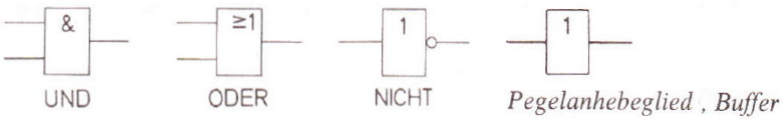
2.2 Schaltalgebra

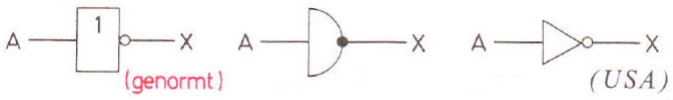
2.2.1 Logische Grundverknüpfungen



Verneinung (Negation), NICHT (NOT) Glied, Inverter

A	X
1	0
0	1

$$X = \overline{A}$$

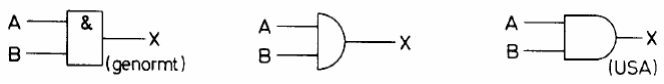


UND (AND) – Verknüpfung (Konjunktion)

B	A	X
0	0	0
0	1	0
1	0	0
1	1	1

$$X = A \wedge B$$

$$X = A \cdot B \qquad X = A \,\&\, B$$

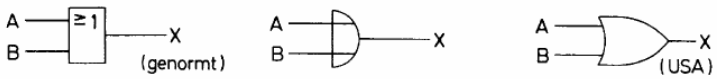


ODER (OR) – Verknüpfung (Disjunktion)

B	A	X
0	0	0
0	1	1
1	0	1
1	1	1

$$X = A \vee B$$

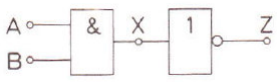
$$X = A + B$$

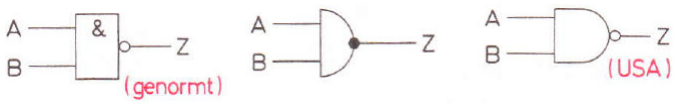


2.2.2 Zusammengesetzte Glieder: NAND

B	A	X	Z
0	0	0	1
0	1	0	1
1	0	0	1
1	1	1	0

$$Z = \overline{A \wedge B}$$

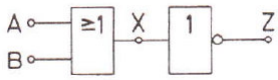


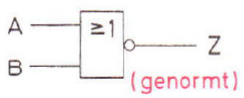


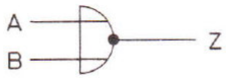
Zusammengesetzte Glieder: NOR

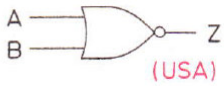
B	A	X	Z
0	0	0	1
0	1	1	0
1	0	1	0
1	1	1	0

$Z = \overline{A \vee B}$





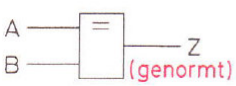


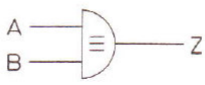


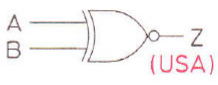
Zusammengesetzte Glieder: Äquivalenz - Glied

B	A	Z
0	0	1
0	1	0
1	0	0
1	1	1

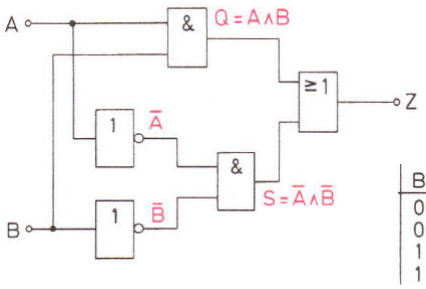
$Z = (A \wedge B) \vee (\overline{A} \wedge \overline{B})$







Zusammengesetzte Glieder: Äquivalenz



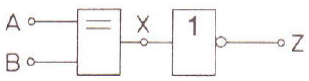
B	A	B̄	Ā	Q = A∧B	S = Ā∧B̄	Z = Q∨S
0	0	1	1	0	1	1
0	1	1	0	0	0	0
1	0	0	1	0	0	0
1	1	0	0	1	0	1

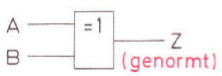
Zusammengesetzte Glieder Antivalenz

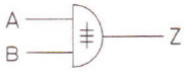
- XOR, Exklusiv Oder

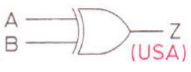
B	A	X	Z
0	0	1	0
0	1	0	1
1	0	0	1
1	1	1	0

$$Z = \overline{(A \wedge B) \vee (\overline{A} \wedge \overline{B})}$$

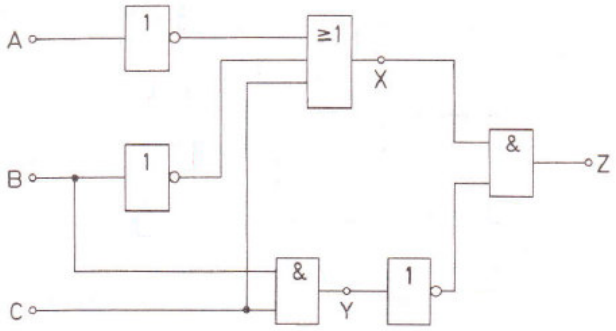








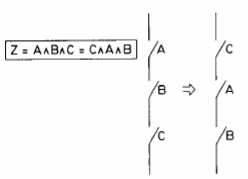
2.2.3 Schaltungsanalyse



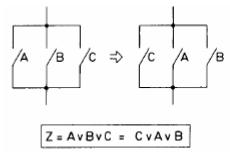
Schaltungsanalyse

- Funktionsgleichung
- Wahrheitstabelle

2.3 Rechenregeln der Schaltalgebra (Kommutativgesetz)

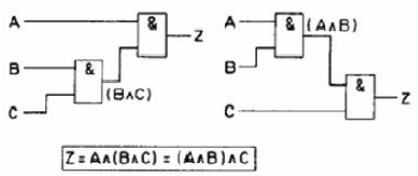


Kommutativgesetz der UND-Verknüpfung

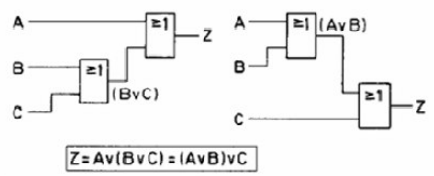


Kommutativgesetz der ODER-Verknüpfung

Rechenregeln der Schaltalgebra (Assoziativgesetz)

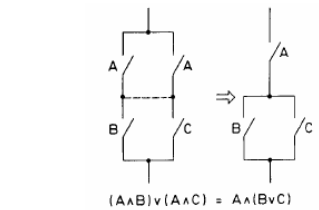


Assoziativgesetz der UND-Verknüpfung

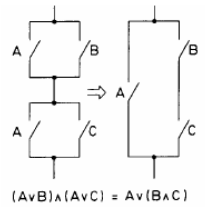


Assoziativgesetz der ODER-Verknüpfung

Rechenregeln der Schaltalgebra (Distributivgesetz)



Distributivgesetzgesetz der UND-Verknüpfung



Distributivgesetz der ODER-Verknüpfung

Rechenregeln der Schaltalgebra (Morgan)

- 1. Morgansches Gesetz

$$Z = \overline{\overline{A} \wedge \overline{B}} = \overline{A} \vee \overline{B}$$

- 2. Morgansches Gesetz

$$Z = \overline{\overline{A} \vee \overline{B}} = \overline{A} \wedge \overline{B}$$