CARDBOARD STICK

A CLUB PROJECT DEVELOPS A .40 POWERED CARDBOARD PLANE

By Jerry Smith and Phil Johnson

It has always been a tremendous challenge to the effort and ingenuity of R/C club officers to maintain a high level of membership interest within the club. Tri-Valley R/C Club of South Bend, Indiana, is no exception and seems to have this problem every year, with each new year becoming more difficult. Although 1973 was busy as usual with individual member's projects and the usual club sponsored events, something new was needed to spark interest within the group and provide a greater common ground for the entire membership. A number of ideas for a club project were tossed around by some of the club members and finally out of this "Witches Brew" came the idea of a cardboard airplane. Initial reactions to the idea by some of the members was modest to say the least, but the idea was pursued and presented to the membership for consideration. Three designs were presented as cardboard possibilities— Stick Design, the RCM 15-500, and the Falcon 56. A vote was taken and the Stick Design won over the RCM 15-500 by one vote.

Real interest in the project started when one of the members cut out a cardboard fuselage, brought it to a meeting and gave a demonstration on "How To Assemble a Cardboard Airplane in Seven Minutes." In order to do it in seven minutes he had to use rubber bands instead of glue and a very slow running watch, but we forgave him for that since the results were very impressive. The demonstration was a great success and having been well publicized in advance via our monthly newsletter "Tri-Valley R/C News" surely accounted for the large increase in the meeting attendance.

At the next regular meeting, again well publicized, a design for the "Cardboard Stick" was presented together with all the materials and information necessary for each member to start in on his own cardboard project. Sheets of cardboard, foam wing cores, cardboard wing covering material and printed instructions were available at the meeting. Partially completed fuselages had been built and were passed around for the members inspection and approval. A demonstration was made showing how to cover a foam wing core with cardboard using contact cement for adhesive. Atten-

dance at the meeting again was very high indicating substantial group interest. All the materials brought to the meeting were picked up and members were clamoring for more. So, the "Cardboard Stick" was officially launched.

The use of cardboard in model airplanes is not new. Some of you may remember cardboard being substituted for balsa wood during the shortages of World War II. Some of our club members have been using and experimenting with the use of cardboard for several years. With the current shortages of materials, the use of cardboard may again be appropriate.

The term cardboard actually is somewhat misleading. When we refer to the use of cardboard in the fuselage and empennage, we should be using the term "corregated fiberboard." The cardboard used to cover the foam cores is called "10 point coated paper."

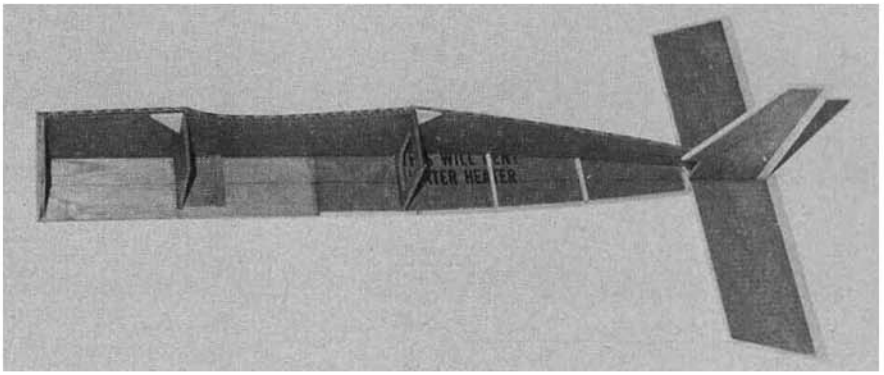
Corregated fiberboard, to use the correct terminology, is specified by test strength, facing weight, and flute style. It is usually used in the single wall form which consists of a Kraft paper outer facing, a fluted media, and another Kraft paper inner facing. Test strengths are dependent upon the weight in pounds per thousand square feet of the inner and outer facings and the weight of the media, plus the flute style of the media — B, C, or A. Size B flutes yield an overall thickness of about 1/8", C flutes 3/16", and A flutes 1/4". The overall thickness of the corregated fiberboard will vary from these dimensions depending upon the Kraft paper weights used in the facings. Corregated cartons will usually be marked with the test weight and the facing weight, but the flute style will not appear.

For the purpose of the "Cardboard Stick" project, two corregated fiberboards were selected: 200# test, 84# facing, B flute which measures about 5/32" thick and 275# test, 138# facing, C flute which measures about 3/16" thick.

