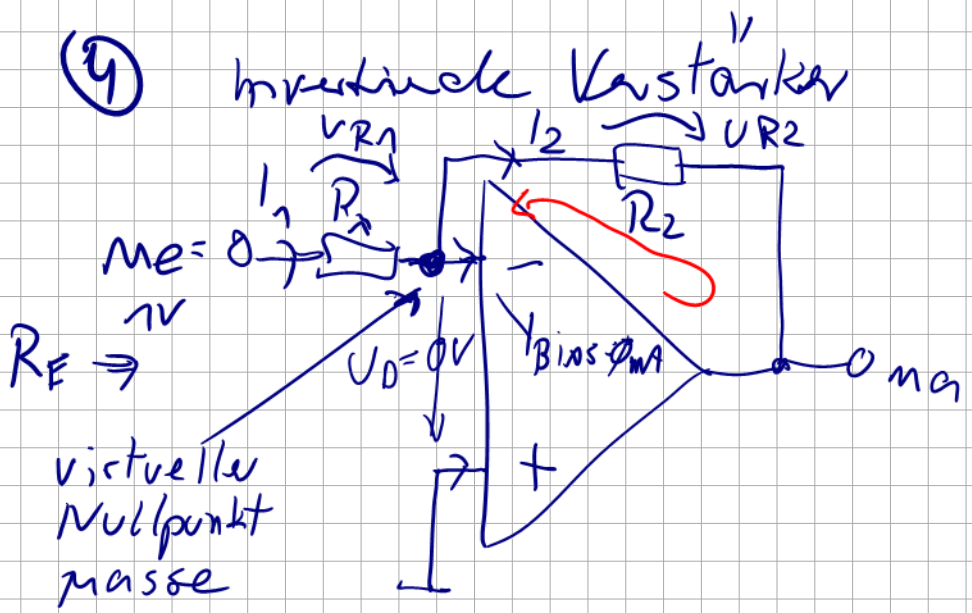
# AE-T1

9.6.2020
B. Re

## ④ Invertierender Verstärker




$$I_1 = \frac{U_e}{R_1}$$

$$R_1 = R_E$$

$$U_E = U_{R1}$$

$$I_E = I_1 = -I_2$$

$$U_A = U_{R2}$$

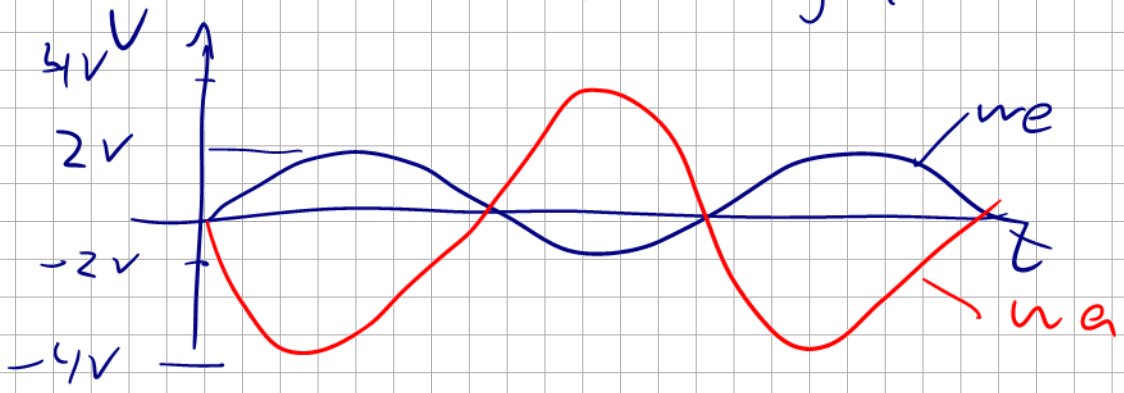
$$\frac{U_A}{U_E} = \frac{U_{R2}}{U_{R1}} = \frac{R_2 \cdot (-I_2)}{R_1 \cdot I_1} = -\frac{R_2}{R_1}$$

