

1929 HEATH

● The Heath Parasol light monoplane was designed and built for the amateur who wanted something inexpensive and easy to handle. The inspiration for the parasol came from Weston Farmer, a naval architect and magazine writer. Weston Farmer was editor of *Flying and Glider Manual* published in the late 20's and early 30's by *Modern Mechanics and Inventions* magazine. His idea was to build an ultra-light airplane using the lower wings of a Thomas Morse biplane and a Henderson motorcycle engine of about 20 horsepower. Weston asked Edward Heath if he would build such an airplane.

Heath was an early-day pioneer, a contemporary of the Wright Brothers and Glenn Martin. He had designed and built his first airplane at age 21 in 1909. In 1913, he opened an aeronautical supply business with an amazing range of parts and supplies offered to the home builder. Everything needed to build or repair an airplane could be found in Heath's catalog. He was a prolific designer and an avid racer. But he

never lost interest in airplanes for the average man. Heath liked Weston's idea and finished the first Parasol in November, 1925. The little Parasol flew quite well and soon began to attract considerable attention. Heath did not go into mass production with this model but, rather, let it move along at its own pace.

Continued development of this model resulted in the Super Parasol. The major improvement consisted of replacing the thin-airfoil Thomas Morse wing with a more efficient Clark Y airfoil. This model was eventually mass produced. One Super Parasol was fitted with a 32 horsepower Bristol Cherub engine and entered in the 1927 National Air Races at Spokane, Washington. Heath won \$1,000.00 in the light and sport plane classes in his "Spokane Super Parasol" with a top speed of 90 mph.

The design of the Parasol clearly shows that Heath was directing his efforts towards the average home aircraft builder. The fuselage was built up of steel tubes, held

together with metal clamp fittings, instead of the more usual and expensive welding. This made for unusually simple construction, enabling anyone to build it without special aircraft experience. The monoplane wing was in two parts, attached to an inverted vee cabane. The wing was braced to the bottom longerons by two steel-tube struts on either side. The undercarriage was light and robust. The tail skid was made from a piece of spring steel. The engine was a 23 horsepower, 4-cylinder air cooled motorcycle motor, but the airplane could be fitted with any engine from 20-30 horsepower. In tests, the Parasol had been flown for long stretches with hands off the controls, and had proved itself to be unusually easy and safe to fly. The Parasol sold for \$750.00 and a complete set of parts (minus the engine) could be obtained by those wishing to build their own machine for \$188.00.

The model of the Heath Parasol is patterned after its namesake in that it is inexpensive to build, easy to construct and simple to fly. The primary building material is 1/8" corrugated cardboard. The advantages of cardboard as a construction material are numerous. The most important factors are the low cost and availability. In addition to being available from cardboard container manufacturers, cardboard can also be obtained from most grocery and department stores in the form of shipping containers. All that's needed to cut out cardboard pieces is a sharp razor blade. Sharp corners or rounded edges are equally easy to cut, with no worry of cracking or splitting as with balsa wood sheets. In addition, since cardboard comes in large panels, large sections may be made from one continuous piece. The ease of cutting, combined with the large shapes which may be formed from a single piece of cardboard, have resulted in simplified design techniques which reduce building time to an absolute minimum. The weight of cardboard varies considerably, but the lighter weight cardboard can be used to build models which are less, or equal, in weight to models using standard balsa wood construction, while still maintaining adequate strength and durability.

The term cardboard actually refers to corrugated fibreboard and is specified by test strength, facing weight, and flute style. In its usual form, it consists of an outer facing paper, an inner flute paper and an inner facing paper. Test strengths are dependent on the weight of the three components specified in pounds per



PARASOL

Designed By Bob Miller
Article By Chuck Felton
Photos By Lane Mosby

thousand square feet. Flute sizes are B, C or A, which result in an approximate thickness of 1/8", 3/16" and 1/4", respectively. The material used for the Parasol is 1/8", 125 pound test, B flute.

