

**W.H. Mason, July, 2018**

### **Curiosity Number 25. The Flying Wing Configuration Controversy**

Is a flying wing the best configuration? W.R. Sears and Irving Ashkenas wrote a section in an Appendix, "Maximum Range of Airplanes with Fuel Consumption Proportional to Thrust" for a secret government report showing that a flying wing is the best configuration choice (1946). The report, *Toward New Horizons*, was eventually issued in a commemorative edition in 1992. However, the Appendix was not included.

*From the design bibliographies:* Joseph Foa studied the Appendix and claimed that although Sears and Ashkenas had found the result for a slope of zero, they missed a sign on the second derivative and actually proved that the flying wing was the worst! Foa demanded that Sears and Ashkenas issue a revision. The result was a paper by Ashkenas that contains another analysis. Foa claimed that this paper was inadequate, and with the emergence of the B-2 the controversy arose again when Foa contacted journalist Wayne Biddle. Essentially, the question was where to distribute volume. As such, the required payload volume changes the answer. Sometimes it's best to put the volume in a distinct fuselage, sometimes not. Thus this has become an interesting configuration issue and has been addressed in several papers.

After someone read this story in the Aircraft Design Bibliographies section of my web page (circa mid-90s) he sent me a copy of the Appendix that I had not seen. I got the appendix in 2013. Every time I start to dig into the analysis contained in the Appendix I get interrupted by other requests that are apparently more urgent than this study. I hope to investigate the Appendix in "the near future."

In the meantime, anyone interested in the issue should read Chapter 5, "From Tube and Wing to Flying Wing," in Egbert Torenbeek's *Advanced Aircraft Design*, Wiley, 2013.