# XVII. OSTIV-Congress 1981, Paderborn

**Introduction**

On 27th of May 1981 the XVII. OSTIV-Congress was opened in the Town Hall of the City of Paderborn by the OSTIV-President, Dr. Manfred E. Reinhardt, under presence of high representatives of the City of Paderborn, the University of Paderborn, the International and National Aero Clubs, the Directorate of the World Gliding Championship, together with Designers, Constructors, Meteorologists and other interested friends of gliding.
The program of the Opening Ceremony includes traditionally addresses by the local authorities and the representatives of the gliding sport followed by the presentation of awards by the OSTIV-President. In addition, the Opening was extended by a Keynote Address given by Professor Dr. Fred Thomas, Member of the Head of German Aerospace Research Establishment, referring about aspects of future development in sailplane design.
Since Dr. Paul MacCready, the winner of the OSTIV-Plaque with Klemperer Award, was unable to attend the meeting and receive the prize, the Film 'The Story of Gossamer Condor' has been shown, giving a report of the work of Dr. MacCready.
With a reception offered by the Major of the City of Paderborn the Opening Ceremony was closed.

**Addresses at the Opening Ceremony**

**Georg Brütting, President 'Deutscher Aero Club'.**
"There had never until then been any research efforts especially designed to promote a sport' wrote Prof. Dr. Walter Georgii in his memoirs on the founding of the Rhön-Rossitten-Gesellschaft in 1925, "which then went on to make such a great progress of soaring". Let me simply mention the development of various launching methods, until they could be used in normal gliding operations and therefore enable glider pilots to break away from the slopes and fly over flat country. Or let me mention the investigation of the airflow under, around and in clouds as a source of energy for cross-country flights.
Prof. Georgii found high interested and motivated scientists in many countries, so that it was only a small step to found ISTUS in the year 1930, the first international body of gliding.
You, Gentlemen, have continued the work of this international organization since 1945 under the name of OSTIV, and you have continued and devoted your work to the investigation of scientific and technical problems combined with soaring.
It is a good tradition that your OSTIV-Congress is held always at the same time and place as the World Championships. May I welcome you most heartily, on behalf of the German Aero Club to this XVIIth World Congress. I hope your meetings are successful and your papers widely read, and I hope that many National Aero Clubs continue to work closely with OSTIV.

**Bill Ivans, President 'Commission Internationale du Vol à Voile (CIVV)'**
"Mr. Mayor, President Reinhardt, Friends of Gliding!
The technical aspects of gliding appear to offer at least as much challenge as the piloting aspects. We are therefore very grateful for the existence of OSTIV as a means for bringing together the talents and energy of technical experts from all over the world, to deal with problems ranging from a better understanding of the atmosphere in which we fly to dealing with the realities of testing and licensing of gliders.
Perhaps the most obvious measure of OSTIV success is the array of gliders entered in the ongoing World Championships. The aerodynamic and structural sophistication of these beautiful machines is directly linked of the efforts of OSTIV, its Panels and its Committees. All glider pilots, whether in World Championships or otherwise, are direct beneficiaries of OSTIV's efforts.
I am very happy to state that there is a most harmonious relationship between OSTIV and the Committee on which I have served for many years, the CIVV. This, of course, is as it should be: to a great extent, we depend upon each other. Beyond that, however, there are ties of friendship and mutual respect which I suspect are really more binding than the ties of convenience or necessity. I hope that this will always remain true."

**Fred Weinholtz, Director of World Gliding Championship 1981, Paderborn.**
"Parallel to the XVIIth World Gliding Championships at Paderborn your XVIIth OSTIV-Congress takes place.
The Gliding sport is – to our knowledge – the only one sport that combines in such a way sport, science and technique in one event.
Experience learns that this combination is a very wise rule in the Statutes of the highest sporting authority of aviation, the F.A.I. (Federation Aeronautique Internationale), namely to give opportunity to be present at the championships of the best glider pilots of the world and to participate in the scientific-technical exchange on the same place at the same time. I welcome you with my sincere wishes for such a most intensive exchange of science and its application in our sport."

**Keynote Address**

by Prof. Dr. Fred Thomas, Head of Research Department for Flight Mechanics, Guidance and Control of German Aerospace Research Establishment (DFVLR), Braunschweig, F.R.G.

*"Aspects of Future Development in Sailplane Design"*

"Ladies and Gentlemen,
Let me first convey to you regards and best wishes from the German Establishment for Aeronautical Research (DFVLR) for a successful progress of the OSTIV-Congress. Although most of the research efforts of the DFVLR are devoted to the development of technologies for transport- and fighter aircraft, to air traffic, astronautics and energetics, there still remains a certain capacity for sailplane research and development. A considerable number of innovations had their origins in the design and manufacture of sailplanes before they were applied to other industrial processes. Especially worthmentioning is the use of glass- and carbon fiber materials in the structure of the airframe, and this again was the basis for an extremely high performance aerodynamic shaping of the aircraft. We expect further advances in this area which promise to be seriously considered for application in other areas.

