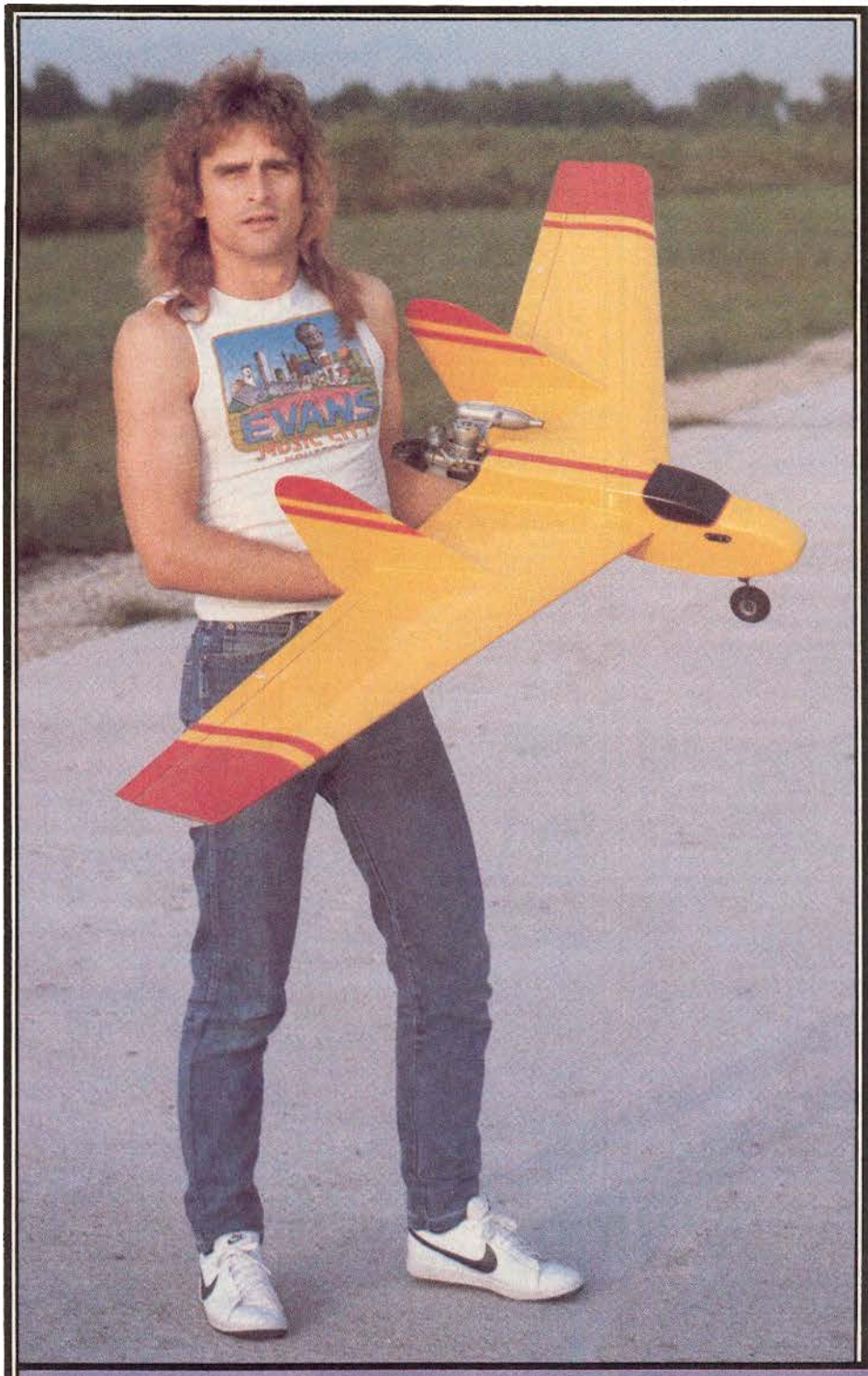


VENDETTA

By Larry Mitschke

Larry Mitschke's colorful Vendetta captures the mystique of the flying wing — handsome on the ground and graceful in the air.

