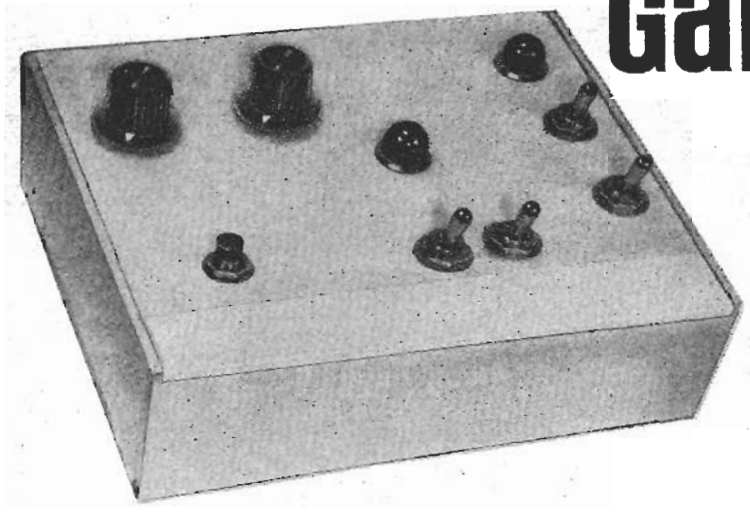
Gadget Box -Mark 99



ELECTRONIC TOY IS ALSO EDUCATIONAL

BY JOSEPH J. TASHETTA

IN THIS MODERN AGE, two things should be expected of any toy that you give to your children. First, it should be an effective attention-occupier. Then, even more important, it should be educational. While many toys are effective attention-*getters*, children often lose interest in them after the initial novelty wears off. And few toys are really educational. The "Gadget Box," however, is one toy that fills both requirements.

Children, especially toddlers who are easily fascinated, won't quickly tire of the Gadget Box. This electronic "toy" is loaded with special effect controls. Flip a switch or press a button, and a siren sounds; flip another switch, and a metronome-like ticking is heard; twirl a knob, and the rate of ticking changes. Through the use of various controls and lights, the toy can also help to develop motor reflexes and teach basic logic.

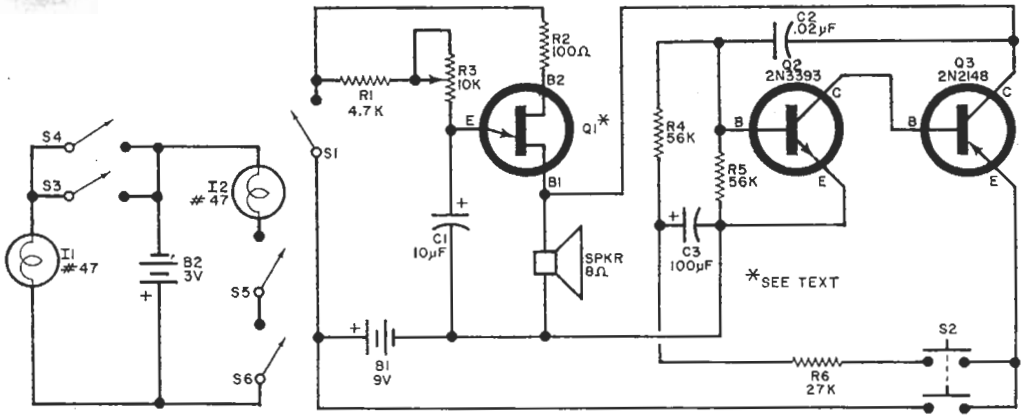
About the Circuits. The ticker circuit contains a unijunction transistor, *Q1*. Closing *S1* causes capacitor *C1* to begin charging through resistors *R1* and *R3*. At some time during the charge cycle (determined by the RC time constant of the circuit) the voltage at the emitter exceeds the voltage at *B2*, driving *Q1* into conduction. When *Q1* conducts, *C1* rapidly discharges through the UJT, causing a "tick" to be heard in the speaker.

This charge-discharge action repeats itself indefinitely as long as power is applied to the circuit. To vary the tick rate, you need only change the setting of *R3*.

