



DISEÑO DE FILTROS A -60 dB/dec

FILTRO PASABANDA CON $f_l=0.1\text{Hz}$ y $f_h=100\text{Hz}$

Procedimiento de diseño:

- Escoja el Amplificador Operacional: LF356 con RRMC=100db, Impedancia entrada= $10^{12}\Omega$
- $B=100\text{Hz}-0.1\text{Hz}=99.9\text{Hz}$
- $f_r = \sqrt{(100\text{Hz})(0.1\text{Hz})} = 3.1622\text{Hz}$
- $f_l = \sqrt{\frac{(99.9\text{Hz})^2}{4} + (3.1622\text{Hz})^2} - \frac{99.9\text{Hz}}{2} = 0.0999\text{Hz}$
- $Q = \frac{3.1622\text{Hz}}{99.9\text{Hz}} = 0.0316 = \text{Banda Ancha}$

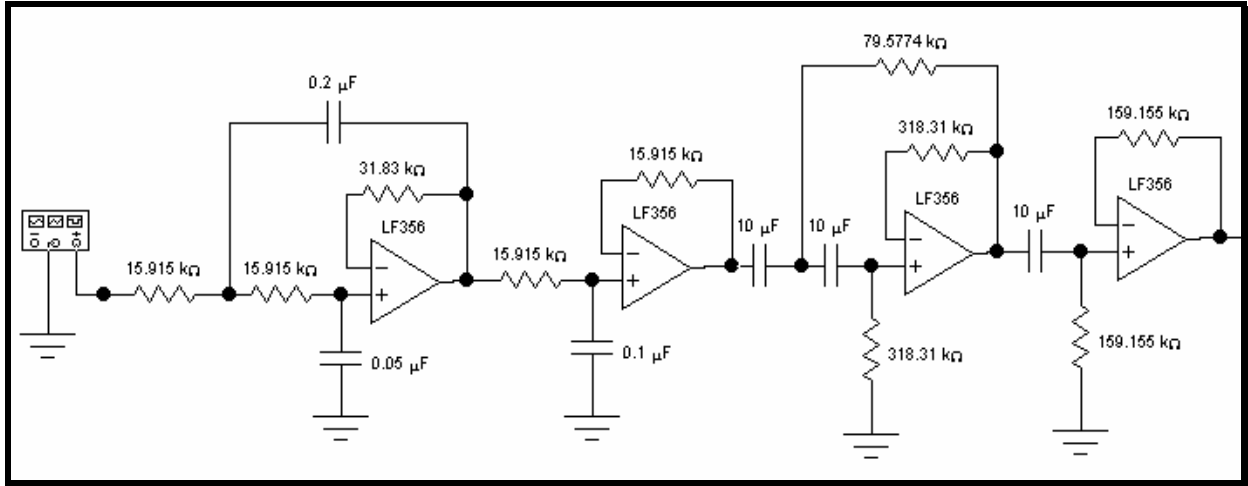
Banda Ancha

Pasabajas $f_h=100\text{Hz}$

- $C_3 = 0.1\mu F$
- $f_c = 100\text{Hz}$
- $R = 15.915k\Omega$
- $C_1 = \frac{0.1\mu F}{2} = 50000\text{pF} = 0.05\mu F$
 $C_2 = 2(0.1\mu F) = 200000\text{pF} = 0.2\mu F$
- $R_1 = R_2 = R_3 = 15.915k\Omega$
- $R_{F1} = 2(15.915k\Omega) = 31.83k\Omega$
 $R_{F2} = 15.915k\Omega$