The use of non-cardboard material is kept to an absolute minimum, while still maintaining structural integrity. In addition, the construction methods have been simplified for easy construction. The fuselage cross-section is rectangular. The empennage and control surfaces are single thicknesses of cardboard. The wing is essentially a single-spar upper surface only airfoil with leading edge doublers. Spruce strips have been used on the leading and trailing edges where streamlined shapes or smooth control surface action is required. Plywood has been used for engine and landing gear supports.

CONSTRUCTION HINTS

Glue: We recommend water base glue such as Wilhold Aliphatic Resin, or Titebond. Contact cement is not recommended since parts cannot be re-aligned. When gluing, weight components on a flat surface.

Folding: The scoring of the fold lines is done with a screening tool available at any hardware store. It consists of a handle with a 1/4" diameter radiused wheel at one end which is run along a straight edge on the fold line.

CONSTRUCTION

Cut out all cardboard and wood parts using the template outlines. Be sure to note the direction of the corrugation. Score and fold the cardboard parts as indicated on the plans.

Fin and Rudder:

Glue the 1/8" x 1/4" spruce strips to the trailing edge of the fin and the leading edge of the rudder and round off. Seal the fin leading edge and rudder trailing edge with glue. Hinge the fin to the rudder with cloth hinges.

Stabilizer and Elevator:

Glue 1/8" x 1/4" spruce strips to the leading and trailing edge of the stabilizer and the leading edge of the elevator, then round off. Seal stabilizer tips and elevator trailing edge with glue. Hinge the elevator to the stabilizer with cloth hinges.

Wing:

The left and right wing panels are made separately. Glue 1/8" x 1/4" spruce strips to the bottom of the wing just forward of the fold line from the centerline to the wing tip. Add the 1/8" x 1/4" spruce doubler from the centerline to the position shown on the plans. The inner bottom wing is now glued

in place and extends from the wing leading edge, across the spruce spars, to aft of the fold line as shown in wing view A-A.

Block up the leading edge of the wing approximately 1/4" when installing the inner bottom wing. The outer bottom wing is then glued to the outer wing leading edge. Glue the 1/4" half-round spruce to the wing leading edge. Glue the 1/4" balsa wing attach piece in one wing half. Slip the other wing half over the wing attach piece and glue the wings together. Glue the 1/8" plywood wing brace to the bottom of the wing. Glue the wing joiner to the bottom of the wing. Reinforce the wing joint with 2" wide tape. Seal the wing tips and trailing edge with glue or with a mixture of polyester resin and micro-balloons.

Fuselage:

Begin the fuselage by making the wing support struts from spruce stock as shown on the plans. Glue 1/8" x 1/4" balsa strips along the inside edge of both fuselage sides as shown. These strips are recessed 1/8" from the fuselage edges. Cut out sections of

