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Correction to "redundancy optimization of general systems"

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It can be further shown that –

$$\lim_{k\to\infty} \beta_k = 0. \tag{A-18}$$

Figure A-1 illustrates the behavior of the probabilities of two types of error as a function of testing times for two values of k, k_1 and k_2 ($k_1 < k_2$). In this graph, when each component is tested for $\tau^*_{k_1}$ units, the probability of accepting a system whose reliability is R_0, is α. However, β_{k_1} (the probability of rejecting a good system, whose reliability is R_1) is greater than β. If k_1 is fixed and the test time increases to some value larger than $\tau^*_{k_1}$, the probability of the first type decreases but β_{k_1} increases. The opposite happens if test time is decreased to a value smaller than $\tau^*_{k_1}$. Now when k_1 is increased to k_2, the testing time required to guarantee the first kind of error at a value less than or equal to α, increases to $\tau^*_{k_2}$. But in this case, β_{k_2} is less than β. Thus the algorithm to obtain the optimum tests times that will satisfy (2) and (3) is now clear. For each $k = 0, 1, 2, \ldots$, compute the associated β_k. Since β_k is a strictly decreasing function and $\lim_{k\to\infty} \beta_k = 0$, by increasing k, it will be possible to obtain a value K such that $\beta_k \leqslant \beta$ for $k = K, K + 1, K + 2, \ldots$. The smallest K for which this inequality holds yields the optimum k^*. The associated optimum component testing times is given by $\tau^*_{k^*}$, the same for each component.

Curve 691300-A

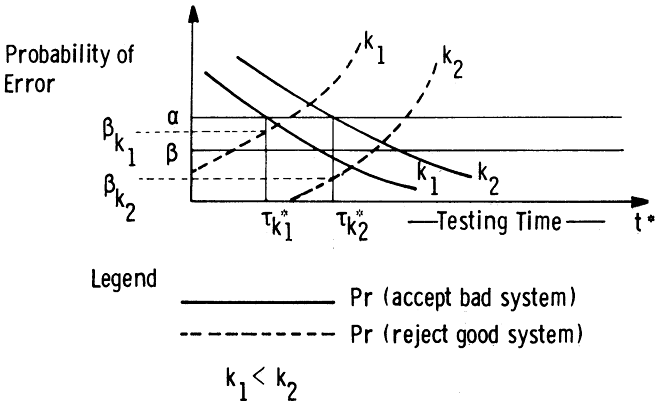

Figure 1.

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BIOGRAPHY

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For biography of the author, refer to vol R-24, 1975 Aug, p 205.

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Correspondence items are not refereed

Correction to "Redundancy Optimization in General Systems"

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Key Words—Redundancy, Algorithm, Optimization

Reader Aids–
Purpose: Report a correction
Special math needed: Probability
Results useful to: Reliability Theoreticians

Aggarwal [1] has presented an interesting algorithm for redundancy optimization in general systems. His paper is key reference for this class of problems. However the table of results for the example is not accurate. The correct results are better than those in the original table. The table should read as follows.

i	1	2	3	4	5	Σg_i	Q_s (%)
n_i	1	1	1	1	1	11	10.9
F_i	2.65	0.83	2.76*	0.83	0.53		
m_i	1	1	2	1	1	13	5.4
F_i	0.80	0.83	0.69	0.91*	0.48		
n_i	1	1	2	2	1	16	2.6
F_i	0.68	0.18	0.72*	0.18	0.14		
n_i	1	1	3	2	1	18	1.18
F_i	0.20*	0.17	0.18	0.19	0.10		
n_i	2	1	3	2	1	20	0.79

System reliability is 0.9921.

REFERENCES

[1] K. K. Aggarwal, *"Redundancy Optimization in General Systems". IEEE Trans. Reliability,* vol R-25, 1976 Dec, pp 330-332.

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Author's reply

K. K. Aggarwal

I have checked the table above and it is correct. Please publish it.