

Simplified priority encoder has low parts count

by Tomasz R. Tański
Warsaw, Poland

The number of chips in the priority encoder circuit first described by Sterling [*Electronics*, Aug. 18, p. 114] can be drastically reduced by replacing the modularized gate arrays by D flip-flops and a wired-OR gate. As in the original circuit, the output ports of this modified momentary-contact switch array responds to the first command received and locks out all subsequent commands, so as to provide a time-sequence priority scheme that is useful in many industrial systems. But this circuit is simpler to build and test, because the interconnections between elements are minimized.

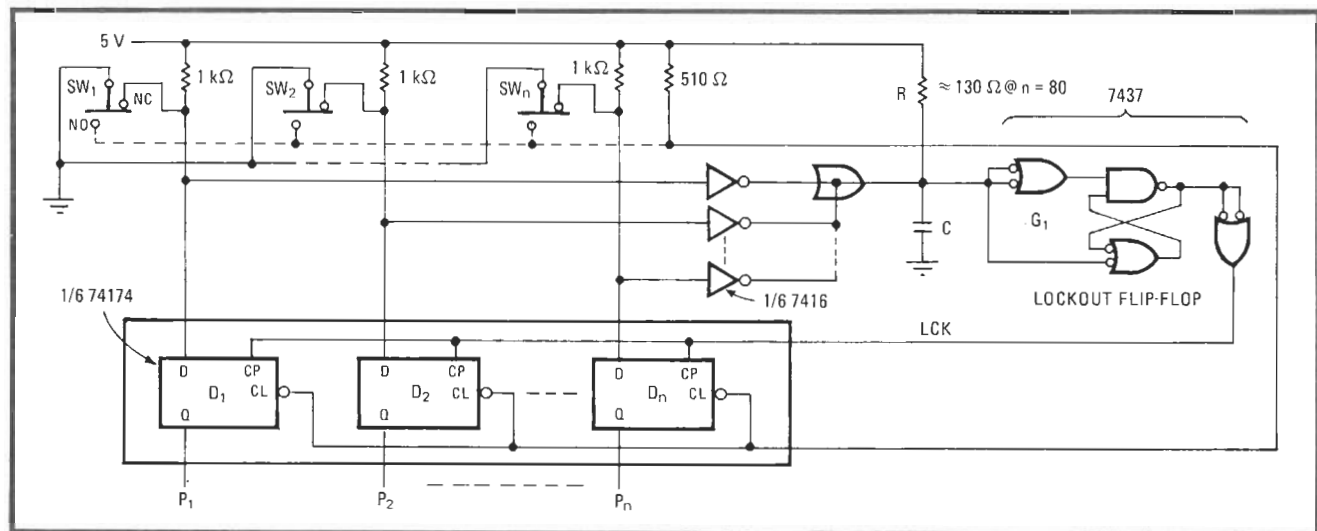
Depressing any switch, SW_n , shown in the figure sets the corresponding D input of its flip-flop, D_n , high. The switch signal also quickly propagates through the 7416 inverters, which have their open-collector outputs wired together to form an n-input OR gate, and fires the 7437

flip-flop (G). A few microseconds later, the rising edge of the resultant output from G_1 stores the signal generated by SW_n into D_n before the D line, at logic 1 for a time measured in milliseconds, can return to ground.

The strobing signal (LCK) will stay high until all switches return to their normally closed (NC) position. Thus altering the output state of any flip-flop is impossible, because all other switch commands are locked out.

Resistor R serves in a dual capacity. Its primary function is as load resistor for the open-collector inverters forming the wired-OR gate. Its value is selected so that the maximum current drawn is limited to the full-on collector current of one gate, independent of how many gates are activated. Secondly, R, in combination with C, provides effective switch debouncing. For optimum debouncing performance, the value of C should be selected (with the aid of a scope) to provide the trailing-edge delay required for signals from G_1 .

Not considering the lock-out flip-flop, only one sixth of a 7416 and 74174 device are needed per switch, compared with the $1\frac{1}{2}$ integrated circuits required in the original circuit. Only one 7437 is required, even for a large number of switches. Each input lead of the 7437 can accommodate an 80-input, wired-OR gate. The LCK signal can drive up to 180 flip-flops. □



Simplification. Momentary-contact priority encoder uses about one fifth the number of chips of previous design. Circuit responds to first command received by switches and locks out all subsequent commands, thus forming a first-come, first-served switch.