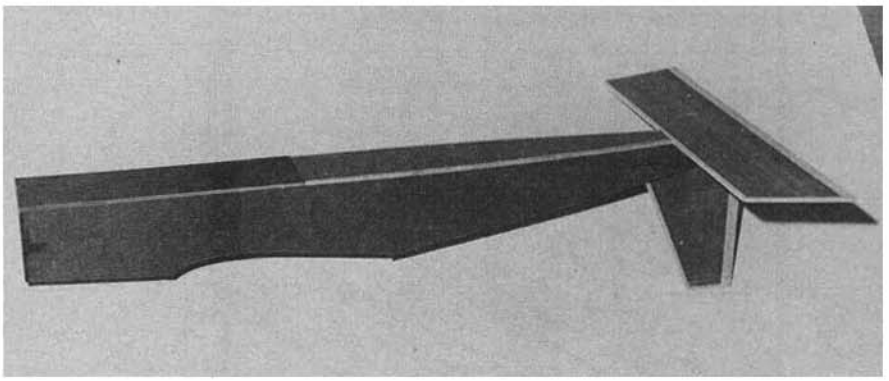
The lighter weight corregated will reduce the fuselage weight by about 6 or 7 ounces. However, since the heavier corregated, which is about 3/16" thick better matches 3/16" balsa, which is a stock item, the heavier corregated was used in the final plans. Either corregated thickness can be used.

The technique used in the "Cardboard Stick" design is somewhat more refined than that used in other designs in that all corners and exposed cardboard edges are covered with wood. The laminated hinge strips used in the empennage and ailerons are especially useful serving both for ease of hinge slot construction and installation, and at the same time, providing a mounting surface for the control horns. The reinforcements built into the design form a rigid reliable structure when assembled.

A corregated wing design was considered early in the project but was abandoned in favor of foam cores with cardboard sheeting. Flat bottom corregated wings have been sucessfully built and flown, but for this project we felt that a symmetrical airfoil would be too difficult and would present too many problems for a group project.



Basic cardboard construction sequence.



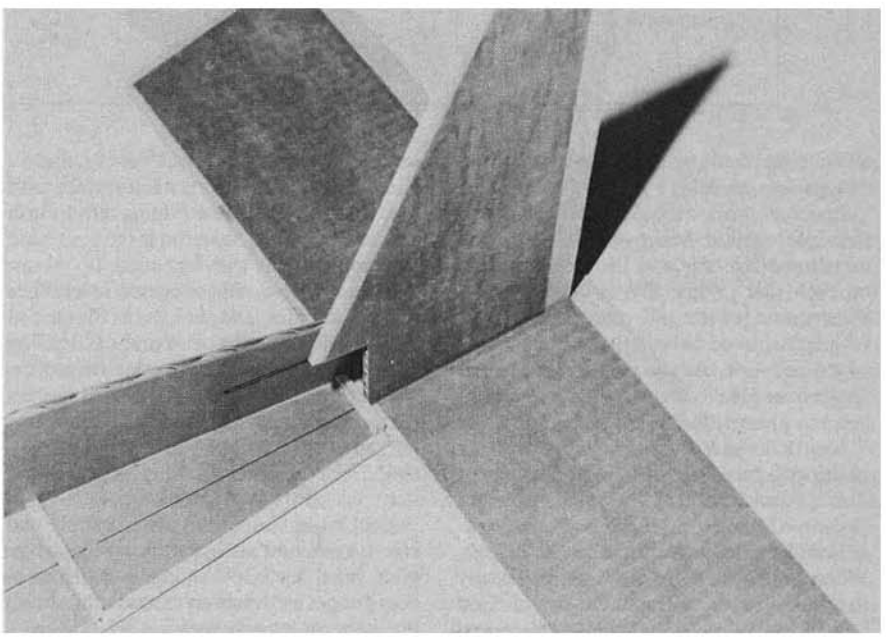
The semi-completed cardboard fuselage.

Much of the balsa wood used in this project can be found in the scrap pile from prior building sessions. The plywood used in the firewall and forward bottom was left over wall paneling pieces. In fact, a thorough search of the basement (also known as a house cleaning) may reveal a treasure of usable parts and pieces — maybe even a whole airplane.

This plane is very easy to build. Just follow the instructions and in short order you will be flying the "Cardboard Stick."

CONSTRUCTION

Begin construction by cutting out all plywood and cardboard parts from template outlines. When cutting cardboard parts be sure to note direction of corregation. Each template has an arrow indicating the proper direction. Block sand to square up cardboard edges as necessary. Use a sharp knife and make several light cutting passes gradu-



Close-up of cardboard fuselage parts with balsa edging.

ally cutting through rather than trying to cut through in one pass.

