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A TABLE OF INTENSITY INCREMENTS

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A TABLE OF INTENSITY INCREMENTS

Occasionally one needs to compute the sizes of increments produced by adding two signals that differ only in amplitude (Figure 1). Normal procedure seems to require that the calculations be performed anew each time someone wants to add two signals. Recently I had to add some tones again and decided to complete a table of values one might encounter using 1-dB/step attenuators. So that no one need go through the arithmetic again unless he really wants to, here is the table (Table 1). Intermediate computational steps are included because their values are sometimes also useful.

Anyone who works with the table should be cautioned that meter readings for nonsinusoidal signals may not agree with the tabulated values; a true-rms meter will solve that problem. Also, he must not trust these values unless he has devised an extremely accurate adding system and has insured that cross-channel leakage is as close to zero as possible. Finally, he must remember that any data he gathers will be just as inaccurate and variable as any other data despite the false sense of precision he feels from using values that look to be correct to the nth significant figure.

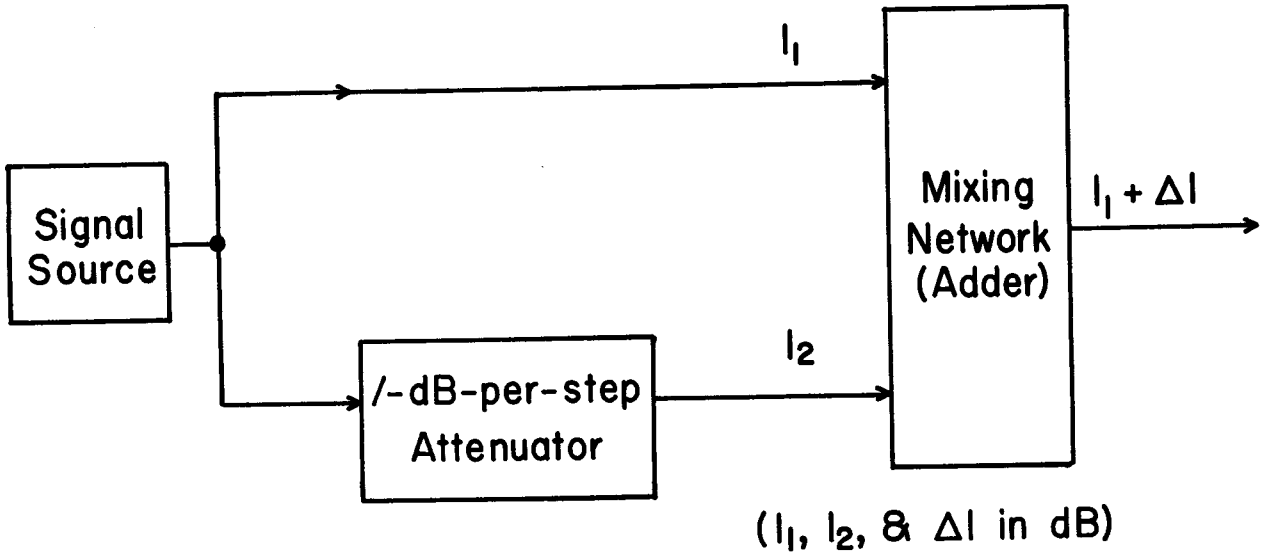

FIGURE 1. Simplified block diagram.

TABLE 1. Intensity increments resulting from mixture of two tones of the same frequency and in the same phase but with differing intensity levels.*

