

Resistors provide nonlinear pot tapers

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For some applications of nonlinear potentiometers, you can avoid the expense of a custom potentiometer by adding fixed resistors to a conventional linear potentiometer. For the variable-resistor or rheostat mode, an external resistor (R' in Fig 1a) gives you the curves of Fig 1b. Note that varying α also varies the maximum resistance ($R+R'$). For convenience, all values of the variable resistor are normalized by $R+R'$.

For the voltage-divider mode of operation, you can add two resistors (Fig 2a). Fig 2d shows the relationship of the normalized wiper voltage (V_{OUT}/V_{IN}) to the wiper position for the case $\beta=0.5$, in which $R_1=R_2$.

Note that the curves' point of intersection equals β , which you can shift from 0 to 1 by changing the values of R_1 and R_2 . Note also that such a shift changes the circuit's loading effects.

Figs 2b and 2c show the voltage divider's behavior for the cases $\beta=0$ and $\beta=1$. (Interpret $\beta=0$ to mean that R_1 is omitted; $\beta=1$ means R_2 is omitted.) The combination $\alpha=5$ and $\beta=1$, for example, provides an excellent modified log with 20% taper (20% taper means 20% of maximum resistance at 50% of the wiper travel). The combination $\alpha=10$ and $\beta=1$ provides a reasonable approximation of a semilog (audio) taper. **EDN**

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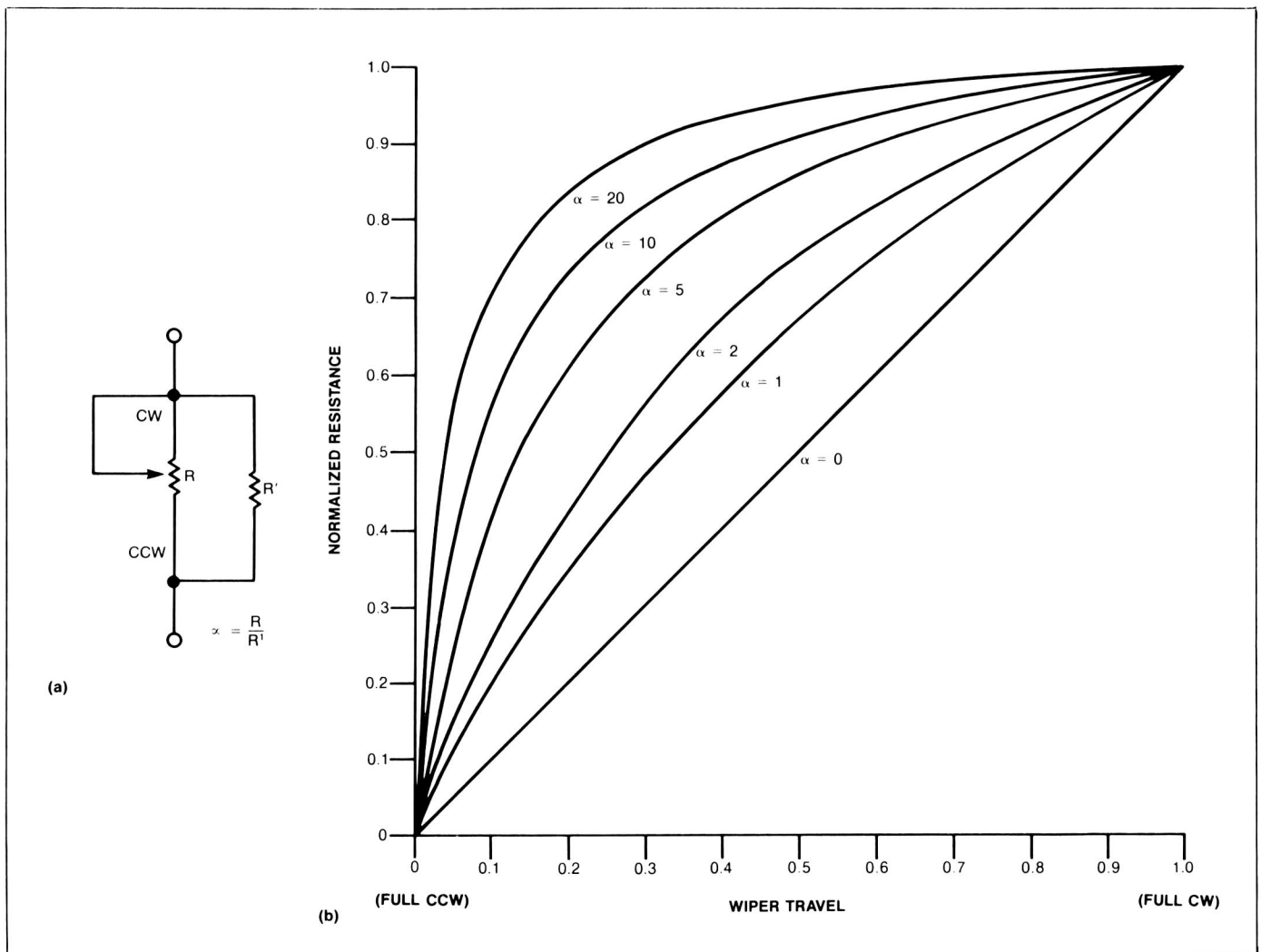
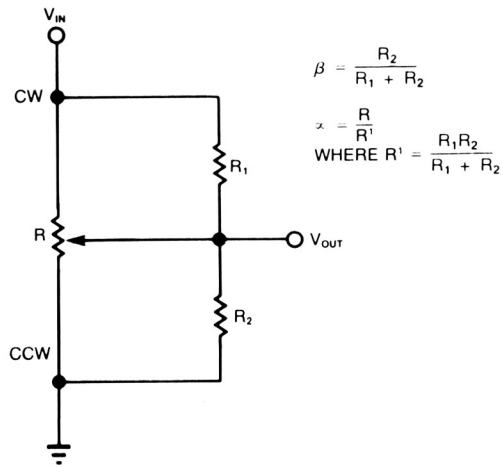
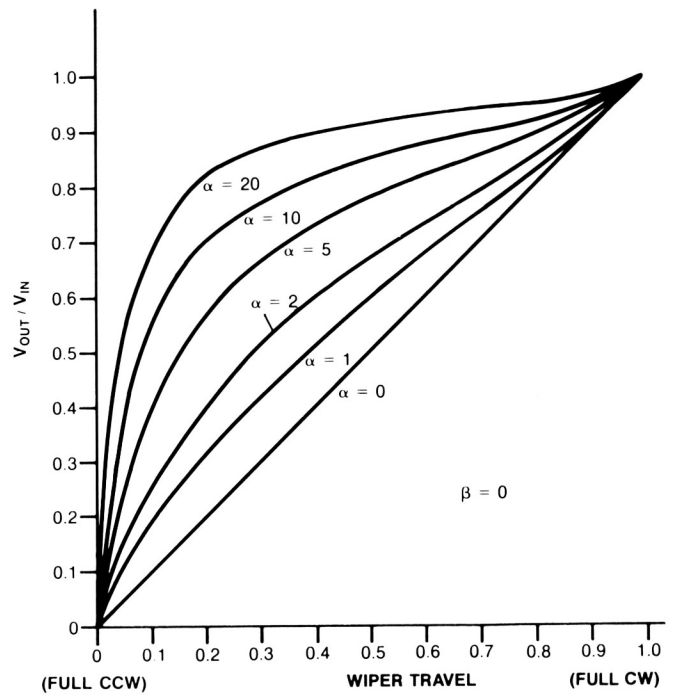


