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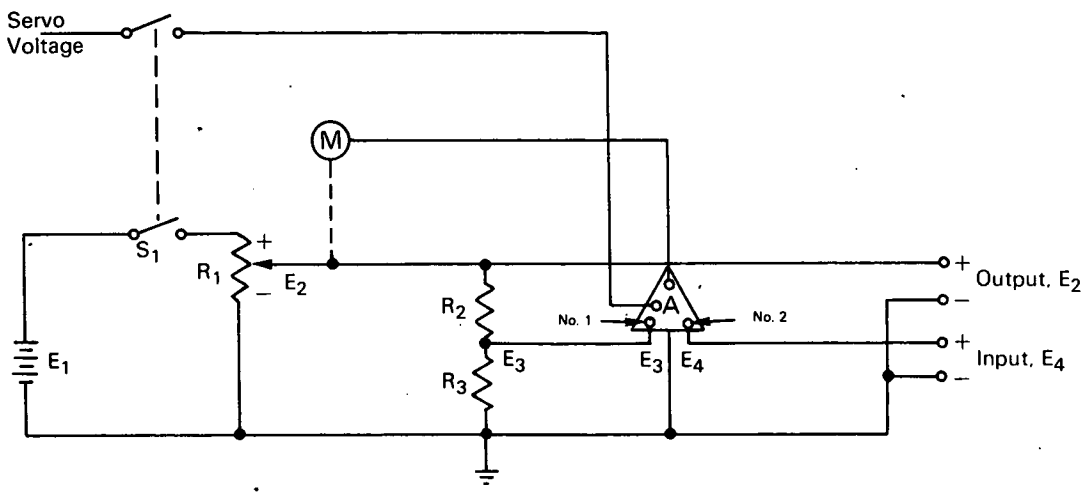
Brief 68-10074

NASA TECH BRIEF

Improved DC Voltage Multiplier



This circuit multiplies (amplifies) a dc input voltage in the millivolt range to yield a larger dc output voltage bearing a fixed ratio to the input voltage. The voltage multiplication ratio depends only on the inherent accuracy and stability of the voltage divider ratio $(R_2 + R_3)/R_3$. This circuit has a number of advantages over other dc voltage multipliers in that the supply voltage, E_1, need not be precisely regulated, the potentiometer, R_1, need not be linear, and the gain of servo amplifier A is not critical.

A positive voltage (relative to ground) applied to input No. 1 of the servo amplifier will cause the servo motor, M, to drive the arm of the potentiometer toward the (−) end, and a positive voltage at input No. 2 of the amplifier will bring the potentiometer arm toward the (+) end of R_1. The potentiometer arm will not move when equal voltages are applied to both amplifier inputs simultaneously. The servo amplifier receives power and dc voltage E_1 is developed across R_1 when switch S_1 is closed. Output voltage E_2 varies from 0 to E_1 as a function of the arm position along R_1 and is developed across the voltage divider $(R_2 + R_3)$. The ratio of E_3 (at the junction of R_2 and R_3) to E_2 is equal to the fixed ratio $R_3/(R_2 + R_3)$. The potentiometer arm comes to rest when $E_3 = E_4$, and as a result $E_2 = E_4 (R_2 + R_3)/R_3$. Thus the output voltage, E_2, is a fixed product of the input voltage, E_4.

This circuit can be readily calibrated to give a direct reading (on an output voltmeter) of the temperature sensed by a thermocouple connected to the input terminals. It can also be readily adapted to function as a current-to-voltage converter or as a current multiplier.

Note:

Further details may be obtained from:

Technology Utilization Officer
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Reference: B68-10074

Patent status:

Inquiries about obtaining rights for the commercial use of this invention may be made to NASA, Code GP, Washington, D.C. 20546.

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