voice energy during a conversation can vary by as much as 40 dB.

To better understand the logarithmic response just described, see Fig. 1. That figure illustrates a small portion of a linear plot of the RSSI response. Notice that the slope or gain around small-input-signal-point P1 is high while the gain for a larger signal at a higher point, P2, is smaller. The figure illustrates how two different amplitude signals with constant percentage modulation result in a constant output (dy).

Circuit Description. The schematic for the Voice-Stress Analyzer is shown in Fig. 2. Power for the circuit is supplied by a 9-volt battery, B1; S1 is the power switch.

Microphone MIC1 is coupled to the NE614 logarithmic amplifier, IC1. The configuration allows voice frequencies ranging from 500-Hz to 10-kHz, where the human voice exhibits the greatest energy, to pass through. The RSSI output at pin 5 of IC1 is low-pass filtered by R6 and C10.

One section of an LM324M op-amp, IC3-c, buffers the RSSI signal to drive IC3-d, which is configured with a gain of two and a center frequency of 12 Hz ± 6 Hz. That results in a low Q value of one. The output at that point is a clean signal of the micro tremor and does not contain artifacts due to signal processing.

Op-amps IC3-a and IC3-b form a full-wave peak detector with an overall gain of 4.2; IC3-a operates on its own as a negative half-wave detector with a gain of 1. Low gain is required at that point because the non-inverting input of IC3-a is biased a bit higher than +2.5 volts. The high gain occurs in IC3-b because its output swings positive during either cycle of the AC signal (the overall high gain is established by the ratio of R18 to R15, where R15 = 2 × R17).

When the output of IC3-b goes positive it is integrated by R10 and C16 for a fast response. During pauses in speech or under stress, the voltage developed on C16 bleeds off through the longer time constant caused by C16, R18, and R19. That allows the bar-graph-display, DISP1, to show the signal quickly and with a fast attack time, and to hold the value with a slow release time during pauses in the speech process.

The display is controlled by IC4, an LM3914 bar-graph driver. Transistor Q2 is configured as an emitter-follower that buffers the output voltage refer-

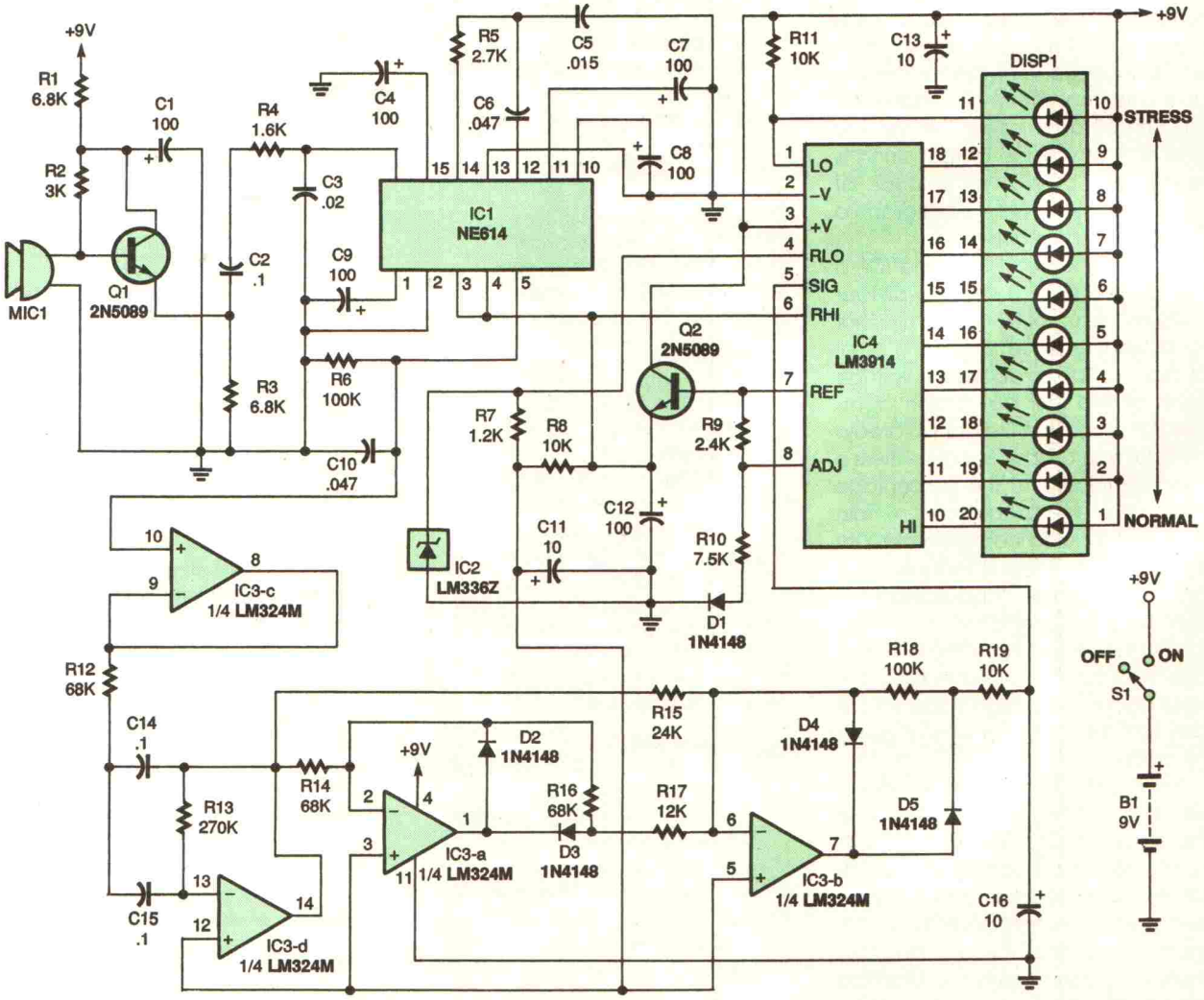

Fig. 2. Here's the schematic for the Voice-Stress Analyzer. At the heart of the circuit is IC1, an NE614 IF logarithmic amplifier, which allows the circuit to "interpret" the human-voice frequencies picked up by MIC1.