DEC. 1973 60 CENTS

Popular Mechanics

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World's first solar-powered watch

This fascinating quartz watch runs virtually forever, even has a calendar good for the next 126 years.

by Stephen Walton

Quartz watches are almost commonplace by now, but this one has plenty of new features that make it special:

□ It draws its power from the sun (or ambient room light), using silicon solar cells like Skylab's to keep nickel-cadmium batteries charged.

□ It incorporates a true calendar—not just a day-counting mechanism—that keeps track of the number of days in the month and allows for leap years as well. It won't need resetting until the year 2100.

□ It has a digital display of light-emitting diodes and automatically adjusts the display's brightness to the light it's viewed in—it's claimed to be the first LED watch display visible in full sunlight.

□ Its working parts are sealed into a module that can stand 5000-G shocks and boiling and freezing temperatures. Neither the watch module nor its case includes a single threaded fastener.

Heart of the watch is a quartz crystal vibrating at 32,768 Hz. This frequency is

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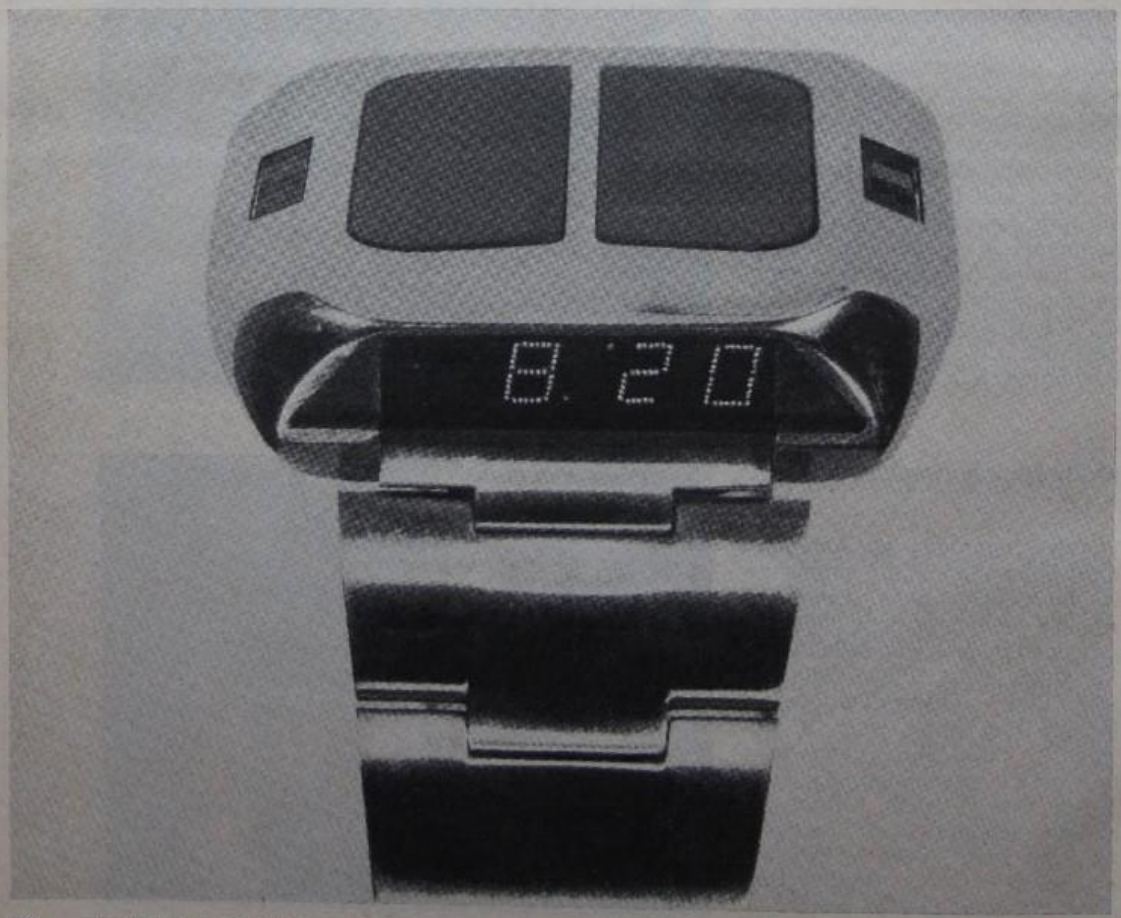

Silicon solar cells on top give watch cobra-like look. Light-emitting diodes on edge facing the wearer display time, date, seconds count. Dots between numerals are binary code for year in leap-year cycle.