$$\boxed{U_A = -U_E \cdot \frac{R_2}{R_1}}$$

Verstärkungsfaktor

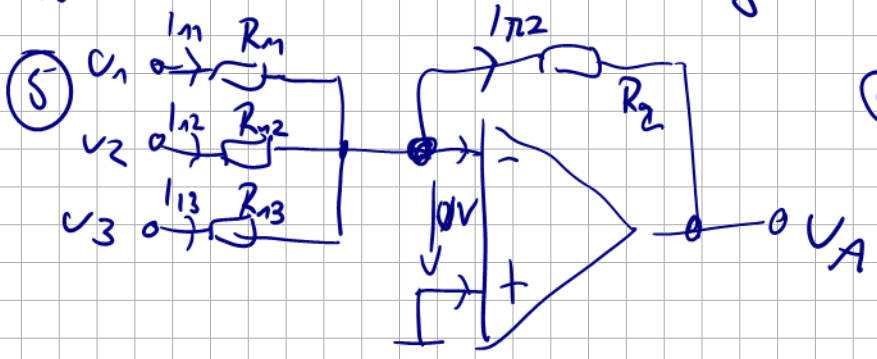
Bsp. $R_2 = 22k$, $R_1 = 10K$

$V = 2{,}2$



# AE-T1

## Weitere Grundschaltungen




⑥ $I_{R2} = -(I_{R1} + I_{R12} + I_{R13})$

$U_A = U_{R2}$

$U_1 = U_{R11}$

$U_2 = U_{R22}$

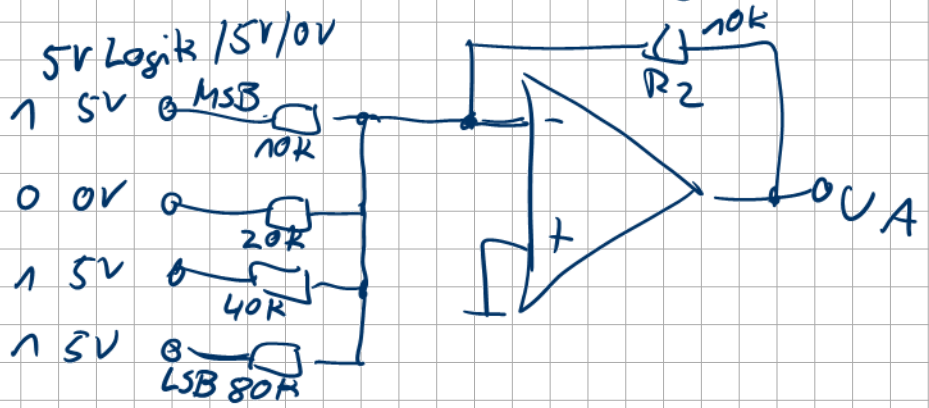
$U_3 = U_{R33}$

in ⑥ $\frac{U_A}{R_2} = -\left(\frac{U_1}{R_{R1}} + \frac{U_2}{R_{R12}} + \frac{U_3}{R_{R13}}\right) \Rightarrow U_A = -R_2\left(\frac{U_1}{R_{R1}} + \frac{U_2}{R_{R12}} + \frac{U_3}{R_{R13}}\right)$

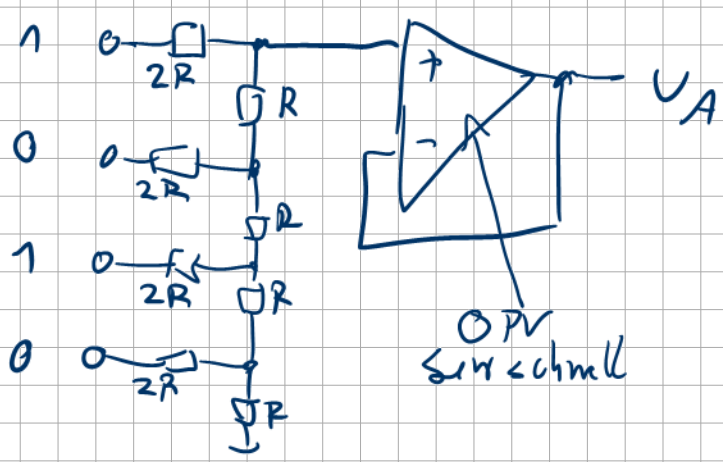
Alle R gleich groß: $\boxed{U_A = -(U_1 + U_2 + U_3)}$

