RC doc: VB200
Author: Allan Giese
Edited: May 1968

RC STANDARD

FOR GRAPHICAL SYMBOLS FOR LOGIC DIAGRAMS

ABSTRACT.
This RC Standard sets forth the principles governing the formation of graphical symbols for logic diagrams.

A/S REGNECENTRALEN
Falkoneralle 1,
Copenhagen, F.

RC STANDARD FOR GRAPHICAL SYMBOLS FOR LOGIC DIAGRAMS

Contents:

1. INTRODUCTION 3
2. DEFINITIONS FOR THE RC STANDARD 3
3. LIST OF DISTINCTIVE SHAPE SYMBOLS 4
4. LIST OF NON-DISTINCTIVE SHAPE SYMBOLS 8

Note:

This publication (VB200) is a major revision of and makes obsolete the previous edition (VB157).

1. INTRODUCTION.

This RC Standard represents the progress made to date in evolving graphical symbols for use in preparation of logic diagrams. The RC Standard is very similar to the standard found in the report:

American Standard for Graphical Symbols for Logic Diagrams, Y32.14, published by American Institute of Electrical Engineers (AIEE).

Specific restrictions due to paper formats, reproduction techniques, etc. are not considered in this Standard.

A logic diagram depicts by logic symbols, and supplementary notations the details of signal flow and control including the point-to-point wiring in a system of two-state devices. The diagram must therefore depict all logic functions and also show non-logic functions, board locations, pin numbers, and other physical elements necessary to describe the physical and electrical aspects of the logic.

2. DEFINITIONS FOR THE RC STANDARD.

2.1. Logic Functions.

A logic function is a combinational, storage, delay, or sequential function expressing a relationship between signal input(s) to a system or device and the resultant output(s).

2.2. Symbols.

A symbol is a graphical representation in diagrammatic form of a logic function, or a non-logic function.

2.3. Distinctive Shape Logic Symbols.

A distinctive shape logic symbol is a symbol with a distinctive shape representing a logic function.

2.4. Distinctive Shape Non-Logic Symbols.

A distinctive shape non-logic symbol is a symbol with a distinctive shape representing a non-logic function.

2.5. Non-Distinctive Shape Symbols.

A non-distinctive shape symbol is a symbol represented by a rectangle, within which an internal label denotes the function.

2.6. States in Binary Logic.

The two physical states on each terminal of each signal line shall be referred to as the 1-state and the 0-state.

2.7. Logic Representation.

In a logic diagram of a system where the more positive potential (current) is consistently selected as the 1-state, the system is said to have positive logic (high logic). If the less positive potential (current) is consistently selected as the 1-state, the system is said to have negative logic (low logic).

This RC Standard requires that only positive logic is employed on logic diagrams. Hence all symbols are defined with respect to positive logic.

2.8. Descriptors and Logic Expressions.

If lines are labeled with descriptors or logic expressions formed by descriptors, they apply to the 1-state.

2.9. Presentation Techniques.

The orientation, the line thickness, or the size of the symbols does not affect the meaning of the symbols.

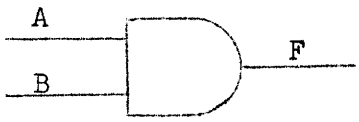
3. LIST OF DISTINCTIVE SHAPE SYMBOLS.

The commonly used logic functions are represented with distinctive symbols as it appears from this list.

3.1. Symbol for AND.



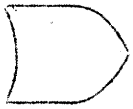
Example.



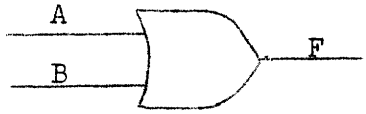
INPUT	OUTPUT
A B	F
0 0	0
0 1	0
1 0	0
1 1	1

$F := A \wedge B$

3.2. Symbol for OR.



Example.



INPUT	OUTPUT
A B	F
0 0	0
0 1	1
1 0	1
1 1	1

$F := A \vee B$

3.3. Symbol for Logic Negation.

This symbol should only occur adjacent to other symbols.

3.4. Symbol for 1-State Generator.



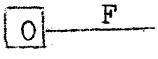
Example. F:= 1



3.5. Symbol for 0-State Generator.



Example. F:= 0



3.6. Symbol for Wired AND and OR.



Where circuits have the capability of being combined according to the AND or OR function, simply by having the outputs connected that capability shall be shown by enveloping the branched connection with a smaller sized AND or OR symbol.

3.7. Symbol for Time Delay.

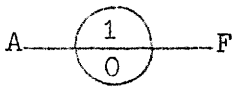
Example.



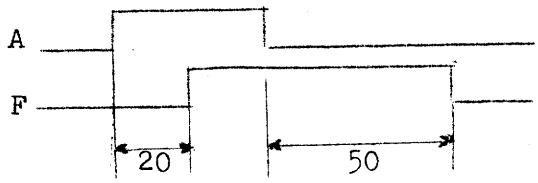
The output signal F is statically equal to the input signal A. When A changes from the 0-state to the 1-state, F is delayed the time T_1 with respect to A. When A changes from the 1-state to the 0-state, F is delayed the time T_0 with respect to A.

