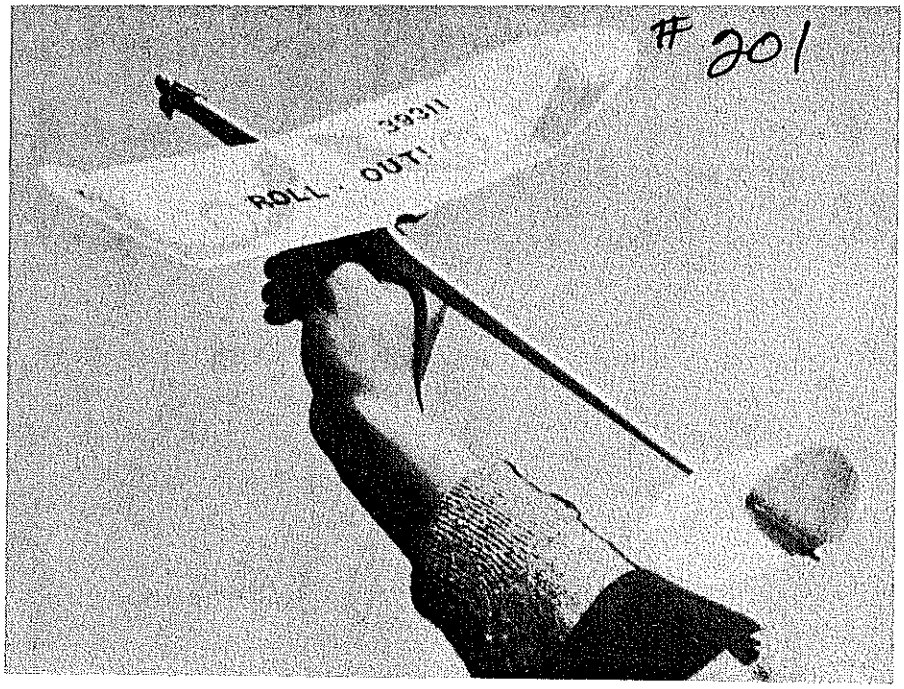
ROLL-OUT

Bob Dunham



This one has won half the meets it has entered. Good design really counts in a hand-launched glider.

WHEN YOU BRING to mind that hand-launch gliders were used as test beds for the first flying machines as long ago as Leonardo da Vinci, and that thousands upon thousands of designs have been flown since, it is difficult to convince yourself that there is much new in layouts that have not already been tried. However, if contest results are any indication of a good performing hand launch, then Roll-Out has in its two-year development period established an enviable record. It has rarely failed to finish in the money and has been outright winner in about 50% of all meets entered.

In appearance the thrown type glider seems to be a simple kid's plaything and only fliers (past and present) of this event really appreciate the unique aerodynamic and structural forces which are at work, all in the short span of about three seconds. From launch to roll-out at the top, the speed and G-forces are constantly building and diminishing, and within this framework there is variance from one flier to another, and even from one flight to another. Keeping all these things in proper perspective, it was our intent to develop a glider to withstand the rigors imposed on it by the hardest throwing enthusiast, have good rolling and transition characteristics, and be able to ride light bouyant lift as well as not have a spinning-in tendency in strong turbulent thermals. These features, combined with a proven and reliable D-T system for recovery, were the design criteria for Roll-Out. We believe all have been attained, so why not try one for yourself.

Fuselage: Since all components build around the fuselage, let's begin here. The fuselage is made from hard straight-grained balsa, ¼" wide and ¾" deep. Sight down the selected blank and make sure it is not warped and twisted. Draw the outline onto the rough blank and trim the excess balsa away, leaving the wing platform untouched, thus providing essentially a 0° incidence datum line. The stabilizer platform should also be at 0° or parallel to the wing platform. Using a combination of knife, razor and sandpaper, round off the corners of the blank to an oval or circular section as the plan indicates. The D-T fuse holder is constructed by soldering shim-brass sheet, wire and tubing as the plans show. The completed assembly is then epoxied to the nose.

Wing: The wing preparation and shaping is probably the most difficult and important component of any hand-launch glider and care should be taken in choosing the correct wood. I like to keep the wing on the light side, and try to choose wood of about 6-lb. density and quarter-grained. This type grain is recognized by a speckled or scaly appearance and is not difficult to find, but must generally be searched out. If 4"-wide sheet is not available, it may be necessary to piece the wing using a combination of 3" and 1" widths, with the 1" piece along the leading edge.

