Operationsverstärker

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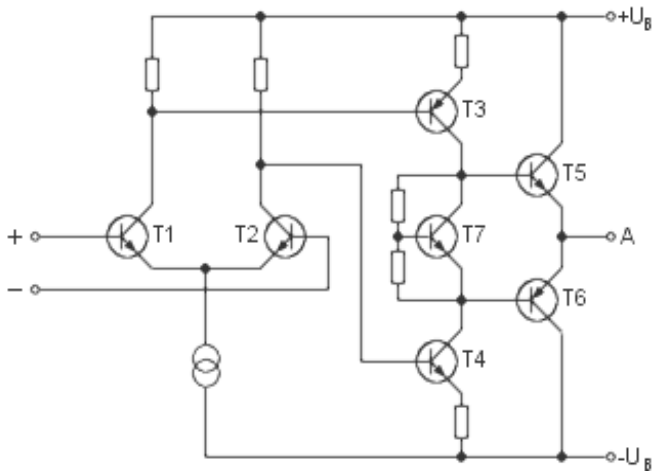
Projektlabor 2006

1)Aufbau:



- Prinzipieller Aufbau: Differenzverstärker => Koppelstufe => Leistungsendstufe

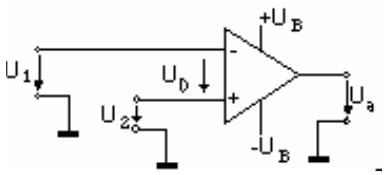
2) Kennwerte: (idealer OPV)

- Eingangswiderstand re = unendlich
- Ausgangswiderstand ra = 0
- Verstärkung u= unendlich , sie ist frequenzunabhängig.

3)Beschaltung des OPVs :

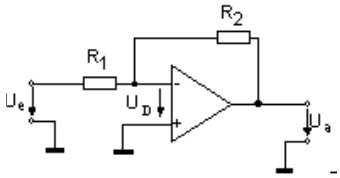
a)Komparator:

$$U_a = \begin{cases} +U_B : U_1 < U_2 \\ -U_B : U_1 > U_2 \end{cases}$$



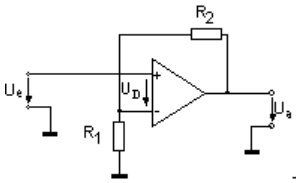
b) invertierender Verstärker:

$$v = -\frac{R_2}{R_1} = -\frac{U_a}{U_e}$$



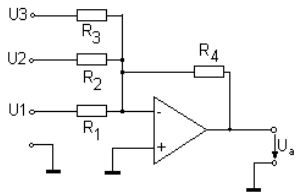
c) nicht invertierender Verstärker:

$$v = 1 + \frac{R_2}{R_1} \qquad U_a = U_e \cdot \left(1 + \frac{R_2}{R_1}\right)$$



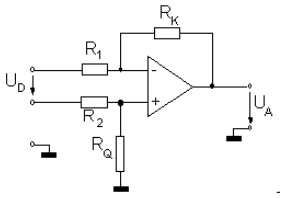
d) Addierer:

$$U_a = -R_4 \cdot \left(\frac{U_1}{R_1} + \frac{U_2}{R_2} + \frac{U_3}{R_3}\right)$$



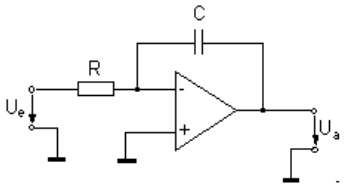
e) Substrahierer:

$$\frac{R_1}{R_2} = \frac{R_K}{R_Q} \qquad U_a = \frac{R_K}{R_1} \cdot U_D$$



f) Integrierer:

$$U_a = -\frac{1}{R \cdot C} \cdot \int_0^t U_e \, dt$$



g) Differenzierer:

$$U_a = -R \cdot C \cdot \frac{dU_e}{dt}$$