AIR-FLOW SENSING THERMISTOR BRIDGE

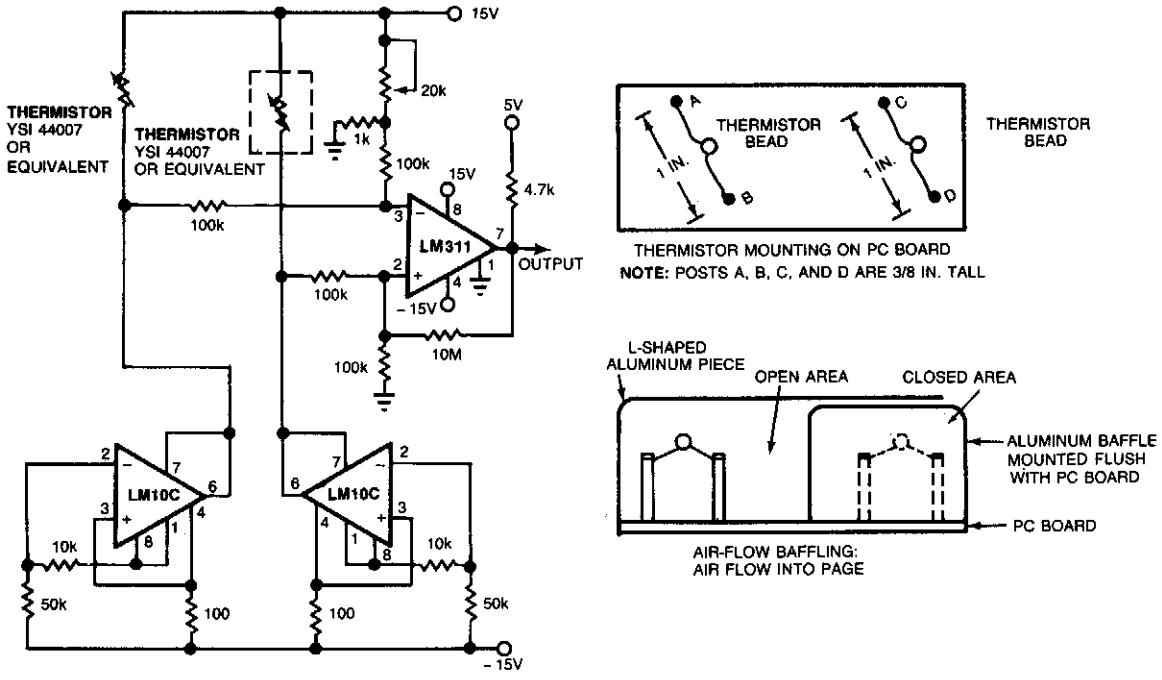

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Fig. 15-1

Using the thermistor-bridge circuit, you can detect system-cooling air losses caused by filter or inlet blockage or fan failure. One thermistor is mounted directly in the air flow; the other is baffled. The exposed thermistor senses the temperature in the cooling system; the baffled thermistor senses the ambient temperature in still air. As long as the thermistors are at different temperatures, the bridge stays unbalanced and the circuit produces a logical high, indicating that the cooling system is working. If the air flow stops, the exposed thermistor will reach ambient temperature, the bridge will become balanced, and the circuit will indicate ventilation-system failure by producing a logical low.

The bridge circuit's matched thermistors are biased by matched-current sources. Two LM10C operational amplifiers act as constant-current sources, and an LM311 comparator senses the difference between the voltage drops across the thermistors, producing the logical high when the bridge is unbalanced and the logical low when the bridge is balanced. Use a 20-kΩ potentiometer to set the comparator's threshold; this setting determines the minimum air flow that will cause the circuit to produce a logical high.

BRIDGE CIRCUIT WITH ONE POWER SUPPLY

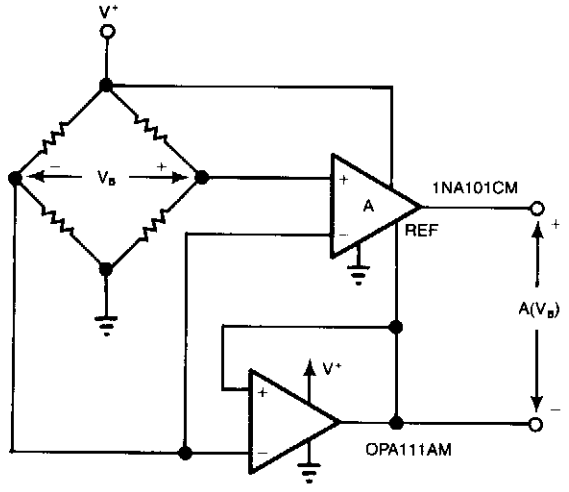

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Fig. 15-2

For systems with only one power supply, two op amps act as instrumentation and buffer amps. The OPA111AM buffers the reference mode of the bridge and applies that voltage to the instrumentation amps REF terminal. Output is taken between the amplifier outputs to exclude the fixed output offset.

The additional op amp creates a bridge error of $I_B \times R/2$, where I_B = bias current of op amp and R is the resistance of one leg of the bridge.

INDUCTANCE BRIDGE

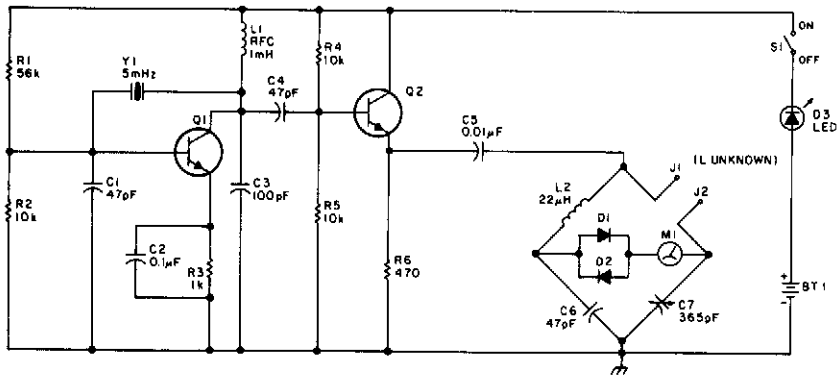

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Fig. 15-3

This bridge will measure inductances from about 1 to 30 µH at a test frequency of 5 mHz. A 365-pF AM-type tuning capacitor is used as a variable element. The circuit should be constructed in a metal enclosure. Calibration can be done on known inductors or by plotting a curve of the capacitance of the 365-pF capacitor versus rotation and calculating the inductance from this. The range of measurement can be charged by using a different frequency crystal and/or variation of L2 and C6.