I'm the kind of person who likes to do things out of the ordinary and, after building several R/C airplanes, I decided to do something very different for me. A flying wing was one design that I hadn't yet built. I wasn't exactly satisfied with the designs that were out, so I decided to undertake a project to design and test fly an original flying wing design. This is how the Vendetta began.

I'd read about the Mitchell "U-2" ultralight plane and decided to base a sport plane on its design. So I ended up with the prototype of a rear engine, tapered and swept-back flying wing with elevons underneath the wing. Supposedly, with the elevons in this position, when the plane is in a stall situation the control surfaces will still be functioning. It sounded good on paper, and I had high hopes for my design. But I learned one thing after more than twenty crashes --- try only one new thing at a time! I had the Center of Gravity as shown on the U-2 plans but could not get the plane to fly. Since I didn't know how well the external elevons were working, I put the elevons back into the wing and I was able to narrow the problem down to C.G. position. After being very frustrated, I put almost one pound of lead in the nose and gave it a try. This flight showed some direction (which was a first). There was no damage on this flight, so with a little more lead I tried another flight. You wouldn't believe my excitement and relief when the plane rose into the air and kept on flying and, to my surprise, flew smoothly and gracefully. You should experience the feeling of success after almost dumping a project several times.

So out of this success came new plans which are presented here, with improvements on the old design.

The Vendetta is the only rear engine flying wing with tapered, swept-back wings that I've seen in my five years of R/C modeling. It features a throttle servo right by the engine, and so far I have had no problems with vibration. Also the fuel tank is right on the C.G. so there is no shift in weight as fuel is used up. The wings have a 4° washout which helps in making this plane one of the smoothest I've flown.

Building this plane requires the experience of building at least two kits, but otherwise no special knowledge is needed. A three channel radio will control this plane, but, unless your transmitter has servo mixing, an Ace "Christy-Mixer" will need to be purchased. Be sure it is the bi-directional unit. *(Editor's Note: One of the mechanical mixers or sliding tray arrangements could be adapted.)* Now, let's build ---

CONSTRUCTION

First of all, you must use **straight** spruce sticks for spars. Also plan on using balsa sheets of the same density for fuselage sides.

Wing:

1. Cut out all parts. Mark former positions on R-1 and fuselage sides. Drill holes in firewall and install 4-40 blind nuts.

2. Cut out a trailing edge (TE) spacer from 1/4" stock, 18 mm tall at root end and 12 mm at tip end, and pin to plans where indicated.

3. Pin bottom spar to plans and glue ribs to spar, giving root rib the angle indicated by the plans. Add top spar.

Note: Due to washout, the bottom spar will need to be raised at R-13. Slip a couple of thicknesses of cardboard under that end. Also, the spars (and TE strip) must extend to the fuselage centerline in order to assist in aligning the wing halves later on.

4. Check front of ribs for alignment and sand to an angle. Then glue on leading edge (LE) triangle, centering it on the ribs.

5. Sand bottom of TE stock to produce a sharp edge. Then sand rear end of ribs to an angle and glue on TE.

6. Glue the 3/8" x 1/2" stick onto outer ribs 5 through 13. Then sand it flush with top and bottom of ribs.

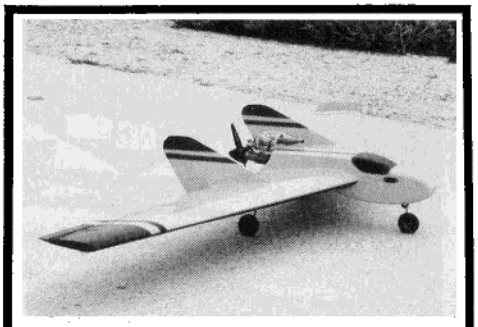
7. With the wing back on the wing spacer, glue on the top TE sheeting and top LE sheeting. I always glue the front edge of LE sheeting first with CA, and then bend the sheeting over and glue to spar and ribs.

