by Stephen Smith

THE idea for "Cumulus" sailplane was first conceived at the National Soaring Contests at Elmira several years ago. Many happy hours were spent prowling amongst the numerous sailplanes, peering into the cockpits, measuring this and that, taking photographs and asking many questions. After studying the various sailplanes, their merits and demerits, there was born—on paper—a streamlined beauty—a midwing job with gull wings and performance to rival the Minimoa. After several months of work—came the rude awakening. The true magnitude of this spare time undertaking was impressed upon me when, after months of work, the stock of finished parts consisted of some ribs, a few fuselage frames and a portion of the main beam. Efforts were then turned to a simpler and smaller design, easy to build and yet having good performance. The result was a single place high-wing plywood and fabric intermediate type of sailplane with a wing span of 46 feet. After many more months of spare time design and three years of actual construction and, in spite of the war and its attendant shortages and difficulties, "Cumulus Sailplane" was finally completed.

Preliminary flight tests were made in July by Emil Lehecka at Harris Hill and the County Airport, Elmira, N. Y. These flights were made from auto tow and resulted in soaring flights of varying duration. On one of the first test flights pilot Lehecka, using only the airspeed indicator and altimeter in the cockpit, managed to soar for several minutes over Harris Hill in a light thermal. Later, a rate of climb indicator was installed and soaring was considerably simplified. The glider was found to be very stable and could be flown hands off the controls; stalling speed was at 32 M.P.H. Best cruising speed appeared to be at 42 M.P.H. with minimum sinking speed of 2.66 feet per second.

The fuselage of "Cumulus" is built around four spruce longerons and frames having flat sides, a vee bottom and semi-elliptical top. Mahogany plywood is used for covering. A single 5.00 x 4.00 tire and wheel is attached to the main beam bulkhead, slightly ahead of the normal C. G. location. A steel sheathed wood skid extends ahead of the wheel. Tail skid utilizes a two leaf spring. A D.V.L. release is mounted on the nose. A standard Bowlus wheel control is installed in the cockpit. 1/8" extra flexible steel cable is used for all controls. The cockpit has a removable scoop with large pyralin windshield and a quick release feature.

The wing consists of a 16-foot center section of uniform chord and thickness and two tapered outer panels. Airfoil used is the N. A. C. A. 4415 for the center section tapering to the 4412 at the panel tips. A washout of 5½° was built into the panels. Main beam and rear beam are of box construction with laminated spruce flanges and two-ply 45° mahogany webs. Ribs are trussed spruce with glued and nailed gussets. Mahogany plywood covers the leading edge of wing, while doped fabric completes the remainder of the wing. Spoilers are located on the top of wing at the 40% chord position. These 3 feet long spoilers were found to be very effective. All fittings are made up of welded chrome molybdenum sheet stock. Tapered nickel steel pins fasten the outer panel to the center section.

The use of a three-piece wing, a center section and outer panels has evoked considerable discussion and controversy. In the design of this sailplane, the merits of the conventional wing were carefully weighed and the three-piece wing was finally selected because:—

(1) A short center section and panels require only one single assembly jig.

(2) A short rigid panel was less likely to warp in service.

(3) Storage problem was solved as the glider on its trailer can be stored in a standard 18 foot automobile garage.

(4) Maintenance and repair is simplified.

(5) Main beam fittings are light and simple as bending loads are one-third that at center line of wing.

A vertical type of jig was used for assembling the wing. This jig was so constructed that it could be used for the center section and the left hand and right hand panels. Ribs were placed into position on the beams and then clamped to the jig in the proper location.

The leading edge plywood was trimmed to the proper size and edges scarfed. The scarfing machine consisted of a multiblade cutting head which was attached to a high speed ½ horsepower electric motor. This unit was fastened to a table with a straight edge guide, so that the revolving cutter would bevel the edge of the plywood as it was passed through the machine.