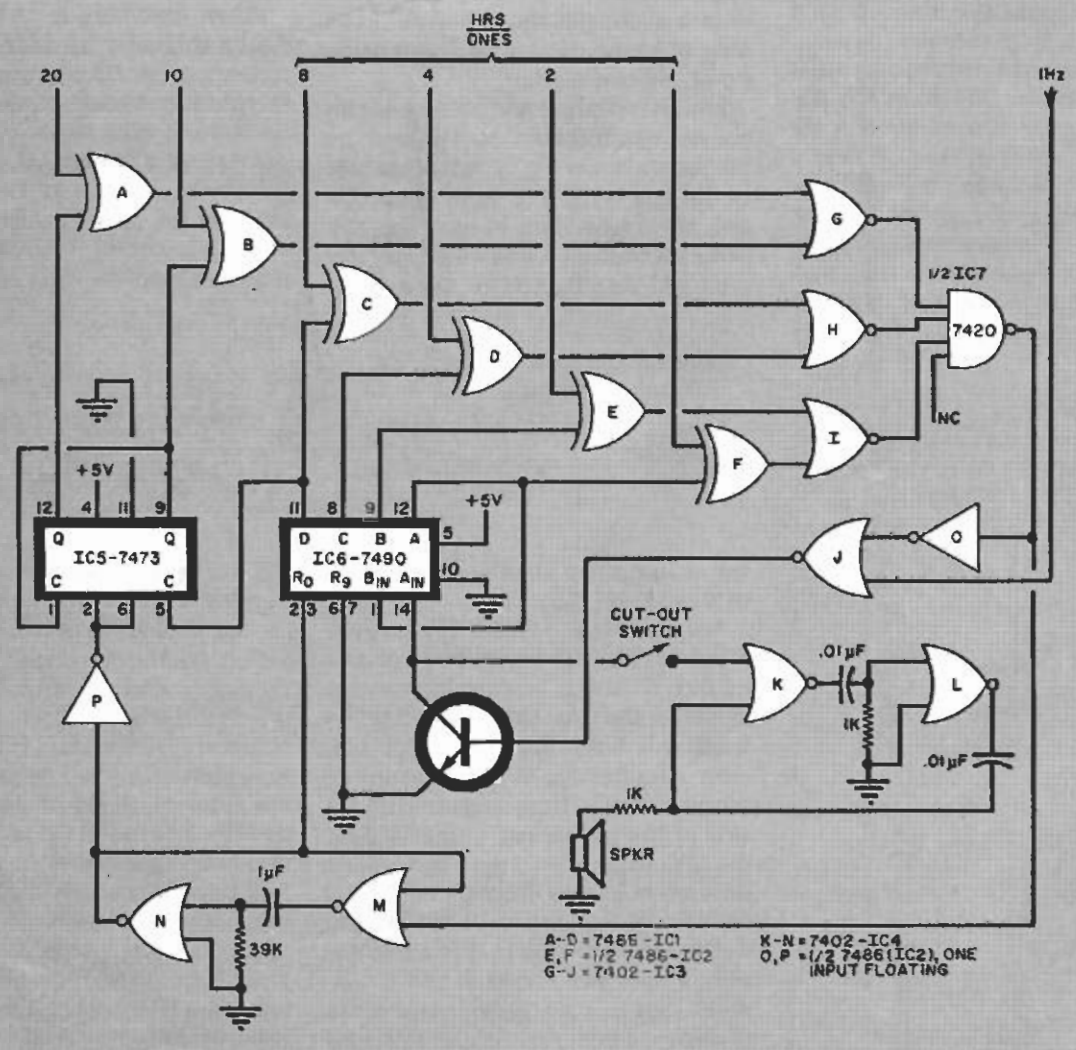
UPDATE YOUR DIGITAL CLOCK WITH ADD-ONS

AN HOURLY CHIMER

BY JEFFREY GLICK

The proliferation of digital electronic clocks in the last few years has been phenomenal. Particularly popular was the "Low-Cost Digital Clock" project published in these pages in March 1973. Never satisfied with the status quo, electronic experimenters have come up with all kinds of add-ons for their clocks—alarms, power supplies, etc. Now, we have a circuit that provides hourly chimes (at least, an audible tone) for your clock.

The circuit for the chimer uses the 1-Hz counting frequency from a digital clock, the 1-2-4-8 outputs of the ones-of-hours counter and the 10 and 20 outputs of the tens-of-hours counter. The latter must be high when the tens-of-hours readout indicates a

