Table 5. Filter Factor Influence on Weighting Percentages

Vehicle (sample)	Filter Cons't	Last Point	Last 10 Points	Last 50 Points	Last Half *	Last 100 Points	Pt. Ratio last: first
Atlas (156)	0.96	4.01	33.6	87.2	96.0	98.5	560
	0.97	3.03	26.5	78.9	91.5	96.1	112
	0.98	2.09	19.1	66.4	82.9	90.6	22.9
	0.99	1.26	12.1	49.9	68.7	80.1	4.7
	0.995	0.92	9.0	40.9	59.7	72.7	2.2
Delta (125)	0.96	4.02	33.5	87.5	92.9	98.9	158
	0.97	3.07	26.9	80.0	87.3	97.4	43.7
	0.98	2.17	19.9	69.1	78.3	94.3	12.2
	0.99	1.40	13.4	55.2	65.6	88.6	3.5
	0.995	1.07	10.5	47.6	58.2	84.7	1.9
Titan (171)	0.96	4.00	33.5	87.1	97.1	98.4	1030
	0.97	3.02	26.4	78.6	93.2	95.8	177
	0.98	2.07	18.9	65.7	85.1	89.6	31.0
	0.99	1.22	11.7	48.1	70.5	77.2	5.5
	0.995	0.87	8.5	38.5	60.8	68.5	2.3

* Last half + 1 if sample size is odd

Although the choice of a filter constant cannot be completely objective, use of a value less than 0.97 or greater than 0.99 produces undesirable weightings. For F = 0.96, for example, the most recent test result for Titan is weighted 1030 times that for the oldest test; the last 50 data points receive 87.1% of the total weighting, leaving only 12.9% for the first 121 flights; the last 100 flights receive 98.4% of the total weighting thus, in effect, omitting the oldest 71 flights from the solution.

At the high end of the F spectrum, a value of 0.995 fails to down-weight the old test results sufficiently. Using Atlas as an example, the most recent data point (1/31/96) is weighted only 2.2 times that of the oldest data point (8/14/64). The oldest half of the data, stretching from 8/14/64 to 3/06/73, receives 40% of the total weight, and the earliest 56 launches, comprising 36% of the data, receive 27% (100 – 73) of the total weight. This is not too different from equal weighting of tests, a procedure that fails to acknowledge the improvements in Atlas reliability that have taken place over a period of 32 years.

In choosing a value of F, an attempt is made to strike a suitable balance between two contrary objectives:

(1) to down-weight substantially those failures for which the probability of occurrence has been greatly reduced through redesign and replacement of components, improved test procedures, and the like;