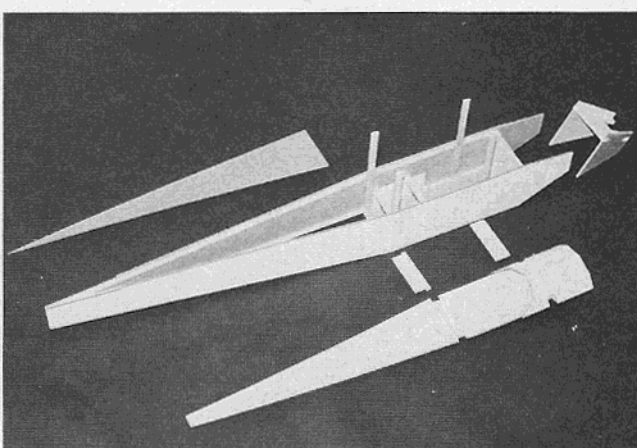
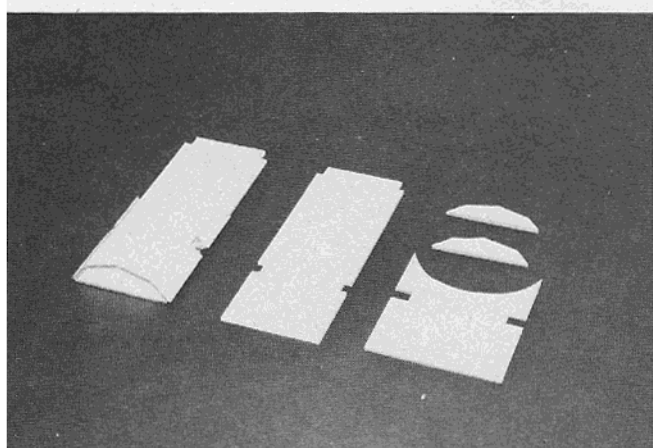
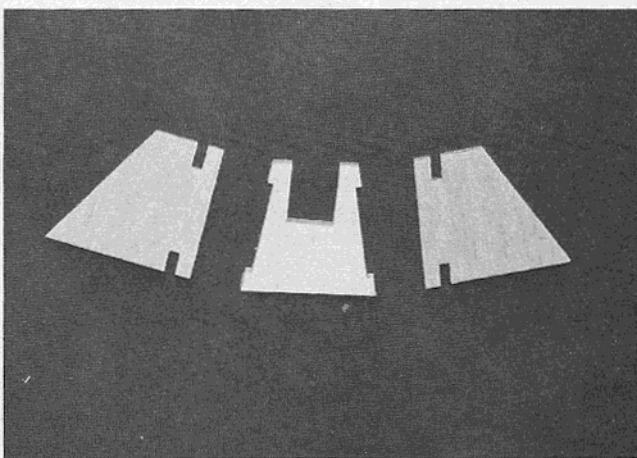
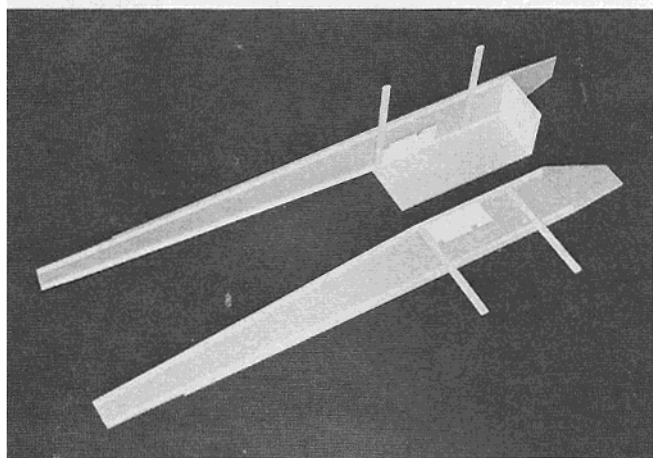
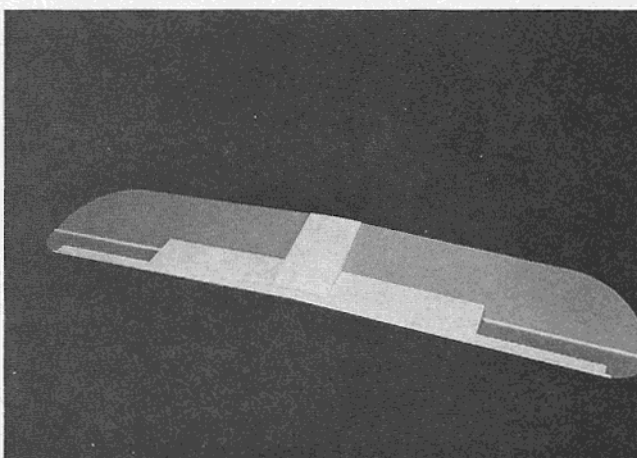
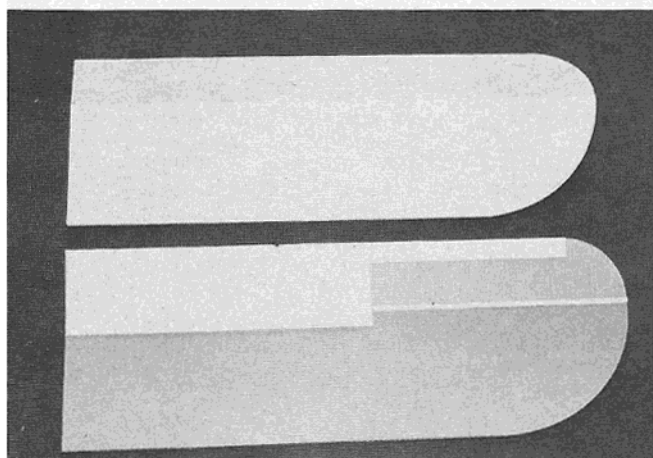
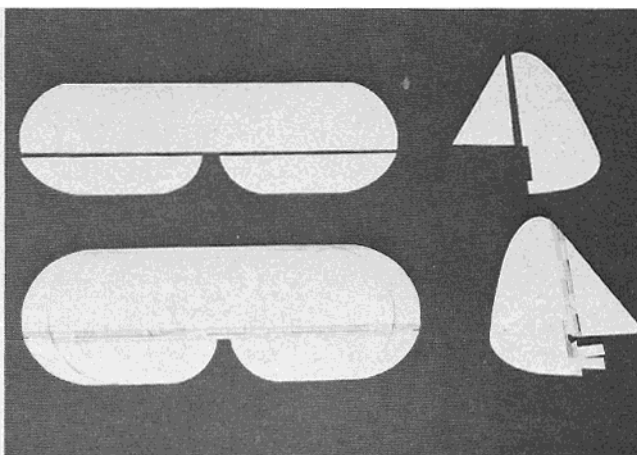
the strips at the fuselage top where the struts pass through. Glue the upright struts to each fuselage side. Glue the cardboard servo support to the inside of each fuselage side. Next, glue the left fuselage side, forward bottom piece and 1/4" ply firewall together. Glue the right fuselage side to this assembly. When dry, pull the fuselage sides together at the tail and glue. Now, add the 1/4" x 3/8" servo support rails. Add the 1/8" ply pieces at the fuselage top for the deck hold-down screws. Glue the aft bottom to the fuselage. Make the motor mount assembly consisting of the 1/4" ply mount and the 1/8" ply side doublers. Glue this assembly to the fuselage nose. Glue the horizontal wing support struts to the upright struts. Add the 1/4" square spruce struts near the top of the upright struts. Glue the aft top piece to the fuselage. Assemble the forward deck installation. Now, turn the fuselage upside down.

