

Table 13. Percentage Weighting for Sample of 1186 Launches

Filter Constant	Last Point	Last 100 Points	Last 200 Points	Last 300 Points	Last 500 Points	Point Ratio Last:First
0.999	0.14	13.7	26.1	37.3	56.7	3.3
0.996	0.40	33.3	55.6	70.6	87.3	1.2×10^2
0.995	0.50	39.5	63.5	78.0	92.1	3.8×10^2
0.994	0.60	45.3	70.0	83.6	95.1	1.3×10^3
0.993	0.70	50.5	75.5	87.9	97.0	4.2×10^3
0.992	0.80	55.2	79.9	91.0	98.2	1.4×10^4
0.991	0.90	59.5	83.6	93.4	98.9	4.5×10^4
0.990	1.00	63.4	86.6	95.1	99.3	1.5×10^5
0.980	2.00	86.7	98.2	99.8	99.996	3.9×10^{11}

The value of $F = 0.999$ is considered inappropriate because, as seen in Table 13, the weighting factor applied to the most recent datum is only 3.3 times that applied to the oldest test result from 39 years ago. The most recent 200 and 300 points in the sample comprising 16.8% and 25.2% of the data receive only 26.1% and 37.3% of the total weight. This is not too different from equal weighting of data, which is appropriate only if the relative frequency of occurrence of each response mode has not changed significantly through the years. On the other hand, use of $F = 0.99$ effectively throws out the oldest 600 to 700 launches that are sorely needed for an adequate sample size.

The results of the filtering process are given in Table 14 for failures during flight phases 0 - 2.

Table 14. Response-Mode Occurrence Percentages

Filter Factor	Response Mode				
	1	2	3	4	5
0.999	7.39	2.27	1.70	73.30	15.34
0.996	2.24	4.35	0.37	80.37	12.67
0.995	1.32	4.92	0.19	82.59	10.98
0.994	0.73	5.26	0.09	84.57	9.35
0.993	0.39	5.37	0.04	86.25	7.95
0.992	0.20	5.31	0.02	87.68	6.78
0.991	0.11	5.13	0.01	88.92	5.84
0.990	0.05	4.87	0.00	90.02	5.06
0.980	0.00	1.86	0.00	96.81	1.33

The results in Table 14 show that the percentages of occurrence for response-modes 2 and 4 are relatively insensitive to filter-factor values, while the percentages for Modes 1, 3, and 5 decrease as filter memory (filter factor) decreases. This suggests that occurrences of Modes 1, 3, and 5 have been decreasing over the years, while Modes 2 and 4 occurrences have not changed much. Although it cannot be argued convincingly