APPENDIX B

COMPARISON FLIGHT TESTS OF "ORAO II" AND "WEIHE"

By

AUGUST RASPET[1] and BORIS CIJAN[2]

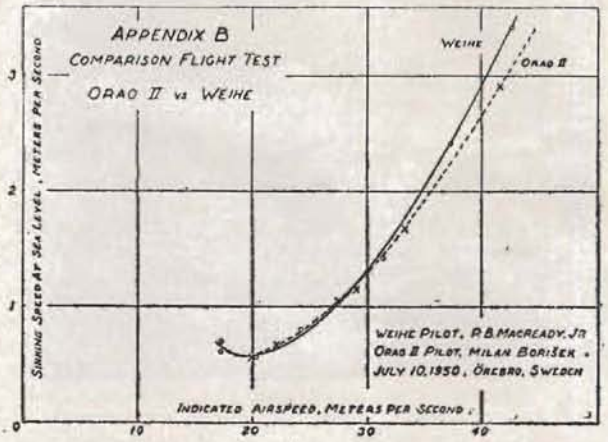
At the World Soaring Championship at Orebro, Sweden, in July, 1950, there appeared a number of very interesting sailplanes as well as a good number of the classical design "Weihe." The Scientific Committee of the Organisation Scientifique et Technique Internationale du Vol a Voile, appreciating the contributions to soaring which a careful flight analysis could make, suggested a comparison flight testing of all of these designs.

A programme, suggested by the Scientific Committee, was presented to the contest committee and through the good offices of Mr. Berthold Florman of the Swedish Airo Club, the first test was arranged between the "Orao II" and "Weihe." The Swedish Air Force kindly furnished the tow planes and the Yugoslavia team the "Orao II" and pilot Milna Borisek and the American team, a "Weihe" and its pilot Paul B. MacCready, Jr.

The "Orao II" is fully described in Schweizer Aero Revue, April, 1950. At flight test the sailplane had a gross weight of 400 kilograms. Its computed minimum sinking speed is 60 cm. per second and its best glide ratio 31-7. The finish on the sailplane was not a glossy finish such as usually found on high performance sailplanes. In addition there were numerous large openings and slots which no doubt acted as spoilers to the smooth air flow. Upon completion of the flight test the pilot, Milan Borisek, reported that the left dive brake protruded five mm. from the upper wind surface. The drag of this brake was sufficient that the pilot had to hold rudder to maintain straight flight. In addition the "Orao II" carried a pitot-static tube on the fuselage nose which the "Weihe" did not.

The "Weihe" which Paul MacCready, Jr., flew in comparison with the "Orao II" was a typical example of how a sailplane can be improved by attention to small details. The American team used the nose pitot for the airspeed indicator. This permits an uninterrupted flow over the nose of the sailplane. The lower laminar drag over the fuselage is then obtained. In addition the American team closed the aileron gap on the wing by screwing flexible aluminium strips to the wing. All other openings and gaps were sealed with adhesive tape. Even the canopy opening was sealed after the pilot was ready to go. Such attention to detail raised the maximum glide ratio of this "Weihe" from 29 to 31. But the gain in high speed cruising flight is even more important than the maximum glide ratio since a sailplane is usually flown at speeds above the best gliding speed during competition. The finish of the "Weihe" was almost a glossy mirror finish.

The comparison flight was conducted in the evening when it was felt all turbulence should have dissipated. The two sailplanes were towed to 2,000 metres altitude by two towplanes of the Swedish Air Force. At this altitude the sailplane pilots released and joined flight so that they were side-by-side. MacCready then flew at constant airspeed while Borisek flew on MacCready. After two minutes the pilots noted the altitude of the two comparison sailplanes which resulted after two minutes of flight at the particular airspeed which was flown. From an average of the readings of altitude differences taken by the two pilots and the time one can compute the difference in sinking speeds of the two craft. A series of such runs starting at the stalling speed of one sailplane and extending up to 150 km./hr. made it possible to obtain the speed polar of the "Orao II" from that of the "Weihe." The comparison method has the advantage that slight vertical motions of the atmosphere do not influence the results. Unfortunately for reasons beyond the control of the OSTIV it became impossible to conduct the comparison tests on the other sailplanes listed in the programme. However, it is felt that the results which are shown in the curve (Appendix B) should warrant an effort by the individual nations possessing



the particular sailplanes to complete the comparison tests. For example Switzerland could conduct the tests "AIR-100" *vs.* "Weihe," "Moswey VI" *vs.* "Weihe" and "Moswey IV" *vs.* "Weihe"; France could conduct "Breuget" *vs.* "Weihe" or "AIR-100."

In the speed polar curve (Appendix B) the "Weihe" curve is the result of absolute sinking speed tests made by MacCready using an altimeter *vs.* time method. Unfortunately the airspeed was not calibrated although an attempt was made to do so. For this reason the glide ratio cannot be computed very accurately. The "Orao II" curve was obtained by the comparison test which is the subject of this report.

It will be noted that the minimum sinking speeds of the "Weihe" and "Orao II" are nearly identical, 58 cm. per second. At 42 metres per second the "Orao II" has a sinking speed of 30 cm. per second less than the "Weihe." However, since the wing loading of the "Weihe" was 19 kg/square metre and the "Orao II" was 22.5 some of the high speed performance of "Orao II" may be ascribed to its higher wing loading. On reducing the performance of both ships to a loading of 19 kg. per sq. metre the "Orao" still shows up better by 10 cm. per second at a forward speed of 42 metres per second.

