HOBBYISTS AND TECHNICIANS ALIKE often find themselves in need of a "quicky" circuit to aid in the testing or repair of some type of electronics gadget. At other times, the need is for an inexpensive add-on circuit to improve or protect some previous project. With that in mind, this month's Circus presents a mixture of circuits that, hopefully, will be of use to you in testing your experimental circuits, or in modifying an existing circuit.

Tunable Audio Frequency Meter

Our first circuit, see Fig. 1, is a *Tunable Audio-Frequency Meter* that can also double as a variable audio-frequency tone decoder. The operation of the circuit is simple. A single transistor, Q1, amplifies the input signal and squares up the waveform. The output of Q1 is then used to drive U1, a 555 oscillator/timer configured as a Schmidt trigger. The squarewave output of U1 at pin 3 is fed to a simple diode-limiter circuit (D4) to provide a maximum positive swing through R7 of about 0.6 volt.

The signal at the wiper of R7 is fed to the input of U2 (a 567 phase-locked loop) at pin 3. If the input frequency is in range, R10 can be adjusted to tune in the signal and lock up U2, causing LED1 to light. A simple hand-drawn dial plate can be calibrated in hertz and placed over the shaft of R10.

With a capacitor value of 0.1-μF for C6, the tuning range of the circuit is between 400 Hz and 5 kHz. That range can be raised or lowered by changing the value of C6. Increasing the value of C6 lowers the frequency, and the opposite holds true when C6's value is decreased.

Resistor R7 should be set to pass the minimum signal level that still allows a good response from U2. Too great a signal level at the input of U2 causes the frequency-detection bandwidth to broaden. That reduces the accuracy of the circuit in determining the actual input frequency from the dial.

A sensitive relay can be connected between pin 8 of U2 and the + V bus to power some other device when the desired frequency is reached, or a transistor can be added to activate an external circuit or function. A number of 567 PLL circuits can be duplicated and their inputs paralleled to operate

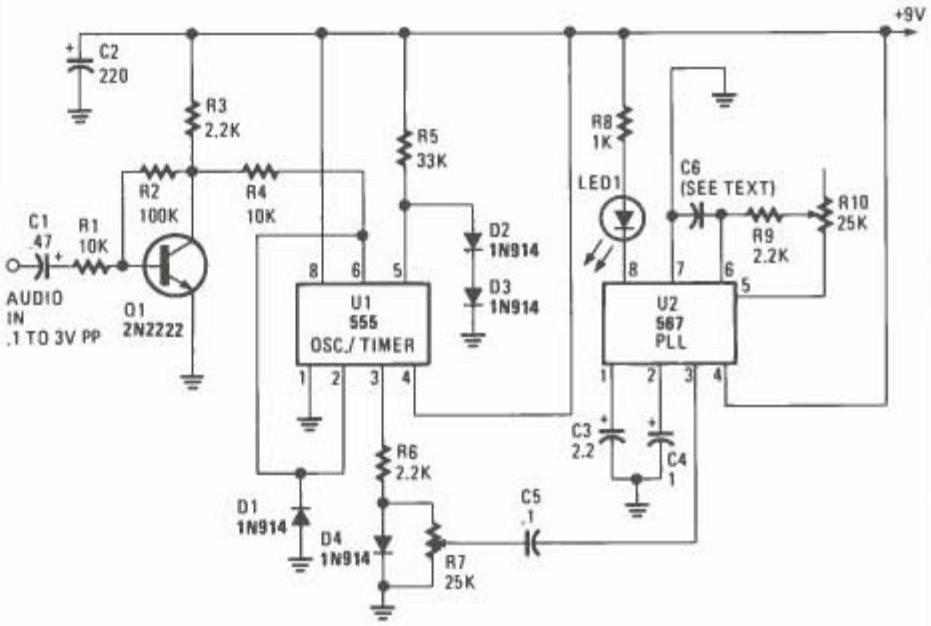

Fig. 1—The Tunable Audio Frequency meter can also double as a variable audio-frequency tone decoder.

PARTS LIST FOR THE TUNABLE AUDIO FREQUENCY METER

U1—555 oscillator/timer, integrated circuit
U2—567 phase-locked loop, integrated circuit
Q1—2N2222 general-purpose NPN silicon transistor
D1–D4—1N914 small signal silicon diode
LED1—Light-emitting diode (any color)
R1, R4—10,000-ohm, ¼-watt, 5% resistor
R2—100,000-ohm, ¼-watt, 5% resistor
R3, R6, R9—2200-ohm, ¼-watt, 5% resistor
R5—33,000-ohm, ¼-watt, 5% resistor
R7, R10—25,000 potentiometer
R8—1000-ohm, ¼-watt, 5% resistor
C1—0.47-μF ceramic disc capacitor
C2—220-μF, 25-WVDC, electrolytic capacitor
C3—2.2-μF, 25-WVDC, electrolytic capacitor
C4—1-μF, 25-WVDC, electrolytic capacitor
C5—0.1μF, 100-WVDC mylar or ceramic disc capacitor
C6—See text

Printed circuit or perfboard materials, enclosure, IC sockets, 9-volt power source, audio generator, wire, solder, hardware, etc.

individually and respond only to their own pre-set frequency.