The circuit containing transistors *Q2* and *Q3* is the siren. When *S2* closes, *C3* charges and switches on *Q2* and *Q3*. The output of *Q3* then provides regenerative feedback to the base of *Q2* to sustain oscillations. As *C3* charges, the output signal frequency increases. Conversely, as *C3* discharges, output frequency diminishes. The result is that the output signal wails up and down the scale like a real siren.

An independent circuit for developing the sense of basic logic is provided by the lamp and switch configuration shown in the schematic diagram. The circuit consisting of *I1, S3,* and *S4* makes up an OR circuit. Closing either of the two switches causes *I1* to glow; closing both switches still causes the lamp to glow.

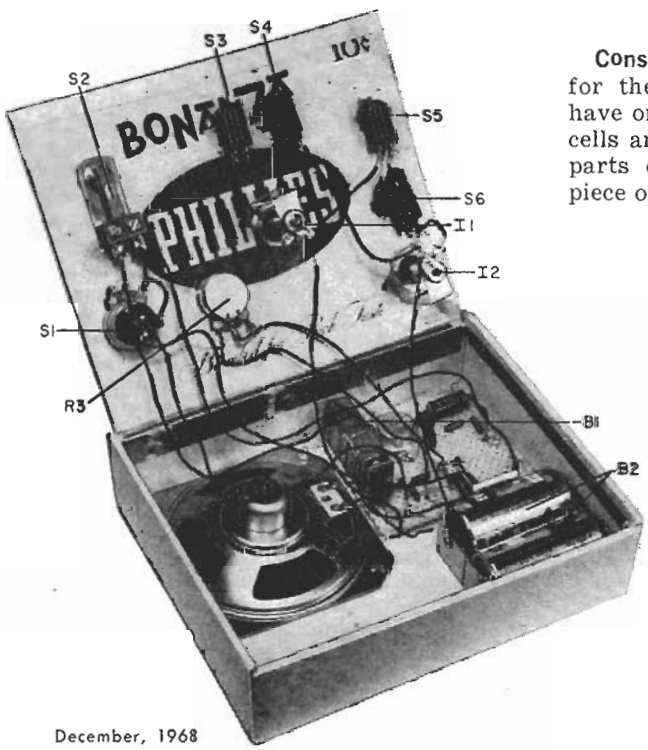
The circuit consisting of *I2, S5,* and *S6* forms an AND circuit. In this case both switches must be closed before the lamp will glow since closing just one switch will not complete the circuit.



PARTS LIST

B1—9-volt transistor battery
B2—Two 1.5-volt D cells
C1—10-μF, 10-volt electrolytic capacitor
C2—0.02-μF ceramic capacitor
C3—100-μF, 10-volt electrolytic capacitor
I1, I2—#47 lamp
Q1—General-purpose unijunction transistor (UJT)
Q2—2N3393 transistor
Q3—2N2148 transistor
R1—4700-ohm, ½-watt resistor
R2—100-ohm, ½-watt resistor
R3—10,000-ohm potentiometer (see text)
R4, R5—56,000-ohm, ½-watt resistor
R6—27,000-ohm, ½-watt resistor
S1—S.p.s.t. switch (see text)
S2—D.p.s.t. normally open momentary-action push-button switch (see text)
S3, S4, S5, S6—S.p.s.t. switch
SPKR—8-ohm PM speaker
Misc.—Cigar (or Bakelite or aluminum utility) box; battery holders; perforated board; flea clips; lamp sockets; hardware; hookup wire; solder; etc.

Unijunction transistor stage Q1 makes up the ticker, and stages Q2 and Q3 form the siren circuits. The AND circuit (left) consists of I2, S5, and S6; the OR circuit uses I1, S3, and S4.



Construction. Many of the parts needed for the Gadget Box you will probably have on hand. Except for the speaker, D cells and holder, lamps, and controls, all parts can be mounted on a 3″-square piece of perforated board, using flea clips

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Controls and lamps mount conveniently on lid, all other components on floor, of cigar box. After mounting speaker, affix rubber bumpers to bottom of box to allow the sound to come through.