

THE

POWERED

SAILPLANE

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Introduction

The problem of launching sailplanes has plagued the sport of soaring since the early days of the primary glider. All manner of methods have been investigated and put to trial in order to obtain an inexpensive, simple system. Unfortunately, all of the popular methods now in use require extensive facilities, expensive equipment, and skilled launching crews. The sailplane enthusiast must, obviously, confine his activities to areas where such launching services are available. This situation has left large sections of the country without any possibility of soaring flight exploration and/or exploitation. There is a definite need for a satisfactory solution to this problem if sport soaring is to progress beyond its present limited activity in this country.

The powered sailplane, or perhaps more technically descriptive, the self-launching sailplane, fulfills the need

the first auxiliary powered glider to receive a type certificate as such, from the CAA. From the experience gained with this craft, the "HUMMINGBIRD" was evolved.

Design Proposal

The original design proposals covering the development of the "HUMMINGBIRD" were influenced to a considerable extent by the experiences and results obtained from the "DRAGONFLY" project. The focus of the proposed design requirements

use at any time during soaring flight. The two-place design was selected on the basis of the following points:

- A. A more favorable ratio of powerplant weight to design empty weight could be obtained.
- B. Physical dimensions were greater, thus providing more space available for the power unit.
- C. Minimum of two persons was required to assemble the aircraft.

The "Hummingbird" over Bishop as a two-place high performance sailplane.

Fig. 1



When lift is absent the retractable power plant is elevated and the "Hummingbird" becomes an adequately powered aircraft.

Fig. 2

just mentioned and opens new possibilities for an expanded soaring program. It is the intent of this paper to describe an aircraft of this type; namely, the Nelson "HUMMINGBIRD," and some of the associated design problems.

The "HUMMINGBIRD" powered sailplane is a development of Ted Nelson of San Leandro, California, and was designed by the author. The project began with the development of an earlier model called the Nelson "DRAGONFLY." This aircraft was

was directed to the areas of power-off soaring performance, climb performance, flight handling and stability characteristics, and assembly and disassembly of the aircraft. It was required that the design yield soaring performance equal to existing two-place designs, possess good stall characteristics, and yet be capable of take-off and climb to soaring altitude unassisted by any external launching devices or launching crew personnel. It was also considered desirable that the propulsion unit be available for

D. More diversified enjoyment of soaring flight.

E. Greater flight instruction utility.

The values chosen for the basic design parameters of wing area, aspect ratio and span were compromises in this design with glider power-off engine retracted soaring performance and glider power-on climb requirements. Only the take-off and climb range in the power-on condition were evaluated due to the narrow performance limits of the power available and high power loading. It was found from flight operations in the field covering the usual soaring activities that aircraft of this type with low rates of climb were unsatisfactory, particularly in areas of strong thermal activity. The high ambient temperatures usually associated with this type of atmospheric condition together with the strong downdraft present combine to reduce the take-off and climb performance to marginal values.