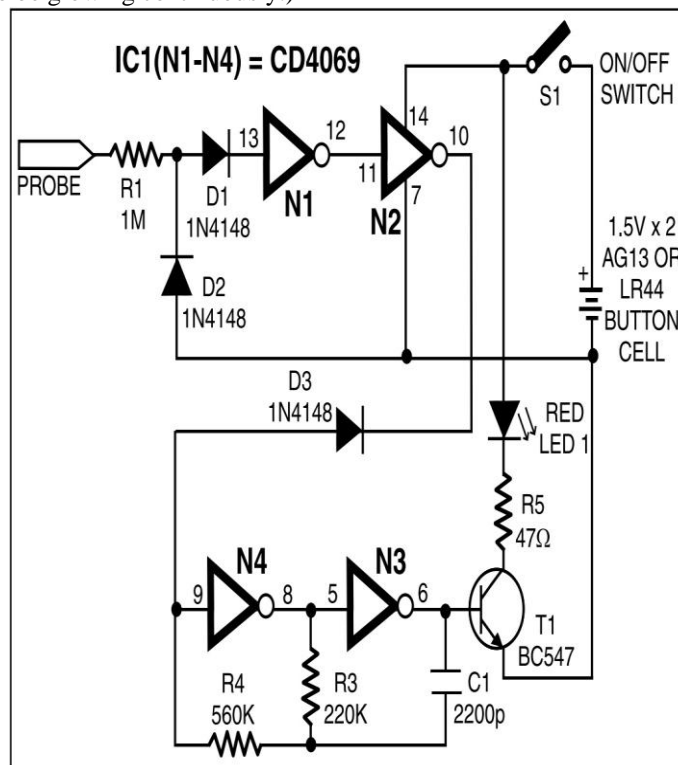
Portable loads such as video cameras, halogen flood lights, electrical irons, hand drillers, grinders, and cutters are powered by connecting long 2- or 3-core cables to the mains plug. Due to prolonged usage, the power cord wires are subjected to mechanical strain and stress, which can lead to internal snapping of wires at any point. In such a case most people go for replacing the core/cable, as finding the exact location of a broken wire is difficult. In 3-core cables, it appears almost impossible to detect a broken wire and the point of break without physically disturbing all the three wires that are concealed in a PVC

II. REQUIREMENTS

The circuit of invisible broken wire detector is a simple circuit which is built using a hex inverter CMOS IC CD4069. This IC has six inverters that is NOT gate. Out of these six inverters the gates N3 and N4 are used as a pulse generator that oscillates at around 1000Hz in the audio range. The frequency is determined by timing Components comprising resistors R3 and R4, and capacitor C1. Gates N1 and N2 are used to sense the presence of 230V AC field around the live wire and buffer weak AC voltage picked from the test probe. The voltage at output pin 10 of gate N2 can enable or inhibit the oscillator circuit. When the test probe is away from any high-voltage AC field, output pin 10 of gate N2 remains low. As a result, diode D3 conducts and inhibits the oscillator circuit from oscillating. Simultaneously, the output of gate N3 at pin 6 goes 'low' to cut off transistor T1. As a result, LED1 goes off. When the test probe is picked from the test probe. The voltage at output pin 10 of gate N2 can enable or inhibit the oscillator circuit. When the test probe is away from any high-voltage AC field, output pin 10 of gate N2 remains low. As a result, diode D3 conducts and inhibits the oscillator circuit from oscillating. Simultaneously, the output of gate N3 at pin 6 goes 'low' to cut off transistor T1.



As a result, LED1 goes off. When the test probe is moved closer to 230V AC, 50Hz mains live wire, during every positive half cycle, output pin 10 of gate N2 goes high. Thus during every positive half-cycle of the mains frequency, the oscillator circuit is allowed to oscillate at around 1 kHz, making red LED (LED1) to blink. (Due to the persistence of vision, the LED appears to be glowing continuously.)



This type of blinking reduces consumption of the current from button cells used for power supply. A 3V DC moved closer to 230V AC, 50Hz mains live wire, during every positive half cycle, output pin 10 of gate N2 goes high.