Piecing is best accomplished with regu-

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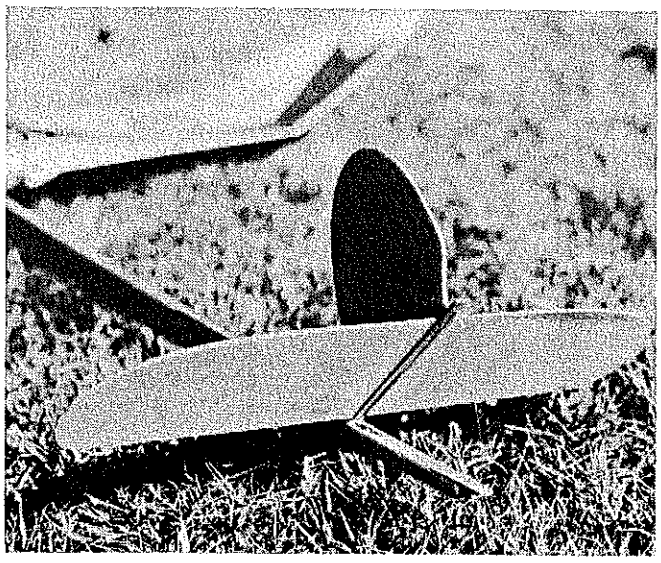
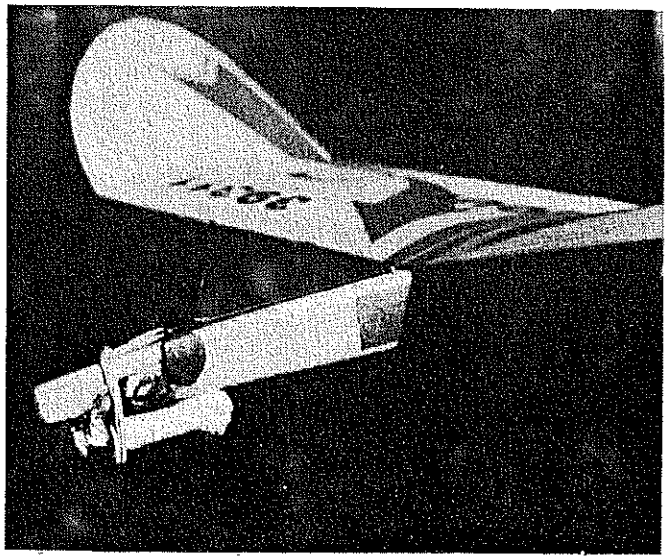
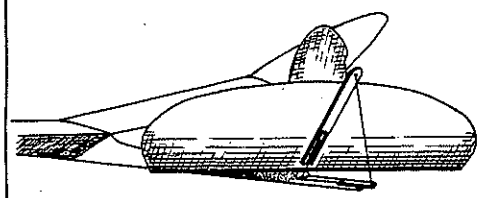


Tail group in the DT position. Note that 1/2"-wide Mylar is pressed in place to join the hinged elevator to the fixed porton of stabilizer—see head photo. Article details adjusting and flying system.



Like any free-flight duration model, the HL glider rides thermals—so a DT is important. The fuse holder is soldered shim-brass epoxied to fuselage. Light fuse with a short piece of fuse—not burning match!



WASHOUT BOTH TIPS IN THIS AREA - 1/32" APPROX.

'75-'76 CONTEST RECORD
5 FIRSTS
2 SECONDS
4 THIRDS

REAR VIEW FOR RIGHT HANDER

ROLL-OUT!

CONTEST PROVEN HAND LAUNCH GLIDER.

R. J. DUNHAM

SHEET BRASS .01" THICK

1/32" M.W. SOLDER TO BRASS.

1/4" O.D. BRASS TUBE. SOLDER TO WIRE.

D.T. FUSE HOLDER EPOXY TO NOSE.

AIRFOIL HIGHPOINT LINE

WING 1/4" x 3 3/4" x 18" MED. QTR. GRAIN BALSA 5-6 LB.

3/16" SOFT BALSA T.E. REINFORCEMENT.

CONTOUR TO FIT FINGER.

