

Electrical and Electronic Engineering

Digital

Introduction to Binary and Hexadecimal

Our number system **0,1,2,3,4,5,6,7,8,9** etc. Is a **base TEN** system,

This means that **EACH PLACE** can have **ten different symbols** inside of it

E.g. 1 to 9 and the tenth value is zero

Binary is the same only in each space it can **only have two** different values 0 and 1 making it **BASE TWO**, it is used in computing where a signal is only recognised as on or off. E.g 0 / 5V

This means that once we want to express a value higher than 1 we need another space just like we need another space in our system to get a number higher than 9

So just like each space of a base 10 number holds powers of ten

eg $1840 = 1 * 10^3 + 8 * 10^2 + 4 * 10^1 + 0 * 10^0$

where: number in that space = number * base^{place}

Each space in a base two system works the same except where the ten is above there is a two

E.g FIVE = 101 = $1 * 2^2 + 0 * 2^1 + 1 * 2^0$

Number	Binary number
0	0
1	1
2	10
3	11
4	100
5	101

The table below shows the values on top of a **10 bit** binary number if the space has a one

502	256	128	64	32	16	8	4	2	1

E. g 100000101 = 502 + 0+0+0+0+0+0+ 4 +0+ 1 use this table to make any ten bit binary number.