EXPERIMENTS WITH AN AURAL BLIND FLYING SYSTEM

by R. S. BARNABY

I have always been intrigued by the effect produced by two radios in different rooms tuned to the same station. Depending on the relative volume of the two sets, there is a certain point in the hall where the sound envelopes one and it is impossible to tell from where it comes. The effect is particularly striking if one stands sideways so that the sound from one room enters one ear and from the other room, the other ear. In such a situation the sound appears to originate inside one's head. However, if one moves a very small distance one way or the other, the sound source takes on a very definite direction.

Back when I was on duty at Pensacola it occurred to me that this might provide the basis for a truly blind flying system that could be used for gliders, at least as far as directional guidance was concerned. Whenever a glider, or any aircraft for that matter, is turning, one wing tip is moving faster than the other. I reasoned that if some form of noise-maker whose volume of noise was roughly proportional to its air speed could be installed at each wing tip, and the sound piped from one tip to one ear and from the other tip to the other ear, the glider pilot, by flying so as to keep the resultant apparent sound source centered, could maintain a straight course. So much for direction.

Next — air speed. By a little research with 5 and 10 cent store horns of the thin vibrating metal reed type such as one finds beside one's plate at Halloween, New Year's Eve and other such parties, I discovered that a certain wind velocity was required to get the reed vibrating and to produce sound. By numerous tests conducted with horns on an arm run out from the window of my automobile I found out that these horns had very little lag or hysteresis. If the car was slowly accelerated a horn might start to sound off at 25 miles per hour air speed, and would keep sounding above that speed. As the car was slowed down the sound would cease at less than one mile per hour below 25. Another characteristic of these horns is that within the limits with which I was interested, the volume of sound was practically independent of speed. When the air speed rose to the critical value the horn abruptly started sounding off at full volume. When the speed dropped to that value it suddenly stopped.

As I normally flew my Franklin PS-2 Utility glider at about 27 miles per hour, by a process of selection I found two horns of different pitch, one of which sounded off at 25 miles an hour and the other at 30. These I taped side-by-side to the right front wing strut about three or four feet out from the fuselage. Thus, when I heard a chord (both horns sounding) I knew I was flying above 30 miles per hour. If only one note was sounding the glider's air speed was between 25 and 30 miles per hour. When this horn stopped I knew I was getting close to the stall, which in my case was 23 miles an hour. As some wag aptly put it, "When the horns stopped singing, the angels started!"

This airspeed indicator, being simple to install and interpret, was the first to be flight-tested. It was eminently satisfactory, enabling me to hold my air speed within the 25-30 miles an hour limits through maneuvers, landing approaches, etc., without difficulty, even with the airspeed meter covered.

Later I installed the wing-tip noise makers. These also were 5 and 10 cent store products, though in this case, they were of the rotary-disc siren type whose volume of sound is proportional to air speed. From these I ran aluminum tubing for sound transmission in through the wings to the cockpit and hooked them into the headset of a doctor's stethoscope borrowed from the Station Dispensary.

After a bit of practice with this equipment I found I was able to maintain a fairly straight course at a proper air speed with my eyes shut for periods as long as 30 seconds. I guess I might have been able to do it for longer if I'd had more self-control but flying solo as I was, and from auto-tow, I was never able to force myself to keep my eyes shut for any longer period of time!

I realize, of course, that these devices could only do part of the job, and did not constitute a full blind flight system, since, while they took care of the "Y" and "Z" axes, that is, pitch and yaw, they took no account of the "X" axis, roll, and thus could only be used as is with a complete spirally-stable glider. It seems like a good idea, however, to pass this information along in the hope that it may give someone an idea that might result in a simple workable blind flight system for gliders.

EUROPEAN VENTURE-II

(Continued from Previous Page)

The comeback since 1951 is tremendous, though the Germans don't necessarily think so. There is a strong contrast to this country. Nearly every town has a glider; and it should be mentioned that there is absolutely no subsidy. The townspeople join together to buy the ship and perhaps receive help from a local manufacturer. At the time of my trip power flying by the Germans was not allowed. If and when the ban is lifted, I doubt if gliding will suffer. The sport will undoubtedly always remain in the forefront in that country and Germany will always remain in the forefront in soaring.

Arriving in Zurich I contacted Pirat Gehriger, Secretary of the Swiss Aero Club and who had flown the WLM II at the Internationals in England; and the next day we hopped over to Birrfeld, the local glider field. A dozen or so ships were in the hanger but it was a week day and there was no flying. Also there was a 30-knot cross wind and we shouldn't have flown in ourselves.

A party was held at the site the following Saturday which brought their soaring season to an end, and the next day I was off to Lausanne where I bumped into Judy Leonard, daughter of Connecticut glider pilot Parker Leonard. Judy decided that it would be more of an education to fly around in the Auster than to go to the University, so less than 24 hours later we were in France and shortly arrived at St. Auban, French wave soaring center.

A school was in progress at the time and considerable flying was done, but it was several months before the actual wave season. This was the last site visited on the Continent as Judy and I decided to try the sun on the island of Majorca. But from this first taste of European gliding, I find that I've developed an appetite. Yes, I'm going back again.