

# Timing error in emitter-coupled-logic one-shot

by M. U. Khan

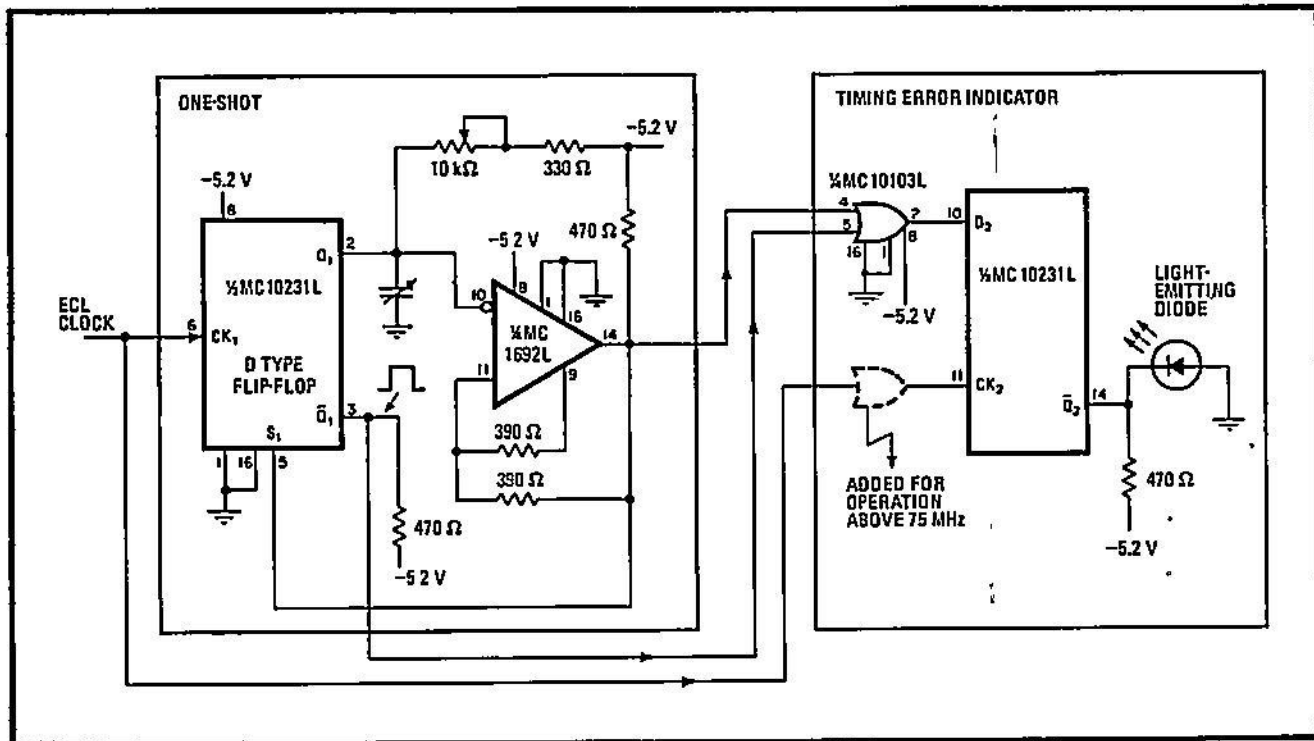
Systronics, Naroda, Ahmedabad, India

Rather than scrutinize waveforms on an oscilloscope, it is possible to employ a simple circuit to monitor the output of a one-shot to determine if it is being triggered at the right time or if the output pulse width is correct.

If the clock pulse arrives while the normally low output  $\bar{Q}_1$  or set line  $S_1$  of the one-shot is at a logic 1 level, the  $\bar{Q}_2$  output of the indicator flip-flop goes to a

logic 0 level, turning on the light-emitting diode.  $Q_1$  of the one-shot remains at the logic 1 level only in its quasi-stable state, whereas  $S_1$  goes to the logic 1 level only in its recovery state. Thus whenever the one-shot is triggered too early—in other words, before recovering—the LED turns on. When the mistrigging is corrected, by reducing either the clock rate or the width of the one-shot, it automatically turns off.

Besides the LED, the indicator circuit consists of an MC 10103 OR gate and an MC 10231 D-type flip-flop, both emitter-coupled-logic devices. The circuit works satisfactorily up to 75 megahertz. For higher speeds—up to 100 MHz—propagation-delay compensation through an additional OR gate (dotted line) is needed. In the latter case, both the OR gates should be replaced by an MC 1660 dual four-input OR-NOR gate. □



Hot shot. Spotting timing errors in a fast one-shot multivibrator is simplified with the addition of an error indicator circuit such as the one shown in the shaded area. If the clock rate is too high or the output pulse width is too small, the LED will indicate it