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AGC circuit uses an analog multiplier

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In the AGC circuit of **Fig 1**, a 4-quadrant analog multiplier (IC_1), an amplifier stage (IC_2), an active, full-wave rectifier (D_1, D_2, R_4-R_7, and IC_3), and an integrator (IC_4) accomplish automatic gain control of V_{IN}'s amplitude variations in the audio-frequency range.

The multiplier's output is $-V_{IN}V_Y/10$, where V_Y is a negative voltage generated by the integrator IC_4. Together, the integrator and the rectifier extract the dc component (V_Y) of V_{OUT} for use as a feedback signal to the multiplier. The integrator sums signal current from the rectifier and control current from potentiometer R_9, which lets you adjust V_{OUT}'s signal level.

Circuit analysis yields the frequency-response **equation**

$$V_{OUT}=\frac{K_1AV_C}{10RC_3}\left(\frac{1}{s+\frac{10A}{RC_3}}\right),$$

or, in the time domain,

$$V_{OUT}=\left(\frac{K_1AV_C}{10RC_3}\right)\exp\left(-\frac{10At}{RC_3}\right).$$

In both **equations**, K_1 is the gain of amplifier IC_2, A is the peak amplitude of V_{IN}, and R is the resistance between the integrator input and the rectifier output. (For this circuit, R equals R_6 in parallel with R_7.)

This AGC circuit is suitable for controlling the long-term variations of amplitude within a limited range. It doesn't respond uniformly over a wide dynamic range, however, because the time response is inversely proportional to input-signal amplitude. EDN

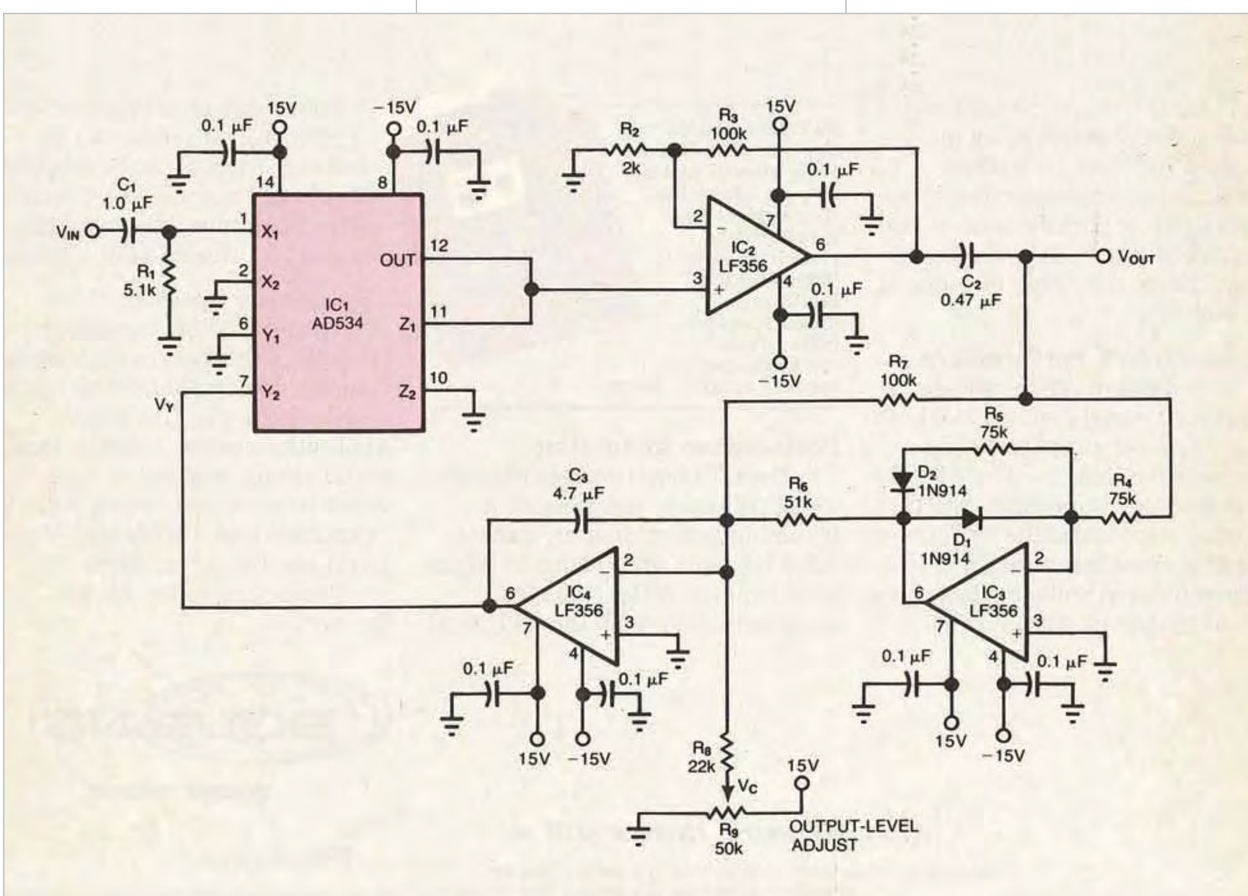

Figure 1 Analog multiplier IC_1 combines V_{IN} with a feedback signal V_Y to achieve automatic gain control.