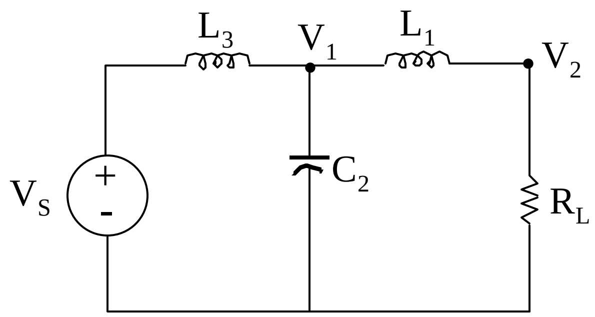
ELEN 458 (ESS)
FALL '99

Quiz #4

Key



$$I_3 = \frac{1}{sL_3}(V_s - V_1)$$

$$V_3' = I_3 R = \frac{1}{sL_3/R}(V_s - V_1) \qquad (1)$$

$$V_1 = \frac{1}{sC_2}(I_3 - I_1)$$

$$V_1 = \frac{1}{sC_2 R}(V_3' - V_1')$$

BUT

$$V_2 = I_1 R_L = I_1 R \frac{R_L}{R} = V_1' \frac{R_L}{R}$$

$$V_1' = \frac{R}{R_L} V_2$$

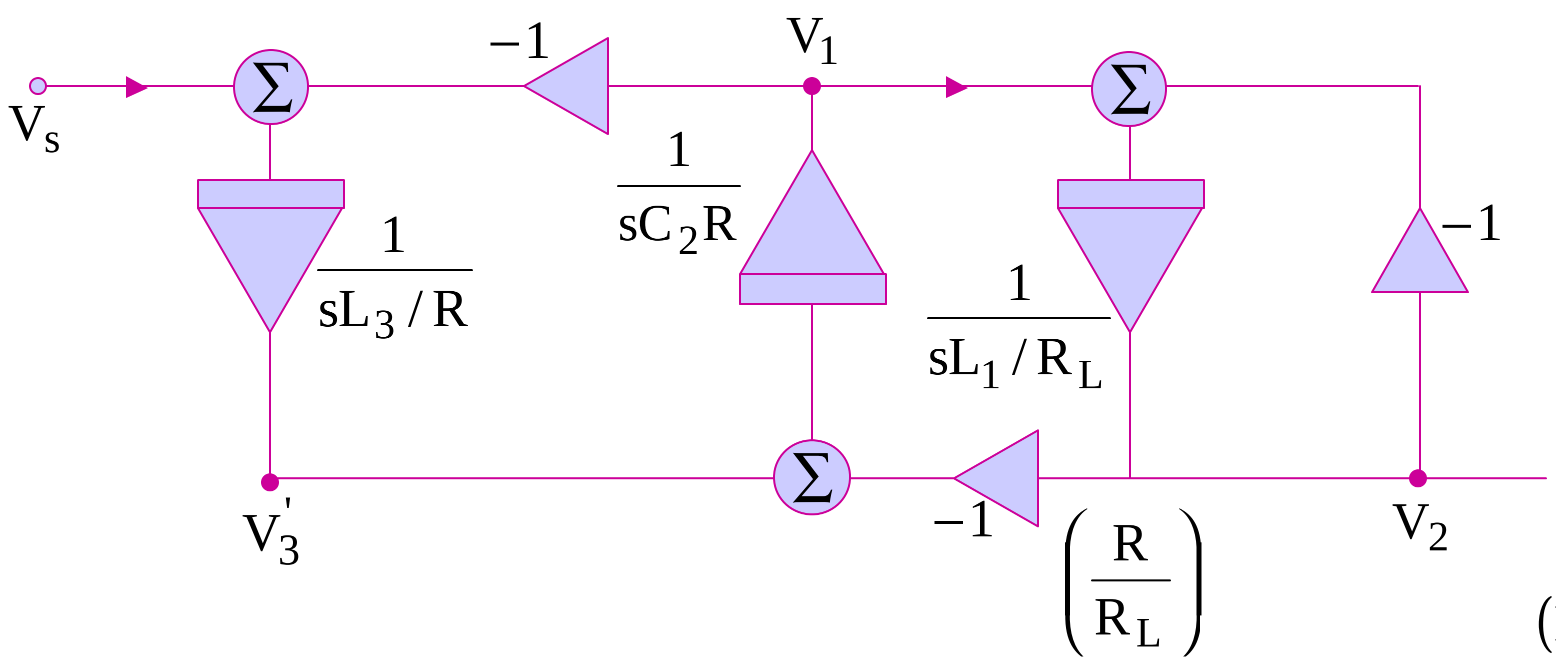
THUS

$$V_1 = \frac{1}{sC_2 R}(V_3' - \frac{R}{R_L} V_2) \qquad (2)$$

$$I_1 = \frac{1}{sL_1}(V_1 - V_2)$$

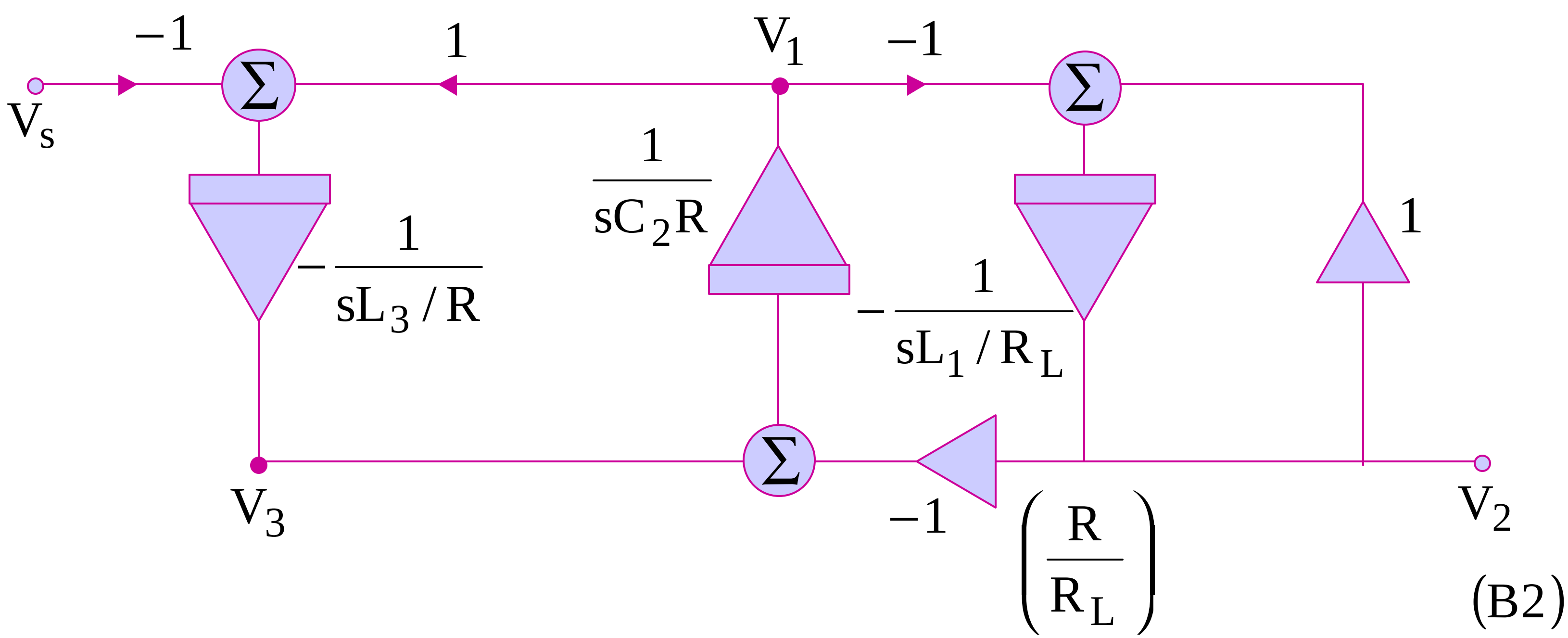
$$V_2 = R_L I_1 = \frac{1}{sL_1 / R_L}(V_1 - V_2) \qquad (3)$$

