The Heath "SUPER-CHAPTER III

Here is one of the greatest of gliders—"The Heath Super-Soarer"—which was designed by the pioneer of light plane designers and is the only type of glider to successfully perform a loop. Many parts of the famous Heath Super-Parasol are used in constructing the glider.

Up She Goes!

HEATH FIELD is only seven miles from my house, so when one crisp, cold day the late Ed Heath roused me from bed with an early phone call and told me to come out and see something peppy happen at his experimental field, I was not long in getting there.

When I drove into the lane leading to the grove of trees where the hangar is, I saw that I was bringing up the rear of a little parade of cars carrying newspaper men and news-reel photographers, most of whom were drifting over to where a beautiful biplane glider less than six feet tall stood poised for flight in the snow. A thin glistening steel cable was attached to a coupling at the nose, releasable from the pilot's instrument board in the snug cockpit, in the nose of the fuselage ahead of the wings. I might note here that the instrument board bore only this cable release and an altimeter. My eye naturally followed the line of the steel cable and there about five hundred feet away I could see the old Standard J-1, OX-5 motorized war-time training plane, which Ed kept in wonderful condition for just such jobs as this, for what could be better than the old Standard, with its 62 mile-per-hour top speed, for glider towing? We could hear the motor faintly as it ticked over slowly, and presently a small figure jumped down briskly from the wing sidewalk of the huge old kite, and with a few parting instructions to his pilot, Jim Lambert, Ed Heath waded back through the snow to our end of the cable, letting the cable slide through his gloved hand.
the "Super-Soarer"

dope. Bottom fairing is applied in a similar manner.

The turtle back fairing of the fuselage top consists of semi-circular bulkheads of 3/16" 3-ply plywood, with 3/16"x5/8" spruce stringers set in deep notches around their edges. The instrument board serves as a bulkhead for the little fairing in front of the pilot and its stringers are of 1/4"x1/2" spruce. All Wood joints are made secure with aircraft glue and 21 ga. nails of various lengths. The little 20 ga. aluminum stub cowl that forms the front edge of the cockpit has the edge toward the pilot turned over a piece of 1/8" wire, similar to the edge of a bucket rim to give a rounded edge.

Fig. 5 describes, perhaps better than words can tell, just how the wing beam fittings are built into the fuselage structure. The front fitting presents no difficulty, the wing end fitting merely being bolted at the bottom to the fuselage fitting marked H and its top lugs wrapped around its vertical strut, and bolted to the flattened end of the new horizontal compression strut which, with the old horizontal fuselage bottom strut, takes all the compression between the front wing beams.

As the rear wing beam fittings come at unsupported points on the longerons, a new horizontal fuselage bottom strut, and two bays of No. 12 hard aircraft wire bracing must be installed together with two struts J 2 and L 2, which complete the truss. Another horizontal 5/8"x20" strut must be installed between the tops of these rear beam fittings.

These lower wing beam fittings must be so installed that the bottom of the wing at the rear wing beam is 1 1/2" below the bottom of the wing at the front beam, with the ship in flying position, to maintain the correct angle of incidence.

Figures 4 and 6 should serve as guides in constructing the glider tail to replace the regular "Parasol" tail, the details of which are shown in Fig. 6. These details are all right excepting that the glider tail has longer spars and ribs due to its larger size. Follow the overall sizes given in Fig. 4 and use Fig. 6 for information on general details of construction. Note that as the front spar of the horizontal stabilizer is farther forward in the glider tail the bolt holes for the top longeron clips are spaced farther apart, as the fuselage is wider at this point than at the old spar position. The bottom wire bracing of the horizontal stabilizer no longer comes to a point at the base of the rudder post, but the rear pair of brace wires attaches there,

Above is shown the "Super-Soarer" taking the air as it is towed behind an automobile. At the left is this glider being towed by an airplane—the only method of launching by which sufficient altitude may be obtained for the loop. Towing by aircraft is now barred by the Department of Commerce unless a special permit is obtained.
Larger Dimensions Are the Only Changes Needed on the "Soarer" Tail

Fig. 6. A mechanical drawing of the tail unit of the "Super-Parasol." The construction of the glider tail is essentially the same, except that the dimensions are larger. See Fig. 4 of first installment.

and the front pair at the first bottom longeron fittings forward. Note that a 3/16" 3-ply plywood filler web is inserted glued and nailed between the cap strips of the horn rib of the elevators and rudder for stiffness.

