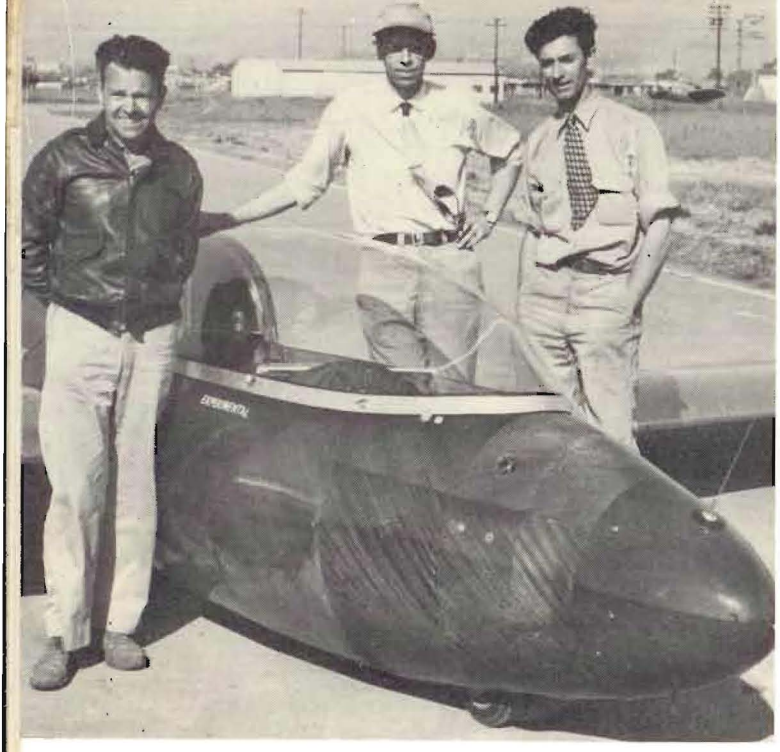

Harry Perl, Ted Nelson, Don Mitchell, the big three of the Hummingbird development.

Both of these ships were developed with the assistance of Hawley Bowlus, an old veteran of the gliding fraternity. Economic conditions did not justify further production of this design, so it was abandoned.

Several years later I was still intrigued with the idea that a powered high performance sailplane could be designed and built. A tremendous amount of information and data had been obtained from earlier ships produced and with hundreds of reports coming in from the N. A. C. A. from which to obtain additional material I decided to try again to develop a satisfactory high performance powered sailplane. This was no small project, so two men, Mr. Harry Perl and Don Mitchell who are well trained in the aircraft industry and with lots of glider experience, were called in to assist in the engineering and design of this ship.

We spent many months analyzing the problems of a powered sailplane and endeavored to develop the proper design that would give the highest all around performance. The design was broken down into five divisions, namely powerplant, wing and airfoil design, fuselage, landing gear, empennage.

The powerplant was a major problem for several reasons. First off, a complete study was made of the various means of propelling power, such as turbo jet, rocket jato, gasoline reciprocating, and diesel engine The turbo jet was eliminated because of high fuel consumption and cost, jato for cost reasons. By the process of elimination the 2 cycle gasoline type appeared to be the most practical for our particular craft. Search showed that no suitable plant was available, so we designed and built a special 4-clyinder engine for gliders. The second problem was to eliminate the drag of the engine and propellor when gliding without power. The possibility of a submerged power plant was investigated and abandoned because of cooling problems and special propeller drives. Full feathering propellers were likewise discarded because of high power impulse problems and cost of construction. The most practical solution was to develop a retracting mechanism whereby the entire engine and propeller could be concealed within the fuselage, and enclose it with suitable doors. It was decided that the engine was to be mounted on the ship as a pusher and located back of the wing main spar. This gives ample protection to the propeller and also gives a weight and balance that allows both pilots to be located out in front of the wing for excellent visability. The estimated weight of the ship indicated we should have 40 H.P. and a max. weight of power plant of approximately 45 lbs. The engine was to be free of vibration and be easily started from within the cockpit. All this met with a suitable engine we call the Model H 59.

The wing design required a tremendous amount of study and discussion before the proper airfoil was selected and the type of construction was determined. The airfoil is a Gott.-549. We decided on a full cantilever tapered wing and determined that metal construction would be the most satisfactory with a minimum of weight. The spar is a box beam with the skin over the nose ribs forming a "D" section. Aluminum 75 ST and 24 ST was decided upon for all structure in building the 185 square foot area wing. Fabric was to cover the trailing edge and control surfaces to conserve weight. Estimated weight of each panel was to be 120 lbs. and it was found to be actually 122 lbs. after completion. Two tapered pins attach each wing panel to a metal box spar in the center section of the fuselage and one straight pin takes all drag loads in the rear section. Ease of assembly was a major consideration in our design and the entire ship can be handled and assembled by two people in approximately 15 minutes.

Several fuselage designs were made and it was decided to try a side-by-side seating arrangement first. This was constructed and flown but abandoned for a two-place tandem design that would give better high speed performance by less frontal area drag. More room and comfort for the pilots was also possible in this new design. Mahogany plywood and wood construction was decided upon as the easiest and less expensive for a limited number of ships. The proper proportions of the fuselage and canopy design were selected after receiving many of the NACA reports that covered such structures.

The first 2 place side by side fuselage was equipped with a tricycle landing gear that was completely retractable and enclosed. This was discarded in the tandem design because of its weight penalty and expense of construction and in its place we designed a bicycle gear with the nose wheel being steerable by the rudder pedals. This system allows the ship to be taxied around the ground with complete ease. Small wheels are used on each wing tip to support them while taxing at low speed or parked. The main wheel is located just aft of the C.G. and is a Goodyear 6.00 x 6 equipped with a brake. The nose wheel is a General 9x3. We decided against retracting the wheels to simplify the ship and reduce some of the cost of manufacturing.

The empennage is of rather novel design in that the elevator design was selected from a NACA report and is known as an all movable elevator. This is very similar to a pendulum elevator used on many sailplanes such as the Baby Bowlus, but with one difference. The trailing edge is equipped with a movable tab and this tab is connected by a link to an adjustable pivot point on the rear of the fuselage. Movement of the control stick moves the elevator but the tab is

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