dB diff. between I_1 and I_2	$\frac{I_1}{I_2}$	$\frac{I_1+I_2}{I_2}$	$\log \frac{I_1+I_2}{I_2}$	$20 \log \frac{I_1+I_2}{I_2}$	ΔI in dB
0	1. 0000	2. 0000	0. 30103	6. 0206	6. 0206
1	1. 1220	2, 1220	0. 32675	6. 5350	5. 5350
2	1. 2589	2. 2589	0. 35390	7. 0780	5. 0780
3	1. 4125	2. 4125	0. 38247	7. 6494	4. 6494
4	1. 5849	2. 5849	0. 41244	8. 2488	4. 2488
5	1. 7783	2. 7783	0. 44378	8. 8756	3. 8756
6	1. 9953	2. 9953	0. 47644	9. 5288	3. 5288
7	2. 2387	3. 2387	0. 51037	10. 2074	3. 2074
8	2. 5119	3. 5119	0. 54554	10. 9108	2. 9108
9	2. 8184	3. 8184	0. 58188	11. 6376	2. 6376
10	3. 1623	4. 1623	0. 61933	12. 3866	2. 3866
11	3. 5482	4. 5482	0. 65784	13. 1568	2. 1568
12	3. 9811	4. 9811	0. 69733	13. 9466	1. 9466
13	4. 4668	5. 4668	0. 73773	14. 7546	1. 7546
14	5. 0119	6. 0119	0. 77901	15. 5802	1. 5802
15	5. 6234	6. 6234	0. 82108	16. 4216	1. 4216
16	6. 3096	7. 3096	0. 86390	17. 2780	1. 2780
17	7. 0795	8. 0795	0. 907385	18. 1477	1. 1477
18	7. 9433	8. 9433	0. 951495	19. 0299	1. 0299
19	8. 9125	9. 9125	0. 996185	19. 9237	0. 9237
20	10. 0000	11. 0000	1. 0413927	20. 827854	0. 827854
21	11. 220	12. 220	1. 08707	21. 7414	0. 7414
22	12. 589	13. 589	1. 13319	22. 6638	0. 6638
23	14. 125	15. 125	1. 179695	23. 5939	0. 5939
24	15. 849	16. 849	1. 22657	24. 5314	0. 5314
25	17. 783	18. 783	1. 27377	25. 4754	0. 4754
26	19. 953	20. 953	1. 32124	26. 4248	0. 4248
27	22. 387	23. 387	1. 36897	27. 3794	0. 3794
28	25. 119	26. 119	1. 41695	28. 3390	0. 3390
29	28. 184	29. 184	1. 46515	29. 3030	0. 3030
30	31. 623	32. 623	1. 51352	30. 2704	0. 2704
31	35. 482	36. 482	1. 56207	31. 2414	0. 2414
32	39. 811	40. 811	1. 61078	32. 2156	0. 2156
33	44. 668	45. 668	1. 65961	33. 1922	0. 1922
34	50. 119	51. 119	1. 70858	34. 1716	0. 1716
35	56. 234	57. 234	1. 75765	35. 1530	0. 1530
36	63. 096	64. 096	1. 80683	36. 1366	0. 1366
37	70. 795	71. 795	1. 85609	37. 1218	0. 1218
38	79. 433	80. 433	1. 905435	38. 1087	0. 1087
39	89. 125	90. 125	1. 954845	39. 0969	0. 0969
40	100. 000	101. 000	2. 0043214	40. 086428	0. 086428
41	112. 20	113. 20	2. 05385	41. 0770	0. 0770
42	125. 89	126. 89	2. 10343	42. 0686	0. 0686
43	141. 25	142. 25	2. 15305	43. 0610	0. 0610
44	158. 49	159. 49	2. 20273	44. 0546	0. 0546
45	177. 83	178. 83	2. 25244	45. 0488	0. 0488
46	199. 53	200. 53	2. 30218	46. 0436	0. 0436
47	223. 87	224. 87	2. 35193	47. 0386	0. 0386
48	251. 19	252. 19	2. 40173	48. 0346	0. 0346
49	281. 84	282. 84	2. 45154	49. 0308	0. 0308
50	316. 23	317. 23	2. 50137	50. 0274	0. 0274
51	354. 82	355. 82	2. 55123	51. 0246	0. 0246
52	398. 11	399. 11	2. 60109	52. 0218	0. 0218
53	446. 68	447. 68	2. 65097	53. 0194	0. 0194
54	501. 19	502. 19	2. 70087	54. 0174	0. 0174
55	562. 34	563. 34	2. 75077	55. 0154	0. 0154
56	630. 96	631. 96	2. 80069	56. 0138	0. 0138
57	707. 95	708. 95	2. 850615	57. 0123	0. 0123
58	794. 33	795. 33	2. 90055	58. 0110	0. 0110
59	891. 25	892. 25	2. 950485	59. 0097	0. 0097
60	1000. 00	1001. 00	3. 0004341	60. 008682	0. 008682

* ΔI is the decibel difference between I_1 and (I_1+I_2), where I_1 is the greater and I_2 is the lesser intensity.

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