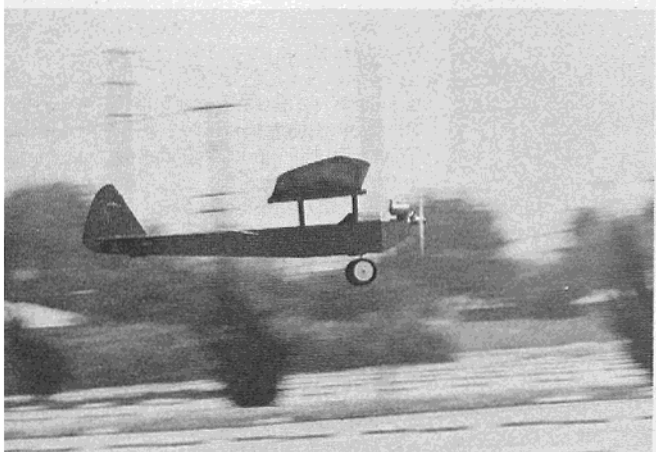
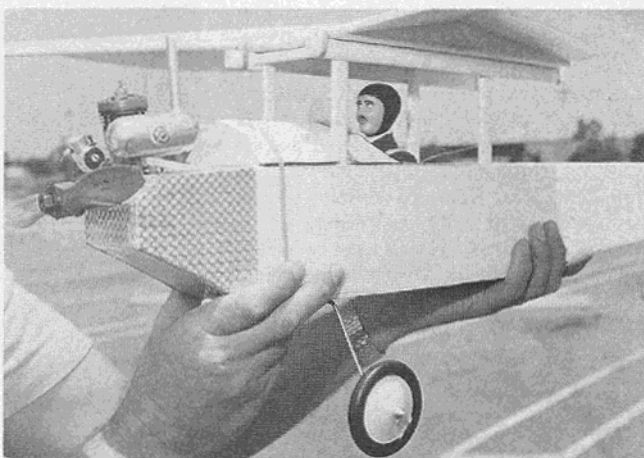
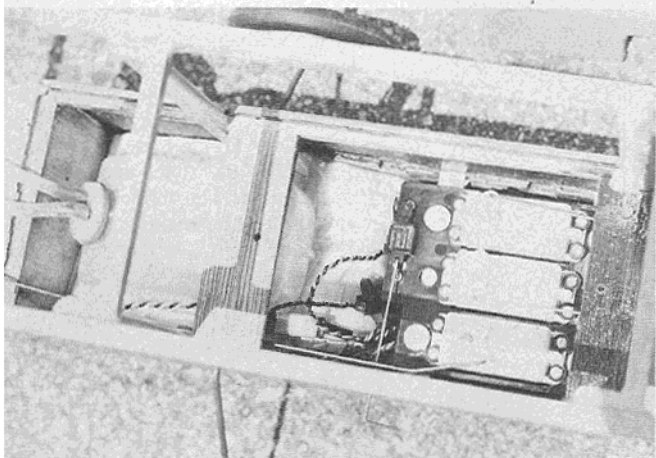
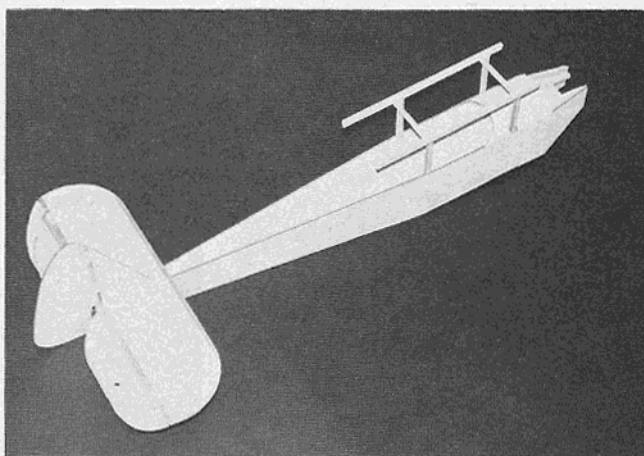
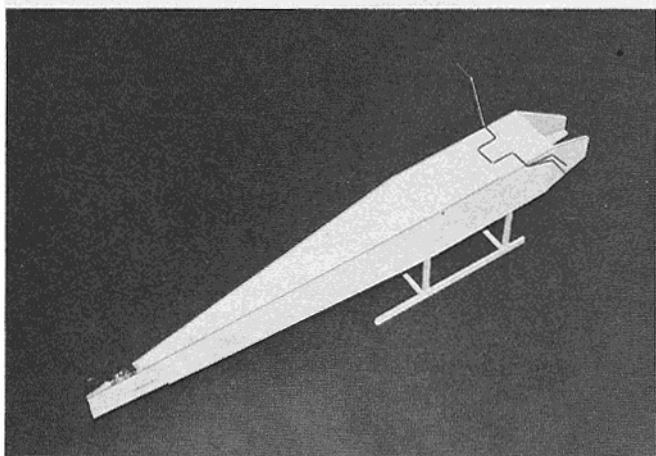
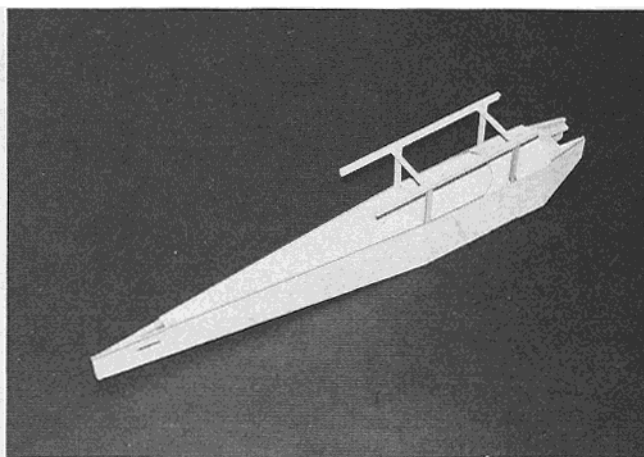
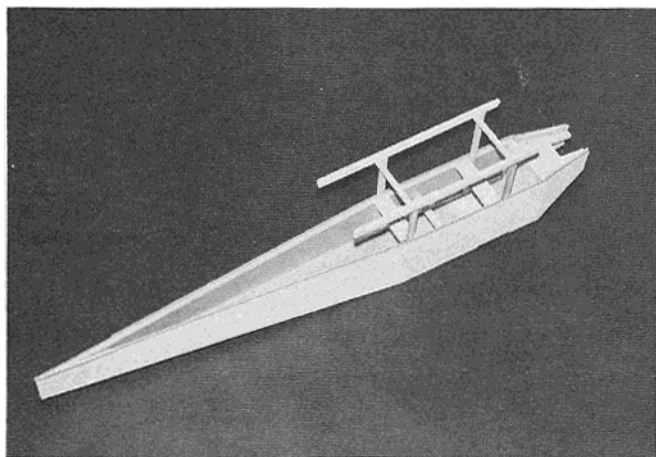
Cut out the cardboard section in the forward fuselage bottom and glue in the 1/8" ply main gear support as shown in the



