

Table 2. Predicted Failure Probabilities for Representative Configurations

Vehicle	Flight Phase	Filter Technique					Sample Failures /Total
		Equal Weight	Index Count	Expon. F = 0.99	Expon. F = 0.98	Expon. F = 0.97	
Atlas	0	0	0	0	0	0	0/7
	0 - 1	0.0256	0.0253	0.0245	0.0219	0.0186	4/156
	0 - 2	0.0449	0.0385	0.0387	0.0313	0.0243	7/156
	0 - 3	0.0769	0.0715	0.0714	0.0643	0.0568	12/156
	0 - 4	0.0833	0.0811	0.0801	0.0740	0.0663	13/156
	0 - 5 *	0.1090	0.1100	0.1078	0.1019	0.0929	17/156
Delta	0	0	0	0	0	0	0/125
	0 - 1	0.0160	0.0126	0.0134	0.0104	0.0075	2/125
	0 - 2	0.0160	0.0126	0.0134	0.0104	0.0075	2/125
	0 - 3	0.0160	0.0126	0.0134	0.0104	0.0075	2/125
	0 - 4	0.0160	0.0126	0.0134	0.0104	0.0075	2/125
	0 - 5 *	0.0640	0.0447	0.0535	0.0469	0.0442	8/125
Titan	0	0.0306	0.0210	0.0225	0.0292	0.0352	3/98
	0 - 1	0.0234	0.0305	0.0314	0.0403	0.0470	4/171
	0 - 2	0.0409	0.0496	0.0514	0.0642	0.0750	7/171
	0 - 3	0.0526	0.0581	0.0597	0.0689	0.0773	9/171
	0 - 4	0.0526	0.0581	0.0597	0.0689	0.0773	9/171
	0 - 5 *	0.1111	0.1167	0.1188	0.1284	0.1358	19/171

\* Includes response mode 'NA'

It is apparent from the data in Table 2 that estimates of future vehicle reliability depend on the filtering (i.e., weighting) technique applied. Since there are many ways to perform the filtering, all generally producing slightly different results, the choice of method to use in deriving empirical failure probabilities cannot be totally objective. Subjective decisions must also be made about which past configurations to consider as representative of future vehicles, which flight tests to include in the sample, how to weight the individual flights, and, in unusual cases, whether to consider a flight a success or a failure, and to which flight phase to attribute a failure. Except for data weighting (i.e., choice of filter), these decisions were made for Atlas, Delta, and Titan before computing the failure probabilities shown in Table 2.

For Atlas and Delta, it can be seen from Table 2 that the predicted failure probabilities computed with the exponential filter decrease as the value of F decreases. Since a decreasing F means more emphasis on recent data and less emphasis on the old, the launch reliability for these vehicles is apparently improving. The reverse seems to be true for Titan, suggesting either that Titan reliability is not improving or, possibly, that improvements that have been or are being made to the vehicle are not yet fully reflected in the test results. For Atlas and Delta, the computed failure probabilities based on equal weighting are higher than for all other filters, and the predicted failure