NEW IDEAS

Ultrasonic pest repeller

PEST CONTROL HAS BEEN BROUGHT INTO the electronic age by the introduction of the ultrasonic insect repeller. That device is said to repel—not kill—unwanted flying and crawling pests by emitting ultrasonic sound waves that sweep between 65,000 and 25,000 hertz. The sound is apparently rather irritating to them.

I went shopping for one of those "miracle" devices but *I* was repelled by their prices, which ranged from \$49 to \$69. Therefore I decided to design and build my own. The circuit I came up with, which should cost about \$20 to build, is shown in Fig. 1.

The repeller is designed around a 556 dual timer. One half is operated as an astable multivibrator with an adjustable frequency of 1 to 3 Hz. The second half is also operated as an astable multivibrator but with a fixed free running frequency around 45,000 Hz. The 25–65 kHz sweep is accomplished by coupling the voltage

across C2 (the timing capacitor for the first half of the 556) via Q1 to the control voltage terminal (pin 11) of the second half of the 556.

Transistor Q1 serves two purposes: it isolates the timing circuit of the first half of the 556 from pin 11 and it controls an LED indicator. When the first half is operating, timing capacitor C2 continually charges and discharges between 1/3 and 2/3 the supply voltage. Because the base of Q1 is tied to C2, the voltage across C2 will affect the operation of Q1. The voltage at the base of Q1 causes it to conduct, thereby turning on the LED and lowering the control voltage that is applied to pin 11. The lower control voltage causes the output frequency of that half of the timer to increase to around 65 kHz. As C2 is charged toward ²/₃ volt, Q1 conducts less and less. That causes the intensity of the LED to decrease and the control voltage applied to pin 11 to increase, because Q1's emitter approaches + V. The increasing control voltage causes the output frequency to decrease from 65 kHz to 25 kHz. That sweep will take from 1 to $\frac{1}{3}$ second depending on the setting of R1. Theory has it that periodic adjustment of the sweep rate will prevent the pests from developing an immunity to the sound.

The device that radiates the ultrasonic sound is a piezo tweeter. Radio Shack sells several models ranging in price from \$9 to \$15.

Because the output of the repeller is above the range of human hearing, it is difficult to determine whether it is operating properly. If S1 is closed, though, the output frequency is lowered so that it can be heard. The output of the piezo tweeter is intense so, if you get tired of the repeller, you can switch C4 permanently into the circuit and turn the repeller into one heck of an alarm.—David L. Holmes



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This column is devoted to new ideas, circuits, device applications, construction techniques, helpful hints, etc.

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