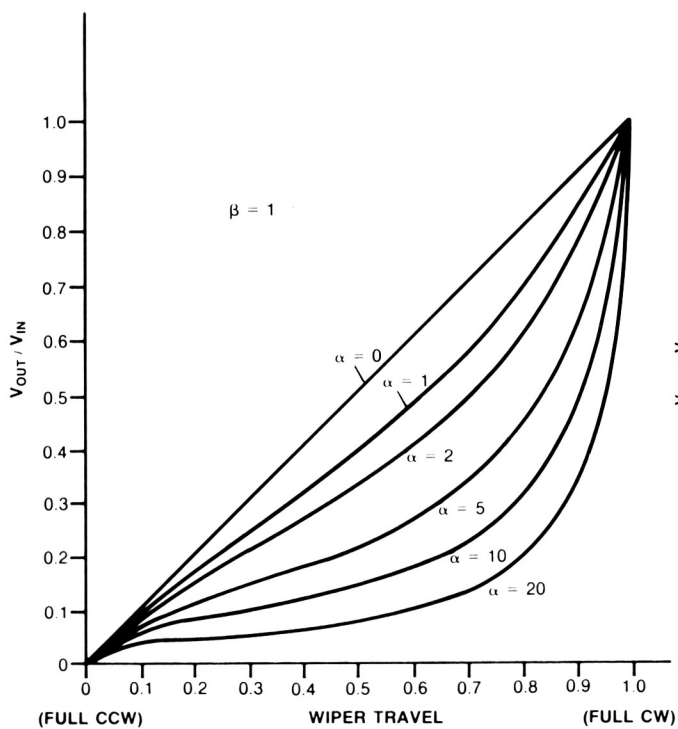
Fig 1—Adding R' to linear potentiometer R (a) results in a nonlinear relationship (b) between the normalized resistance and the wiper position.



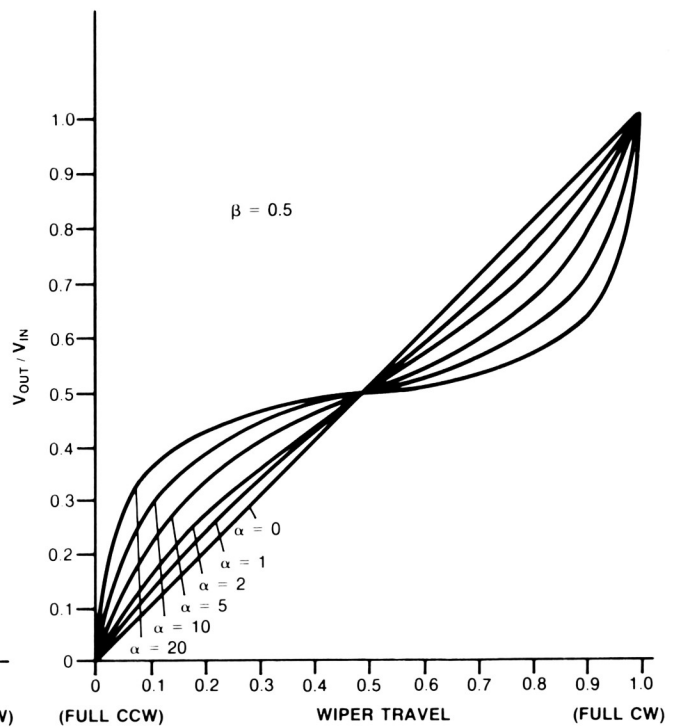
(a)



(b)



(c)



(d)

Fig 2—You can make a nonlinear voltage divider (a) by adding resistors to a linear potentiometer. The curves in b, c, and d show respective results for the three cases $\beta=0$ (omit R_1), $\beta=1$ (omit R_2), and $\beta=0.5$ ($R_1=R_2$).