Passive Crossovers Theories & Practice Reference Guide was written by Paul D. Vogt

IMPORTANT EQUATIONS

EQUATION FOR CAPACITIVE REACTANCE

$$Xc = \frac{1}{2\pi\, Fc\, R} \times 1{,}000{,}000$$

Xc = The value of capacitor required
$\pi = 3.14$
Fc = Your chosen crossover frequency
R = The impedance of the speaker

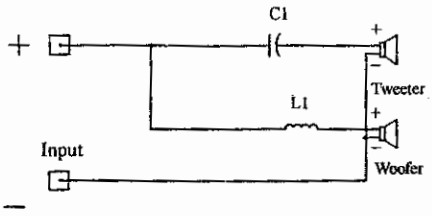
EQUATION FOR INDUCTIVE REACTANCE

$$XL = \frac{R}{(2\pi\, Fc)} \times 1{,}000$$

XL = The value of inductor required
$\pi = 3.14$
Fc = Your chosen crossover frequency
R = The impedance of the speaker

SCHEMATICS

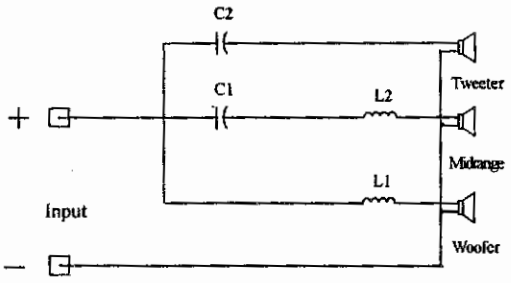
First order 2-way schematic



C_1 = Capacitor $\quad X_C = \frac{1}{2\pi F_c R} \times 1{,}000{,}000$

L_1 = coil, $\quad X_L = \frac{R}{(2\pi F_c)} \times 1{,}000$

First order 3-way schematic



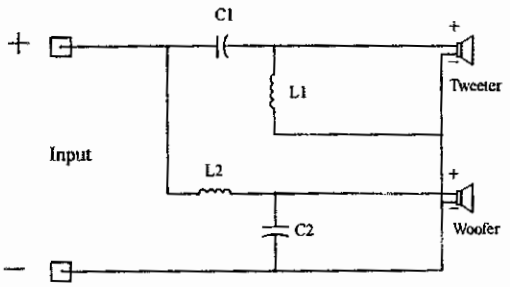
$L_1 = \frac{R}{(2\pi F_c)} \times 1{,}000$

$C_1 = \frac{1}{2\pi F_c R} \times 1{,}000{,}000$ at the same frequency as L_1

$C_2 = \frac{1}{2\pi F_c R} \times 1{,}000{,}000$

$L_2 = \frac{R}{(2\pi F_c)} \times 1{,}000$ at the same frequency as C_2

Second Order 2-way schematic

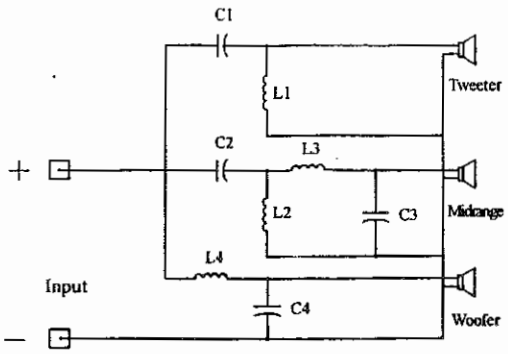


$C_1 = \frac{.1125}{R(F \times 1.3)} \times 1{,}000{,}000$ $\quad L_1 = \frac{.2251 \times R}{(F \times 1.3)} \times 1{,}000$

$C_2 = \frac{.1125}{R(F / 1.3)} \times 1{,}000{,}000$ $\quad L_2 = \frac{.2251 \times R}{R(F / 1.3)} \times 1{,}000$

C= capacitor, L = coil, R = impedance of speaker
F = chosen crossover frequency

Second order 3-way schematic



$$C_1 = \frac{.0791}{R_H \times F_H} \times 1{,}000{,}000 \qquad L_1 = \frac{.3202 \times R_H}{F_H} \times 1{,}000$$

