

1 DOS MMBasic Ver 5.05.03
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3
4 RELIABILITY ANALYSIS OF REDUNDANT SYSTEMS (RMN.BAS)
5 Written by Dwight S. Burgess 11-05-1986
6 Revised by Phil Rutherford 10-22-2020
7 Run with MMBasic.exe (www.mmbasic.com)

8
9 This program calculates reliability of redundant systems based on the general
10 equation developed By Robert S.Pringle And Philip M.Gresho in
11 'A Comprehensive Reliability Analysis Of Redundant Systems',
12 Journal Of Spacecraft And Rockets, Vol. 4, No.5, May 1967, pp 631-638.
13 Reliability logic options include parallel operating redundancy or operating
14 and standby redundancy with or without startup for operating units and with
15 or without switching for employed standby units.

16
17 22-10-2020
18 DD-MM-YYYY
19 23:26:10
20

21 WHAT IS THE OPERATING FAILURE RATE (/HR)? 0.00001
22 WHAT IS THE STANDBY FAILURE RATE (/HR)? 0.00002
23 WHAT IS THE MISSION TIME (HR)? 8760
24 WHAT IS THE PROBABILITY OF SUCCESSFUL STARTUP FOR EACH OPERATING AND STANDBY UNIT? .9
25 WHAT IS THE PROBABILITY OF SUCCESSFULLY SWITCHING A STARTED STANDBY UNIT ON-LINE? .9
26 WHAT IS THE REQUIRED NUMBER OF OPERATING UNITS (M)? 6
27 HOW MANY STANDBY (OR EXTRA OPERATING) UNITS ARE PROVIDED (N)? 3

28
29 INPUT DATA

30
31 M = 6
32 N = 3
33 LAMDOP = 1e-05 (/HR)
34 LAMSTAND = 2e-05 (/HR)
35 MISSION TIME = 8760 (HR)
36 RSTART = 0.9
37 RSWITCH = 0.9
38 RSTARTSW = 0.81
39 ALPHA (M*LAMDOP/LAMSTAND) = 3
40 BETA (UNRELIABILITY OF SINGLE STANDBY UNIT) = 0.1607108538
41 ROP (RELIABILITY OF (=M/M.S) OPERATING UNITS) = 0.5912005376
42 ETA (MINIMUM OF M AND N) = 3
43

44 SYSTEM RELIABILITY IS 0.9045207665 P(=> 6/ 9.S)
45
46
47

48
49 22-10-2020
50 DD-MM-YYYY
51 23:26:50
52

53 CALCULATED RELIABILITY FOR A REDUNDANT SYSTEM WITH THE FOLLOWING CONFIGURATION:

54
55 STANDBY REDUNDANCY WITH 6 OPERATING UNITS REQUIRED AND 3 STANDBY UNITS
56 MISSION TIME IS 8760HR
57 OPERATING UNIT FAILURE RATE IS 1e-05 /HR
58 STANDBY UNIT FAILURE RATE IS 2e-05 /HR
59 PROBABILITY OF UNIT STARTUP IS 0.9
60 PROBABILITY OF SWITCHING A STANDBY ON-LINE IS 0.9
61 SYSTEM RELIABILITY IS P(=> 6/ 9.S) 0.9045207665
62
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64

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