

$$S_{C_4}^Q = \frac{Q}{\omega_0 R_5 C_4} \left(1 - \frac{K R_5}{R_6} \right) - \frac{1}{2}$$

$$S_{R_5}^Q = \frac{Q}{\omega_0 R_5 C_4} \left(1 + \frac{C_4}{C_3} \right) - \frac{1}{2}$$

$$S_K^Q = \frac{-KQ}{\omega_0 R_6 C_4}$$

$$S_{R_6}^K = -S_{R_5}^K = 1$$

DESIGN PROCEDURE

Given: $Q = 1/\alpha$, $\omega_0 = 2\pi f_0$

H_0 must be a free parameter.

Choose: $C = C_3 = C_4$, $R = R_1 = R_5$

K is chosen to reduce the spread of element values or to optimize sensitivity. It might typically be between 1 and 10.

Calculate: $R = \frac{\sqrt{Q}}{\omega_0 C}$

$$R_6 = R \frac{K \sqrt{Q}}{2 \sqrt{Q} - 1}$$

$$G_2 = \frac{1}{R_2} = \frac{1}{R} \left(Q - 1 - \frac{2}{K} + \frac{1}{K \sqrt{Q}} \right)$$

For this procedure, $H_0 = \sqrt{Q} K$.

This completes the section on infinite-gain multiple-feedback realizations. A few general comments are in order. An advantage of this realization is that the output impedance is low; thus networks may be cascaded with negligible interaction. A disadvantage is that it is not possible to obtain high Q without resorting to large spreads of element values and also incurring large Q sensitivities. The multiple-feedback realization with positive feedback can overcome this and allow reasonable sensitivities up to a Q of 50.