8. Turn over and glue on TE sheeting using a flat surface to lay it on.

9. Glue plywood reinforcements onto R-2 and R-3. Check hardwood for fit.

10. Install NyRod for antenna (right wing) and gussets on R-5.

11. Before gluing on LE sheeting on both wings, check the fit of hardwood sticks to be sure the holes are aligned, fit is good, and dihedral is correct. Use the TE and upper spar to match up the wings. When all is good, glue on the LE sheeting.

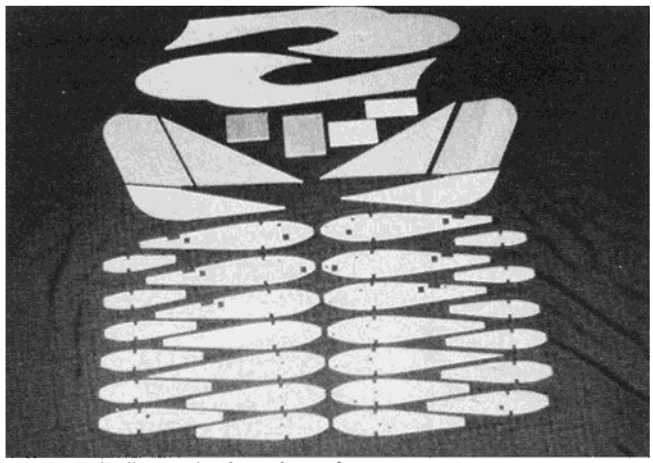


VENDETTA
Designed By:
Larry Mitschke
TYPE AIRCRAFT
Sport Rear-Engine Flying Wing
WINGSPAN
70 Inches
WING CHORD
9 Inches M.A.C.
TOTAL WING AREA
612 Sq. In.
WING LOCATION
Low Wing
AIRFOIL
Symmetrical
WING PLANFORM
Swept back, tapered
DIHEDRAL EACH TIP
1½ Inches
OVERALL FUSELAGE LENGTH
22¾ Inches
RADIO COMPARTMENT SIZE
(L) 7½" x (W) 3" x (H) 3"
VERTICAL FIN HEIGHT (ea.)
7¼ Inches
VERTICAL FIN WIDTH (ea.)
7¾ Inches (Avg.)
REC. ENGINE SIZE
.40 Cu. In.
FUEL TANK SIZE
8 Oz.
LANDING GEAR
Tricycle
REC. NO. OF CHANNELS
3
CONTROL FUNCTIONS
Elevons (Elev. & Ail.), Throt.
BASIC MATERIALS USED IN CONSTRUCTION
Fuselage ..... Balsa & Ply
Wing ..... Balsa, Ply, Spruce & Hardwood
Empennage ..... Balsa
Wt. Ready To Fly .... 4 Lbs. 10 Oz. (74 Oz.)
Wing Loading ..... 17.4 Oz./Sq. Ft.

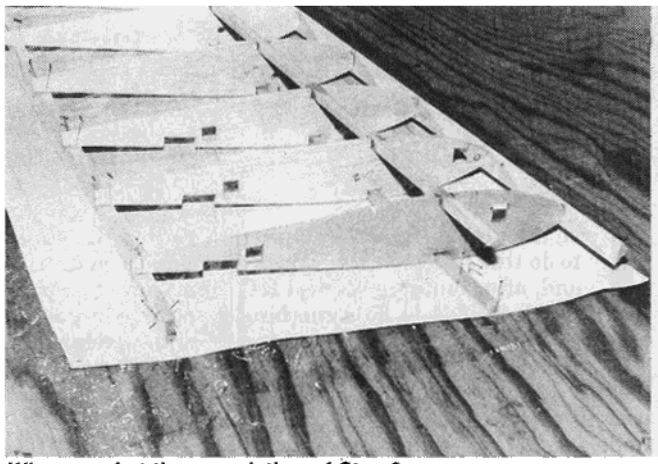
ABOUT THE AUTHOR

Larry Mitschke flies almost year-round in Houston, Texas. R/C flying provides a diversion from his job which is renting musical instruments and performing part-time in a rock band. His activities in R/C have rekindled the interests of several people at the music store where he works, and he is instructing their first flights.

