Estes Industries Rocket Plan No. 23

RAVEN

AN EXPERIMENT IN BOOST-GLIDE DESIGN

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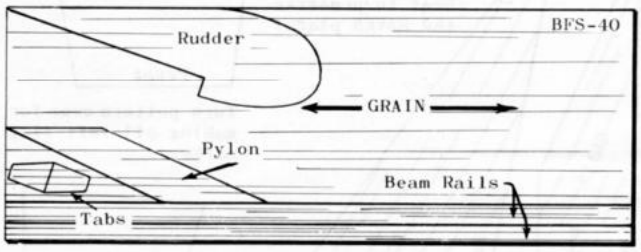
The Raven represents a design study to determine the problems which might be encountered with forward flaps on a boost-glider and the effectiveness of such an arrangement in controlling the model's flight. It is by no means a perfect or near perfect rocket, but it is hoped that this plan will serve as an idea source for modelers who are interested in developing new types of boost-gliders. The main inspiration for the shape of the Raven came out of a clear blue sky in the form of a paper airplane--hurled by E. I.'s chief illustrator. Final design of the bird was chosen to get the most use out of a minimum amount of balsa.

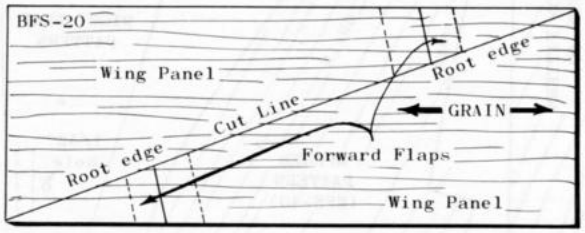
PARTS LIST

1	Nose Cone	Part #BNC-20A
1	Body Tube	Part #BT-20J
1	Sheet Fin Stock	Part #BFS-40
1	Sheet Fin Stock	Part #BFS-20
1	Launching Lug	Part #LL-1A
1	Elastic Thread	Part #ET-1
1	Sheet Paper Reinforcing	Part #PRM-1
1	Nose Cone Weight	Part #NCW-1
1	Paper Clip	Part #SC-ROUNGE

BEGIN CONSTRUCTION

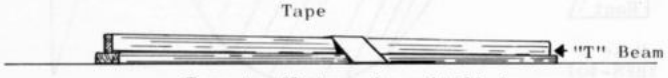
Trace all patterns onto a separate sheet of paper. Cut out these copies on the edge lines. Mark two 1/4" wide strips on one side of the 1/8" thick BFS-40 sheet. Lay out the other pieces as shown below and mark around them. Cut out the parts with a sharp modeling knife. Draw a line diagonally across the 1/16" thick BFS-20 sheet and cut on the line. Lay the flap pattern over the front of one wing with the outside edge of the pattern against





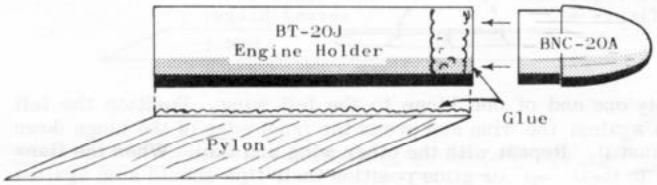
the edge of the wing as in the illustration. Mark around the pattern and cut. Repeat with the other wing.

Apply glue to one edge of one of the 1/4" x 1/8" x 9" fuselage pieces and attach it to the other piece to form a "T" bar. Tape the bar down to a flat surface as shown until it is dry.



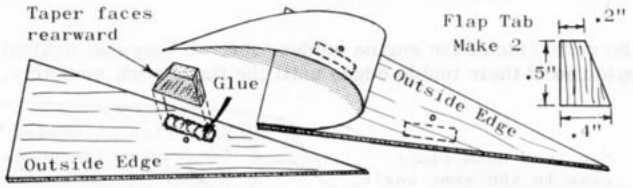
Tape to flat surface 'till dry.

Place the BT-20J engine holder in any convenient "V" notch such as the flange on a drawer and draw a straight line along its entire length. Apply glue to 1/4" of the inside of the tube at one end and slide the nose cone into place. Sand the pylon piece, apply glue to its top edge, and attach it to the engine holder tube



along the line, aligning it so it is perfectly parallel to the tube and projects straight away from it. Set this assembly aside to dry.