RIGHT: The empennage layout. Spruce strips used to brace cardboard. Strong and light.

SECOND ROW (L): The Heath wing halves showing the spruce spar, cardboard inner and outer bottom wing. (R): The joined wing halves with cardboard wing joiner in place. **THIRD ROW (L):** Fuselage sides with upright struts, servo rail supports, forward bottom, and plywood firewall in place. (R): The ply motor mount assembly pieces. **FOURTH ROW (L):** Forward deck assembly. (R): Right fuselage side and servo rails installed.





FIRST ROW (L): The motor mount, 1/8" ply pieces, horizontal struts, and aft bottom in place. (R): Top deck and aft top pieces installed. **SECOND ROW (L):** Placement of the wire landing gear. (R): The completed fuselage assembly ready for the radio installation. **THIRD ROW (L):** Top removed to show tank and radio installation. Plenty of room for three servos, side-by-side. (R): You can add as many niceties as you like, including burnished aluminum cowl plates. **LEFT:** One of the Heath Parasol prototypes coming in for a landing.

Three of the many cardboard Heath Parasol prototypes built to date.



side view. Make the 1/8" wire main gear and attach to the ply gear support with gear clips. Make the tail skid from 1/16" wire and attach to the 1/8" ply support with thread and glue to the aft fuselage. Seal all fuselage exposed raw cardboard edges with paper gummed tape. Glue the stabilizer and fin assemblies to the fuselage.

Cardboard gives a solid surface with no open areas to cover and is non-porous. The lightest, simplest, and most inexpensive method is to give two coats of clear dope and two coats of color dope. However, a wide variety of finishing material can be used on cardboard. Coverings such as Solarfilm, MonoKote and vinyl paper can be used. With any of these, it is recommended that the surface not be doped, which will result in a better bond. Vinyl shelf paper is least expensive but incurs an additional weight penalty.

