What more could you ask in a do-nothing box?

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It started years ago. Some guy invented an electronic gadget which did nothing but sit around and blink a light. Then somebody added an occasional beep to the blinking light. And so on. It all had to end somewhere. So, here's our idea of the ultimate do-nothing box.

If you've ever put together simple projects, you've probably found yourself wishing the circuit would do more.

No matter how many functions a project has or how well it performs, there's always one more thing you'd like it to do. Well, here's your chance to design your own *do-nothing box*.

You can have it turn on and off lamps or LEDs at different times and for different periods. You can have it make different tones, sounded at different times for different periods. You can even use it to control motors to turn pinwheels and other mobile displays.

The heart of the ultimate do-nothing box is a 4060 CMOS binary counter. As shown, it *turns on* 10 outputs once every second, two seconds, four seconds, eight seconds, 16 seconds, 32 seconds, 64 seconds, 128 seconds, 256 seconds and 512 seconds, respectively.

Blinking lights

You can design a very simple do-nothing box by simply connecting an
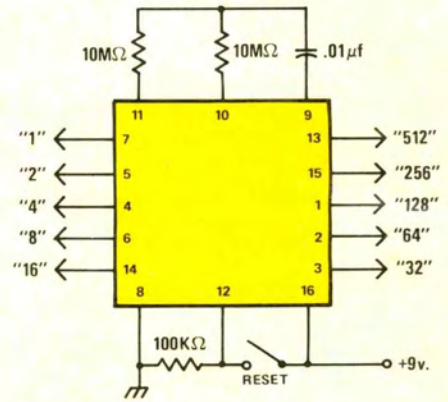
Figure 1 The heart of the ultimate do-nothing box is this self-oscillating 4060 CMOS ripple-carry binary counter, divider. Each succeeding output switches on and off at half the rate of the preceding output.

LED to each output through a buffer such as the 4050 CMOS. This will result in one LED turning on for about a half-second, then turning off for a half-second; a second LED turning on for a second, and off for a second; a third LED turning on for two seconds, and off for two seconds; and so on.

A more sophisticated lighting arrangement comes from driving the LED through a 4081 AND gate; one input of which is connected to the *1* output of the 4060, the other input connected to any other output. With this arrangement, the LED will blink at the half-second on, half-second off rate, but only some of the time.

For example, if the 4081 were connected to the *1* and *128* outputs of the 4060, the LED would blink at the half-second on-off rate for about one minute, then remain off for the next minute, and

(A)

(B)

