The Sailplane in Research, Training and Sport

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The urge to fly the sailplane or glider for research, for training, and for sport dates back centuries to the dreams of Leonardo da Vinci in the fifteenth century. Leonardo actually built a motorless craft and, following typical modern practice, retained a test pilot to do the flying while he himself observed from the vantage point of a hill top. Today the engineer sits in his office pouring over flight test data without ever seeing his aircraft in flight.

In motorless flight, however, there is an intimate association between the research scientist and the phenomenon of flight. In research using the sailplane as a tool, the scientist attempts to make all of his own measurements — in the turbulence and noise-free atmosphere at early dawn. When he wishes to study the reaction of his aircraft to atmospheric disturbances, he makes his flights either in a convective atmosphere or in an atmosphere containing small- or large-scale turbulence of the atmospheric wave type, which can extend to 45,000 feet in altitude.

In addition to his ability to understand and select the nature of his medium, a sailplanist also enjoys an advantage over high speed pilots, because he is able to exploit the slower periods of reaction of a sailplane and outwit even an unstable craft. It was for this reason that the eminent German aerodynamicist, Dr. A. M. Lippisch, used the glider for his very radical tailless airplane experimentation. During some twenty-five years of advanced research, it is said that he did not lose one pilot or damage a ship beyond repair. It was perhaps because the Wright brothers chose a motorless craft on which they not only tested control and stability but also trained themselves as pilots, that they lived through their experiments. These same features of slow flight, of low weight and low initial cost commend the motorless plane for training the youth of our nation to fly.

CESSNA: prepared for gliding tests.

In sport soaring the skill of the pilot and the perfection of his sailplane are used to contest the idiosyncrasies of the weather. The goal of flying for sport is the spanning of long distances or the gaining of high altitudes. Every effort is made by the pilot to maximize the performance of his sailplane. It is this determination to make the most out of the energy available in the atmosphere which provides the sporting challenge to sailplane pilots. Some of these men carry a consciousness of this challenge away from a contest and continue to work on their sailplanes throughout the rest of the year, perfecting the aerodynamics of their crafts in preparation for the next competitive flight. As a result of this kind of impulse, America's outstanding performance sailplane now has a glide ratio of 40 to 1.

The sailplane as a tool for research began making its contributions to science with the first heavier-than-air flights. These contributions were in the fields of control and stability and performance. Although the Wrights did use a wind tunnel for their airfoil studies, they found it unsatisfactory for their control and stability studies. Even today the final answer to all problems of flight aerodynamics is the attainment of stable and controlled flight itself. Up to the last few years all airplane configurations followed the conventional airplane with a tail behind the lifting wing. Today we are seeing considerable work being done on deltas and tailless designs. Much of this tailless work stems back to the research begun in 1920 which Dr. Lippisch carried on by means of gliders. The culmination of his efforts resulted in the formidable interceptor rocket airplane ME163. In the sailplane field, his experiments inspired the development of an unusual tailless sailplane, the Horten IV. This sailplane is now being used by Mississippi State College as a framework from which to project further developments in non-classical airplane configurations.

After achieving controlled and stable flight on a glider, the Wrights added an engine. It was not until 1911 that they returned to motorless flight, and then only long enough to make their record of sustained gliding of nine minutes and forty-five seconds. From studies of descriptions of this flight and Wilbur Wright's own analysis, we are led to believe that the flight was made by means of soaring in gusts. Unfortunately, the exact technique of that performance has never again been duplicated.

In 1921, however, Dr. W. B. Klemperer broke the Wright record with his flight of thirteen minutes by soaring on a slope current. Scientists and pilots then began to combine their efforts in order to study this type of meteorological flow over mountains. It was over a mountain slope in Hawaii that the present American duration record of twenty-two hours was flown by Lt. William Cocke in 1931.

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