FUSELAGE 1/4" x 3/4" x 19" HARD BALSA - 10 LB.

MYLAR PRESS. SENSITIVE TAPE 1/2" WIDE-TOP ONLY

1/16" SHEET LT. QTR. GRAIN 6-7 LB.

RECOMMENDED FLYING WEIGHT: 1 OZ. OR LESS.

LOCATION OF THIS PIN LIMITS TAIL POP-UP ANGLE.

BENT PIN

D.T. RUBBER BAND

PIN WT.

FLAT

BALANCE POINT

12" MONO LINE

.012" M.W. SPRING 1 1/2 TURNS

KNOT

LT. 1/32" SH. 5-6 LB.

45°

0°

FUSE

SNUFFER TUBE

SANDPAPER GRIPS ON BOTH SIDES - LOCATE TO SUIT.

1/32" PLY

0 1/2 1 2 3 4 5

R.J.D.

FULL-SIZE PLANS AVAILABLE ..... SEE PAGE 96

Sig Bond. Use a triangle and carpenter's square to check, holding everything in position with masking tape. Allow several hours for resin to set then pull tail post together, using fast glue. The 1/32 balsa fairing is positioned, formed, and instant-glued in place. (A Sig cowl is shown.) The gear is bent to shape over the plan, then attached to a 1/16 ply former with carpet thread, wrapped, and glued.

Tail surfaces are cut from 1/16 sheet, sanded, and positioned with fast glue. Scallops can be easily done with sandpaper on a ½" dowel.

The wing is straight-forward, involving two identical assemblies with the center section cut out and discarded for the lower wing. Dihedral angle is sanded in, using a ½-in. block under tip and the classic table edge. Joints are fast glued. Cover and finish wings before attaching them to fuselage. Japanese tissue and clear dope works fine.

The engine and its hardware should be installed before covering the fuselage. A handy removable motor set-up can be made by epoxying the nuts onto a small piece of plywood, which is fast glued to the back of the firewall. The filler nipple is mounted on 1/32 ply and stuck in position after rolling the tubing in loops as needed to place the tank in the proper position. Use a scrap of balsa to hold tank tight.

The finish on the prototype was done with Floquil Caboose Red mixed in clear nitrate dope. Although an airbrush would be ideal, the color was brushed on. One coat covered well and added almost no weight. Do not attempt to use colored dope; it is much too heavy.

Now cut the cabanes from 1/32 ply. Mark the exit point from fuselage side (in pencil, *not* ball-point) and entry at rib bottom. Cut thin slots through the 1/32 balsa cowl, stick cabane through, and fasten with fast glue. The tissue is cut in the wing center section and the top wing positioned with fast glue, checking alignment carefully. The lower wing is installed in the same way, then the 1/32 bass interplane struts are installed with fast glue.

The model is completed by constructing the 1/32 bass landing gear frame in place on the fuselage bottom. The wire is *not* attached to the basswood. It is allowed to swing free, preventing breakage but still looking realistic. The tailskid is cut from basswood and fast glued to the tail post. Interplane "wires" are monofilament fishing line threaded through the small holes previously drilled in the struts. Tie a knot in one end, thread through both holes, tighten and fast glue. The wires should be tightened only enough to remove sag. They are not functional.

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lar model cement because it sands and works easier than epoxy or white glues. The seam should be a tight fit and allowed to dry thoroughly before proceeding. Trace the wing outline and airfoil high-point line with a ball-point pen and cut almost to outline, leaving 1/16" all around for final finish. The first important step is to carefully sand in about 1/32" tip wash-out on the bottom side in the area shown on the plan. This is a delicate operation and only a little is required, so don't overdo.

I use a small razor plane to shape the rear airfoil portion of the blank from the high point line to the trailing edge, keeping it as flat as possible, and use a straight-edge for a check. Sand out all the hills and valleys using a sanding block, but maintain a trailing edge thickness of about 1/32". The leading edge is next, and it should have a bit of top camber, leaving enough thickness at the front for the bottom side curved entry and leading edge radius. The outer wing tip panels should be tapered and thinned, keeping the airfoil shape all the way. Next, trim to exact outline and final sand using progressively finer grit down to 400 W-D.