(C)
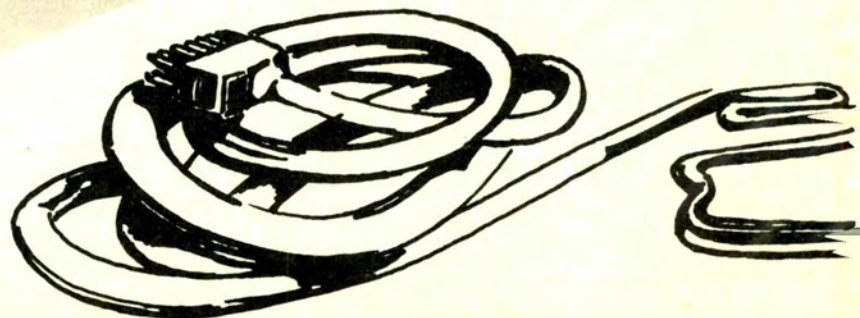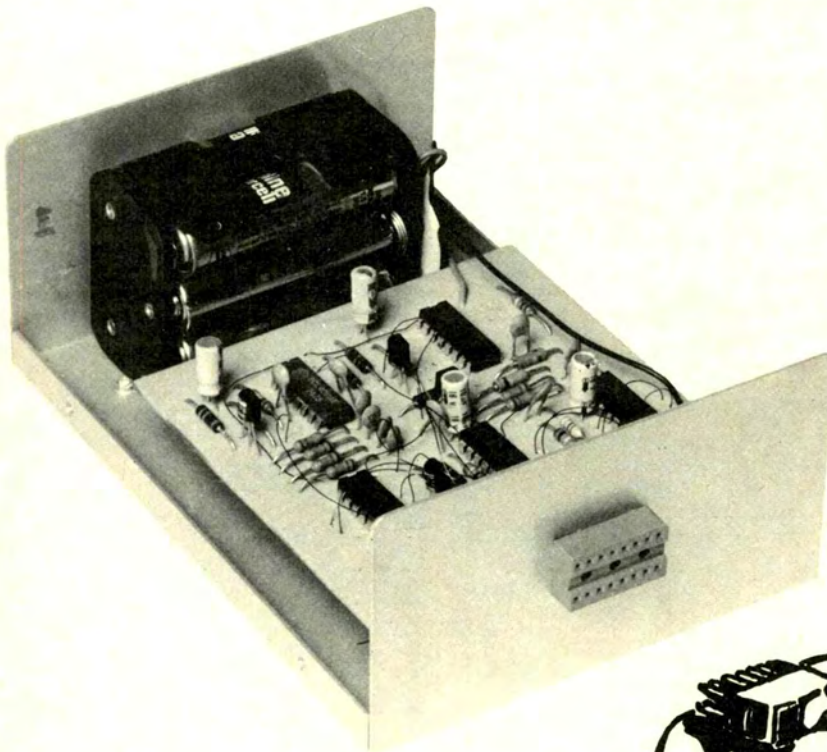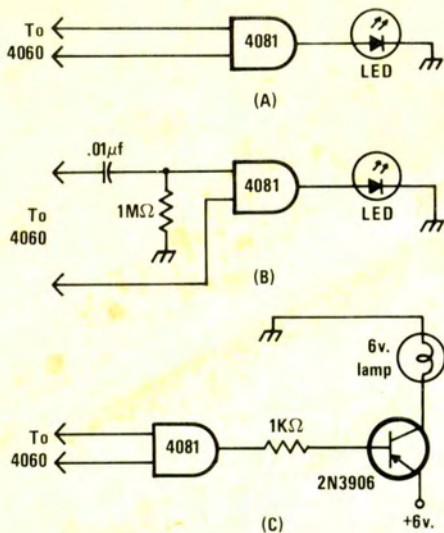
Figure 2 You can use your do-nothing box to control up to 90 combinations of blinking LEDs and lamps. LEDs can be connected (A) to remain on for a period of time equal to the shortest 4060 output, or (B) to flash at a rate equal to the rate of the 4060 output connected to the capacitor input. If you'd prefer, you can use incandescent lamps (C) with transistor drivers.

so on. You can have greater variety by connecting the 4081 gates to other combinations of 4060 outputs—4 and 64, for example. This gives you up to 90 blink rate/on-time combinations.

Power packs

Although LEDs draw very little current individually—some draw only 0.005 amps—the total can add up fast. 90 LEDs, for example, draw close to one-half ampere. So, if you want a battery-powered do-nothing box, you'll
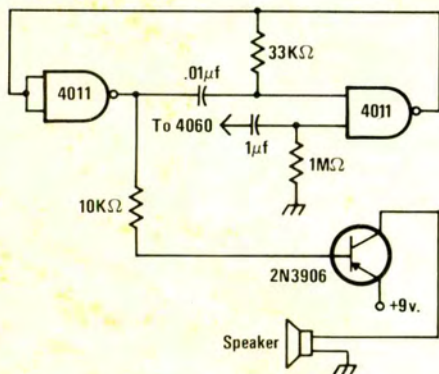

Figure 3 Your do-nothing box can be used to create a sound spectacular by generating hundreds of combinations of tone, on-time and time sequencing. The tone is controlled by the resistor and capacitor in the feedback network between the 4011 gates.

have to limit the number of LEDs you use.