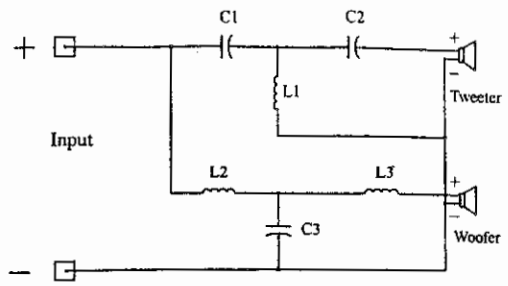
$$C_2 = \frac{.3236}{R_M \times F_M} \times 1{,}000{,}000 \qquad L_2 = \frac{1.0291 \times R_M}{F_M} \times 1{,}000$$

$$C_3 = \frac{.0227}{R_M \times F_M} \times 1{,}000{,}000 \qquad L_3 = \frac{.0837 \times R}{F_M} \times 1{,}000$$

$$C_4 = \frac{.0791}{R_L \times F_L} \times 1{,}000{,}000 \qquad L_4 = \frac{.3202 \times R}{F_L} \times 1{,}000$$

C= capacitor, L = coil
R_H = tweeter impedance
R_M = midrange impedance
R_L = woofer impedance,
F_H = the upper crossover frequency
F_L = the lower crossover frequency
F_M = square root of (F_H x F_L)

Third order 2-way schematic



$$C_1 = \frac{.1061}{R_H \times F} \times 1{,}000{,}000 \qquad L_1 = \frac{.1194 \times R_H}{F} \times 1{,}000$$

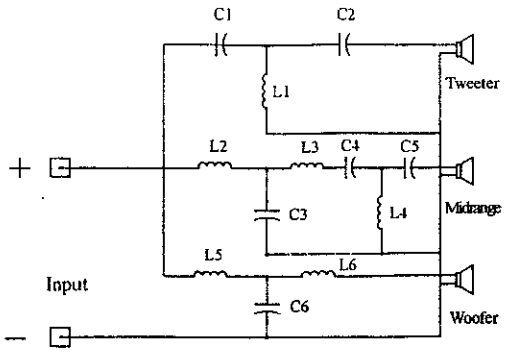
$$C_2 = \frac{.3183}{R_H \times F} \qquad L_2 = \frac{.2387 \times R_L}{F}$$

$$C_2 = \frac{.2122}{R_L \times F} \times 1{,}000{,}000 \qquad L_2 = \frac{.0796 \times R_L}{F_M} \times 1{,}000$$

$$C_3 = \quad \times 1{,}000{,}000 \qquad L_3 = \quad \times 1{,}000$$

C= capacitor
L = coil
R_H = tweeter impedence
R_L = woofer impedence,
F = your chosen crossover frequency

Third order 3-way schematic



$C_1 = \frac{.1158}{R_H \times F_H} \times 1{,}000{,}000 \quad L_1 = \frac{.1189 \times R}{F_H} \times 1{,}000$

$C_2 = \frac{.2927}{R_H \times F_H} \times 1{,}000{,}000 \quad L_2 = \frac{.0634 \times R}{F_M} \times 1{,}000$

$C_3 = \frac{.0884}{R_M \times F_M} \times 1{,}000{,}000 \quad L_3 = \frac{.0284 \times R}{F_M} \times 1{,}000$

$C_4 = \frac{.3112}{R_M \times F_M} \times 1{,}000{,}000 \quad L_4 = \frac{.3395 \times R}{F_M} \times 1{,}000$

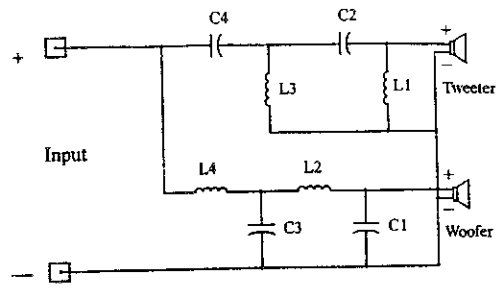
$C_5 = \frac{.9667}{R_M \times F_M} \times 1{,}000{,}000 \quad L_5 = \frac{.2187 \times R}{F_L} \times 1{,}000$

