Simple window discriminator

The voltages at the input terminals of the comparator are as shown. V_A is an attenuated form of the input V_i, but V_B is offset by an amount $-bV_S$ (V_S = supply voltage), and rises linearly with V_i until D_1 becomes reverse biased, when it is clamped to V_{ref}. Thus the V_A and v_B curves cross twice, giving rise to the two switching points. V_B, below the knee, is given by $V_B = V_{in}(1-b) - bV_S$, and above by $V_B = V_{ref}$. Because $V_A = aV_{in}$, the lower switching point occurs at;

$$aV_{in} = (1-b)V_{in} - bV_S$$

i.e. $$V_{in} = -bV_S/(a+b-1),$$

and the upper switching point at;

$$aV_{in} = V_{ref}$$

i.e. $$V_{in} = V_{ref}/a.$$

By fixing the ratio, the two switching points may be varied independently by adjusting b and V_{ref} for the lower and upper points respectively. As shown, the circuit will work only with positive going input voltages, but by reversing the polarity of D_1, V_{ref} and $-V_S$, may be made to work with negative going inputs.

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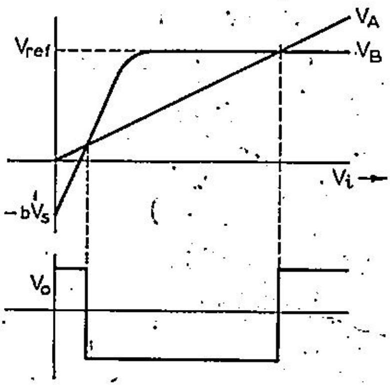

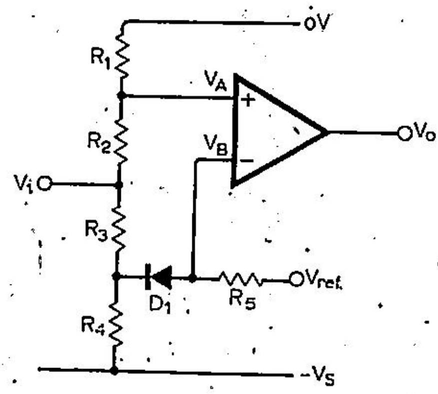

$$\frac{R_1}{R_1+R_2} = a; \quad \frac{R_3}{R_3+R_4} = b; \quad R_5 \gg R_3 \parallel R_4$$