Epoxy Numbers 1 and 2 3/16" plywood firewalls together. Make sure No. 2 firewall is centered, leaving 3/16" for fuselage side on each side. While this is curing, begin construction of the tail empennage. With white glue, bond balsa strips to the leading edges and tips. Apply glue to wood, run finger over glue to level and spread. Retain balsa in place with masking tape until dry.

No. 18 laminated assemblies are made by gluing together 2 strips of 3/32" x 5/8" x 21½" balsa with 1/32" x 5/8" strips between. Wherever a hinge location is required, leave out 3/4" of the 1/32" sheet. When complete, hinge slots will be exactly in line and ready to accept Du-Bro or Klett hinges. Make 2 assemblies for stabilizer and elevator. Build together so that hinge slots line up. Edge glue these assemblies to stabilizer and elevator, respectively, and retain with masking tape on a flat surface until dry. Block sand balsa edging until flush with cardboard. Be careful not to over sand the cardboard. It will fuzz up.

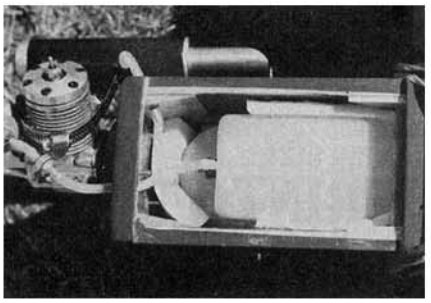
Make two No. 18 laminated assemblies for vertical fin and rudder as described above. Block sand and round off leading edge, tip and and trailing edge of rudder. This completes the construction of the tail empennage. You will need the vertical and horizontal stabilizer for building the fuselage.

Fuselage Assembly

First build No. 9A aft top assembly and No. 6A aft bottom assembly. With white glue, bond the 3/16" square balsa to cardboard edges as shown on the drawing. From the patterns, mark location of the cross members and bulkheads. Retain balsa strips with masking tape until dry.

Pick a good flat spot on your work bench and lay out No. 3 forward bottom, No.6A aft bottom assembly, and No. 11A horizontal fin assembly. Line up these parts with the center line established on each part. Use a straight-edge. With white glue, edge glue these parts together and pin down to work bench.

Epoxy firewall assembly (Numbers 1 and 2) to No. 3 forward bottom. Firewall should be flush with front edge of No. 3 forward bottom. Make sure firewall is square to forward bottom. Following the locations marked from the patterns, center and glue No. 4 forward bulkhead to the No. 3 forward bottom. Locate No. 15 landing gear reinforcing against bulkhead and glue in place. Install No. 5 aft bulkhead between lines indicated on No. 6 aft body assembly. Locate and glue No.10 vertical stabilizer assembly to centerline on No. 11 horizontal



View of fuel tank and engine. Note muffler pressure.

1/8" balsa and No. 24B 1/32" balsa and laminate as shown on drawing. When dry, sand and round off edges. Wing cores may be obtained from Wing Central, Box 33, Crystal Lake, Illinois 60014, for $10.95 plus $1.35 postage. Specify "Cardboard Stick" wing kit.

Aileron linkage may be installed as shown on drawing. There are other methods if you so desire. This method was chosen for its simplicity.

Wing may be painted or covered with MonoKote, Solarfilm, or shelf paper, but it does need protection. Take your choice and have at it.

FLYING

Flying the "Cardboard Stick" is not much different than flying the usual Stick configuration. The aircraft is rather fast with a good .40 and very responsive. All maneuvers are steady and smooth. For those who have not flown a tail-dragger the biggest problem occurs at take-off. Unless the rudder is used to overcome the engine torque, the aircraft will turn decisively to the left. A good remedy is to apply the throttle gradually (don't jam it full on) and hold a slight bit of right rudder. As the ground speed builds up, gradually release the rudder, so that at the time of take-off the rudder is neutral. By this time the tail will have lifted off and a slight bit of up elevator will lift the plane into a moderate climb. This problem is usually not as severe on grass fields.

Ground handling is very good, especially with the tail wheel. However, the tail skid works very well on grass fields. Remember to hold up elevator when taxiing a tail dragger so that the prop blast over the elevator will hold the tail down.

With proper care and a little help from above, the "Cardboard Stick" will prove to be a sturdy reliable airplane providing many happy hours of flying. Simple and utilitarian probably best describe this airplane.

With the shortage and ever rising cost of balsa, try your hand at building the "Cardboard Stick." That's what the members of Tri-Valley R/C Club are doing. □

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