







## Logic Gates

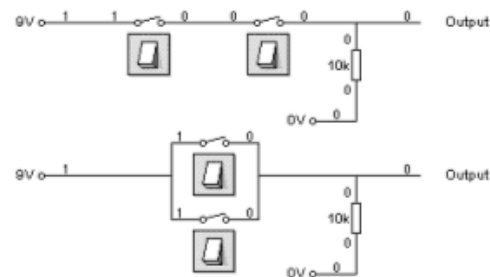
And gate		Nand gate (Schmitt)	
Or gate		Nor gate	
Not gate		Xor gate	

Logic gates are used to combine two or more inputs to a processing subsystem. These inputs will normally be from digital inputs; these have clearly distinguishable high and low levels. Any analog inputs (vary continuously over the whole voltage range) will need to be converted to digital by using a comparator or other adc (analog to digital converter).

X	Y	X AND Y	X OR Y	X XOR Y	X NAND Y	X NOR Y	NOT X
0	0	0	0	0	1	1	1
0	1	0	1	1	1	0	1
1	0	0	1	1	1	0	0
1	1	1	1	0	0	1	0

The table above is a multiple truth table showing the results of 6 different logical operations on the two inputs X and Y. In practice, X and Y could be two push switches in potential divider arrangements or the outputs from other logic gates. The table shows every possible combination of X and Y.

The diagram shows 2 logic gates formed out of switches. The first is an And gate; both switches have to be on to get a high output. The second is an Or gate. You can use switches and/or diodes to create logic gates but usually we use integrated circuits. These often have several gates per chip so it is convenient if we can make our logic system using only the same type of gate; usually Nand or Nor.



Gates can be combined to achieve a needed function. If we had a simple lock to a treasure chest with two push switches. To release the lock switch A must be pressed and switch B must not be pressed. The required function can clearly be obtained with A AND (NOT B) but you can see from the table that you could also use (NOT A) NOR B.

A	B	NOT B	A AND (NOT B)	NOT A	(NOT A) NOR B
0	0	1	0	1	0
0	1	0	0	1	0
1	0	1	1	0	1
1	1	0	0	0	0