three factors: (1) Maximum cross sectional area; (2) streamlining; (3) surface smoothness. The first of these three items will now be discussed in more detail with the aid of Fig. 1.

The full line represents the conventional rectangular framework fuselage having a minimum size sufficient to accommodate the two passengers shown. If it is required that the external form of the fuselage be streamlined, then light formers and stringers must be added and the superstructure must be covered with fabric. In such a manner the total cross sectional area is increased to that indicated by the dotted line.

In the case of the monocoque fuselage the dash-dotted line shows the required contour. This contour can be maintained with the plywood monocoque fuselage of the classical German soaring plane construction or else with the standard reinforced aluminum alloy construction in general use in powered planes. It is obvious from the figure that in this respect the monocoque has a great advantage over the framework. As a matter of fact in the figure the area enclosed by the contour of the monocoque is only two-thirds of the area enclosed by the outer covering of the framework fuselage. The reduction of drag through the use of the monocoque is therefore very significant.

Moreover the monocoque has the advantage of better streamlining and surface smoothness.

Suggestions for Improvements in Framework Fuselages

It may be stated on the basis of the preceding analysis that the welded steel tube fuselage is very attractive from the standpoints of safety for the pilot, ease of repair, cheap production in small series, and light weight, but it is inferior to the monocoque as regards drag. When the writer invented the pseudo-framework construction shown in Fig. 2 his object was to reduce this disadvantage. This new construction incorporates ring frames of the type used in aluminum alloy monocoque construction, longitudinals, and bracing elements in most of the panels of the surface of the fuselage bounded by two adjacent rings and two adjacent longitudinals. The number of longitudinals to be used varied with the purpose of the plane. The materials of construction may be steel or aluminum alloy, or possibly wood. The cheapest design undoubtedly combines steel tubing for stringers and diagonals with bent steel profiles for the rings. The structure may be welded.

The behavior of a welded steel pseudo-framework in a crash will be just as good as that of the conventional welded steel tube framework fuselage. Its cost of production is slightly higher than that of the basic structure of the conventional framework. On the other hand the streamlined shape can be obtained by attaching to the rings a few small size wooden stringers, the cost of which is negligible. Furthermore the weight of the pseudo-framework is somewhat greater than that of the basic structure of the conventional framework but at least part of the difference is eliminated by the reduction in the weight of the superstructure. The pseudo-framework can be repaired just as easily as the regular framework.

Fig. 3 shows that the maximum cross-sectional area of the pseudo-framework fuselage is much smaller than that of the conventional framework fuselage. One of the great advantages of pseudo-framework construction is that the interior of the fuselage is entirely free. It is known that in the conventional rectangular framework diagonals must be applied in several transverse planes or else the torsional rigidity of the fuselage is not satisfactory and torsional oscillations of the tail surfaces may ensue. In the pseudo-framework fuselage sufficient rigidity can be obtained without any internal bracing so that the entire interior is available for accommodating the crew, controls, and equipment. Calculations show that the required size of the ring frames is small except in the neighborhood of attachments where concentrated loads are introduced into the fuselage. In the pseudo-framework large openings can be easily provided for doors and landing wheels without causing any material decrease in the strength and rigidity of the structure.

The only inherent disadvantage of the pseudo-framework is that the forces in it cannot be calculated as easily as in the conventional framework fuselage since it is a highly redundant structure. Some added work in the stress analysis should be accepted, however, when definite structural gains can be had by the use of a new type of construction.

GLIDING IN CANADA, 1946

(Continued from Page 3)

firm has contributed in many ways and has done much to advance the SAC.

Now what of the actual flying done in 1946? It was mainly training, short flights and many of them. Pilots capable of longer flights willingly stayed on the ground and helped the others into the air.

There are now 27 gliding instructors in Canada and the number is, of course, growing.

In 1946 about 6000 flights were made and the earning of 132 certificates has been reported. Last year only 73 were earned. Of the 134 there were 71 A, 60 B, and 3 C. Next year we want more C's, and at least 175 certificates of all kinds.

Practically all this flying, all these 6000 flights were made on 3 Cadets, 3 SGU-1-19, 1 Dagling, 1 Sparrow and 1 Robin or only 9 gliders in all. There is much more that can be done by greater use of the gliders we have and by obtaining more gliders as well.

With all these training flights and hard work we are working toward longer flights and higher flights. To give you an idea of what can be done with skill and a sailplane of only moderate performance, let us see what Les Baranowski accomplished. At the Elmira Contest and at Toronto he put up a flying time of 21 hours in only 8 flights. He reached 6000 feet and flew 71 miles. That is the sort of thing we all would like to do and if progress is made as it was made in 1946 it may not be long before such wishes are fulfilled.

As you know all this work done by the SAC is voluntary and done in the spare time of busy men. Such spare time is scarce and that is why some of our developments have not moved as fast as we could wish. All members owe a great debt of gratitude to our Honorary Secretary-Treasurer, Flight Lieutenant A. N. LeCheminant who has worked very hard all this year and the year before. We cannot overpraise him.

B. S. SHENSTONE
President