more and more as the sample size increases. For samples of 200, 500, and 1000, the weighting of the last 50 tests are, in each case, 43.7%, 19.0%, and 9.7% of the total weight. For samples of 100 or more, no matter how large, the index-count filter assigns 25% of the data weight to the oldest half of the data sample – too much in RTI's opinion.

For missiles and space vehicles, the data weightings imposed by the exponential filter (F = 0.98) appear reasonable. For small samples less than 20 or so, there is little difference between equal and exponential weightings. For sample sizes near 80, the index-count and exponential filters produce similar results. For sample sizes of 200 and more, the weights assigned to the most recent 5, 10, 25, and 50 tests are essentially constant, showing the fading-memory nature of the exponential filter.

The denominator of the exponential-filter equation [Eq. (18), Appendix C] is a geometric series that asymptotically approaches a limit of $[1/(1-F)]$ as n approaches infinity. For F = 0.98, that limit is 50. Thus, the last data point, which is always given a weight of one, can never be weighted less than 2% of the total, no matter how large the sample. For samples of 200 and 300, the oldest half of the data receives only 11.7% and 5% of the total weight. For samples of 500 and larger, the oldest half of the data sample is essentially omitted altogether. The exponential filter is clearly a fading-memory filter, as it should be for space-vehicle performance data.

Having decided upon the exponential filter as the best method for weighting missile and space-vehicle performance data, a filter constant F must be chosen. To see how data weighting varies with filter-factor value, weighting percentages for various samples were computed for representative configurations of Atlas, Delta, and Titan using values of F from 0.96 to 0.995. The results are shown in Table 5.