The regular 3/32" control cable is used for the elevators and rudders but must be lengthened a couple of feet.

The tow cable end detail is shown well in Fig. 9. The 3/8" shock cord is passed through the 2" cable end ring and eight inches is lapped back on itself, where it is spliced with a heavy sewing of heavy linen cord saturated with wing dope. There is ten feet of this shock cord with another steel ring spliced in the other end in the same way, then 500 feet of 1/8" hard steel aircraft cable for attachment to the tow plane.

After the glider pilot releases the glider the tow plane flies to the landing field dragging the tow cable and drops the cable just before landing so it will not be lost.

The same equipment can be used for auto towing, which now seems to be the favorite method of launching.

This is great sport, and Fig. 9, A, shows how the shock cord and hook for the nose of the glider are prepared. Tow men brace their heels in holes in the ground and hold
Minor Changes in Control and Wing Details Are Shown on This Plate

Fig. 8. This plate shows construction details of the rudder and controls. The letters in the sketches correspond with those shown in Fig. 2 of the manual.
The Heath "Super-Soarer" is Adaptable to Every Type of Launching

Fig. 9. Details of construction of the hand launching and airplane and auto towing equipment of the "Super-Soarer" are shown on this plate.

A short length of rope tied to the tail skid. At a word from the pilot the two groups of men on the shock cord ends walk forward about 100 feet apart until the cords are well stretched, then they run forward and outward and when the glider pilot thinks the rubber cords are tight enough he gives the word and the men behind the tail release their rope and the glider is catapulted into the air fast enough to go 1000 feet high and glide or soar a long distance, at least 1000 ft. Beginners must be careful not to use much tension so as not to go very high, and the two crews of men should be at least 150 feet apart at the moment of launching to preclude danger of hitting them accidentally with the glider. It is hardly necessary to add that the launching must be done against the wind.

If the glider should prove nose heavy the upper wing should be moved forward, and vice versa.

The main thing in this light plane and glider sport is to be careful. Be sure that everything is strong and right, then go ahead with confidence and a light heart and have some fun!

Those who do not have the plans of the Heath "Super-Parasol" will find them in the 1929 FLYING MANUAL, which may be obtained from the publishers for $1.00; or large blueprints may be purchased from the Heath Aircraft Company, Niles, Michigan.

Although this job is of extremely simple construction for those who have the Heath "Parasol" plans, it is frankly not a glider for the beginner unless a capable instructor is present to handle the towing auto. Those teaching themselves to glide should use a primary ship to get the feel of the air.
Stratosphere planes, capable of flying 10 miles above the earth, are being designed by French and German engineers as the next advance in aviation. Essential details of a stratosphere plane, which must be air-tight and well insulated, are given in the drawing above.
SOARER' GLIDER

by

STEWART ROUSE

"Hello, Stew!" cried the dean of light plane builders, with a cheery smile, "I see you're on the job!"

The newspaper men prevented any further conversation between us, and the newsreel men nearly broke their cameras getting pictures of Ed, dressed for arctic upper air gales, as he climbed into the cockpit.

He motioned us to stand clear, gave Lambert a pre-arranged signal, the motor of the Standard commenced its roving song and the big ship 500 feet away moved off with the glider in tow. Before it had traveled one hundred feet the glider was skimming along about five feet high, and Ed was flying it as fast as possible to cut down resistance and allow the Standard to get up flying speed. After the Standard had gained a little altitude, Ed nosed up a little and the way that glider soared up to about one hundred feet above the tow plane was so sudden and thrilling to see, that an exclamation of pleased excitement burst from the little crowd around me.

