Bcd (Binary Coded Decimal) Encyclopedia Article

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Bcd (Binary Coded Decimal)

BCD (binary coded decimal) is a system for converting ordinary decimal digits (the numbers 0-9) into 4-bit binary numbers. In BCD, each digit of a decimal number is coded separately as a 4-bit word (sometimes called a "nibble," since 8-bit words are called "bytes"). For ease of reading, these 4-bit groups are often displayed separated by spaces. The BCD format is founded on the binary number system, which is based on powers of 2; that is, the weights of the four **bit** positions in BCD, from right to left, are $2^0 = 1$, $2^1 = 2$, $2^2 = 4$, and $2^3 = 8$. BCD format is thus also denoted "8-4-2-1."

The BCD **code** is as follows: 0000 = 0, 0001 = 1, 0010 = 2, 0011 = 3, 0100 = 4, 0101 = 5, 0110 = 6, 0111 = 7, 1000 = 8, and 1001 = 9. The decimal number 271, for instance, is represented as 0010 0111 0001 in BCD. Note that the words 1010-1111 are unassigned, and that each BCD nibble encodes, by definition, for a single positive digit. This is because BCD is not a scheme for encoding numbers in general, but for encoding *digits*, which are the component symbols of larger numbers.

BCD is primarily used for encoding decimal numbers so that they can be transmitted within and between certain computing devices. The 4 bits of a BCD digit code may, for instance, be passed through a code converter to control a 7-segment digit display device of the type that hand calculators use to display individual digits. The fact that BCD only uses 10 of the 16 available 4-bit words is a form of built-in inefficiency; therefore, the numbers processed in a computer's **arithmetic-logic unit** are represented in more efficient formats such as two's-complement (for integers) or floating-point, not in BCD.