Final Assembly:

Install your servos, battery, receiver, pushrods, bellcranks and fuel tank. We recommend a Veco .19 engine with a 9/4 propeller. Attach 3/8" diameter Williams Bros. vintage wheels to the main gear.

FLIGHT CHARACTERISTICS

As with any airplane design, the handling qualities of the Parasol are a trade-off of stability versus maneuverability. The Parasol was designed to be a stable, slow flying model with realistic flight characteristics. It is ideal as a trainer for the beginner. Yet its Stand-Off Scale appearance and nostalgic appeal make it a welcome change of pace for the experienced flyer.

As with all tail dragger configurations, the throttle should be advanced slowly on take-off to avoid ground looping. However, the long tail moment of the Parasol provides adequate directional stability during the take-off run. In addition, the model can

1929 HEATH PARASOL

Designed By: Bob Miller

TYPE AIRCRAFT

Sport/Stand-Off Scale

WINGSPAN

56 Inches

WING CHORD

10 1/8 Inches

TOTAL WING AREA

526 Square Inches

WING LOCATION

Parasol

AIRFOIL

Undercamber

WING PLANFORM

Constant Chord

DIHEDRAL, EACH TIP

1 1/2 Inches

O.A. FUSELAGE LENGTH

36 7/8 Inches

RADIO COMPARTMENT AREA

(L) 8 1/4" X (W) 3" X (H) 3"

STABILIZER SPAN

18 Inches

STABILIZER CHORD (incl. elev.)

6 1/2 Inches

STABILIZER AREA

95 Square Inches

STAB AIRFOIL SECTION

Flat

STABILIZER LOCATION

Top of Fuselage

VERTICAL FIN HEIGHT

6 Inches

VERTICAL FIN WIDTH (incl. rudder)

5" (Avg.)

REC. ENGINE SIZE

.19 cu. in.

FUEL TANK SIZE

4-6 ounce

LANDING GEAR

Conventional

REC. NO. OF CHANNELS

3

CONTROL FUNCTIONS

Rudder, Elevator, & Throttle

BASIC MATERIALS USED IN CONSTRUCTION

Fuselage Balsa, Ply, Spruce, Cardboard

Wing Spruce, Ply, Cardboard

Empennage Cardboard & Spruce

Weight Ready-To-Fly 57 Oz.

Wing Loading 15.9 Oz./Sq. Ft.

easily be hand launched, due to its low stall speed, making it ideal for use from fields where smooth taxi areas are not available.

The Parasol is equally easy to land. The shallow glide, combined with the low stall speed, make landings routine. It should also be mentioned that the take-off distance is short for a model this size, due to its high lift-to-weight ratio. The large wheels make take-offs and landings on grass a pleasure.

In flight, the lateral stability of the model is provided by the wing dihedral and the high center of lift combined with the low center of gravity. Therefore, ailerons are not required. Loops, turns and inverted flight are possible. The model is usually flown at half throttle, making for a more realistic looking flight. The model has even been thermal soared under good conditions with the engine at idle power. Stalls are shallow and gentle.

SUMMARY

The use of cardboard as a construction material is in its early stages. Its potential has not yet been fully developed. However, its advantages are already quite obvious. It is inexpensive, readily available to everyone, and easy to work with. Large sections can be made from a single piece of cardboard which simplifies building and reduces construction time. A high strength-to-weight ratio can be obtained. The larger the model, the greater the weight and cost savings. No additional covering material is required. Cardboard is easily repaired and damage is usually very localized, since there is no splintering or cracking as with other building materials.

So, try your hand at building the Parasol. We think you will be pleased with the model. We are sure you will derive satisfaction from knowing you have built it more economically, easier and faster than any other model this size. □