

Peak-reading millivoltmeter responds instantaneously

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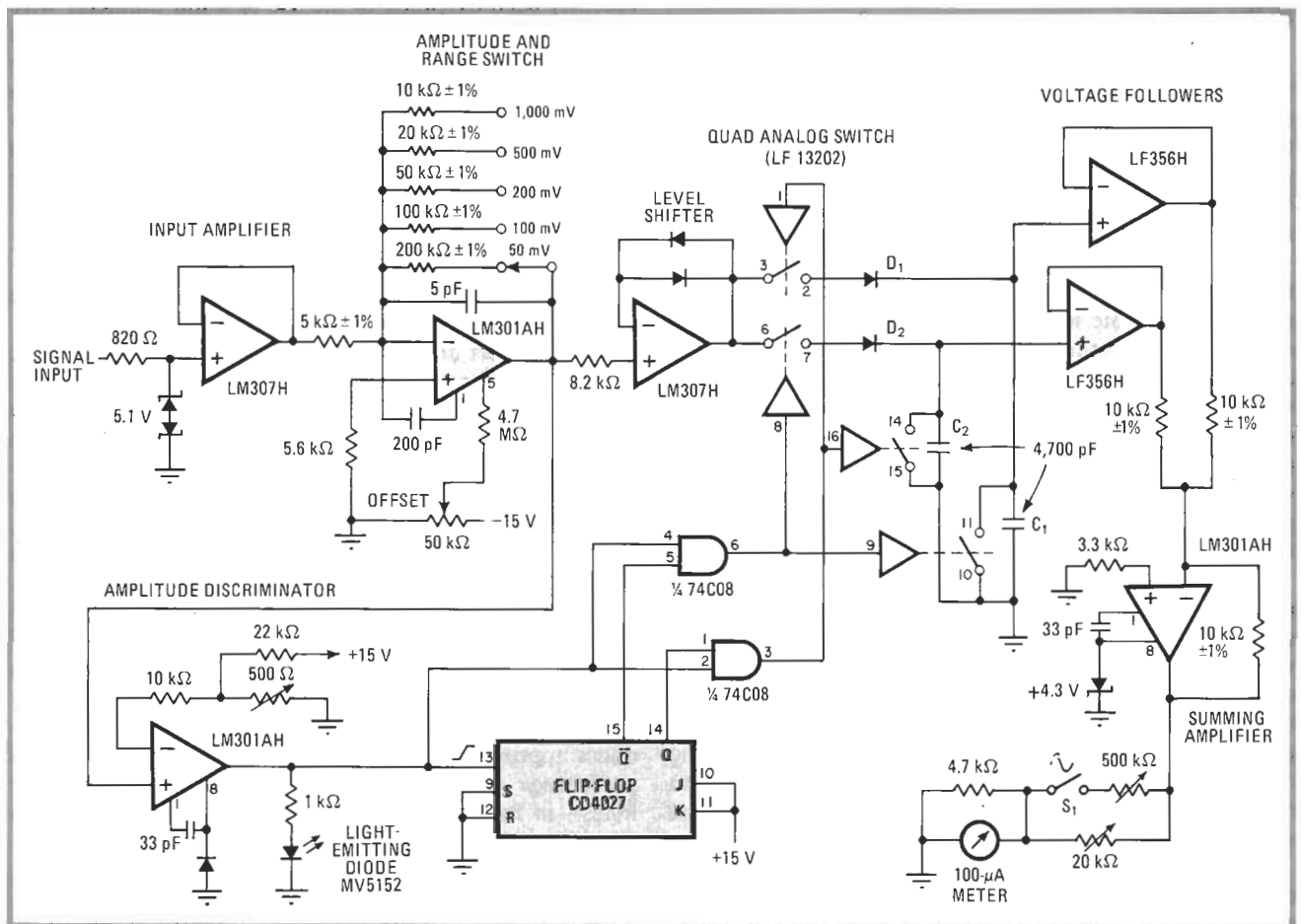
Requiring but a single pulse or cycle of a sine, square, or triangular wave in order to determine its peak value, this millivoltmeter-microammeter will serve as a respectable substitute for an oscilloscope, oscillographic recorder, or other instrument that must deliver an instantaneous response. Such a low-cost unit is extremely useful in biomedical applications, where the amplitude of certain electrophysiological variables of small magnitude has to be closely monitored.

The millivoltmeter processes either negative-going pulses or the negative portion of the incoming waveform. The signal voltage first passes through the LM307 input

amplifier and through the LM301 range amplifier (see figure). The level shifter that follows imparts a positive offset to the signal to compensate for the voltage drop of charging diodes D_1 and D_2 , which transfer the peak value of the wave to holding capacitors C_1 and C_2 . The voltages on C_1 and C_2 are then alternately applied to the input of the LM301 summing amplifier; any change in the amplitude of the input signal will thus be instantly reflected at the output.

Capacitor switching is achieved with a quad analog switch (LF13202), which in turn is driven by a toggled 4027 flip-flop that is triggered by the input signal and the LM301 amplitude discriminator. The 500-ohm potentiometer is used to set the input trigger voltage at any point near zero, a necessary condition for detecting small input voltages.

As C_1 is charged, C_2 is discharged, and vice versa. Thus the stored voltage on C_1 or C_2 is constantly and quickly updated without the need for a discharge cycle. Note that the zener diode at the input to the summing amplifier prevents it from overdriving the output meter.



1. Quick update. This meter requires only one negative pulse or half cycle of sine-, square-, or triangular-wave input to determine peak current or voltage amplitude. The applied signal charges capacitors C_1 and C_2 alternately, so that either can update immediately without the need for a separate discharge cycle. The meter's range is 0 to 1 V or 0 to 100 μ A. The output meter reflects instantaneous changes.

The output microammeter may be calibrated in millivolts through the use of its associated 20-kilohm and 500-kilohm potentiometers. Switch S_1 must be closed in order to measure sinusoidal waveforms.

Although this meter has been used mostly for meas-

urement tasks below 100 hertz, it will work over a wide range of frequencies and thus is suitable for general-purpose audio-rate applications. As shown, the meter is useful for square waves to 8 kilohertz, sine waves to 10 kHz, and pulse widths down to 15 microseconds. \square