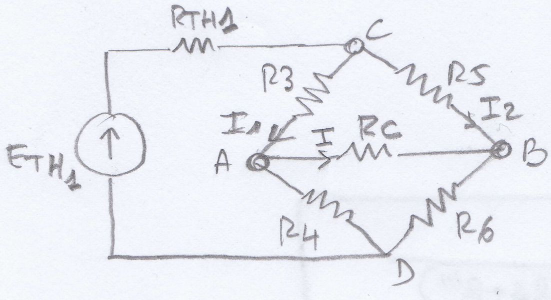


Recherche de I dans Rc

On cherche l'expression de U_{AB} lorsque Rc est débranchée

$\Rightarrow$ Recherche du modèle de THEVENIN en AB

On applique MILLMANN =

$$V_A = \frac{V_C R_4}{R_3+R_4} \qquad V_B = \frac{V_C R_6}{R_5+R_6}$$

$$V_C = \frac{\frac{E_{TH1}}{R_{TH1}} + \frac{V_C R_4}{R_3(R_3+R_4)} + \frac{V_C R_6}{(R_5+R_6)R_5}}{\frac{1}{R_{TH1}} + \frac{1}{R_3} + \frac{1}{R_5}} \Rightarrow V_C\left[\frac{1}{R_{TH1}} + \frac{1}{R_3} + \frac{1}{R_5} - \frac{R_4}{R_3(R_3+R_4)} - \frac{R_6}{R_5(R_5+R_6)}\right] = \frac{E_{TH1}}{R_{TH1}}$$

$$\Rightarrow V_C\left[\frac{R_3R_5(R_3+R_4)(R_5+R_6) + R_{TH1}R_5(R_3+R_4)(R_5+R_6) + R_{TH1}R_3(R_3+R_4)(R_5+R_6) - R_4R_{TH1}R_5(R_5+R_6) - R_6R_{TH1}R_3(R_3+R_4)}{R_{TH1}R_3R_5(R_3+R_4)(R_5+R_6)}\right] = \frac{E_{TH1}}{R_{TH1}}$$

$$\Rightarrow V_C = \frac{E_{TH1}R_3R_5(R_3+R_4)(R_5+R_6)}{(R_5+R_6)\left[R_3R_5(R_3+R_4) + R_{TH1}R_5R_3\right] + R_{TH1}R_5R_3(R_3+R_4)}$$

$$\text{d'où } V_A = \frac{E_{TH}\cancel{R_3R_5}(R_5+R_6)R_4}{(R_5+R_6)\left[\cancel{R_3R_5}(R_3+R_4) + R_{TH1}\cancel{R_5R_3}\right] + R_{TH1}\cancel{R_3R_5}(R_3+R_4)}$$

$$\Rightarrow \boxed{V_A = \frac{E_{TH1}(R_5+R_6)R_4}{(R_5+R_6)\left[(R_3+R_4)+R_{TH1}\right] + R_{TH1}(R_3+R_4)}}$$

