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Optical encoder controls range switch

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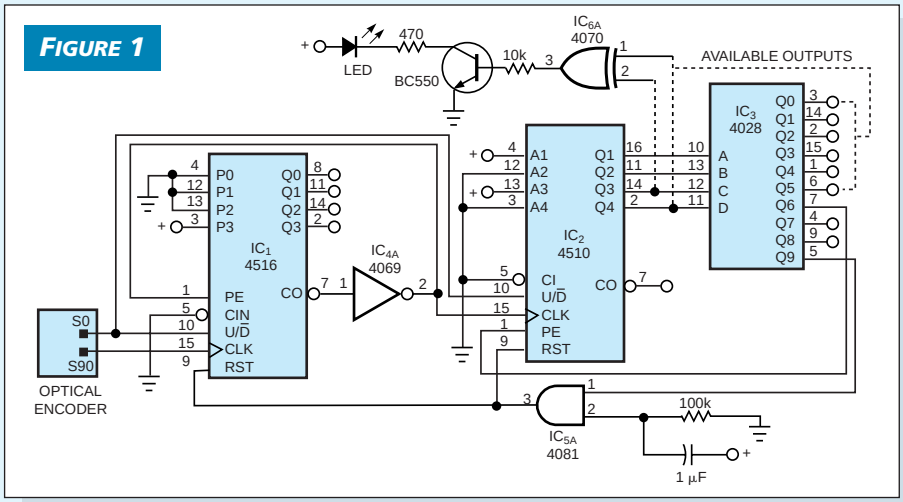
Instead of using a counter-controlled, pushbutton-activated range switch, you can use an optical encoder. Inexpensive encoders are available, and they occupy minimal space on the front panel of an instrument. Moreover, an encoder gives you the opportunity to select the optimum operating speed. However, at positions near the transition points in counter position, mechanical shocks can provoke false switching. The circuit in **Figure 1** overcomes the false-switching problem.

FIGURE 1



An optical encoder, immune to false switching, takes the place of a counter-controlled range switch.

Output S0 of the optical encoder controls the up/down inputs of counters IC_1 and IC_2. Output S90 connects to the clock input of the HEF4516 binary counter (IC_1). When this counter reaches 0 or 15, the output CO goes low and clocks (via an inverter) the HEF4510 decimal counter (IC_2). Simultaneously, the binary counter assumes a value of eight. Thus, it requires eight pulses of the optical encoder to alter the position of the decimal counter. You must stop turning the optical encoder within eight pulses, which in practice is eminently possible. When you want more security, you can feed the outputs Q3 and Q4 of the decimal counter to an exclusive OR gate. When the output of the XOR gate is high, changing the state of the decimal counter requires a minimum of four pulses from the optical encoder.

The circuit provides control with bidirectional hysteresis. To stop the decimal counter at zero when counting down, the counter resets when output Q9 of the 1-of-10 decoder HEF4028 (IC_3) goes high. To limit the number of decoder positions, you can load the decimal counter one position lower than the maximum output position you want to reach with the output decoder. The configuration in **Figure 1** loads the decimal counter with the value five when Q6 (the seventh position) of IC_3 goes high. (DI #2255). EDN

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