NEW IDEAS

Entryway monitor

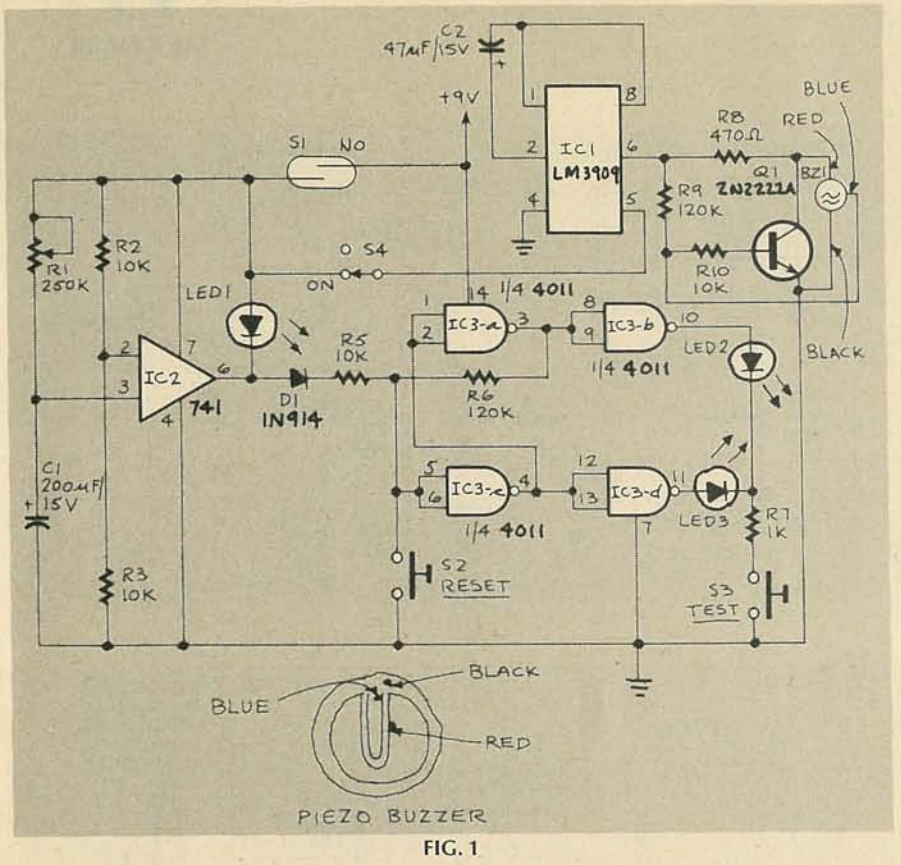

FIG. 1

EVER WONDER IF A GAS OR ELECTRIC company representative came to read the meter while you were out, or if the your landlord has visited your apartment without your knowledge? Well, wonder no longer! The circuit described here is designed to be your personal *watchdog*. Figure 1 is a schematic of the watchdog circuit.

How it works

At first glance, the circuit in Fig. 1 may appear a bit complex. However, a closer look shows that it's really a simple circuit made up of only three IC's and a few discrete components, all of which fit nicely into a small project box. The circuit has three main sections: a time delay provided by IC2 (a 741 op-amp); a set/reset flip-flop made up of IC3 (a 4011 quad NAND gate), and a piezo-element driver section consisting of a IC1 (LM3909 LED flasher) and transistor Q1.

With a simple flick of a switch (S4), you can choose either a silent or audible mode. Either way, once tripped, the circuit can only be reset by you. In the silent mode, one of two LED's light to show the status of the circuit. In the audible mode, a piezo buzzer sounds off to show that the circuit has been tripped. In that mode, the buzzer can also double as a door announcer.

You may choose between two audio outputs: warbling tone or constant tone. The warbling-tone effect is produced by IC1, and that is its only function in the circuit. Depending on the value chosen for C2, anything from a warbling tone to a slow pulsed output can be produced. However, if no audio output is desired, the driver section and the piezo element can be eliminated.

Checking the status of the circuit is as simple as pressing a switch, before the delay has timed out. If, when switch S3 is pressed, LED2 lights, all is well. But if LED3

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lights, someone has tripped the circuit. The remaining LED provides a visual indication of the delay time.

When the circuit is untripped, a low is applied to the input of IC3-b. Therefore, a high is output at pin 10. Pressing switch S3, TEST, provides a path to ground through LED2 and causes it to light, indicating that the circuit has not been tripped.

However, pressing the RESET switch (S2) causes the flip-flop to change states, which means that pin 10 goes low and pin 11 of IC3-d goes high. Now a press on S3 causes LED3 to light and LED2 remains dark. Also, a delay is provided so that you can enter or leave your apartment without triggering the circuit.

If switch S1 is closed when the delay times out, or the circuit is tripped by someone entering the apartment, IC2 outputs a high. That high is delivered to the input of the flip-flop via diode D1 and resistor R5. That, in turn, causes the flip-flop to change states. Now a high is at the anode of LED3, which means it will light when S3 is pressed, showing that someone has been in your apartment.

The delay time is dependent on the setting of potentiometer R1 and the value of capacitor C1. Make sure that the delay provides ample time for you to enter and check the status of the watchdog circuit, or to leave the apartment. The delay time may be varied to suite your needs using R1.

When switch S1 is tripped, capacitor C1 begins charging through R1 and the voltage at pin 3 of IC2 begins to rise. When that voltage reaches the level of that at pin 2 (set by the R2/R3 series combination), IC2 outputs a high at pin 6, which triggers the flip-flop. That turns LED2 off and LED3 on.

The method of construction is not critical; wirewrap, point-to-point wiring, or a PC board of your own design works fine. Housing for the circuit is again a matter of choice. S1 is a normally-open magnetic, security-type switch, and is mounted at the door so that it makes contact when the door is opened and visa versa when the door is closed. S2 and S3 are normally-open momentary switches, and S4 is a SPST.

With switch S4 engaged, the circuit draws 10–11 milliamps of current, and when open, it draws only 5–6 milliamps. If you include the audio portion of the circuit, it can be used to test the operation of the circuit. LED's 2 and 3 should be red and green, respectively, to make it easier to check the status of the circuit. LED1, the delay time indicator, can be either color. (It's your choice.)

To test the project simply trip the circuit several times and check its status, as shown by watching the LED's, and listening for the buzzer (if it's included). The unit may also be used at windows along with a loud bell or siren to scare off unwanted visitors. There are other possibilities as well, like triggering a hidden video monitor and recorder, etc.—*Ronald I. Goers*

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