on déduit

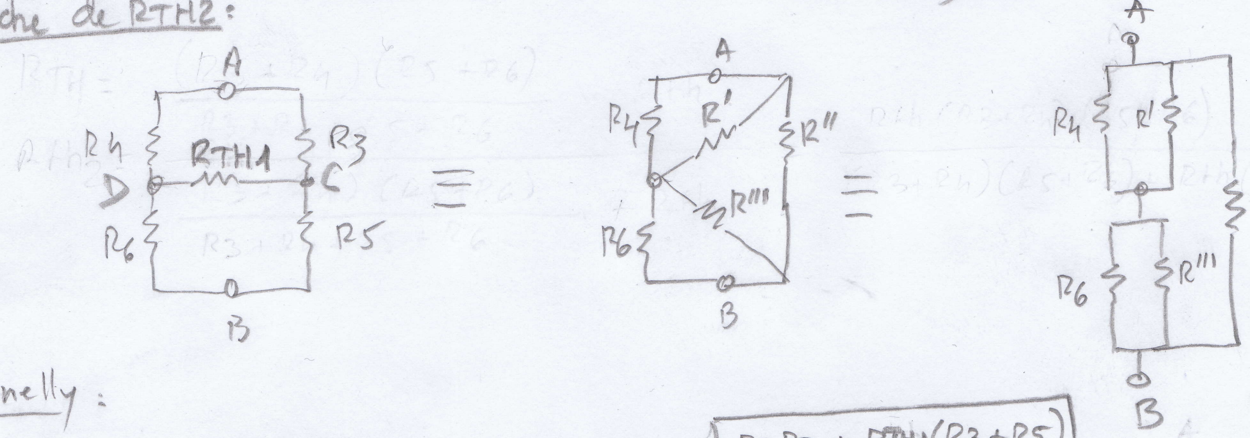
$$\boxed{V_B = \frac{E_{TH1}(R_3+R_4)R_6}{(R_5+R_6)\left[(R_3+R_4)+R_{TH1}\right] + R_{TH1}(R_3+R_4)}}$$

$$\Rightarrow V_A - V_B = \frac{E_{TH1}\left[R_5R_4 + \cancel{R_6R_4} - R_3R_6 - \cancel{R_4R_6}\right]}{(R_5+R_6)(R_3+R_4+R_{TH1}) + R_{TH1}(R_3+R_4)}$$

$$\Rightarrow \boxed{(V_A - V_B)_0 = \frac{E_{TH1}(R_5R_4 - R_3R_6)}{(R_5+R_6)(R_3+R_4+R_{TH1}) + R_{TH1}(R_3+R_4)}}$$

$$ETH2 = (U_{AB})_0 = \boxed{\frac{ETH1\,(R5R4 - R3R6)}{(R5+R6)(R3+R4+RTH1) + RTH1(R3+R4)}}$$

Recherche de RTH2 :



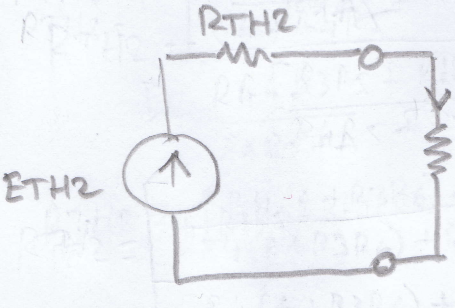
→ Kennelly :

$$\begin{cases} R' = \dfrac{R3R5 + R5RTH1 + RTH1\,R3}{R5} = \boxed{\dfrac{R3R5 + RTH1(R3+R5)}{R5}} \\[2ex] R'' = \dfrac{R3R5 + R5RTH1 + RTH1R3}{RTH1} = \boxed{\dfrac{R3R5 + RTH1(R3+R5)}{RTH1}} \\[2ex] R''' = \dfrac{R3R5 + R5RTH1 + RTH1\,R3}{R3} = \boxed{\dfrac{R3R5 + RTH1(R3+R5)}{R3}} \end{cases}$$

Soit $RTH2 = \left[(R4 /\!/ R') + (R6 /\!/ R''')\right] /\!/ R''$

$$\Rightarrow RTH2 = \frac{\left[\dfrac{R4R'}{R4+R'} + \dfrac{R6R'''}{R6+R'''}\right] \times R''}{\dfrac{R4R'}{R4+R'} + \dfrac{R6R'''}{R6+R'''} + R''}$$

$$\boxed{RTH2 = \frac{\left[R4R'(R6+R''') + R6R'''(R4+R')\right]R''}{R4R'(R6+R''') + R6R'''(R4+R') + R''(R4+R')(R6+R''')}}$$



$$\boxed{I = \frac{R_C\ ETH2(R5R4 - R3R6)}{R_C + RTH2}}$$