There's nothing, however, to prevent you from using a power supply such as an HO gauge model train power pack, for power. With a power supply, you can use as many LEDs as you want. Or, you can replace them with incandescent lamps, which provide much greater light output.

With lamps, you illuminate colored translucent glass or plastic forms to animate free-form sculpture or other static displays. If you do use lamps, you'll have to include a transistor driver for each lamp in your circuit.

The 4060 timer also can be used to gate on and off various audio oscillators to produce a sound program of different tones, produced for varying lengths of time, during different time periods. The timing is accomplished in the same manner as you would use to obtain different combinations of LED or lamp on-off times.
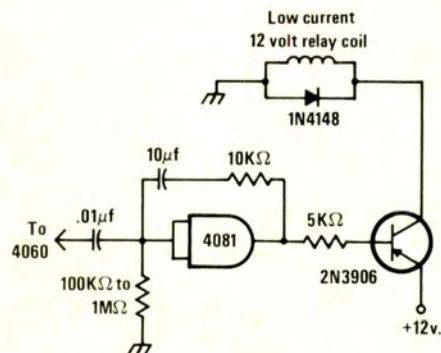
Figure 4 Small motors powering mobiles, pinwheels and other action displays can be controlled with your do-nothing box. The relay is actuated each time an *on* signal is received from the 4060. The time the relay remains closed is determined by the feedback capacitor and the resistor to ground. The values chosen *must* be at least 10 times greater than those of the input capacitor and feedback resistor.

The audio oscillator shown in figure 3 uses a pair of 4011 NAND gates and a PNP transistor, such as the 2N3906, to drive a small speaker. The resistor and capacitor in the input lead from the 4060 determine the length of time the oscillator produces a tone.

Using the values shown, the tone will sound for about one second. If you want to create a real sound show, you can connect the input lead of the 4011 gate to the output of a 4081 gate. This will, in effect, make your speakers *blink* with sound in the same manner as LEDs or lamps.
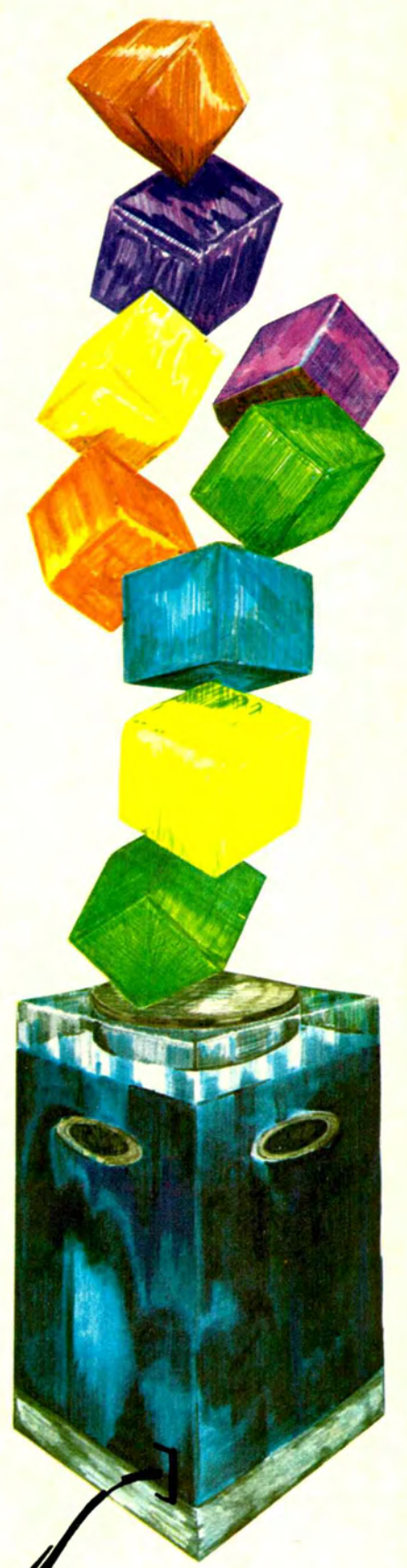
Ultimate do-nothing box