The wing next is cut into four pieces at the dihedral points and the ends carefully beveled to make the correct angles and are epoxied. These joints should be a good tight fit with no gaps or else disaster is waiting in the wings (double entendre). Allow to cure thoroughly and build up a glue skin at each break to help strengthen the joints. The fuselage is then V-notched to accept the mid-dihedral point and the wing is centered and glued in place. A glue fillet on the under side along the fuselage is desirable. The forefinger reinforcement triangle is cut and edges streamlined, then glued to the underside of the wing. Conform the finger oval to a snug custom fit using sandpaper wrapped around a dowel or pencil.

Stab and Rudder: The horizontal stabilizer is cut from 1/16" warp-free sheet balsa and sanded to an airfoil section. Smooth and remove balsa fuzz with 400 W-D paper and give two coats of Sig Lite Coat. Using a metal straightedge as a guide, part the elevator along the line shown on the plan. The two portions are butted together on a flat surface and the ½"-wide Mylar pressure-sensitive tape is pressed into place. The 1/32" ply piece serves as stiffener and spring guide, and is glued to the underside.

The D-T spring is installed in the fuselage and epoxied in place. The spring must have enough tension to raise the pop-up stab to a 45° angle and .012" to .014" dia. wire has been found satisfactory. The stabilizer is then glued to the fuselage with a slight tilt as the plans indicate. The rudder is glued to the stabilizer and should have just a hint of left offset. The remaining rigging of the D-T system is self-explanatory from the plans, the only caution being to make sure that everything is working smoothly and proving the point by actually operating the assembly on the ground before attempting to fly.

After the glider is completely assembled, the fuselage and wing should be given one coat of sanding sealer followed by two coats of 50% thinned clear dope, with a generous amount of fine sanding between coats. If visibility is likely to become a problem, depending upon which part of the country you live, a light spray coat of red or orange day-glo dope, applied to the underside of the outer tips is all I recommend for the sake of weight build-up. Any further decoration is best satisfied by using your favorite design cut from Japanese tissue and applied between the first and

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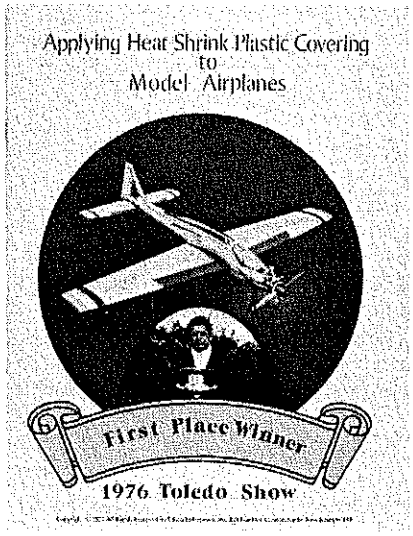

Applying Heat-Shrink Covering to Model Airplanes is the title of a 32-page book prepared by Dan DeLuca for Edson Enterprises. Printed on heavy slick paper, it is extensively illustrated with step-by-step how-to-do-it photographs printed in 4-colors. Dan was the first place winner at the 1976 Toledo Show. The model he won with is the vehicle for his detailed discussion. Pictures and text begin with materials and required tools, cover every fine point, ending with trimming and detailing. If you have never covered with heat-shrink materials, this book is an invaluable aid. If you are already into these covering materials, the book will upgrade your versatility in obtaining stunning effects and color schemes. Price is $5.95, plus 50 cents for postage and handling. Edson Enterprises, Inc., 228 Franklin Ave., Nutley, NJ 07110.

product review product review product review

second coat of clear dope.

Flying: Your glider will probably need a small amount of weight on the nose to make the ship balance at the 50% point of the wing chord. If you are right-handed, the glide circle should be definitely to the left. To rough trim, pick a calm day and a field with foot-high soft grass, and proceed to launch with a left bank inclination, and with enough force to gain about 30 feet of height. The ship should go over the top and into its 40-ft. diameter glide circle with little or no dip and descend without diving or stalling. Compensating adjustments should be made to the stabilizer by shimming, 1/64" at a time.

Next, slip a fuse in the nose tube and light it, using another piece of burning fuse. *Never* use a burning match for lighting, or you may end up with the whole nose section afire. After taking a few steps into the wind, launch the ship with the nose up at about a 60° angle and banked to the right. The glider should climb in a right pattern and as it slows should go over the top into a left-hand glide. A hard throw is necessary to realize the full potential, and a half-hard launch could be disastrous if enough speed is not attained to take the ship through the top transition portion. Only repeated trial and not too many errors, will give you the experience to know.

