

# Some Notes On Drag

By R. H. Warring

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## Wing/Fuselage Junction

In considering streamlining in the broadest sense, one source of drag is frequently overlooked, or neglected — namely, the wing/fuselage junction and attachment. Any projection from the centre section of the wing, such as pegs to retain elastic bands, hooks, etc., all contribute so much drag, and may even destroy part of the lift of that section.

An extreme example is where a gap exists between the wing root and the fuselage, such as a gap between the two halves of a wing plugged together, or between the root rib and the fuselage side of a plug-in wing. Not only does this gap cause a lot of extra drag: it also results in a serious loss of lift. One example of a full-size aeroplane with a gap of only 1/2 in. between the two wing panels typifies this. When the gap was sealed with tape the rate of climb was doubled!

Avoid, then, gaps in the centre section (or in any other part) of the wings and make sure that plug-in wings do fit flush against the fuselage sides.

Cut-outs have a similar effect, a cut-out in the leading edge being worse in this respect than a cut-out in the trailing edge.

Most shoulder or mid-wing models can have the wing/fuselage junction improved by careful filleting. The airflow in this region is critical and is easily broken up. Fillets help to smooth it out, but hooks, even rubber bands and other projections, only aggravate turbulent flow.

There are no general rules for calculating fillet size and shape, but they should be kept quite small and reflexed. That is to say, a line through the trailing edge of the fillet and the trailing edge of the wing should be approximately parallel to the datum line. A fillet carrying-on the undercamber of a section will probably do more harm than good.

*Editor's Note: R. H. Warring was wounded and "invalided" out of the service in 1942, about a year prior to writing this. He was the last pre-war holder of the British Hand-Launched Glider record. At the time he had written more about model aircraft than anyone else in the world.*