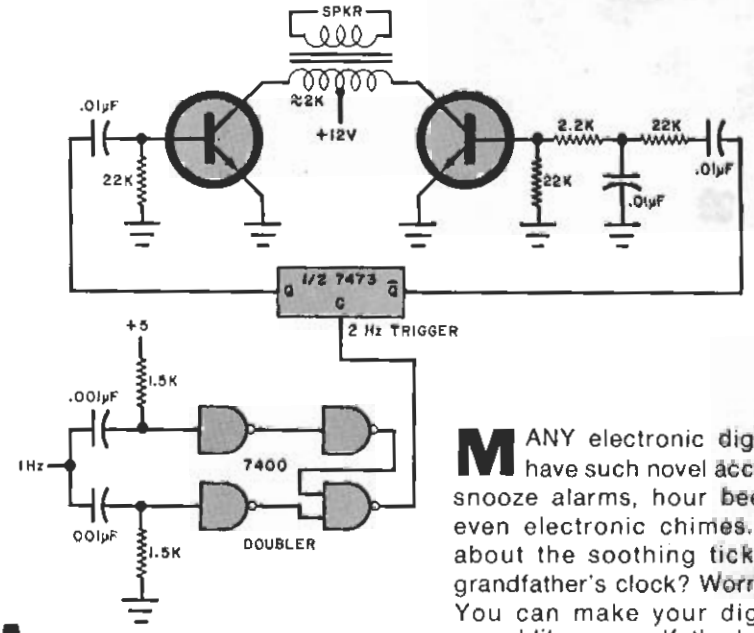


10 or 20, but low otherwise. The operating power can also be taken from the digital clock.

The exclusive-OR gates (*A-F*) normally have low signals on their inputs but when the clock changes the hour, the signal to one of the gates changes. This produces a high output from the NAND gate (½*IC7*). The latter triggers a one-shot multivibrator (*M,N*) to reset the counter (*IC5,IC6*) to zero. Simultaneously the 1-Hz clock signal is gated through gates *O* and *J* to start the count on *IC5* and *IC6*.

The 1-Hz clock signal also turns on a tone generator (*K,L*) which provides a beep once per second. Audio output is through a small (1"), low-impedance speaker.

When the counter reaches the state that disables the functioning exclusive-OR gate, the NAND gate is inhibited stopping the 1-Hz toggle, which stops the counter and the beep. Thus, the beep occurs once per second until it has indicated the number of hours. ◈



A GRANDFATHER'S TICK-TOCK

BY WILBUR MARKY

MANY electronic digital clocks have such novel accessories as snooze alarms, hour beepers, and even electronic chimes. But what about the soothing tick-tock of a grandfather's clock? Worry no more! You can make your digital clock sound like a grandfather's clock very easily with the aid of the logic circuit shown here. It can be assembled on perforated board or a pc board, and the power can be obtained from your existing clock.

If you have a clock that indicates seconds, then the 1-Hz timing signal can be found at the toggle input of the first decade counter. If the smallest indication you have is minutes, you will have to locate the 1-Hz signal in the countdown that feeds the units of minutes counter. If you have a single-chip clock, and there is no access to a 1-Hz signal, you can build a divide-by-60 from a couple of 7490's to produce the synchronized 1-Hz signal from the ac side of the transformer.

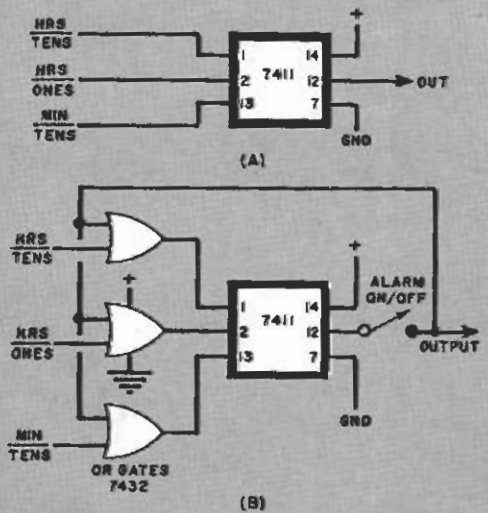
The 1-Hz signal (square wave) is coupled to a 7400 TTL chip arranged as a digital frequency doubler. The 2-Hz signal is then passed to a conventional divide-by-2 flip-flop (which can be any TTL chip having a single flip-flop available). The output of this flip-flop is then passed to a two-transistor sound generator, with one transistor having a simple capacitor coupling to generate the "tick," and the other having a filter to remove the high-frequency components and generate the "tock." Any type of npn switching transistor can be used. The transformer can be a standard unit for push-pull output transistors with a 2000-ohm center-tapped primary and a secondary impedance to match the speaker.

Connect the circuit as shown, install the board in the present clock case and attach the speaker to the wall of the case. ◈

AN ALARM FOR HEAVY SLEEPERS

BY JERRY McELWEE

IN THE December 1973 issue of POPULAR ELECTRONICS (p. 61), a 10-minute alarm add-on for digital clocks was described. Unfortunately, a lot of people can drift back to sleep after the alarm first goes off and completely miss the 10 minutes. To prevent this, the circuit shown here can be added to keep the alarm going beyond 10 minutes.



Circuit (A) was used in the original alarm. The 7411 IC operated off of the tens-of-hours, ones-of-hours and tens-of-minutes signals from the clock. When the signals agreed with the set time, the output of the 7411 was used to drive some type of external alarm. However, as soon as the tens-of-minutes signal stopped, the output signal stopped.

Circuit (B) shows how to extend the length of time that the alarm is on, no matter what happens on the selected input signals. It uses three OR gates (in a 7432) and a switch wired as shown. When the switch is closed, and at the selected time, the OR gates are turned on and the 7411 delivers the alarm signal. However, the output signal is fed back to the second input of the OR gates which keeps them on until the switch is opened. If the switch is located far enough from the bed, the sleeper will have to get up to turn off the alarm. ◈