Capacitance Nomogram

Relation among capacitance, voltage, stored charge, and amount of energy available upon discharge of capacitor.

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ERE is a nomogram relating the capacitance of a capacitor (C), the voltage across its terminals (V), the stored charge (Q), and the available energy if the capacitor is discharged (W). It is optimized about C=1nt. This allows the nomogram to cover most of the capaciter values normally encountered in timing circuits, SCB firing circuits, and pulse-forming networks. V is in volts. Q, the stored charge, is microcontombs; and W, the energy, is in

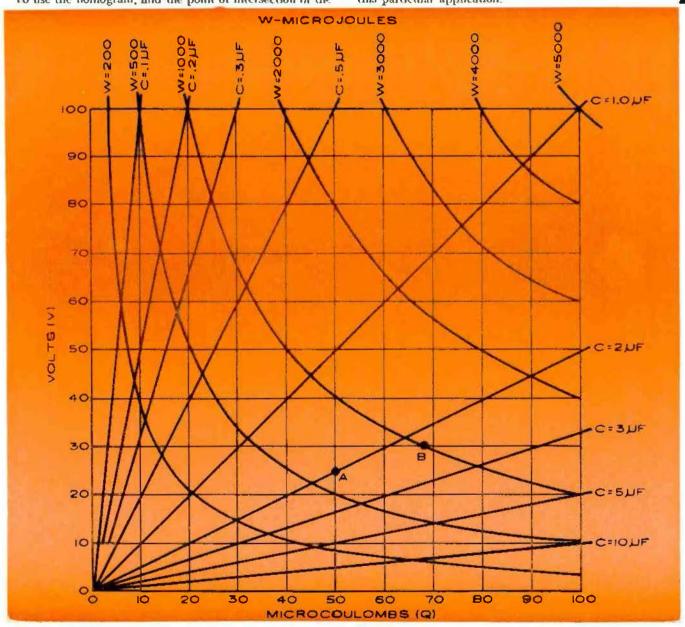
The basis for the nomogram are two capacitor equations: $Q = C \times V$ and $W = Q \times V \times E$. (Note: By substituting $(C \times V)$ for Q in the second formula, we obtain the more familiar W=

 $(C \times V) \times V \times \mathbb{N} = \mathbb{N}(CV^2)$ Knowing any two of the variables lets a solution for the other two to be found.

To use the nomogram, find the point of intersection of the

two known values, and then read out the unknown values. Example 1. A 2-uf, capacitor is charged to 25 volts. What is the charge and the stored energy? The intersection point between C=2 µf, and V=25 volts is found (point A). The charge is then read vertically downward and is seen to be 50 microcoulombs. The stored energy is between the 500-and 1000-microjoule lines and is nearer to the 500 line. Interpolation will give a value of 625 microjoules.

Example 2. An SCR needs 1000 microjoides of energy to insure firing. A capacitor charging voltage of 30 volts is available. What is the minimum value of capacitance that can provide this energy? The intersection between the W=1000 and V=30 is found (point B). Although this is close to the $C=2 \mu f$ line, $2 \mu f$ is not quite enough to provide this energy. A value closer to 2.23 af, or 3 af, would have to be chosen for this particular application.



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