Shevell's second comment refers to his Fig. 1 which clearly shows both the increase in induced drag as the tail download increases when the c.g. is moved forward, and the increase in compressibility drag as the wing lift is increased because of this tail download. The author stated, following his Eq. (16), that a tail download of 5% *W* would increase the total drag coefficient by 2.4% over the minimum drag produced by a very small tail upload. The 5% fuel saving mentioned in the author's introduction would correspond to the DC-8 flying at $M=0.82$ with $C_{L_0}=0.4$ for the aircraft and $C_{L_1}=0.42$ for the wing (because of a 5% *W* download on the tail), in comparison with a design change that would move the wing forward approximately 15% m.a.c. (1.01 m or 3.31 ft.) so as to attain a zero tail load with $C_{L_0}=C_{L_1}=0.4$ and $C_{L_2}=0$. Then the decrease in both the induced drag and the compressibility drag increment, along with the reduced engine thrust requirement, would result in a total fuel saving of approximately 5%.

Shevell's third comment on the use of a larger tail area is irrelevant to the author's suggestion that a larger tail volume be introduced since a forward location of the wing would increase the tail volume without increasing the parasite drag. A zero tail load was, and still is, a desirable and attainable design goal as clearly stated in 1934 by A. Betz in Durand's *Aerodynamic Theory*, Vol. 4, p. 85. The common use of a tail download in modern transport aircraft has been erroneously justified by calculating the so-called "tail thrust" by using the total downwash of the wing on the tail, and then neglecting the effect of the tail upon the wing. The author's Eq. (8) verifies the fact that the complete circulation vortex system produced by a tail download induces a downwash on the wing that rotates the wing's lift vector rearward so as to increase the wing's induced drag. When the tail span is very small, relative to the wing span, then potential theory shows that the increase in the wing's induced drag is mainly produced by the trailing vortex system of the tail download. Conversely, a tail upload produces an upwash on the wing that rotates its lift vector forward, corresponding to a "wing thrust" increment. Consequently, the minimum induced drag always occurs with a slightly positive tail load if the tail is either above or below the wing. However, the author's Table 1 shows that a zero tail load gives practically the same total drag, so it provides a good design goal that can be attained by either the rearward c.g. position made possible by a greater spacing between the wing and the tail, or a reduction in the wing's moment due to camber. Sailplane designers are well acquainted with the advantages of a zero tail load and easily attain this by a very small and smooth upward sweep of the rear portion of the wing's profile so as to reduce the negative moment of positive camber.

One correction should be made to the author's original paper. In Table 2 on p. 191, $\sigma b_2/b_1$ should be replaced by $\sigma b_1/b_2$.

Errata

Integrated Scramjet Installation Effect on the Subsonic Performance of a Hypersonic Aircraft

P. J. Johnston,* J. L. Pittman,† and J. K. Huffman‡
NASA Langley Research Center, Hampton, Va.

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THE following paragraph was omitted from p. 332 of the article. It should immediately precede the "Concluding Remarks":

Performance Summary

Figures 16 and 17 show the effects of changing the engine location and nozzle angle on vehicle performance and also provide an overall perspective of the study results. Although many of the particular details have been covered, these summaries show that, despite the variety of engine geometry changes made, maximum lift-drag ratios fell in a rather narrow band, ranging from about 3.75 to 4.15. Although it was not tested below $M=0.4$, an extrapolation indicates the 16-deg nozzle configuration might have produced an L/D_{max} of 4.25 at low speeds; this advantage decreased with Mach number, however, so that, once choking occurred in the engine, all three nozzle angles produced identical values of L/D_{max}. The nozzle fences afforded small improvements in L/D_{max} across the speed range (Fig. 17) despite the fact that they were diverged a total of 6 deg and increased the vehicle wetted area by about 10%, both of which would normally be thought of as adversely affecting performance.

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*Aero-Space Technologist, Hypersonic Aerodynamics Branch, HSAD. Member AIAA.
†Aero-Space Technologist, Hypersonic Aerodynamics Branch, HSAD.
‡Aero-Space Technologist, Fluid Dynamics Branch, STAD.