Integrate-and-hold circuit gives electrochemical measurements

Operational-amplifier integration techniques can provide input-signal and time ranges comparable with those obtained from electrochemical cells. A FET peak-holding circuit holds the largest voltage reached by the integrator's output. More important, the value is held for a period up to three times longer than could be expected for the integrator capacitor alone.

With switch S_1 in the Integrate position (Fig. 1), the integrated signal from A_1 is fed to the peak-holding circuit comprised of amplifier A_2, low-leakage capacitor C_2, diode CR_1 and FET Q_1.

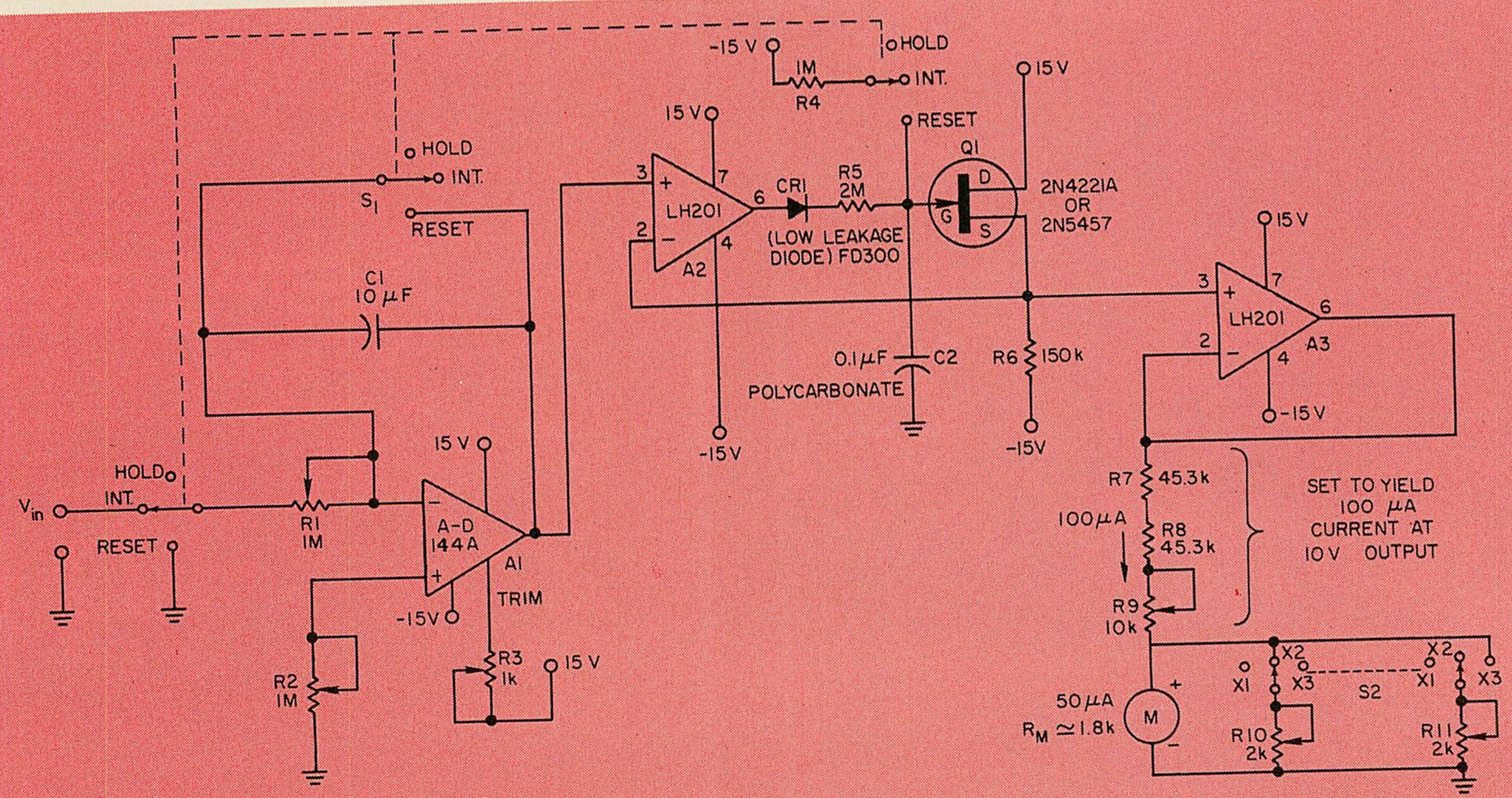
The high input impedance of FET Q_1 and the use of a voltage-follower circuit provide isolation between the integrator and output meter, thus minimizing leakage from the integrating capacitor, C_1.

The meter reads directly in coulombs when S_2 is set in the X1 position and when the input scale factor is 1 V/A. Switch S_2 should be set to the X3 position to avoid off-scale meter readings, if the unit is to be unattended during an integration cycle.

The Reset position of S_1 clears C_1 and C_2. When the measurement is completed, S_1 is switched to the Hold position. This disconnects the input signal from the integrator and prevents a loss of charge from capacitor C_1.

The coulombmeter shown has a range of 0 to 128 coulombs, with the upper limit resulting when one or more internal amplifiers reach saturation. The peak-holding circuit will limit the output droop to about 0.7 coulomb/min., for an indication of 120 coulombs on the meter.

Robert G. Warsinski, Ford Motor Co., 24500 Glendale, Detroit, Mich. 48239. CIRCLE NO. 311



The peak value of the integral of the input voltage is read out directly on the microammeter, M, which is calibrated to read in coulombs for an input scale factor of 1 V/A.