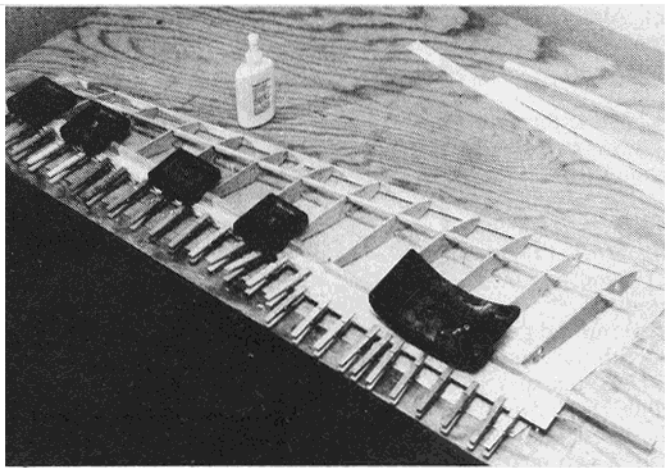
Larry's current project is a specially designed airplane with a TV transmitter on board. He likes to put challenges into a hobby that could get mundane after awhile. However, Larry doesn't believe there will ever be an end to new things that can be done with an R/C airplane.



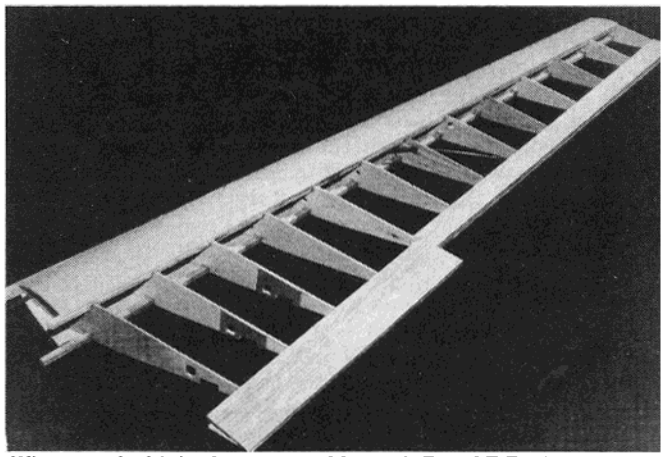
"Kit" of all ribs and other shaped components.



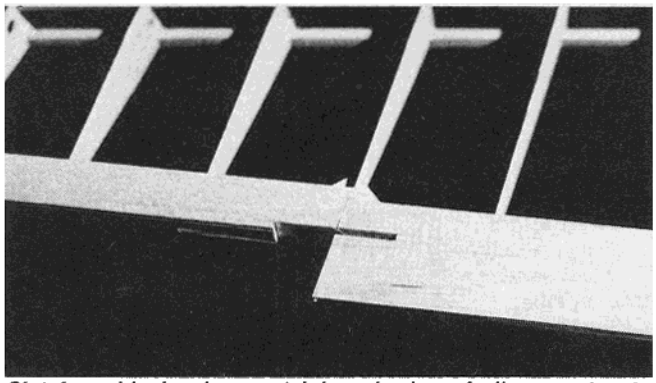
Wing panel at the completion of Step 3.



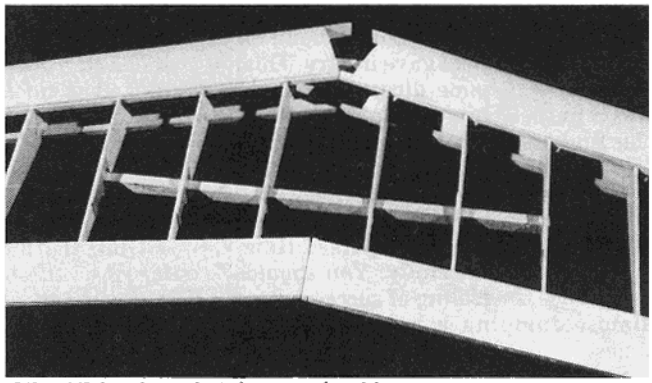
Trailing edge sheeting being glued and clamped in position (Step 5).