The airplane and glider now made two wide circuits of the surrounding country and finally flew right across the flying field at an altitude of 1,200 feet, flying down wind. Suddenly close observers saw the Standard gain rapidly on the glider which seemed to be trying to point its nose at the zenith, then, while in this position the tail was blown upon by the following breeze, and as the tail had little inertia, and great leverage on the rest of the ship, it moved in a quarter circle until

—and Over—

the ship was on its back, from which position Ed dived it right into three more loops just like the first. After this thrilling exhibition we could hear Ed’s voice which was one of the most penetrating in the aviation world, (I have heard him explain things to students when almost 1,000 feet up) telling us to stand back so he could land where he started from, which he almost did, but this was no surprise as he often won spot landing com-

—and Down!'
Fig. 1. These two photographs show the construction of the new lower wings, which are really regular "Parasol" wings shortened ten inches at the root. Note how the sidewalk is applied on the lower left wing butt. Regular Heath Warren truss type ribs are used and the internal bracing consists of drag struts and 14 ga. wire.

petitions at air meets in a Heath "Parasol."

Ed says that when released from the tow plane the glider drops from 60 back to 25 miles per hour so suddenly that one must take care not to bump his head against the instrument board, and if loops are to be made, they must be made right away before the extra speed is lost, or the glider will stall hopelessly before it even points straight up, and a loop will be impossible. He also states that a glider loop has to be made from a down wind start, as the wind is relied upon to blow the tail around. Diving for speed does not help, for the glider is so lightly loaded and has so much resistance that it dives but little better than a parachute. It won't dive as fast as the Standard can pull it!

About two years ago when the glider first became really popular, Heath could not but note what flimsy contraptions most of them were. As a successful glider relies for its surprising soaring ability mostly upon a light wing loading, Heath soon came to the conclusion that the Heath "Parasol" sportplane would make a successful glider if another pair of wings was attached to make it a biplane and the pilot and pilot's cockpit substituted for the motor and motor mount. His supposition proved correct and the Heath "Super-Soarer" glider will soar on any current of air that rises faster than the glider comes down, with its 18 to 1 gliding angle.

The first one in which Ed made the loops just described had a wooden fuselage made to the same dimensions as the regular Heath "Parasol" fuselage. This fuselage had 3/4" x 3/4" spruce longerons and struts, arranged in a Warren truss. The joints were secured with 3/32" 3-ply plywood gussets held with airplane glue and 3/32" x 3/8" wood screws. This style of fuselage is very successful for general glider work and blueprints have been prepared for its construction.

But the type of Heath "Super-Soarer" which will probably have the greatest vogue among amateur airplane builders is the "Super-Soarer" which is made by converting a bolted type fuselaged Heath "Parasol" sportplane into a biplane glider. It has a wonderful advantage over most gliders in that while it is a successful glider, it also becomes a strong, successful, powered airplane by the shedding of its lower wings, and the installation of a suitable motor. This advantage will be appreciated by glider owners who have tried to convert their flimsy gliders into powered airplanes with indifferent success.

Due to the fact that space is limited I will not try to describe the entire building of the ship, but only to describe the building of the parts and changes necessary to convert a Heath "Parasol" sportplane into a Heath "Super-Soarer" glider. Those who missed the plans for the "Parasol" in the 1929 Flying Manual may still obtain this
Figure 2. The high-lift wings around which the "Super-Soarer" is designed. The figures in the small circles are reference numbers accompanying the instructions issued by the Heath Company.

manual by sending $1.00 to this magazine, or the large blueprints may be obtained from the Heath Aircraft company.

A close inspection of Fig. 4 will give a clear idea of the work to be done as the regular "Parasol" parts are shown in dotted lines. It will be seen that the four $\frac{1}{4}''$ nickel steel motor mount bolts now must hold the flattened ends of the pilot's compartment longerons to the flattened tube ends of the fuselage longerons. The detail drawings will show how joints are made.

The strut ends are reinforced with 2 $\frac{1}{2}''$ pieces of the next size smaller tubing slipped
Assembling of Wing Parts Calls for Careful Attention to Every Detail

A. ATTACHMENT OF RIGHT WING FLYING WIRES TO FUSELAGE

B. ATTACHMENT OF RIGHT WING FLYING WIRES TO FUSELAGE

C. ATTACHMENT OF LANDING WIRES AT TOP OF REAR CENTER SECTION STRUTS

D. HOW THE END OF THE LINK WIRE BETWEEN TOP AND BOTTOM AILERONS IS ATTACHED

Figure 3. Strut, wire, and aileron details which will be helpful in converting the Heath "Par-nsol" into the "Super-Soarer." It will be noticed that the top aileron horn is not necessary on the lower wing, while the bottom one will not be used on the upper wing, since the two ailerons work together.