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JUMPING FOR JOY

NEWS has reached us from our friends abroad of a comparatively new sport which is becoming very popular amongst members of the Aeronautical Union of Yugoslavia—" parashutism."

Over twenty-thousand jumps have been made since the end of World War II without a single accident.

The youth of Yugoslavia is very interested in this exciting new sport and it seems that most of the jumps are being made by the younger ones as this is essentially a sport for the strong.

There are in Yugoslavia a number of National records, some of them they think to be of world worthiness : 132 jumps in a single day is the proud achievement of young Junko Lootovuz ; 25 jumps in one day made by a girl, Zagorkah Speechunavich, with a 52 second delay before opening the parachute with each jump ; a jump from 4770-metres with free fall to 1,780-metres by Alexander Stunich last year, and a number of other high altitude single and collective jumps.

There are many such achievements but the greatest success was in June when, starting at 03.54 hours a.m. from the aerodrome at Novi Sad, on the Danube, Junko Lootovuz began his new record-breaking endless series of jumps from a school two-seater aeroplane. Fitted on the wing was an attachment on which the parachutist lay during the take-off and climb to 250-metres when he slipped down the wing and jumped with free non-automatic opening of his parachute.

At the end of seven hours he had made seventy-five jumps but had to take a rest because of a strong wind which was blowing at eleven metres per second. When the wind lessened to five metres he proceeded and at the end of a further eight-and-a-half hours his total stood at 101 jumps. Then at 21.06 hours he made his final 132nd jump.

His efforts had by no means exhausted him and after a bath and refreshment he took a walk through the Corso in Novi Sad the same evening.

Only from Russia do the Yugoslavs receive any competition in this remarkable new sport but we do not receive any details of their records to publish.

(Details of Soaring Activity in Yugoslavia can be found amongst Club News.)

THIRD INTERNATIONAL SOARING CONGRESS *from page 268*

When the revolutionary design such as the " Orao II " of Boris Cijan and Stanko Obad appears in competition there also appears wild guesses and opinions as to its performance. Some designers are occasionally too proud to permit their craft to be evaluated. It is fortunate for the international soaring movement that Boris Cijan not only did not object to the foregoing comparison test but indeed co-operated in its execution. The contribution of Cijan and Obad to sailplane design thus becomes immediately available to other designers the world over. In turn, Cijan, as a result of these tests, appreciates the fact that " Orao II " can be improved by the same techniques MacCready used on the " Weihe."

In this programme it is hoped the reader sees the function of OSTIV, the world discussion of information on soaring flight.

SOARING IN FRANCE

By GUY BORGÉ

The Military Soaring Contest

At Cazaux (Gironde), a Military Soaring Contest grouped from July 24th to August 3rd, 17 sailplanes : 2 " Weihes," 13 " Nord 2,000," 1 " Castel 310 " and 1 " Nord 1,300," and some numerous pilots of different ranks from private to Colonel. Weather was fine, and 2,500 miles were flown in 281 hours. Figures are impressive when one learns that the airfield, near the Atlantic Coast, is completely bordered by some pine forests (average width 30 miles).

Sergent Aubert became the winner by recording some top performances. He was classed the first in the circuit leg with 55 miles in 3 hours, and the first in the goal distance leg with 147 miles from Cazaux to Toulouse. In the free distance leg, Soldier Serf was first with 173 miles, Sergeant Orgueil second with 147 miles. Five other flights exceeded 125 miles, and eight between 60 and 125 miles.

The Angers Regional Competition

A few clubs, only three, entered the Angers Regional competition with 14 sailplanes : 1 " Weihe," 3 " Nord 2,000," 5 " Nord 1,300," 2 " Castel 310," 1 " Emouchet " and 2 " Castel 301," and also 14 pilots. This small number of participant Clubs is certainly caused by the financial difficulties of numerous Soaring Sections, but perhaps also because their Presidents fear to lose their precious sailplanes during the distance flights. These fears are real (see the British National Championships), and the wealth of the machines is kept safer by letting them on their airfields or even in their hangars. But such an attitude is retrograde and negative ; by observing the results of the 1949 and 1950 Regional Competitions, one sees that no one sailplane was broken in spite of the miles flown. Training of the competitors is better and they are prudent enough to limit the inevitable risks.

At Angers 4 pilots succeeded to follow the imposed circuit of Angers-Saumur-Cholet and return (98 miles), a nice achievement and a historical circuit, since it was the famous " Circuit d'Anjou," in 1912 along which Roland Garros won the speed race and the great prize of the France Aéro-Club.

In the goal flight leg, one pilot reached La Châtre (138 miles), and two others Cognac (129 miles). Another competitor arrived at Cognac, but he preferred to pass the town and to try his 186 miles ; he landed at 160 miles, missing in the same time his goal and his distance leg. Winner in the performance class was Gautier from Nantes in a " Nord 2,000," followed by Moreau from Saumur and Marenne from Angers.

These performances would seem good by our usual standards, but weather was not very favourable. The Loire country is excellent for soaring, with numerous and frequent cumulus generally beginning at 6,000 feet. But certain days their base is staying at 10,000 feet above the ground, and I know one pilot that taking off at 2 hours p.m. from Chateauroux in a " Castel 310 " covered 174 miles.