

# THE EVOLUTION of *the Sailplane*

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ONE of the most interesting developments in the aeronautical field in the years between the wars was the rapid growth of the soaring movement. Started in Germany in 1920 by groups of students and a few war pilots, eager to assert themselves in a field all but closed to them by the Treaty of Versailles, early motorless flight activity soon developed into a sporting movement that swept the country, and later spread all over the world.

It is certain that soaring activity will be revived now the war is over: apart from the continued need for the technical contributions of sailplane pilots and designers, it has such a strong appeal as a sport that its devotees will not lightly relinquish it. However, little sporting flying has been done in the last five years, and as we stand on the threshold of a new phase of motorless flight development it is interesting to review progress made in the past, to evaluate the standards of the present, and to estimate probable future trends.

## Past Achievements

Figures 1, 2 and 3 present, in graphical form, a review of past achievements. They show the duration, altitude, and distance records, plotted against the years in which they were made. The current world records are surprising—single seat sailplanes have remained in the air 56 hours; they have climbed to 32,000 feet; they have flown a point to point distance of 512 miles—but even more surprising is the steady progress made from year to year. Further, these curves show that progress is not yet at an end—the distance flights in particular are improving at an ever increasing rate.

Improved soaring flights have been the result of many factors, the relative importance of which it is difficult to assess. Better piloting technique, new instruments, discovery by the meteorologists of new sources

of energy, and developments in aerodynamic and structural design have all played their part. Of these factors the only one which can be measured quantitatively is design improvement. We can show the influence of this by plotting the performance of the record making sailplanes against the year of their design. Although no allowance can be made for such important items as improved maneuverability, this method does give a good indication of all around efficiency.

The efficiency of sailplanes is usually judged by their maximum gliding ratio, minimum sinking speed, and speed range. The gliding ratio is numerically equivalent to the ratio of lift to drag. The speed range, or the ability to fly at high forward speeds with low sinking speed, is difficult to define numerically, but may be measured as the "speed range index" proposed by Raspet,  $I = \frac{(W/S)^{1/2} \times AR^{1/2}}{C_D}$ . This is the radius of the osculating circle at the minimum of the lift-drag polar. A high value indicates a flat polar and therefore a good speed range.

On Figure 4 are plotted the maximum gliding ratio, minimum sinking speed and speed range index for the best sailplanes built since 1920. The sailplanes chosen as representative of their year are listed with their principal characteristics in Table I. For the most part these are the craft with which the distance records were established, although they are listed in the year of their design rather than that of their best flights. For the years in which no new records were established, the sailplane winning the international soaring contest on the Wasserkuppe has been chosen. When no type better than its predecessors appeared, a space has been left blank. Although it is quite possible that in some years sailplanes of higher performance were built, but

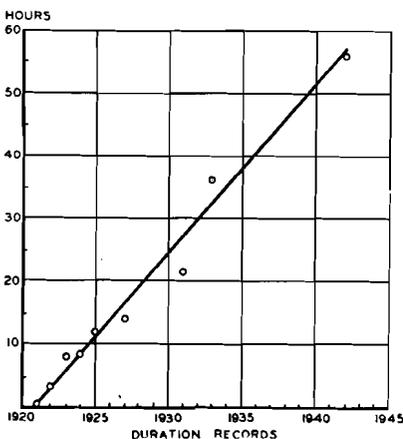


Figure 1. Distance Record Flights.

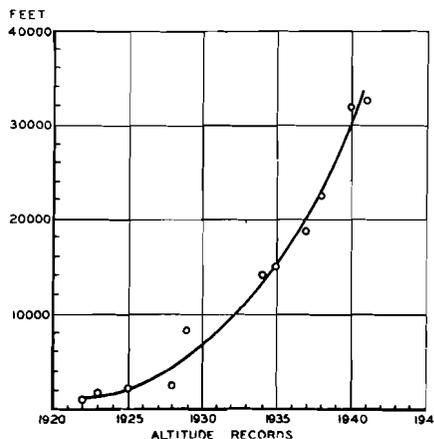


Figure 2. Altitude Record Flights.

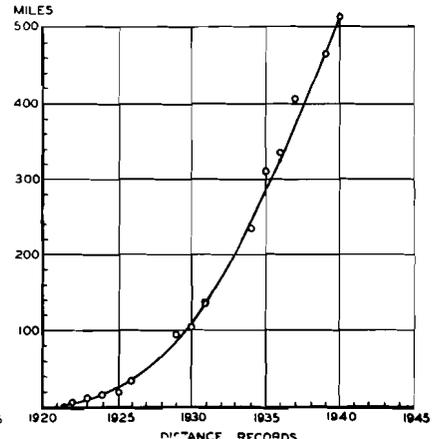


Figure 3. Duration Record Flights.