UNDERSTANDING DECIBELS (dB) WITHOUT A CALCULATOR

Here is a handy way to to work with dB's when figuring power comparisons, antenna gains or losses, or just brainstorming at your desk... without a calculator! I even find myself using this handy method during technical discussions in QSO, and all I need is a little scratch paper, a pencil, and this simple table that is easy to remember and reconstruct .

We will make a simple table of numbers by drawing a "T", making the tail rather long. Label the "T" above the crossbar with "dB" on the left , and "X" on the right. In the column under the "dB" side jot down the numbers 10 through 2 descending vertically down the left side of the "T".

Across from each of these numbers write in these numbers in descending order: 10, 8, 6, 5, 4, 3, 2.5, 2, and 1.5. This series of numbers is easily remembered by arranging them in 3 groups of 3 numbers each: 10, 8, 6 (counting backwards from 10 by 2's), then 5, 4, 3 (counting backwards by 1's), and then 2.5, 2.0, and 1.0 (counting backwards by 1/2's). Memorizing the 3 sets of 3 numbers on the right side of the table is the trick to being able to reconstruct the table whenever you wish. Just remember the system and the numbers will spill out of your pen. Here is the table:

dB	X
10	10
9	8
8	6
7	5
6	4
5	3
4	2.5
3	2.0
2	1.5

USING THE TABLE:

The basic principle to using the table is that decibels ADD while the X's, or factors, MULTIPLY. Hams usually memorize that a ratio of 10 (i.e., 10 times a given power level) equals 10dB and 2X = 3dB. This little table goes beyond those pairs of factors and corresponding dB values to help newcomers to deal with those pesky dB's.

This table is fairly accurate for everyday use, but be aware that I made two rather broad assumptions concerning "1.5X" and "6X". Ratios of 1.5 and 6 are actually 1.76dB and 7.78dB respectively. These were rounded off to 2dB and 8dB for simplicity, but I want the reader to know that I am aware of these small "built-in" errors in my table. However, if you need accuracy to 2 or 3 significant figures, by all means use your calculator.

EXAMPLE:

Joe Ham across town runs 18 times as much power as I do. How many dB's stronger might his signal be in DX-land than mine? 18 is larger than any number in the "X" column, so we find the factors that yield 18 when multiplied. Factors 6 and 3 work, and so do factors 3, 3, and 2. Look up the corresponding dB's for each factor in the table and ADD them. Factor 6 = 8 db, and Factor 3 = 5dB, so 18X yields 13dB.

Using the other factors is a good test to see if this table will yield the truth when the factors are varied. Using 3, 3, and 2: factor 3 = 5dB, 3 again is 5dB more, and factor 2 = 3dB. 5 dB + 5 dB + 3dB = 13dB again!

If we picked some off-the-wall factors, would this system still work? Sure! Using the preceding example, let's try the factors 2, 1.5, and 6 (18 ÷ 2 = 9, and 9 ÷ 1.5 = 6). Factor 2 = 3dB, factor 1.5 = 2 dB, and Factor 6 = 8dB; therefore 3dB + 2dB + 8dB = 13dB once more.