



# designideas

$R_2$  and  $R_3$  halve the voltage across  $C_1$  and apply it to  $IC_1$ 's positive input voltage at Pin 3 for comparison with its built-in 1.245V reference. For voltages across  $C_1$  that do not exceed 2.49V,  $IC_1$ 's output at Pin 6 remains low. When  $C_1$ 's voltage reaches 2.5V, Pin 3's voltage exceeds the reference voltage, and  $IC_1$ 's output goes high, turning on  $Q_1$  and  $Q_2$ .

Several days must elapse before  $C_1$  becomes fully charged, given its huge capacitance and a charging current of less than 10  $\mu$ A. The voltage on  $C_1$  can never exceed 2.5V because, once it reaches 2.49V,  $Q_1$  and  $Q_2$  turn on, connecting  $C_1$  to a switched-mode-power-supply circuit. Because the power-supply current exceeds the

charging current, the voltage across  $C_1$  starts to decrease when  $Q_2$  turns on. Transistor  $Q_3$  holds  $Q_2$  on when  $C_1$ 's decreasing voltage causes  $Q_1$  to turn off.

The switched-mode-power-supply circuit comprises a Linear Technology ([www.linear.com](http://www.linear.com)) LTC3459 micro-power boost converter,  $IC_2$ , and its associated components, which deliver 5V at 10 mA. A fully charged  $C_1$  can supply power to a 10-mA load for approximately 40 sec. With no load, the circuit can sustain its 5V output for more than 10 hours. For greater output current and shorter operating time, select another boost converter that can operate at a low input voltage.

Mechanical switches, open-drain

MOSFETs, open-collector transistors, or a microcontroller's open-drain output pins can drive two external control inputs to force the circuit on and off. Pulling the On input low forces  $Q_2$  to turn on and deliver power from  $C_1$  to the power converter, and pulling the Off input low turns off  $Q_2$  and removes power from the converter. Note that the power converter's output-return line connects to the telephone line and thus should not connect to an earth ground or to grounded equipment. **EDN**

---

## REFERENCE

■ "Part 68," Federal Communications Commission, [www.fcc.gov/wcb/iatd/part\\_68.html](http://www.fcc.gov/wcb/iatd/part_68.html).