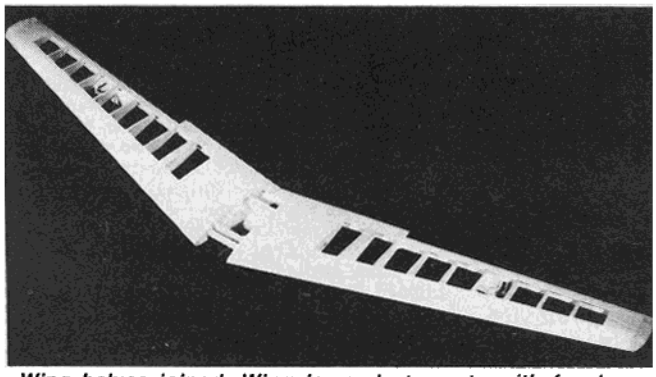
Wing panel with both upper and lower L.E and T.E. sheeting in place (Step 11). Note plywood doublers at landing gear block location.



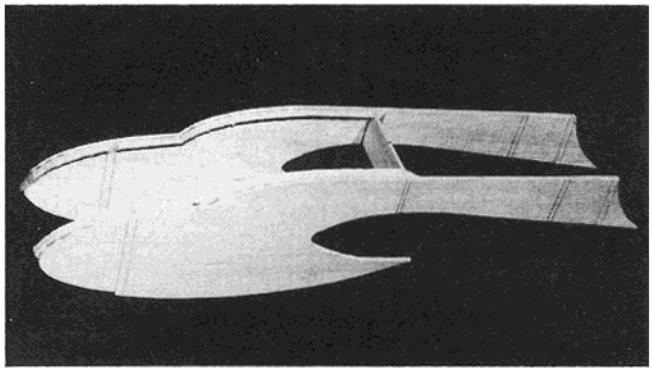
Slot for mid-wing brace at inboard edge of aileron cut out (Step 12).



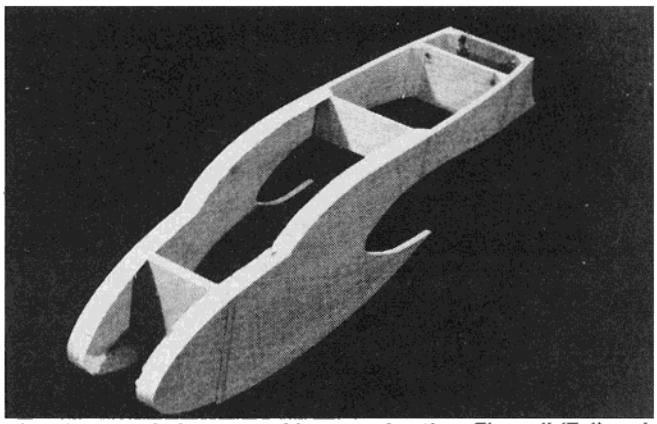
3/8 x 1/2 hardwood stub spar glued in space.



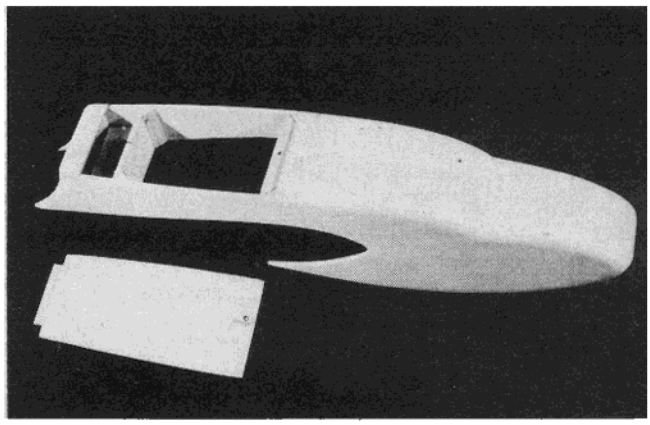
Wing halves joined. Wing is ready to mate with fuselage (Steps 13-19).