The 1-state signal is not delayed if the internal number 1 is omitted from the symbol; an equivalent rule is naturally valid for the 0-state.

T_1= 20 ns



T_0= 50 ns



3.8. Symbol for Amplifier.



This symbol represents a linear or nonlinear current or voltage amplifier. This amplifier may have one or more stages and may or may not produce gain.

Example.



INPUT	OUTPUT
A	F
0	0
1	1

3.9. Symbol for Oscillator.



The internal figure in the circle shows the wave-form

3.10. Examples of Usage of Negation Symbol.

3.10.1. Symbol for Logic Inverter.

Example.



INPUT	OUTPUT
A	F
0	1
1	0

F:= $\neg$,A

3.10.2. Symbol for NAND.

Example.



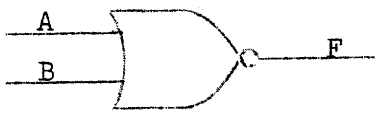
INPUT	OUTPUT
A B	F
0 0	1
0 1	1
1 0	1
1 1	0

F:= $\neg$,(A $\wedge$ B)

or F:= $\neg$,A $\vee$ $\neg$,B

3.10.3. Symbol for NOR.

Example.



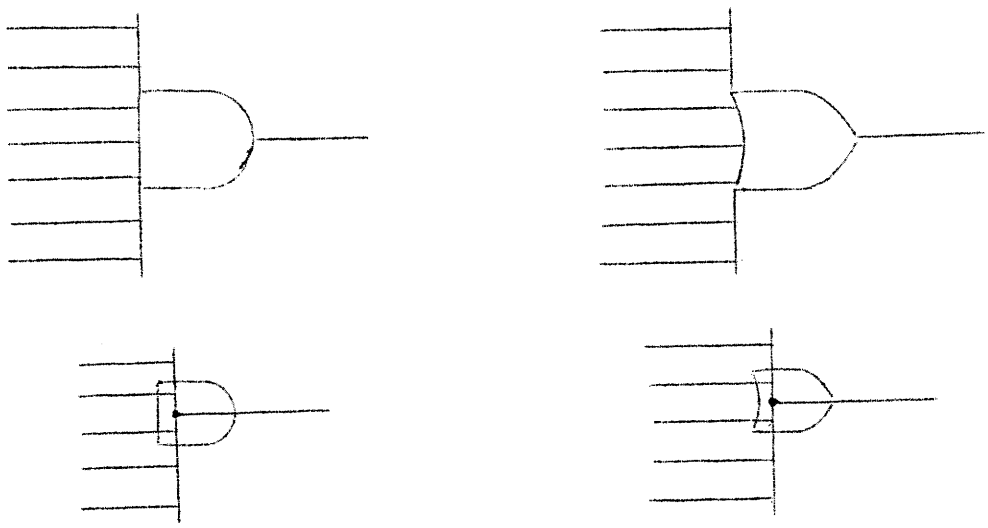
INPUT	OUTPUT
A B	F
0 0	1
0 1	0
1 0	0
1 1	0

F:= $\neg$,(A $\vee$ B)

or F:= $\neg$,A $\wedge$ $\neg$,B

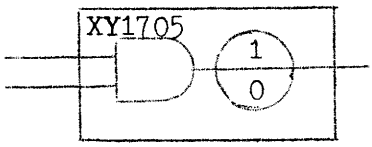
3.11. Multiple Inputs.

To accommodate the symbols for multiple inputs, the input side of the distinctive shape symbols for AND and OR shall be extended as follows:



4. LIST OF NON-DISTINCTIVE SHAPE SYMBOLS.

This category comprises logic and non-logic functions which are depict by rectangles. The symbol shall be adequately labeled to identify the function performed. Notice that distinctive symbols may be part of the label.



4.1. Bistable Elements.

A bistable element or binary storage element is a device that stores a single bit of information. The bistable element has two possible outputs, 1 and 0.

There are several possible versions of bistable elements of which the most commonly used are S-R bistables and J-K bistables.

4.2. Letter Combinations.

The following letter combinations may be used to denote special properties.

C Control signal that controls the data input to a bistable element, which operates in asynchronous mode.

D Data input.

G Gate control signal that selects one out of several data inputs. For bistable elements, G is used in connection with synchronous operation.

J Input J to a J-K bistable.

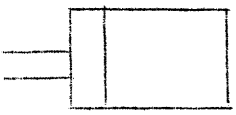
K Input K to a J-K bistable.

R Input R (reset) to a R-S bistable.

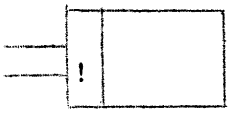
S Input S (set) to a R-S bistable.

T Trigger, toggle, or clock pulse input to a bistable.

4.3. Graphical Symbols within Non-Distinctive Shape Symbols.



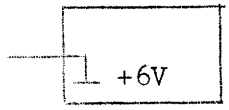
The small box at the left in the rectangle denotes a logical multiplication of the two incomming signals.



The small box at the left in the rectangle denotes a logical addition of the two incomming signals.



0 volt supply.



6 volt supply.