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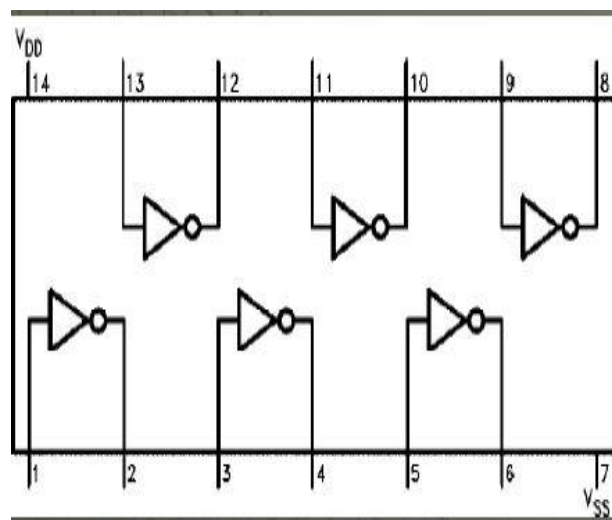
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III. DESCRIPTION

To detect the exact location of the broken wire inside the PVC jacket we employ our circuit with a hex inverter CMOS which uses its actions to control an oscillator which in return detects the presence of ac current and thus shows us the exact location till where the wire is intact and allowing the passage of current through

IV. METHODOLOGY

The circuit presented here can easily and quickly detect a broken/faulty wire and its breakage point in 1-core, 2-core, and 3-core cables without physically disturbing wires. It is built using hex inverter CMOS CD4069.



Gates N3 and N4 are used as a pulse generator that oscillates at around 1000 Hz in audio range. The frequency is determined by timing components comprising resistors R3 and R4, and capacitor C1. Gates N1 and N2 are used to sense the presence of 230V AC field around the live wire and buffer weak AC voltage supply is sufficient for powering the whole circuit. AG13 or LR44 type button cells, which are also used inside laser pointers or in LED-based continuity testers, can be used for the circuit.

The circuit consumes 3 mA during the Sensing of AC mains voltage. For audio-visual indication, one may use a small buzzer (usually built inside quartz alarm time pieces) in parallel with one small (3mm) LCD in place of LED1 and resistor R5. In such a case, the current consumption of the circuit will be around 7 mA. Alternatively, one may use two 1.5V R6- or AA-type batteries. Using this gadget, one can also quickly detect fused small filament bulbs in serial loops powered by 230V AC mains. The whole circuit can be accommodated in a small PVC pipe and used as a handy broken-wire detector. Before detecting broken faulty wires, take out any connected load and find out the faulty wire first by continuity method using any multimeter or continuity tester.

Then connect 230V AC mains live wire at one end of the faulty wire, leaving the other end free. Connect neutral terminal of the mains AC to the remaining wires at one end. However, if any of the remaining wires is also found to be faulty, then both ends of these wires are connected to neutral. For single-wire testing, connecting neutral only to the live wire at one end is sufficient to detect the breakage point. In this circuit, a 5cm (2-inch) long, thick, single-strand wire is used as the test probe. To detect the breakage point, turn on switch S1 and slowly move the test probe closer to the faulty wire, beginning with the input point of the live wire and proceeding towards its other end. LED1 starts glowing during the presence of AC voltage in faulty wire. When the breakage point is reached, LED1 immediately extinguishes due to the non-availability of mains AC voltage. The point where LED1 is turned off is the exact broken-wire point. While testing a broken 3-core rounded cable wire, bend the probe's edge in the form of 'J' to increase its sensitivity and move the bent edge of the test probe closer over the cable. During testing avoid any strong electric field close to the circuit to avoid false detection. The cable. During testing avoid any strong electric field close to the circuit to avoid false detection.



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V. CONCLUSION

The circuit is made cheap and best. It would not only be able in reducing wastage of time but resources too. Thus using just a hex inverter and few resistors we are able to construct a device which can easily detect a faulty broken wire and thus save the extra cost of a user which is incurred on replacing it which is otherwise too difficult.

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