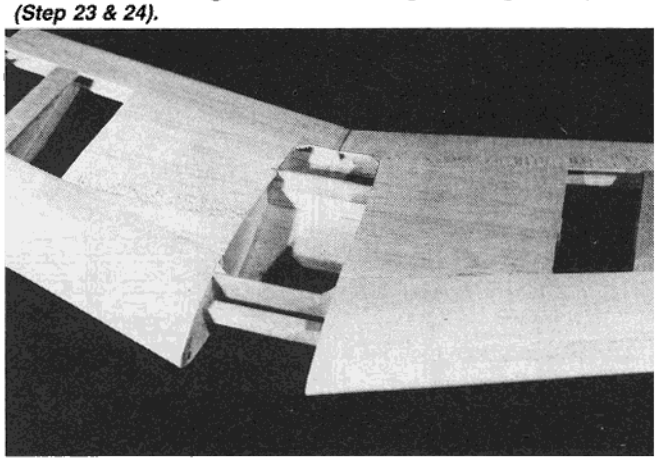
Fuselage assembly (Steps 20-22).



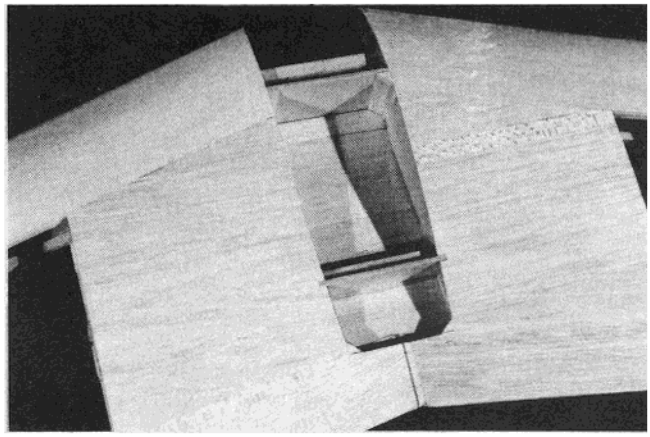
Fuselage ready for top and bottom sheeting. Firewall (F-4) and bulkheads F-1 through F-3 have been aligned and glued in place (Step 23 & 24).

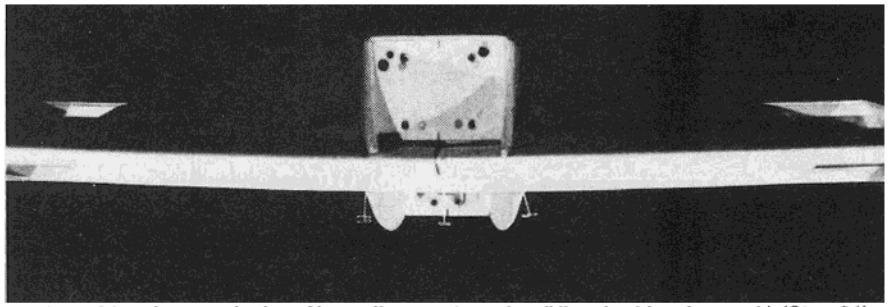


Top and nose of fuselage sheeted with 1/8 balsa and sanded to contour. Tank hatch fabricated (Steps 25-27).



Details of tank bay in wing.





Mating of fuselage and wing. Note alignment marks (View looking forward.) (Step 31).