$C_6 = \frac{.2130}{R_L \times F_L} \times 1{,}000{,}000 \quad L_6 = \frac{.0866 \times R}{F_L} \times 1{,}000$

C= capacitor, L = coil, R_H = tweeter impedance,
R_M = midrange impedance, R_L = woofer impedance,

F_H = the upper crossover frequency, F_L = the lower crossover frequency, F_M = square root of (F_H x F_L)

Fourth order 2-way schematic



$C_1 = \frac{.1040}{R_H(F \times 1.13)} \times 1{,}000{,}000 \quad L_1 = \frac{.1009 \times R_H}{F \times 1.13} \times 1{,}000$

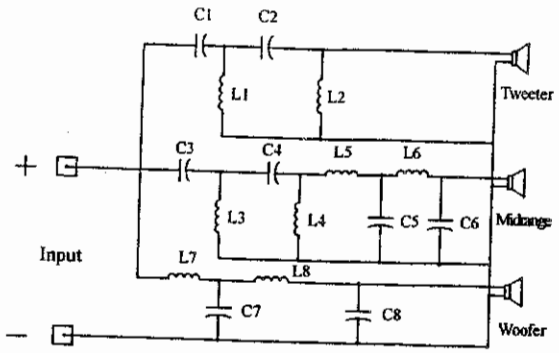
$C_2 = \frac{.1470}{R_H(F \times 1.13)} \times 1{,}000{,}000 \quad L_2 = \frac{.4159 \times R_H}{F \times 1.13} \times 1{,}000$

$C_3 = \frac{.2509}{R_L(F/1.13)} \times 1{,}000{,}000 \quad L_3 = \frac{.2437 \times R_L}{F/1.13} \times 1{,}000$

$C_4 = \frac{.0609}{R_L(F/1.13)} \times 1{,}000{,}000 \quad L_4 = \frac{.1723 \times R_L}{F/1.13} \times 1{,}000$

C= capacitor, L = coil
R_H = tweeter impedance
R_L = woofer impedance
F = your chosen crossover frequency

Fourth order 3-way schematic



$$C_1 = \frac{.0846}{R_H \times F_H} \times 1{,}000{,}000 \qquad L_1 = \frac{.1004 \times R_H}{F_H} \times 1{,}000$$

$$C_2 = \frac{.1686}{R_H \times F_H} \times 1{,}000{,}000 \qquad L_2 = \frac{.4469 \times R_H}{F_H} \times 1{,}000$$

$$C_3 = \frac{.3843}{R_M \times F_M} \times 1{,}000{,}000 \qquad L_3 = \frac{.2617 \times R_M}{F_M} \times 1{,}000$$

$$C_4 = \frac{.5834}{R_M \times F_M} \times 1{,}000{,}000 \qquad L_4 = \frac{1.423 \times R_M}{F_M} \times 1{,}000$$

$$C_5 = \frac{.0728}{R_M \times F_M} \times 1{,}000{,}000 \qquad L_5 = \frac{.0939 \times R_M}{F_M} \times 1{,}000$$

$$C_6 = \frac{.0162}{R_M \times F_M} \times 1{,}000{,}000 \qquad L_6 = \frac{.0445 \times R_M}{F_M} \times 1{,}000$$

$$C_7 = \frac{.2523}{R_L \times F_L} \times 1{,}000{,}000 \qquad L_7 = \frac{.2987 \times R_L}{F_L} \times 1{,}000$$

$$C_8 = \frac{.0567}{R_L \times F_L} \times 1{,}000{,}000 \qquad L_8 = \frac{.1502 \times R_L}{F_L} \times 1{,}000$$

C= capacitor, L = coil, R_H = tweeter impedance, R_M = midrange impedance, R_L = woofer impedance, F_H = upper crossover frequency, F_L = lower crossover frequency, F_M = square root (F_H x F_L)