Remember, no hand launch will do the two-minute max without thermal help, but a well adjusted and thrown Roll-Out will get you about halfway there in neutral air. So if you want to win contests, you must look for the tell-tale signs of lift before making your officials. The dethermalizer permits test flights to be made and to determine what these signs are for that particular day as well as to limber up and just fly for the fun of it, without risk of losing the ship.

Avenger/Sarpolus

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cockpit area, panel lines, machine guns, insignia, etc., its realistic appearance is rewarding. The characteristic lines of the Avenger cannot be mistaken.

Some comments about the original Avenger, which entered combat in 1942, during the Battle of Midway. It was designed in 1941 to replace the Douglas TBD Devastator torpedo-bomber. Grumman did a quick job getting the Avenger into production and in all almost 10,000 were built. Many different versions came along; the TBF carried one torpedo or 2000 lbs. of bombs in its large bomb bay, also had a .50" machine gun firing forward, a .50" gun in its dorsal turret, and a .30" gun in the ventral "step" which surprised many opponents. Other versions had two .50" guns in the wings, radar in some, reconnaissance versions with special cameras, anti-submarine models, and even a transport version which carried up to seven passengers out to aircraft carriers at sea. It was produced until 1944; Grumman built about 2300 planes designated TBF, and General Motors made approximately 7600 designated TBM. Some went to the British Royal Navy and a few to the Royal New Zealand Air Force.

Construction

To build our model, only two thicknesses of balsa are needed; 1/8" and 1/4". Also some 1/32" plywood, a few scraps of 1/8" plywood, and the usual hardware consisting of a bellcrank, control horn, pushrod, leadouts, etc. We suggest you cut out all the necessary parts, make your own kit, that is, before beginning assembly.

Starting with the wing, to get the necessary 6" width we edge glue two pieces of 3 × 24" stock together (cut from standard 3 × 36" pieces). Sand the joining edges to get a good fit, use a piece of masking tape to hold the two pieces tightly together, and open the joint from the opposite side to apply the glue. Close the joint and wipe off the excess glue. The wing tip pieces added with the grain going at right angles to the main wing panel help the wing resist warping. Block sand the entire wing and round all the edges; no airfoiling is needed.

The tail surfaces, fin, rudder, stabilizer and elevator, are cut from the remaining 1/8 × 3" balsa. Sand all pieces and bevel the edge of the rudder so it can be glued to the fin with 1/8" offset toward the outside of the flying circle. Commercially packaged nylon cloth tape is used for the hinges, applied in the usual over-and-under manner, glued on with model airplane cement. We use five-minute epoxy for all other assembly work, for its strength and speed of assembly. It is not hard to assemble this entire model in one evening.

The fuselage is the most complicated part. The necessary width is obtained by edge gluing 1/4 × 3" stock together as was done for the wing. Cutting the fuselage outline to shape is most easily done with a jig or band saw, but it can be done with an X-acto knife. Make the notches for the motor mounts carefully so the spacing is correct for the engine you will be using. Glue the mounts in place before adding the 1/32" plywood nose doublers. When gluing the nose doublers in place either lay the assembly on your workbench and use heavy weights to hold the doublers on until dry, or hold them in place with clothespins and/or small C-clamps. All edges of the fuselage should be well rounded, as shown on the plans. Time spent in sanding now will really pay off in a good looking model.

With the wing, tail, and fuselage assemblies done, now they must be joined together. Alignment is critical; be sure the wing is glued into the fuselage at right angles to it. The stab must be parallel to the wing, and the fin, of course, vertical. Take your time here as a straight, correctly aligned model will always fly better than an even slightly crooked one. With the wing assembled into the fuselage, the 1/8" plywood bellcrank mount and leadout guide may be added. Also the tip weight can be glued in place. Mount the bellcrank and control horn; bend the 1/16" wire pushrod ends so that the bellcrank is in a neutral position when the elevator is level. This permits equal up and down elevator travel.

Use the engine to mark its mounting holes for drilling. The engine is mounted with two washers under the front mounting holes for thrust line offset to insure tension on the control lines while flying. 1/16" wire is used for the gas tank retaining hook; make the two bends as indicated