## BURGLAR-ALARM UPGRADE

I was pleasantly surprised to see my burglar alarm mentioned in your column. I designed it to work in my old apartment; I have moved now and brought the alarm with me. It has been ganged together with two more circuits of newer design. The three circuits form a modular security system, with each responsible for a particular zone. I have included a drawing of the new version (Fig. 8). It has the same features as the
older one, but the design is "cleaner" and the parts are easier to find.
The alarm sensors should be the normally-closed types, connected in series to the terminals labeled Loop. With switch S1 closed, the alarm is disabled. The low that the switch provides to pin 13 on U1 keeps pin 11 high. Diode D1 passes current to C2, keeping it charged. That applies a high to the inputs of a NAND gate connected as an inverter. The low output of the nand-gate inverter cuts Q1


Fig. 8. This alarm-control circuit provides an entry delay, an exit delay, and latching action.
column. It just so happens that we have yet another burglar-alarm submission, but it is partly based on the NOR-gate circuils we've discussed.

## INTRUSION ALARM

You can use this circuit (see Fig. 9) to alert you when someone opens any door or window that you wish to monitor. The circuit is built around a 4001 quad NOR-gate IC and an XOR gate from a 4070 IC.

The two NOR gates, U1-a and U1-b, act as a bounc-
eless switch, more commonly known as an R-S latch. The Xor gate acts as a 1-bit comparator. It's a good idea to make switch S2 a key switch, as it is used to arm and disarm the alarm system.
Switch S 1 is a homemade normally-closed switch used as a sensor. It was made from two metal plates, one placed on the frame of a door, and one on the door itself. The plates are positioned so they only make contact when the door is closed. Gate U2


Fig. 9. When this alarm latches, it activates its own buzzer. Note the use of the NOR-implemented R-S latch.
compares the inputs at pins 1 and 2; if pin 2 is high (i.e. S1 is closed) the buzzer, BZ1, and LED1 remain off, but if the input at pin 2 is low (i.e. the door is opened) U2's output goes high, it sets the R-S latch, the buzzer sounds, and the LED glows. To reset the circuit, momentarily close switch S2.

The circuit has an interesting advantage: since it is wired for normally-closed operation, you need not protect the sensor wires by running them through a conduit. If a thief tries to break the wire the alarm will sound. However, the circuit and wires should be hidden or camouflaged to provide the element of surprise.

- Joe Louis Balpuesta, Texcoco, Mexico

As a matter of personal preference, I would still place the wires in a protective conduit. It's all too easy for a smart, skilled burglar to short the sensor wires, completing the circuit before opening the door. They've been known to use a razor (like the kind used to cut carpet) to cut out a section of luan doors to allow them to disable interior sensors. There's nothing to keep them from doing the same thing with a window, provided they have a glass cutter.