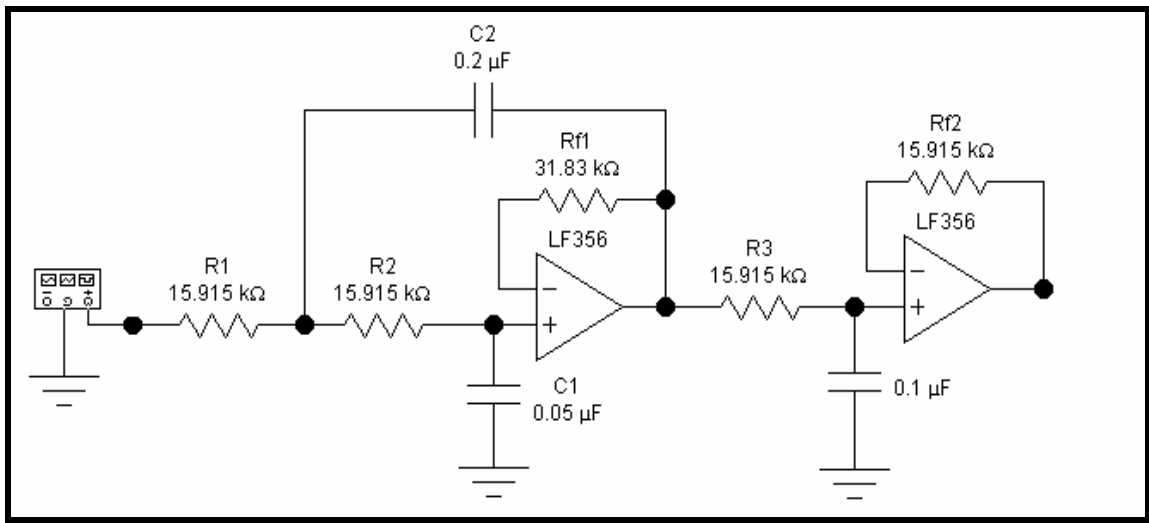
Pasaaltas $f_l=0.1\text{Hz}$

- $C_3 = 10\mu F$
- $f_c = 0.1\text{Hz}$
- $R_3 = \frac{1}{2\pi f_c C} = 159.154k\Omega$
- $R_2 = \frac{159.154k\Omega}{2} = 79.57k\Omega$
- $R_1 = 318.308k\Omega$
- $R_{F1} = 318.308k\Omega$
 $R_{F2} = 159.154k\Omega$



FILTRO PASABAJAS CON $f_c=100\text{Hz}$

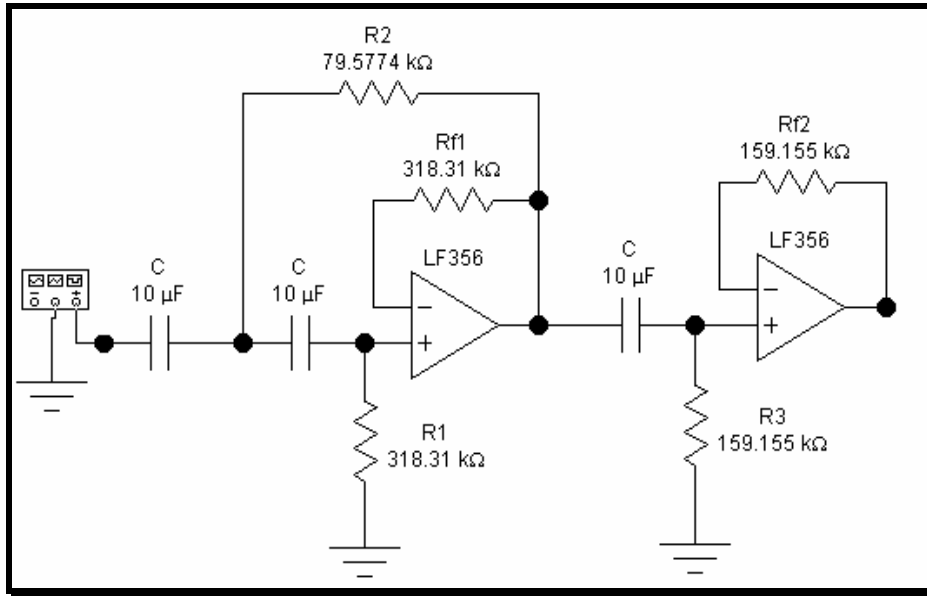
- Amplificador Operacional: LF356
- $C_3 = 0.1\mu F$
- $C_1 = \frac{C_3}{2} = 50000\text{pF} = 0.05\mu F$
- $C_2 = 2C_3 = 200000\text{pF} = 0.2\mu F$
- $R = \frac{1}{2\pi f_c C_3} = 15.915\text{k}\Omega$
- $R_{F1} = 2(15.915\text{k}\Omega) = 31.83\text{k}\Omega$
 $R_{F2} = 15.915\text{k}\Omega$



FILTRO PASAALTAS CON $f_c=0.1\text{Hz}$

- Amplificador Operacional: LF356
- $C = 10\mu F$

- c. $R_3 = \frac{1}{2\pi f_c C} = 159.1549k\Omega$
d. $R_1 = 2(159.1549k\Omega) = 318.3098k\Omega$
e. $R_2 = \frac{159.1549k\Omega}{2} = 79.5774k\Omega$
f. $R_{F1} = 318.3098k\Omega$
 $R_{F2} = 159.1549k\Omega$



FILTRO RECHAZA BANDA CON $f_r = 120\text{Hz}$ y $B = 6\text{Hz}$

- a. Amplificador Operacional: LF356
b. $f_l = \sqrt{\frac{B^2}{4} + f_r^2} - \frac{B}{2} = \sqrt{\frac{36}{4} + 120^2} - \frac{6}{2} = 117.04\text{Hz}$
 $B = f_H - f_L$
c. $f_H = B + f_L = 123.04\text{Hz}$
d. $C = 1\mu F$
e. $f_r = \sqrt{(123.04\text{Hz})(117.04\text{Hz})} = 120\text{Hz}$
f. $Q = \frac{120}{6} = 20$
g. $R = \frac{0.1591}{BC} = \frac{0.1591}{(6)(1\mu F)} = 26.517k\Omega$
h. $R_r = \frac{R}{2Q^2 - 1} = \frac{26.517k\Omega}{2(20)^2 - 1} = 33.19\Omega$

