DESIGNER'S NOTEBOOK

ROBERT GROSSBLATT,
CIRCUITS EDITOR

An audio oscillator

AT VARIOUS TIMES I'VE PRESENTED YOU with several handy-dandy oscillator circuits of one kind or another. But if you're into building your own equipment you know the truth of Grossblatt's fifteenth law: *You can never have too many oscillators.*

An oscillator can be built from just about anything ranging from a handful of transistors to a rusty door hinge, but one circuit usually works better in a particular application than others. Some oscillators produce nice clean logic-level pulses; others are better suited for generating audio tones, etc. While reviewing past installments of this column, I realized that I've never shown you an oscillator that will drive an eight-ohm speaker. This month's circuit will correct that deficiency.

An audible tone generator is a useful circuit to have in the back of your drawer. It could be used as an alarm, a microphone tester, or any of a bunch of other things. For example, if you've ever done any recording that uses more than three or four microphones, you know how much trouble it is to keep the cables straight and to set uniform levels on the mixer. By attaching a battery-operated beeper to a microphone with a rubber band, the task will be much easier.

The oscillator shown in Fig. 1 is built around the popular and easily-obtainable LM386 low-voltage audio amplifier. Even Radio Shack carries it as one of their ever-dwindling stock of IC's. As you can see, the circuit requires only a handful of parts. The LM386 is such an even-tempered IC that it doesn't really care how you put those parts together. You could design a PC board to hold the parts, but the circuit will work just as well with wire-wrap construction.

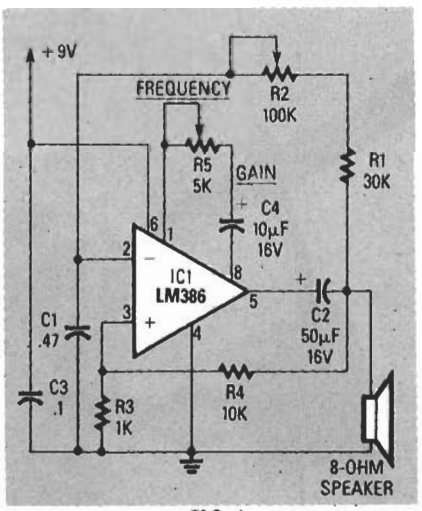

FIG. 1

The circuit's frequency of oscillation can be calculated easily from this formula: $f = 2.8/[C1 \times (R1 + R2)]$. If you use the values I've indicated, you'll be able to vary the output from 60 Hz to 20 kHz by rotating potentiometer R2. There will be some droop in output at either end of R2's rotation, but, for microphone testing, that's not a problem.

How it works

A portion of IC1's output voltage is fed to its non-inverting input (pin 3). That voltage serves as a reference for capacitor C1, which is connected to the non-inverting input (pin 2) of the IC. That capacitor continually charges and discharges around the reference voltage, and the result is a squarewave output. Capacitor C2 decouples the output so you get a nice AC signal to drive the speaker.

With GAIN control R5 at maximum, the circuit will deliver a fairly loud signal—about 40 dB according to my sound level meter. The LM386 has a 1350Ω resistor connected internally between pins 1 and 8. That resistor limits the minimum gain of the IC to about 20 dB. The 10-µf capacitor, C4, bypasses the resistor and allows you to vary the gain with an external control. If you don't need a gain control, just short pins 1 and 8 together.

Varying the size of output decoupling capacitor C2 also affects overall circuit gain. To change gain, you could experiment with its value, but you'll find that using a potentiometer and a capacitor across pin 8 is the easiest way to alter gain.

As with all circuits presented in this column, you can use them just as they appear here, but chances are that they'll be a lot more useful to you if you experiment with them to meet the needs of your specific application. **R-E**