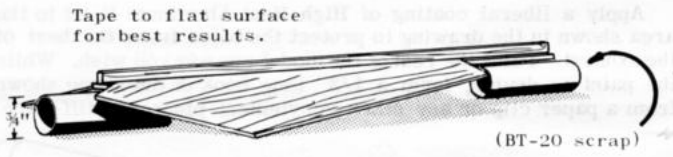
Transfer the tab and hole marks from the flap pattern to the two flaps so that the marks are on the upper sides of the flaps as illustrated. Drill the holes with a 1/32" bit or punch through



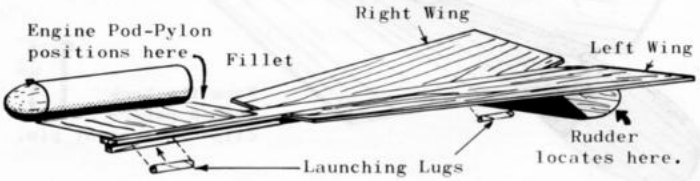
with the point of a ball point pen. Glue the tabs to the flaps so the sloping side of the tab is toward the rear of the flap. Set these units aside to dry.

ATTACH WINGS

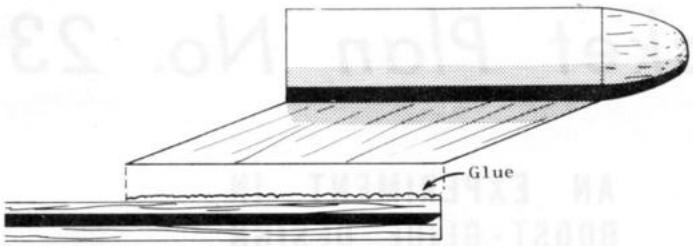
When the fuselage has dried completely, mark the top side of the "T" 2.9" from one end. Apply glue to the root edge of one



wing and attach the wing to the fuselage so the front of the wing matches the mark. Attach the other wing in the same manner. Support the fuselage 3/4" from the table surface with the wing tips touching the table until this assembly has dried. While it dries, coat the surfaces of the flap tabs liberally with white glue.

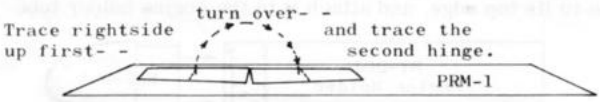


Apply a glue fillet to the fuselage and wing joints. Cut two 5/8" long launching lugs (an LL-1A cut in half will do) and glue them to the fuselage, one at the front and one at the back, in the corner formed by the two parts of the "T". Glue the engine pod pylon to the front end of the fuselage. Glue the rudder to the rear of the fuselage. Support the model in a horizontal position until the glue on all joints has set. When the glue is reasonably dry, apply glue fillets to the pylon-engine holder joint, the pylon-fuselage joint and the rudder-fuselage joint. Let the fillets dry.

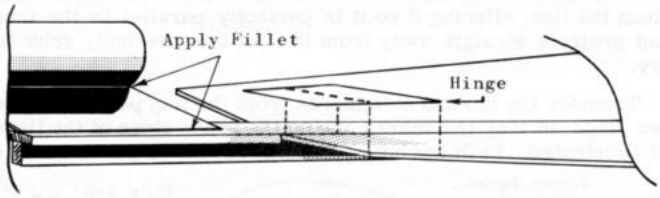


INSTALL FLAPS

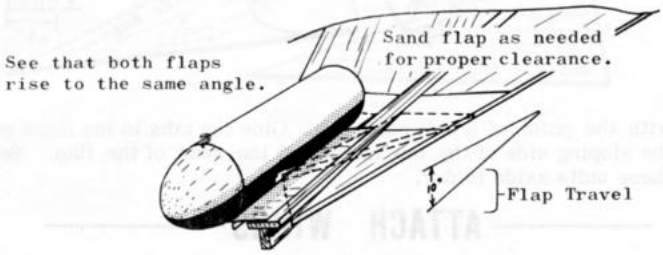
Lay the hinge pattern on the sheet of self-adhesive paper reinforcing material and trace around it. Turn the pattern over and trace out the other hinge. Cut out the two hinges and crease them along a line corresponding to the dotted line on the pattern.