Another aspect of our activities in this field is the promotion of aeronatical students and young engineers in close cooperation with the Technical Universities and the 'Akademischen Fliegergruppen'. A large number of existing research problems is dealt with in the thesis work of students. The same applies for the design and construction of sailplanes and their components. The combination of theoretical and experimental research work, design, manufacture and flight testing of an aircraft forms an ideal basis for the professional career of young aeronautical engineers. A considerable number of very advanced sailplanes has emerged from this kind of work. I think we have to be very grateful to OSTIV, because this organisation has provided the opportunity to these students and young engineers to present the results of their research work to this distinguished audience of internationally renowned experts during this congress.

When I was asked to say a few words during this opening ceremony, it was also expected from me to address the aspects of future development in sailplane design. It is of course a great pleasure for me to do so, partly because I have great respect for the excellent work which has been performed by OSTIV during many years, and partly because I am also very much interested in sailplane design myself. However, it is obviously not possible to offer a complete picture of the future development of sailplanes within the few minutes available for such an outlook during an opening ceremony. I shall therefore restrict myself to touch only a few of those aspects which are discussed among the community of sailplane researchers in Braunschweig.

The characteristic feature of soaring is to extract the energy required for flying from natural sources of energy in the atmosphere. The extraction of energy, for instance from a thermal, as well as the conversion of this energy into a distance flown by the sailplane, has to be performed with the least possible loss of energy, that is, with a high degree of efficiency. Both aspects have formed the main elements of OSTIV's work for many years. One section of OSTIV is occupied with research of energy resources of the atmosphere, and the other one with sailplane development. After a long and interesting evolution, we have now reached a very high standard in both disciplines. Further improvements will require a considerable amount of effort.

Nevertheless, we are still confronted with a number of unsolved fundamental problems like laminar bubbles, insect contamination and flow separation at the wing-fuselage intersection. Advances are expected by new design concepts for wing sections with boundary layer blowing to avoid the laminar bubbles, as was demonstrated with the SB 12. In the near future it may be possible to achieve the performance of earlier FAI-15m sailplanes by properly designed standard class gliders. Wind tunnel measurements have shown further improvements with advanced wing-fuselage combinations. Unconventional shapes like tailless or canard configurations, including winglet-elevator combinations, are very promising with respect to low interference drag. Much research work has to be invested, however, before such configurations will achieve the high level of aerodynamic performance and handling qualities of our present day conventional high performance airplanes.

Simpler approaches to designs with variable geometry are another area of potential progress, for instance with the goal to match the performance of the single SB 11 with normal production sailplanes.

Continual improvements are also expected in the industrial production by means of advanced materials for the airframe, by digital techniques for instruments and controls, and by human engineering for the cockpit lay-out.

All the progress described so far will be achieved by more or less conventional methods which are quite familiar to us. But we have to ask ourselves whether additional possibilites for advancement can be found which so far have not been explored for soaring.

Today we consider the thermal as the only important source of energy for the sailplane, quite like the pilots did with the slopewind for hill soaring in the early years of the Wasserkuppe. By the method of thermal soaring the sailplane uses only a fraction of the available energy. No advantage is taken, however, of the radiation energy to which the airplane is exposed and which only heats up the pilot, to his discomfort.

We are already able to convert solar radiation energy into electric energy by solar cells, which could be used to propel the aircraft. Paul McCready, who will receive high honours today from OSTIV, has demonstrated with his "Solar Challenger", that a suitably designed airplane can be flown by nothing else than radiation energy.

Paul McCready's aircraft would certainly not be able to compete on an average competition day of a world championship with the present day sailplanes. Even further developments will not change this situation drastically. A specially designed hybrid sailplane, using thermal and radiation energy, would certainly be able to exceed the performance of a conventional sailplane quite considerably. There is a great variety of possible utilizations for the additional energy. It may be used for boundary-layer control either to increase the area of laminar flow or to avoid separation in critical areas. It could also be used - in combination with a suitable storage system - to sustain flight during periods of weak thermals, or to extend the final glide in the evening. The correct and careful application of this limited amount of additional energy would add an interesting element to the decision making of the pilot in a competition.

The very high cost of solar cells may be prohibitive for their widespread application in the near future. The enormous effort, which is made all over the world toward the direct conversion of solar energy will finally lead to highly effective mass produced solar cells at reasonable cost.

A typical example for such a cost-effective development was given by the carbon fiber. When it was first applied in the SB 10 nearly 10 years ago, it was extremely expensive. Today - although not yet really cheap - we find more carbon fibers in current production sailplanes than in the SB 10.

It may be questionable whether we will ever reach a balance between cost and performance of solar cells in sailplane design. Scientists and engineers from all over the world will have to explore which of the many ways into the future will be most promising.

I wish much pleasure and success to everybody who will contribute to the progress in sailplane development, and I wonder what innovations will be presented to us at OSTIV congresses in coming years."