You also can use your do-nothing box to control other electrically operated devices. Here too, the time period during which the controlled device is turned on depends on how the relay circuit is connected to the 4060. You could, for example, replace an incande- scent lamp with a sensitive relay coil. Or, if you prefer, you can make self- timing relay drivers that are turned on by an output from the 400, as shown in figure 4.
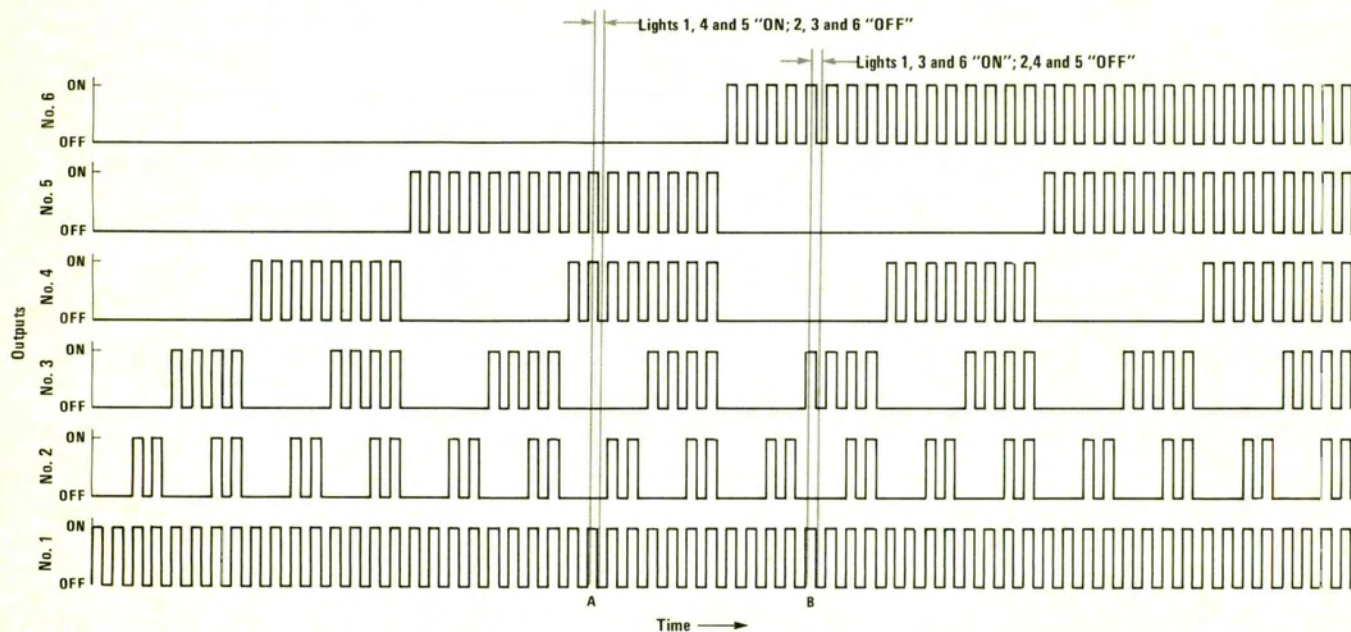
Figure 5 This partial timing diagram shows how the various combinations of on and off times are obtained. The six LEDs are driven by AND gates, one input of each gate being connected to the *1* output of the 4060. The other gate input for LED one is also connected to the *1* output; LED two, to the *2* output; LED three, to the *4* output. Others are connected in turn to the *8, 16* and *32* outputs. You can determine which LEDs will be on by drawing a vertical line through the *1* on-time pulse. If any other LED shows an on pulse, that LED will be lit. At point *A*, for example, LEDs one, four and five are on. At point *B*, however, LEDs one, three and six are on.