Apply one end of one hinge to the left wing. Position the left flap against the wing and press the front edge of the hinge down against it. Repeat with the other wing and flap. When the flaps are in their "up" or glide position their tips should stop against

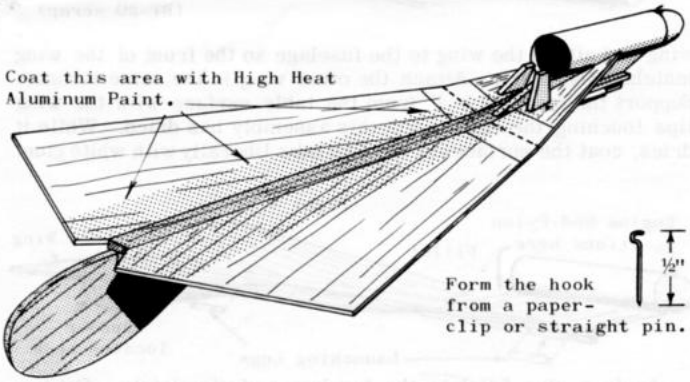


the underside of the engine holder tube. If they rub against the pylon sand their inside edges until the flaps work smoothly.



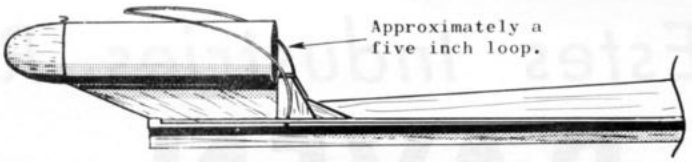
PAINT

Apply a liberal coating of High Heat Aluminum Paint to the area shown in the drawing to protect the balsa from the heat of the exhaust. Paint the rest of the model any way you wish. While the paint is drying, form a 1/2" long hook of the shape shown from a paper clip or any other convienient piece of stiff wire.



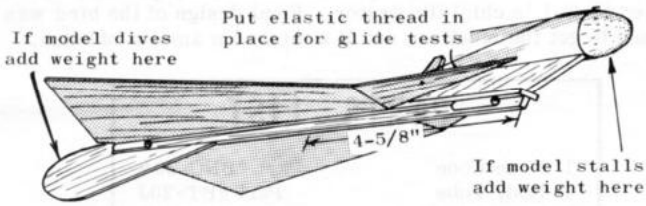
NOTE: Exhaust residue may be easily removed with a damp cloth.

When the paint has dried, tie a knot in one end of a 7" long elastic thread. The knot should be large enough to keep the thread from pulling through the holes in the flaps. Pass the other end of the thread up through the hole in one flap and down through the hole in the other flap. Tie another knot in this end, approximately 5" from the first knot. Trim off any excess thread. Push the hook into the upper side of the nose cone just ahead of the end of the tube and hook the middle of the thread around it.



TRIM AND FLY

The Raven will balance approximately 4-5/8" from the front of the fuselage for a flat glide. Push slivers of lead (NCW-1) into the nose or tail of the rocket until it balances at this point. Take it outside and toss it lightly into the wind. If it tends to dive, add weight to the tail. If it stalls, add weight to the nose. When the rocket is balanced correctly it will glide for 20 or more feet on a light toss.

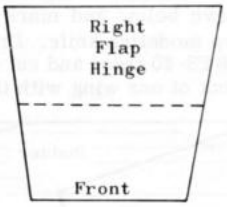


Between flights unhook the elastic thread so it does not become stretched. After each flight check the model carefully for damage. If the flap hinges begin to come loose, replace them. With proper maintenance the Raven will be good for an unlimited number of flights using 1/2A. 8-2, A. 8-3 or B. 8-4 engines.

For first flights, use 1/2A. 8-2 engines. Install the nichrome igniter in the engine and apply just enough tape to the engine to keep it from falling out, but not enough to keep it from ejecting easily. Hold the flaps down and slide the engine into place. Set the rocket on the launcher, attach the clips, give the countdown and launch.

FULL SIZE PATTERNS

Trace onto another sheet to preserve the RAVEN plans.



Turn pattern over for making all left flap marks.