LOGIC GATES

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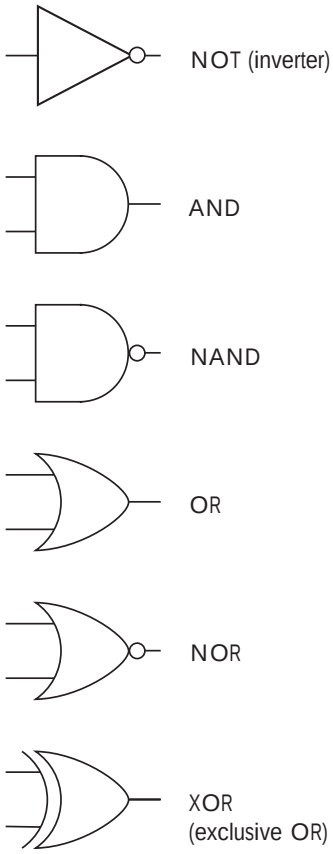
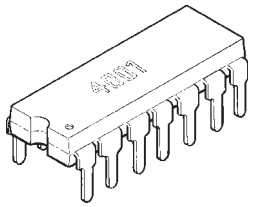
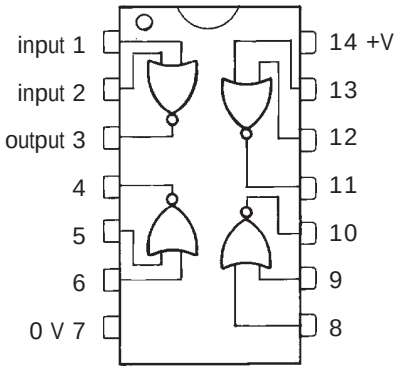


WHAT IT LOOKS LIKE





IC 4001

WHAT IT'S USED FOR

In digital circuits:

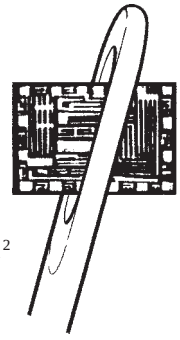
- Where the output of a circuit depends on more than one thing happening on the input.
- To control the flow of data from one part of a circuit to another. Logic gates are circuits which have a logical function such as: AND, OR, NAND, NOR, NOT.

e.g. A drilling machine will only operate (output), if it is switched on (input), AND the guard is in place (input).

WHAT IT'S MADE OF

The integrated circuit (IC) is a silicon chip in a plastic package. It can have 8 or 14 pins depending on the number of logic gates on the chip. In general, logic gate ICs belong to one of two logic families:

- TTL (transistor-transistor logic) which uses junction transistors.
- CMOS (complimentary metal oxide semi-conductor) which uses FET's.



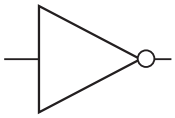
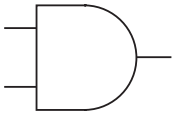
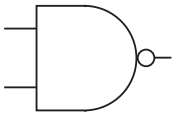
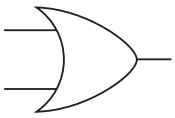
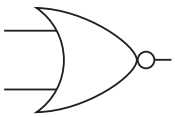
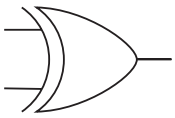
The silicon chip is normally no bigger than 0.2 mm^2 small enough to pass through the eye of a needle!

HOW YOU USE IT

Logic gates are digital devices and their inputs and outputs are always represented as 0 or 1. The input or output is 1 when the voltage on it is high or 0 when the voltage is low (approx. 0 V)

The action of a logic gate is shown by a **Truth Table** in which outputs for particular patterns of inputs are defined.

Logic gates and their truth tables

Logic gate	Symbol	Truth table			IC number	
		Inputs A	B	Output X	TTL	CMOS
NOT (Inverter)		0 1		1 0	7404	4049B
AND		0 0 1 1	0 1 0 1	0 0 0 1	7408	4081
NAND		0 0 1 1	0 1 0 1	1 1 1 0	7400	4011B
OR		0 0 1 1	0 1 0 1	0 1 1 1	7432	4071B
NOR		0 0 1 1	0 1 0 1	1 0 0 0	7402	4001B
XOR (Exclusive OR)		0 0 1 1	0 1 0 1	0 1 1 0	7484	4070B

NOTES

- All the integrated circuits in the table contain four gates, each with two inputs, except for the 7404 4099B which have six gates each with a single input
- A small circle on the output of a gate symbol shows an inversion