Into the strut ends which are then flattened with a vise while red hot, and finally drilled for the fitting bolt. The sheet metal fittings are made of 20 or 22 ga. half-hard cold-rolled sheet steel which is first bent around a piece of the tubing used and then mashed flat in the vise to a shape like that shown in Fig. 5. The side panels of the pilot's compartment are made first, the hard wire bracing is installed and then the bottom and top horizontal struts are installed. While bending, the 3/8" x 22 ga. longerons should be filled with sand and the ends plugged tightly with hammered in wood stoppers. The sand will prevent the tube from kinking and becoming weakened. Each sheet metal fitting is secured against sliding along its longeron by drilling through it and the longeron and inserting a rivet made of a two-penny shingle nail. The hard wire bracing is made of No. 12 hard aircraft wire and No. 324 turnbuckles. The wire ends are made as shown in the fuselage joint detail sketch of Fig. 5. The loops at the wire ends are formed by bending the wire around two 1/4" bolts fastened parallel and vertical 1/16" apart in the jaws of the vise. This trick is easily acquired, the main points being never to scratch, dent or split the wire, and never to bend it twice in the same place. It is cut by filing it through.

The seat is made of 20 gauge aluminum sheet, and extends from F to D, Fig. 4. It is secured by wrapping its edges around the longerons and horizontal struts and fastening them back to the seat bottom with 1/8" bolts spaced 3 1/2" apart. A seat back is made of 3/8" 3-ply plywood or other piece of 20-ga. aluminum. A regulation safety belt should be installed with its ends attached to the fitting F and the corresponding fitting on the other longeron.

Fig. 2 shows the construction of the new lower wings and points out that they are really regular "Parasol" wings shortened
Figure 4. A three-view mechanical drawing, showing how the Heath "Parasol" sportplane is converted into the Heath "Super-Soarer" glider. The dotted lines show the standard "Parasol" parts used, while the solid lines indicate new parts necessary in converting the sportplane into the soaring glider.

10" at the root at the A-A line on the drawing. On the lower wings the sheet steel wing strut fittings are mounted upside down to make an attachment for the 3/4"x22 ga. steel tube interplane struts' lower ends, and to hold the outer ends of the landing wire cables.

The wings are made in the regular Heath way with front spar of 5/8"x3 5/8" cross section and rear spar of 3/4"x3 3/8" cross section. Regular Heath Warren truss type ribs are used and the internal drag bracing consists of 5/8"x3/8" drag struts and 14 ga. hard wire with No. 324 turnbuckles.

The regulation aileron control cable pul-
THE ONLY HEATH "PARASOL" SPORTPLANE PARTS NOT USED IN THE HEATH "SUPER SOARER" GLIDER ARE THE MOTOR MOUNT, TAIL UNIT, WING STRUTS, AILERON TORQUE TUBE, FRONT CENTER SECTION BRACING CABLES, AND GAS TANKS.
Entire Fuselage Is Finished in Auto Enamel to Prevent Rusting of Parts

Figure 5. Wing butt fittings on the lower longerons of fuselage and wing strut fittings for the wing beams are shown in these drawings. The letters in the circles correspond to those in Figure 4.

In the photos in Fig. 1.

The wings when finished are covered in the regular way with aircraft cloth or a good grade of unbleached muslin sheeting. When properly covered, give them two coats of clear and two of pigmented wing dope. Four coats is enough as more will warp the ribs. The rail surfaces are covered in the same way.

The landing wire upper ends are both held by a strap fitting secured between the flattened top of the rear pair of center section struts and the wing by the two ¼” nickel steel wing butt bolts, see Fig. 3, C. These wing butt bolts also hold a pair of double ended cable lugs under their heads to hold the old “Parasol” anti-drag and the new 3/32” drag cables of the center section struts.