Implementing (1) - (3), The Block Diagram yields



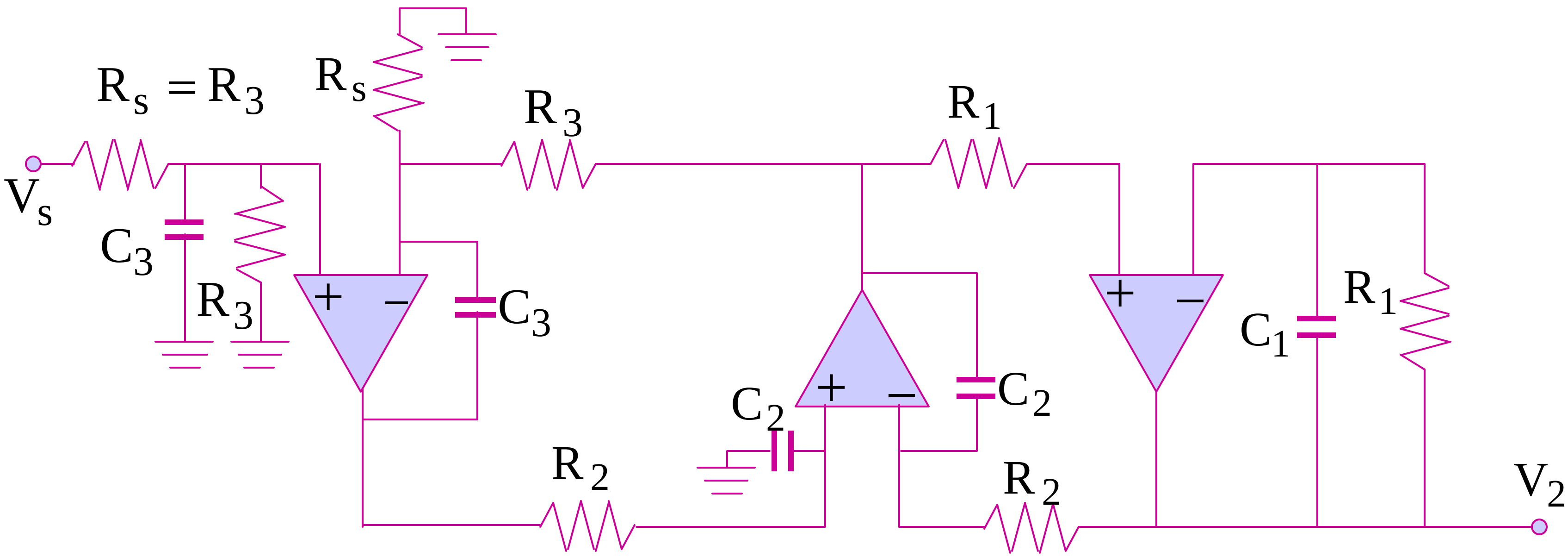
(B1)

Since we often prefer to use more inverting integrators, B1 can be modified as

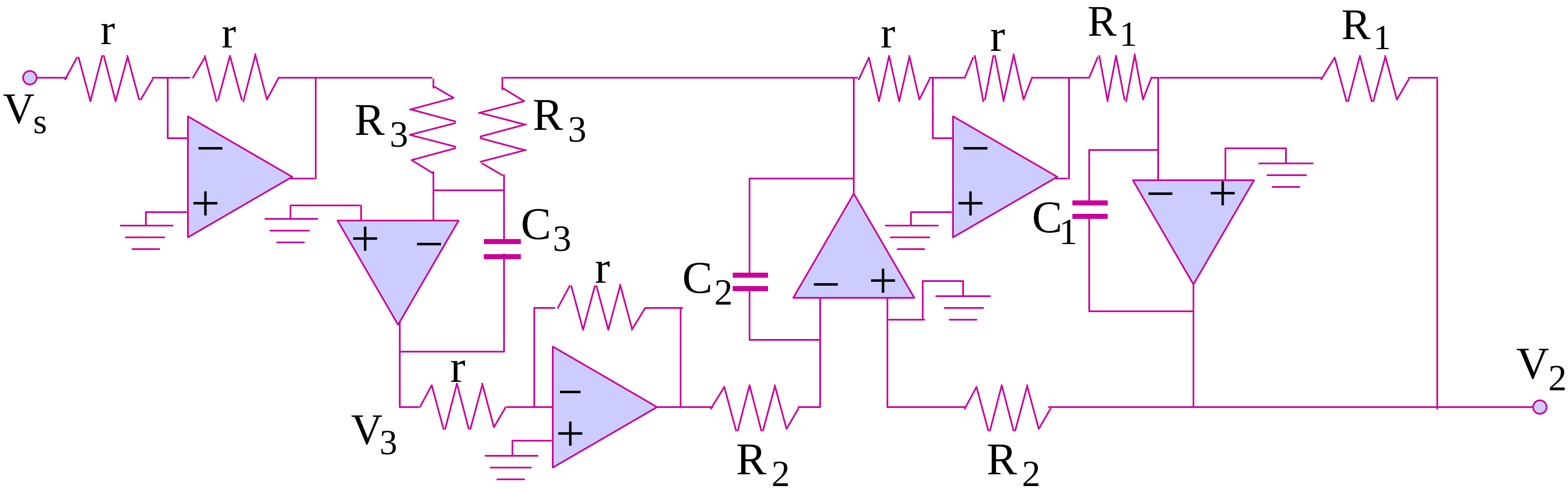


Note. That how the integrators alternate polorites and one is pointing up and another down.

The corresponding implementations are:



Circuit Implementation of B1 Using Fully Balanced Integrators.



Circuit Implementation of B2 With Only Inverting Configurations

MAKE FOR THE ACTUAL DESIGN

$$\frac{L_3}{R} = R_3 C_3$$

$$C_2 R_L = C_2 R_2$$

$$\frac{L_1}{R_L} = R_1 C_1$$