64 Precision VOM Calibrator

☐ Until now, most of the calibrator circuits appearing in hobby magazines could not be considered as primary reference standards. Instead, they were **transfer standards,** since the builder would be instructed to align his calibrator using a voltage reference of known accuracy. The obvious reaction of most readers was: "If I had access to an accurate voltage reference to begin with, why would I want to build this calibrator?"

Our sentiments exactly. Now National Semiconductor comes to the rescue with a voltage reference IC, the LM185, having an output of 1.235 bolts 1%. What's more, this voltage remains stable in the face of changing ambient

temperature and supply current.

The circuit diagrammed here produces six useful reference voltages from .100 V to 10.0 V. As noted above, the 1.235-volt output is accurate to within 1%. All of the other outputs are accurate to within 2% except for the 3-volt output, which has a tolerance of 4%. Reduced accuracy on all derived outputs is the result of errors introduced by the 1% resistor tolerances. Bear in mind, however, that worst-case accuracies are quoted here.

Be certain that the input resistance of the instrument being calibrated greatly exceeds the resistance at the circuit node being read. Most of you who worry about calibration have high-impedance (10-megohm) FET voltmeters, the loading effects of which are negligible here.

PARTS LIST FOR PRECISION VOM CALIBRATOR

B1—ten AA cells in series to yield 15 volts
C1—100 uF, 25 electrolytic capacitor
C2—.1 uF ceramic disc capacitor
C3—.01 uF polystyrene or mylar capacitor
IC1—LM185 1.235-volt reference IC (National Semiconductor)
IC2—3140A FET-input op amp (RCA) All Resistors ½w, 1% precision unless noted otherwise
R1—12,000-ohm, ½-watt 10% resistor
R2—1,180-ohm, ½-watt resistor
R3—3,480-ohm, ½-watt resistor
R4—1,000-ohm, ½-watt resistor
R5—499-ohm, ½-watt resistor
R6—162,000-ohm, ½-watt resistor
R7—115,000-ohm, ½-watt resistor
R8—2,150-ohm, ½-watt resistor
R9—4,990-ohm, ½-watt resistor
S1—SPST normally open pushbutton switch