The flying wires are held at their lower ends by a sheet steel double shackle secured in the old “Parasol” front strut fitting by a 5/16” nickel steel bolt, see Fig. 3, B. This drawing also shows the outlet for the aileron cable admirably.

In Part II we will take up the control system, the lower wing fittings, the cowling and fairing, tail assembly, and the towing and launching gear. Those who do not have the 1929 FLYING MANUAL, which contains the necessary plans for the “Parasol,” may obtain this book by submitting one dollar to the publishers.

Complete working blueprints of both the Heath “Super-Parasol” and the “Super-Soarer” may be purchased from the Heath Aircraft Corporation, Niles, Michigan. This company also is in a position to furnish you with parts and materials, either rough or knocked down ready for assembling.
Heath’s New “LN” Parasol to Have an Approved Type Certificate

And while on the subject of the Heath “Super-Parasol,” it might be apropos here to mention that the Heath Company is now developing the “LN” Parasol, which will meet the demand for a light plane that will be eligible for a commercial license.

This model is built in strict accordance with the Department of Commerce regulations, and with the same fine materials that Heath has always used. They are applying for an approved type certificate on their factory-made ship, and have reasonable assurance that the right to a commercial license will extend to those who build their own airplanes at home provided that they use materials supplied by the Heath Aircraft Corporation and follow exactly the Heath certified blueprints.

The workmanship and final rigging of these home-built Heath airplanes will then be inspected and passed upon by a licensed airplane mechanic whose name will be supplied when the builder is ready to use him. For builders whose state governments do not require a federal license on airplanes, the old reliable “Super-Parasol” will still be available. There is very little difference in these two ships. It was only necessary to increase the wing and tail area so that an approved type motor could be used, in order to get into the license classification. This has reduced the speed somewhat.

This photograph of the “Super-Soarer” skeleton shows how the tail assembly has been enlarged. Note that the front spar of the horizontal stabiliser is farther forward in the glider tail than in the “Parasol,” and that the bolt holes for the top longeron tips are placed farther apart, as the fuselage is wider.

This three-quarter view of the fuselage skeleton shows how the pilot’s compartment has been placed forward to compensate for the weight of the motor used on the “Parasol.” Compare this with the detail drawing on the opposite page.
Here is the final installment of that masterpiece of the late Ed Heath—the only type of glider ever to perform a loop. This is a two-place biplane glider of the soaring type and is the next logical step for those advanced Double M fans who have constructed the Northrup Primary and the M. M. Secondary Gliders. The “Super-Soarer” uses the Heath Parasol plans as a basis for construction.

by STEWART ROUSE

PART II

PART I of this article told what changes were necessary in the Heath “Super-Parasol” plans, to convert this job into a soaring biplane glider. The first installment started you well along on your work, so this time we will start with the control assembly, winding up the job before we get through.

The only changes necessary in the control stick assembly are to install a torque tube long enough to put the aileron cable horn to the rear of point F, Fig. 4, to mount the rear torque tube bearing in front of this aileron horn, and to mount the torque tube underneath the horizontal bottom struts instead of above them. It may be necessary to change the length of the rudder bar tripod legs somewhat.

Fig. 9 shows how the tow cable coupling is made and installed on the stem piece. Make the stem piece of ⁵⁄₈”×20 ga. seamless steel tubing with a liberal reinforcement of the next smaller size tube slipped inside. The 1/16” flexible release cable passes through a guide at the top of the stem piece and thence back through a hole in the 3/16” 3-ply plywood instrument board at a point just below the altimeter where it terminates in a 2” steel pull ring. Make this coupling as neatly as possible for it must work smoothly and release the tow cable end ring when the cable is under tension. The hook for holding the shock cord for hand launching is clearly shown in Fig. 9 A. Cut it out of 3/16” cold rolled sheet steel and clamp it to the left longeron at the lower end of stem piece.

The side fairing of the fuselage consists of two ¼”×1½” spruce stringers on each side running the full length of the fuselage and fastened to each vertical strut with a serving of linen rib cord passed through a 3/16” hole bored through the stringer. These cord wrappings must be saturated with wing