SCIENCE —— STRATOSPHERIC RESEARCH

This paper is a translation of an article which appeared in the French aviation periodical, ESPACE, in July, 1947. The author, R. Jarland, is in charge of the development of the glider as a tool for research as well as an instrument for training pilots in France.

In this country several scientific branches of the Government have displayed an active interest in the sailplane as a tool for aerologic research. At the present time the Aerophysics Institute, under Office of Naval Research sponsorship, is engaged in an exploration of the air flow over extended ridges at Mattituck, Long Island.

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THE use of gliders in France has been confined mostly to the sport of soaring. World War II has shown, though, that the utility of a glider can be extended in certain cases to such applications as the transportation of troops and materiel. The cargo glider will no doubt some day play an important role in aerial transportation, but the usefulness of a glider can be exploited in other fields as well. Among them is the field of scientific research.

This application deals mostly with the problems which are closely related to physics of the atmosphere and especially meteorology, aerology, atmospheric electricity and aerodynamics. However, other problems, such as the measurement of cosmic radiations at altitude, find in the glider an excellent research instrument.

The sounding balloon, free balloon as used by Professor Picard, and the airplane can evidently serve the same purpose, but the glider offers a number of important advantages.

The sounding balloon can lift only a very limited useful load and the risk of losing the instrument carried by it precludes the use of expensive instrumentation necessary for the numerous experiments.

If the glider be compared with the powerplane its advantages are as follows:

1. The glider has generally a much better speed range, between 50 and 120 km/h.
2. The glider permits the installation of very sensitive instruments because of absence of vibration.
3. Because of its wood construction and absence of engine and accessories it does not generate a sufficiently large electrical field to prevent accurate measurement in the ambient air.
4. Danger of fire is practically non-existent in a glider as it does not carry inflammable fuel.

In comparison with the balloon the glider is particularly advantageous.

1. The launching procedure of a balloon is considerably more complicated and more costly than the launching of a glider.
2. In the field of research dealing particularly with atmospheric electricity, it causes essentially no distortation of the electrical equipotential surfaces as its ratio of length to height is 1:8, while that of the balloon is about 1:2.

However, one may ask the following question: The balloon has reached altitudes of over 20,000 meters (65,600 ft.), the airplane can easily reach 15,000 meters (50,000 ft.). Is it possible to reach such heights with a glider?

This question might have been in order several years ago. Today, however, using the airplane tow or the standing wave as well as ascending currents inside the cumulo-nimbus clouds flights to great altitudes in sailplanes do not present a problem any longer.

By the use of the aero-tow method it was possible for the German DFS 230 cargo glider to reach an altitude in excess of 10,000 meters (33,000 ft.) with a useful load of 1000 kg. (2200 lbs.).

But it is also possible for a glider to attain such heights in free flight. In 1942 Klockner soared to an altitude of 12,000 meters (39,400 ft.) in a Kranich two-place sport sailplane, He could have gone higher if his oxygen equipment had not failed or if the sailplane had been equipped with a pressurized cabin. The lenticular cloud which marked the ceiling of active lift was at 14,000 meters (46,000 ft. app.)

The work of Professor Georgii, director of the D.F.S. (German Research Institute for Soaring Flight) and the German Air Ministry Research Service, has proven that it is possible for a sailplane equipped with a pressurized cabin to attain altitudes of 20,000 meters (65,000 ft.) utilizing the foehn winds of the Alpine region of Austria and Bavaria. Similar conditions, though less favorable, should surely be found in the French Alps and in the lee of the Pyrenees.

It is estimated that by equipping a sailplane with a pressurized cabin, which already has been achieved by the D.F.S., it will be possible to attain without difficulty altitudes of over 15,000 meters (50,000 ft.), either by airplane tow, or in soaring flight, and to achieve, furthermore, flights of appreciable duration at that altitude.

There are no better means of proving these well-founded considerations than by giving several examples of research already conducted in this field with gliders by the D.F.S.:

a. Research in the motion of air masses (air flow of the atmosphere).
b. Research in the physics of the atmosphere.
c. Aerodynamic research.

(This article will be continued in subsequent issues-Ed.)