Umkehr addierer

Bsp. "gewichtete" Eingangswiderstände



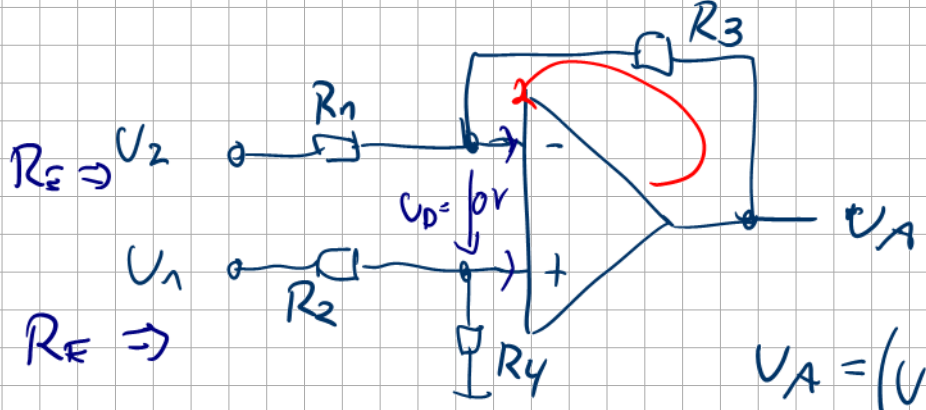

D / A Wandler




D / A Wandler

# AE-T1

⑥




Differenzverstärker

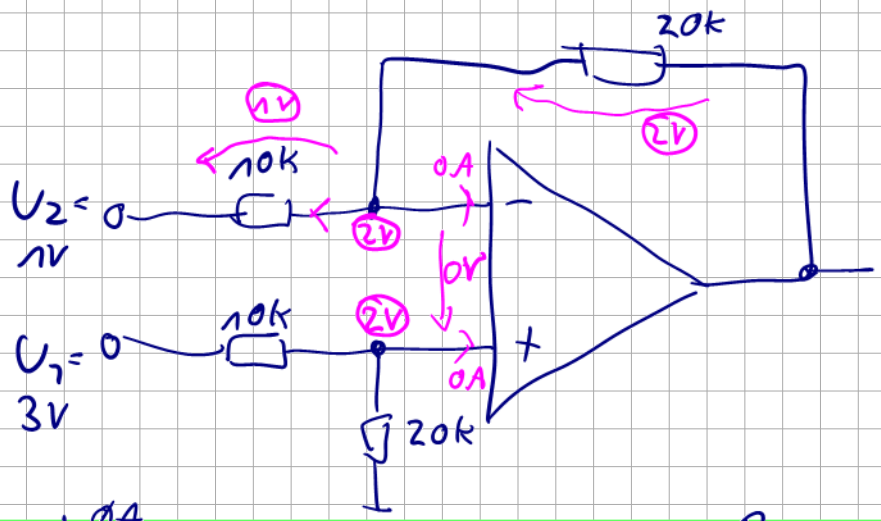
$$U_A = \left(U_1 \frac{R_1+R_3}{R_2+R_4} \cdot \frac{R_4}{R_1} - U_2 \frac{R_3}{R_1}\right)$$

alle R's gleich groß sind $\boxed{U_A = U_1 - U_2}$

$R_1 = R_2$ und $R_3 = R_4$
(paarweise gleich groß)

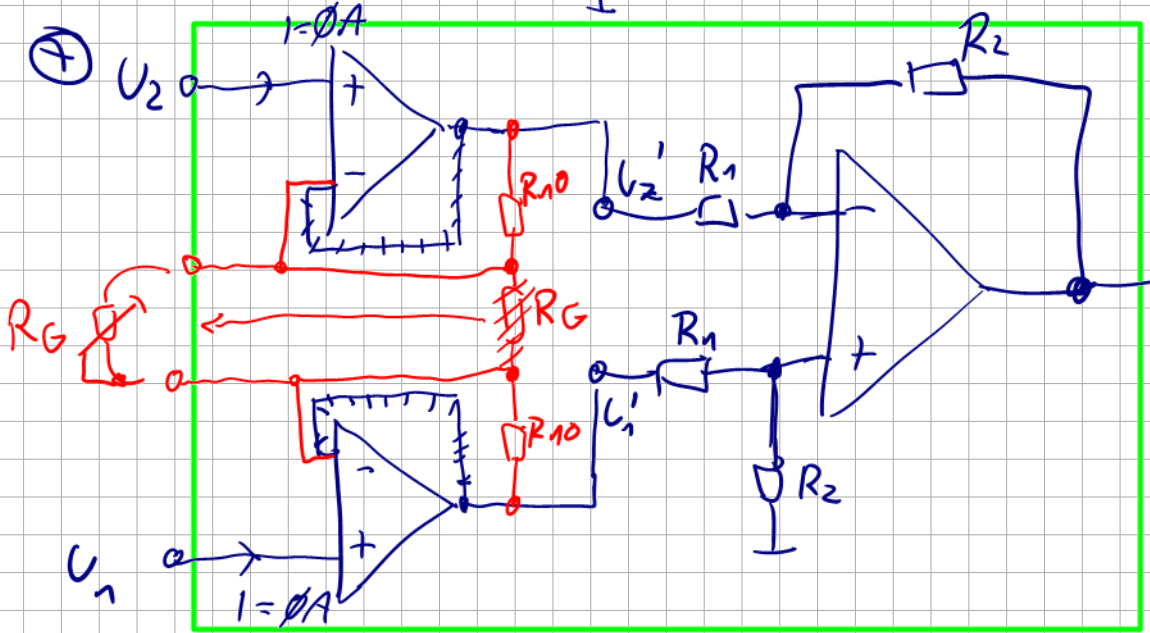
$$\boxed{U_A = \frac{R_3}{R_1}(U_1 - U_2)}$$

$R_E$ sehr klein, wird bestimmt durch $R_1$, $R_2$, $R_4$




$U_A = 2 \cdot (3V - 1V) = 4V$

⑦




"Abwandlung" d. Differenzverstärkers

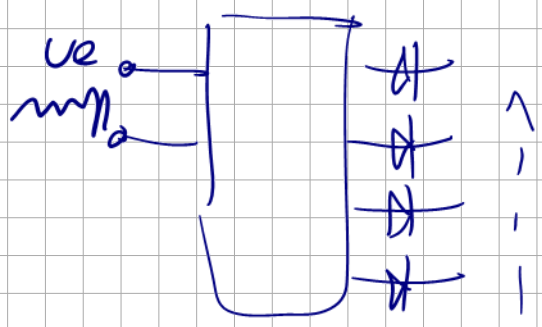
Instrumentationsverstärker

INA 333
AD 620

AE - T1

Komparator anwendung

1) Aussteuerungsanzeige




2)