Accurate motor speed control

In this design the motor voltage-drop is the sum of the back e.m.f., V_b, and the voltage dropped across the internal armature resistance R_a. If the armature current is I_a,

$$V_x = I_a R_a + V_b$$

and

$$V_y = \frac{R_2}{R_2 + R_3} \cdot V_c + \frac{R_3}{R_2 + R_3} [V_b + I_a (R_a + R_1)]$$

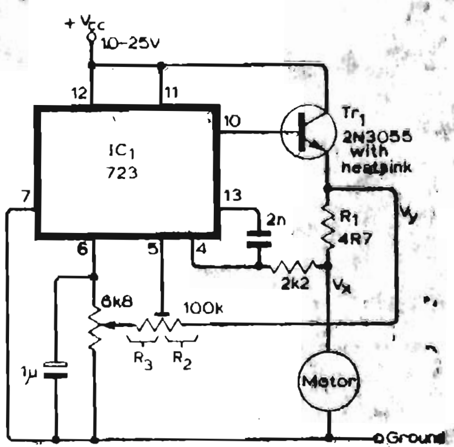
Because

$$V_x = V_y,\ V_b = V_c + I_a [(R_a + R_1) R_3 - (R_2 + R_3) R_a]$$

Therefore, if

$$\frac{R_2}{R_3} = \frac{R_1}{R_a}$$

$V_b = V_c$, so the back e.m.f. is always equal to the control voltage V_c, and the motor speed can be regulated with the potentiometer. The preset control is adjusted until the motor speed remains constant with different loads.



The circuit has been used with a domestic cassette recorder and has improved the motor performance with C120 tapes. Note that motor speed is not dependent on the supply voltage.

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