SOLAR-POWERED WATCH

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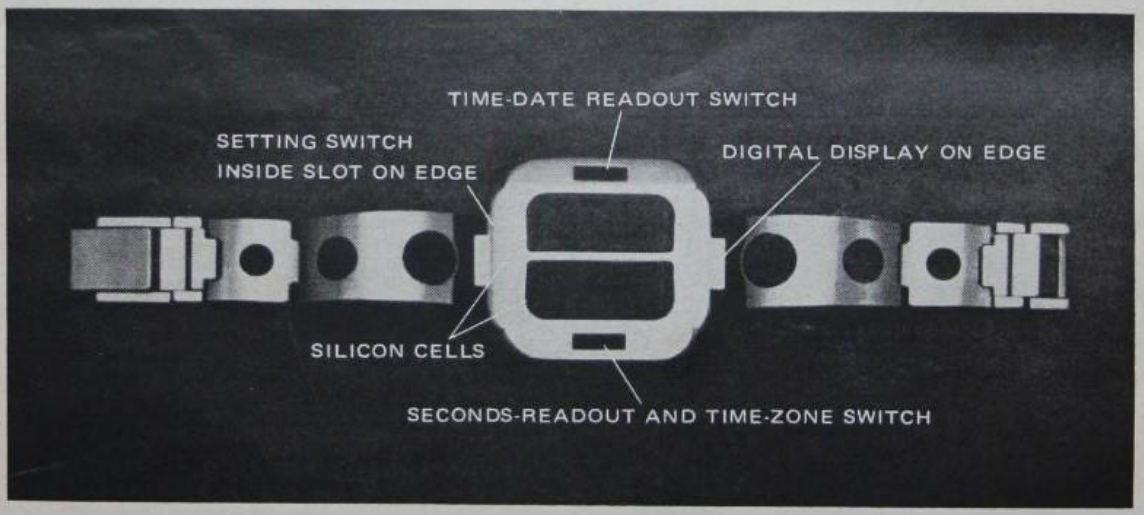
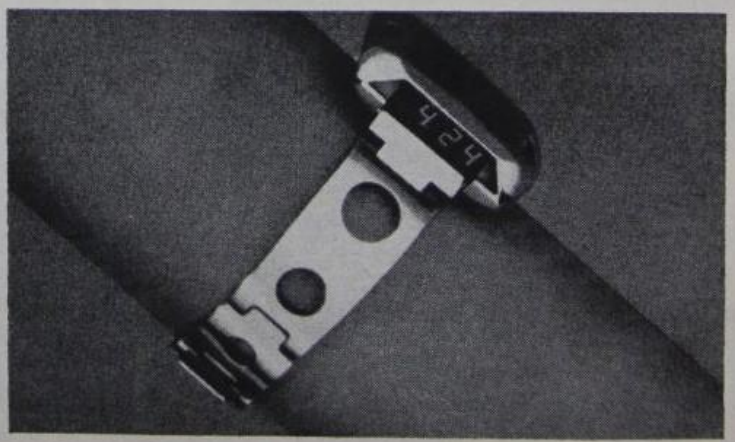
turned into time and date-keeping information by a complementary MOS (metal-oxide semiconductor) integrated circuit with more than 4 trillion different logic states. According to the watch's inventor, Roger Riehl of Troy, Ohio, the circuit is a breakthrough in the number of components used—about 1100—to achieve its functions. An equivalent circuit would require about 4500 transistors. Timekeeping accuracy within a minute a year is claimed.

Wearing the watch, you don't have to roll up your sleeve and go outdoors once a day. A total of 14 hours of sunlight takes the nicad batteries from dead to full charge, which will give six months of normal use. This amounts to an average of about 10 or 15 minutes' exposure a day, and the watch will also charge, although more slowly, in room light. Left in a drawer, with no drain from the LEDs, the watch will run for a year on a full battery charge. Nickel-cadmium batteries have a limited life, however, and will have to be replaced—perhaps once a decade.

Replacing batteries will require opening the module into which all the watch's operating components are sealed. This is an injection-molded Lexan jacket filled with a jelled epoxy. Placed in a stainless-steel shroud, the module is held in the watch case by overriders on the pins that also attach the watchband. Tested to withstand pressures equivalent to 300 ft. of water, the watch was undamaged after being subjected to sustained temperatures of 180°F., being placed in boiling water and frozen into a block of ice.

In addition to three output brightness levels and a switch for setting time-zone changes without changing the calendar, the watch offers a choice of 12-hour or 24-hour time readout and carries a 3-year guarantee. The Synchronar solar wristwatch is made by Ness Time, 3780 Fabian Way, Palo Alto, Calif. 94303, and retails for $500.





Controls have no electrical connection to sealed watch module. Slide "switches" on case move magnets that actuate reed switches inside module. To read the time, move upper switch (on right-hand side from wearer's point of view) toward display, away from display for date. Moving lower (left-hand) switch toward display starts count of seconds; moving it away (against a stronger spring) resets hour for time-zone change, but does not affect calendar. Setting switch is located inside slot to prevent accidental movement; when used (e.g., after crossing the international dateline) it can be operated with a toothpick or paper clip.