COMMUNICATIONS DATA SHEET 104

Addition and Subtraction of Power and RMS levels expressed in db's

Power levels can be compounded two at a time. The following table can therefore be used for the addition and subtraction of any number of individual values.

Since a specific change in level is equivalent to 10 log the power ratio or 20 log the ratio of the corresponding RMS quantity, the table can be used equally well for power or RMS levels.

D = Difference in db's between two levels to be added.

A = Value in db's to be added to the lower of the two levels.

B = Value in db's to be added to the higher of the two levels.

D	A	B		D	A	B
0	3.0	3.0		6.0	7.0	1.0
0.5	3.3	2.8		7.0	7.8	0.8
1.0	3.6	2.6	Approximated	8.0	8.6	0.6
1.5	3.8	2.3	to the	9.0	9.5	0.5
2.0	4.1	2.1	nearest	10.0	10.4	0.4
3.0	4.8	1.8	0.1dB	12.0	12.3	0.3
4.0	5.5	1.5		15.0	15.1	0.1
5.0	6.2	1.2		20.0	20.0	0

Applications:

1. Addition:

   (a) Two O.B. links in tandem have S/N's of 54 and 53 db's respectively. What is the total S/N? (-53) - (-54) = 1 D = 1. From the tabel A = 3.6 B = 2.6. The answer is -54 + 3.6 or -53 + 2.6 = -50.4. Total S/N = 50.4db.

   (b) This O.B. contribution is connected to a network having an overall S/N of 55db. What is the overall S/N? D = 4.6 Interpolating in the table gives A = 5.9 B = 1.3 approximately. The overall S/N is therefore 49.1 or approximately 49 db's.

2. Subtraction:

   (a) Two links in tandem give an S/N of 50 db. Terminating at the mid point improves the figure to 54 db's. What is the S/N of the first link? Since the first link raises the overall by 4 db's, it is A which equals 4.0. Interpolating gives B = 2.2 and D = 1.8 approximately. The first link's S/N is 52.2 db or near enough 52 db.

   (b) Doubling the bandwidth of triangular noise decreases the S/N by 9 db's. In what proportion does each half of the spectrum contribute to the total. We are told in the data that A = 9. Interpolating gives D = approximately 8.5 db and B near enough 0.5 db. Removing the lower half of the spectrum would improve the S/N by approximately 0.5 db. We already know that removing the upper half would improve it by 9 db's.