RC FILTER CHART

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Graph for use in calculating proper values of resistance and capacitance for coupling, decoupling, and bypassing.

CAPACITORS perform many vital functions in amplifiers, such as extending the frequency response, increasing gain, and inhibiting "motorboating" tendencies. Choosing the proper value of capacity for each job can be a difficult problem, but this chart (based on a simple design rule) solves each problem easily.

Adequate coupling, bypassing, and decoupling in *RC* filters (C_c-R_g, R_k-C_k, R_s-C_s, R_f-C_f) are assured when the capacitive reactance, at the lowest frequency of interest, equals about one-tenth of the filter resistor's value. This chart gives the required capacitor values from 1 $\mu\mu$f. to 1000 μf. for resistors of 1 to 100,000 ohms over a frequency range of 10 cps to 16,000 mc.

Using the Chart

From the known resistor value go up to the frequency curve of interest, go across to the left, and read the capacitor value from the appropriate scale. The key shows which capacity scale to use for each frequency curve. For example, a 2000-ohm resistor (point A) is adequately bypassed by 20 μf. at 40 cps, 0.02 μf. at 40 kc., or 20 $\mu\mu$f. at 40 mc.

R_s, R_k, and R_g are normally fixed by circuit requirements, but R_f, when used, in most low power amplifier stages should be about 1/5 to 1/10 of R_L. R_f-C_f isolates stages from the effects of a common power-supply impedance. If R_L, R_f, and C_f are used as a power-supply filter, this chart can determine the minimum value of capacity for filtering applications.

Extending the Chart

The chart can be "extended" for very low frequency use by dividing each cps scale by 1000 and increasing the high C scale by 1000; thus the chart would now cover from 1000 μf. to 1 farad over the range 0.01 to 16 cps.

Additional frequency scales can be added by computing X_c for two different capacitors at the same frequency. Multiply each X_c value by 10 and plot points to get the new curve.

Posted near your bench or lab table, this chart will save time and effort. ▲