Board continuity tester senses only dead shorts

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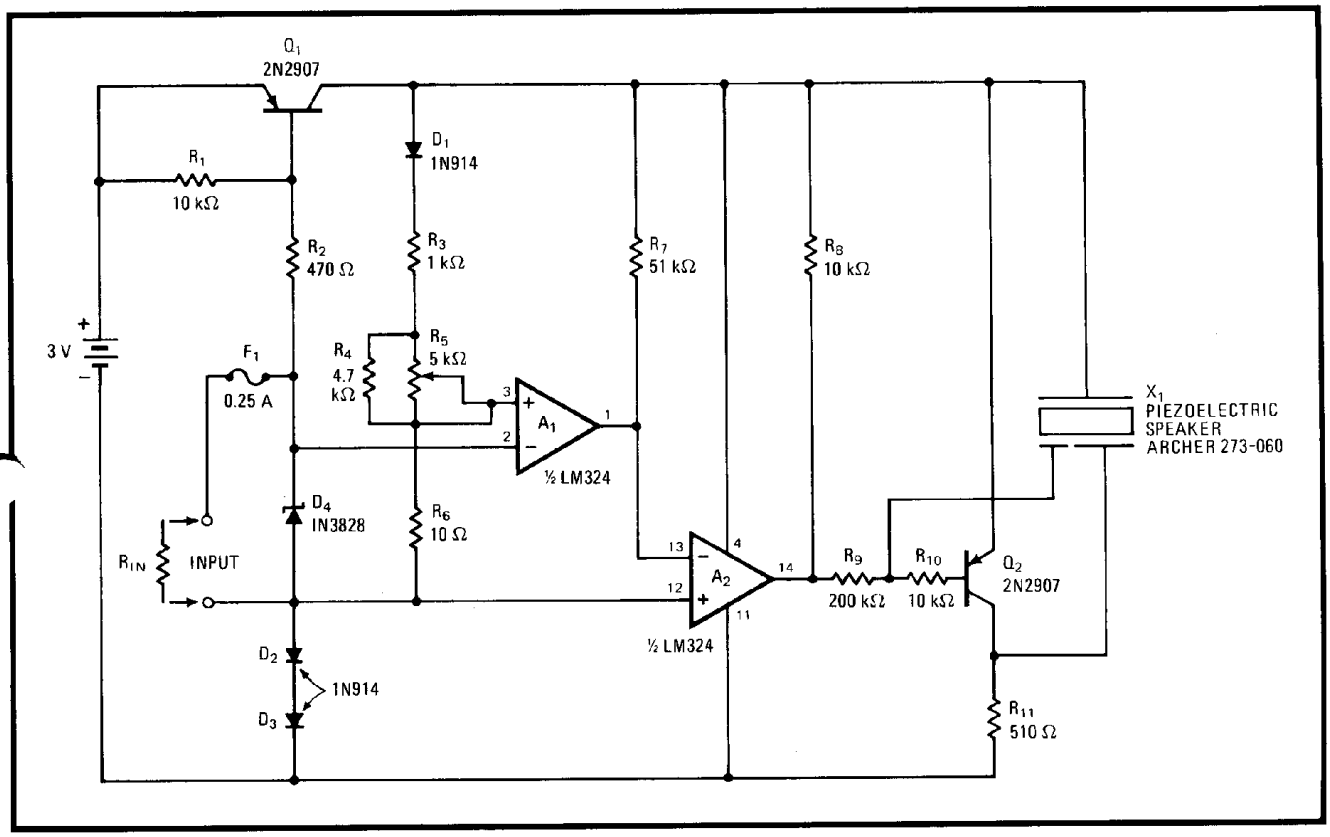
The average continuity tester is of limited usefulness in checking boards with a full complement of integrated circuits. The unit cannot differentiate between the true continuity of two test points and the low resistance (typically 5 to 20 ohms) of internal parts of any IC that may shunt the test points. In contrast, this tester triggers its audio oscillator when it detects a resistance of one ohm or less between its terminals. It draws low power, too—typically 100 nanoamperes in the standby mode and 5 milliamperes maximum.

When a resistance of 1 kilohm or less is placed across the tester's input, Q_1 turns on and applies power to the unit. Comparator A_1 and resistance bridge R_2–R_6 then determine if the resistance across the input is 1 ohm or less, taking the 2.5-ohm resistance of fuse F_1 into account. Assuming the probe is not placed across a coil winding or resistor having a resistance of 1 ohm or less, the tester will provide accurate indications.

F_1 and D_4 protect the tester from voltages that may be inadvertently applied. D_1 compensates for the base-to-emitter drop of Q_1, in order to minimize bridge imbalance caused by variations in battery voltage.

A_1 moves high if $R_{in} \leq 1$ ohm. A_2 provides gain for oscillator X_1–Q_2, which works at 4 kilohertz.

Transducer X_1 is a modified piezoelectric buzzer, the Archer 273-060: The transducer is removed from its original casing, mounted in the tester, and driven by a transistor, Q_2, in order to minimize size and power consumption in the oscillator circuit. Alternatively, the unused sections of the LM324 device and a transistor can be used to drive a small speaker if greater audio output is desired. □



Zeroing in. Bridge R_2–R_6 and comparator A_1 detect if R_{in} is 1 ohm or below, thus performing test for true continuity (virtual dead short) between two test points on IC-filled circuit boards. Modified transducer X_1 and transistor Q_2 comprise 4-kHz audio-output indicator.

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