

# BEEP! BEEP! BE...

Add a power-failure sensor to any ac digital clock

By James Antonakos

**M**OST digital clocks do not have the backup circuits (reserve power supply and oscillator) necessary to keep them running during a power outage. Thus, it is possible that someone glancing casually at a clock can be misled as to the time. One way to combat this problem is to install the "Power Out Sensor" in your digital clock. After a power failure, the circuit will "beep" until you reset the clock.

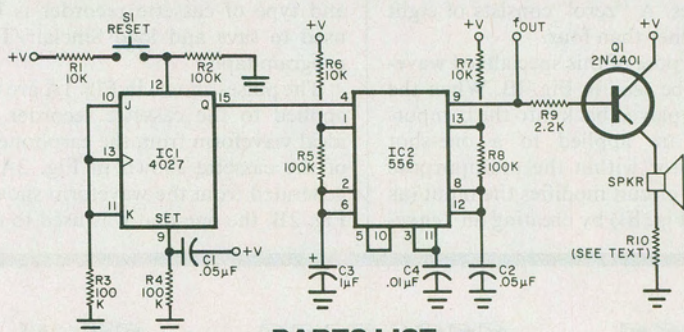
**Circuit Operation.** When power is first supplied to the circuit, a positive spike, produced by *C1*, is applied to the SET input of flip-flop *IC1*. This causes the Q output to go high and enables one half of the dual timer, *IC2*. The latter oscillates at about 5 Hz, alternately enabling the other half, a 1-kHz oscillator. The circuit will continue to oscillate until the flip-flop is reset by momentarily closing *S1*. This forces Q low

and disables the timer. The circuit will remain in this state because the inputs to the 4027 are grounded through *R3*. Therefore, the circuit is actuated only when power is shut off and then re-applied.

The output from *IC2* is applied to emitter follower *Q1*, which drives the speaker through *R10*. The value of the latter resistor is selected for the desired audio level. If the clock is a radio alarm, its speaker can be used, or any small type of speaker can be added. If desired, the audio oscillator output from pin 9 of *IC2* can be used to drive any external audio system.

**Construction.** Assembly is not critical. The prototype was built on a standard perf board cut to fit into the clock to be used. A printed-circuit board could be used but is not required and is time-consuming to prepare.

Because CMOS integrated circuits are used, the supply voltage can be any value between 5 and 18 V, a range suitable for most applications. The current drain for the alarm is only 30 mA and can be safely drawn from most clock power supplies. ◇



## PARTS LIST

C1, C2, C4—0.05- $\mu$ F capacitor  
C3—1- $\mu$ F, 35-V electrolytic  
IC1—4027 CMOS dual JK flip-flop  
IC2—556 dual timer  
Q1—2N4401 transistor  
R1, R6, R7—10-kilohm, 1/4-W resistor  
R2 through R5, R8—100-kilohm, 1/4-W

resistor  
R9—2.2-kilohm, 1/4-W resistor  
R10—See text  
S1—Normally open pushbutton switch  
SPKR—8-ohm speaker  
Misc.—Mounting hardware, perf board, IC sockets, etc.