STANDARD CLASS FOR THE 1959 NATIONALS

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A first attempt to include a Standard Class sailplane competition in the National Soaring Contest was made last year at Bishop. Because sailplanes in this country had not been built to comply with many of the restrictions adopted by the OSTIV to govern Standard Class sailplanes, the only restriction actually used was the maximum span limitation of 15 meters. This had the effect of permitting many existing sailplanes to compete in this category but did little to encourage the development of a true Standard Class sailplane which would be eligible for international competition.

The Standard Class requirements were discussed by the SSA Board of Directors at their meeting following the Contest last August. It was the consensus of opinion that future Standard Class events should adhere to all of the OSTIV requirements. The subject was again discussed at the midwinter Director's meeting held in Denver at the end of January of this year. There was complete agreement that OSTIV requirements should govern in the Standard Class events but it was recognized that there were some unresolved problems in providing for speed limiting devices which would not impose a handicap on U.S. sailplanes because of the difference in government regulations governing maximum permissible speeds in the various countries. As this situation would not be corrected in time for the 1959 National Contest, the Chairman of the SSA Contest Board was to determine a reasonable interim speed brake requirement and have this published in the March-April issue of SOARING to provide the greatest possible advance notice to those who planned to participate in this Class in the 1959 Contest.

Briefly, present U.S. Civil Air Regulations design parameters would impose either larger speed brakes or greater structural strength requirements for U.S. sailplanes than would be necessary for foreign aircraft which are accepted as Standard Class sailplanes. The problem is further confused by the fact that an experimental airworthiness certificate may be obtained in this country with little or no verification of structural integrity or the validity of the limit speed selected by the designer. Nor is there any simple way to insure that the speed brakes will actually hold the aircraft to the limit speed in a vertical dive. It is anticipated that several years will be required to clarify this situation. In the meantime, a practical, fair, and easily administered yardstick is needed to insure that some real effort has been made to approach the goal of providing a satisfactory speed limiting device on Standard Class sailplanes. Yet care in selecting the yardstick is required to insure that unnecessary handicaps are not imposed on the U.S. sailplanes.

For the 1959 National Contest Standard Class Competition, the OSTIV requirements as published in the 1959 January - February SOARING will apply except that compliance with the requirement for a speed limiting device will be based on the following arbitrary criteria:

1. The equivalent flat plate area of the speed brakes may not be less than 6% of the wing area. (This will limit the speed of the average sailplane to about 4 times the stalling speed.)

1. a. For the types of speed brakes in general use where the brakes are on the top and bottom of the wing between 20% and 50% chord, the equivalent flat plate area will be taken as the total projected frontal area of the extended speed brakes including the thickness of the wing and any gaps between the wing and the brakes provided that the solidity of this total area is no less than 80%.

1. a. (1). For speed brakes located on the wing aft of the 50% chord line, the required projected frontal area is 1.0% greater for each additional 2.0% of chord aft of 50%.

1. a. (2). For speed brakes of this type with a solidity of less than 80% but more than 50% based on total projected frontal area when extended, the frontal area required is increased by 1% for each 1% decrease in solidity below 80%.

1. b. For fuselage brakes, the required equivalent flat plate area will be based on the actual projected frontal area of the extended dive brakes.

2. Forces required to operate the brakes must be low enough to permit satisfactory operation at all speeds. In general, forces required to operate spoiler type speed brakes hinged at the leading edge will be too high to permit sufficient extension at high speed to accomplish the design objective. A simple mechanical analysis of the loads on the brakes and the control linkage will be made to show that not more than 50 pounds force is required to operate the brakes at any permissible speed. Friction may be neglected in this analysis and hinge moments will be based on an even pressure distribution across the surface of the brake equivalent to the total projected frontal area specified in (1) divided by 90% of the maximum gross weight.

These requirements, although arbitrary in nature, are based on an analysis of speed limiting devices used on foreign aircraft and on dive brake drag data compiled by Dr. S. F. Hoerner in his book on Fluid-Dynamic drag published in 1958. Several flight tests have been made to verify the results. In arriving at these requirements, it was assumed that the maximum permissible speed would be four times the stall speed and that the stall speed for an average sailplane is:

$V_{STALL} = 16.5 \times \text{square root of } (W/S) \text{ (mph)}$

where W = weight and S = wing area. On this basis:

$V_{MAX} = 66 \times \text{square root of } (W/S) \text{ (mph)}$

and in a dive: Weight = Drag, or

$W = \frac{1}{2} \times (\text{Air Density}) V^2 C_D \times (\text{eq. fl. pl. area})$.

For flat plates, $C_D = 1.3$:

$W = .00333\ V^2 \times (\text{eq. fl. pl. area})$

$W = .00333 \times 66 \times 66 \times W/S \times (\text{eq. fl. pl. area})$

$S = 14.44\ (\text{eq. fl. pl. area})$

eq. fl. pl. area = .0673 x wing area

The drag of the basic aircraft in a dive was taken to be equivalent to that of a flat plate of 1% of the wing area. This then left the equivalent flat plate area to be provided by the speed brake as 5.7% of the wing area which has been changed to 6% for the purpose of this requirement.

This requirement generally gives speed brakes designs which are easier to meet than if based on U. S. C.A.R. placard speed requirements and also

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