12. Cut slot for midwing brace and epoxy the brace in place.

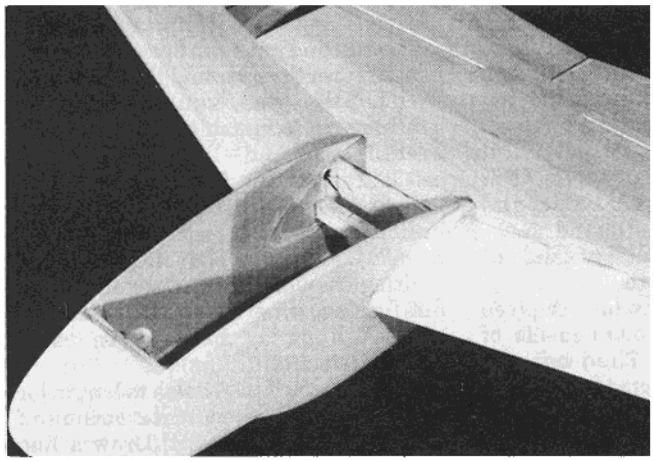
13. Set up two wing halves on flat surface with everything in alignment and 1½" dihedral each wing tip. Then epoxy both hardwood sticks in place.

14. Cut spars out of center section.

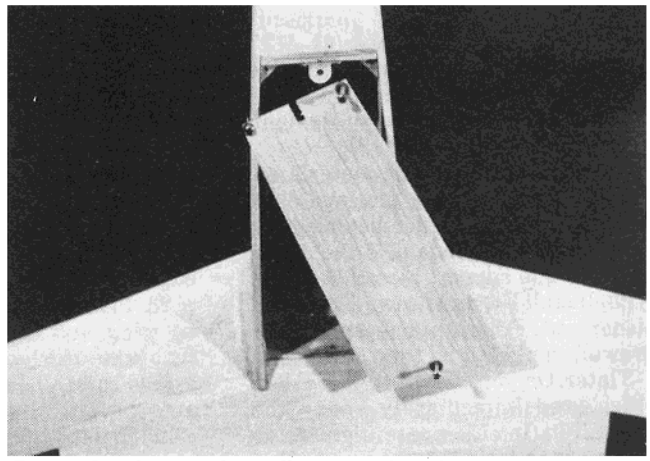
15. Epoxy landing gear mounts into place.

16. Glue on wing sheeting and capstrips, then reinforcing triangles where the fin will attach.

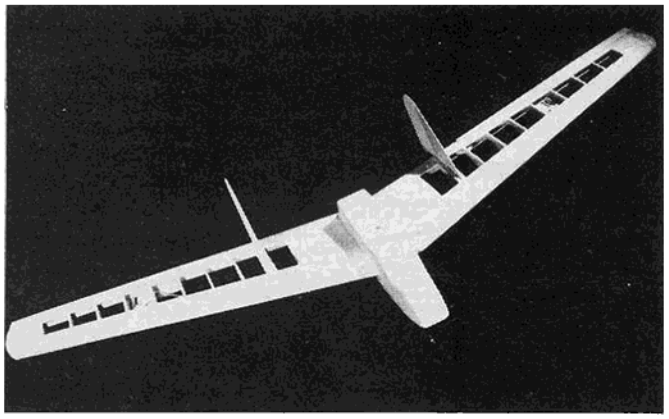
17. Glue wing tip triangles onto wing tips and rough shape them.

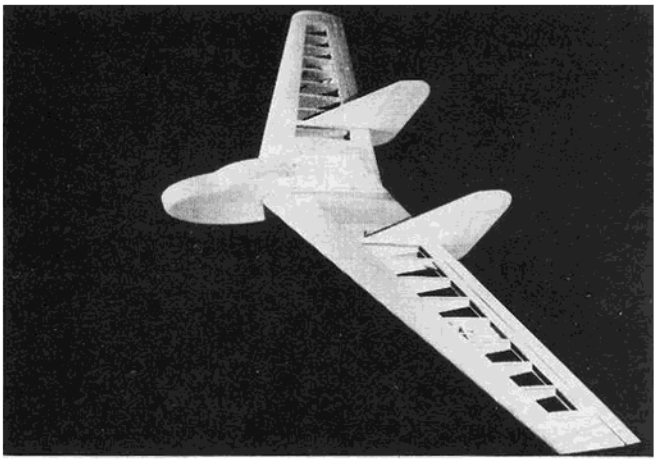


Fuselage/wing joint reinforced with fiberglass and epoxy (Step 32 & 33).

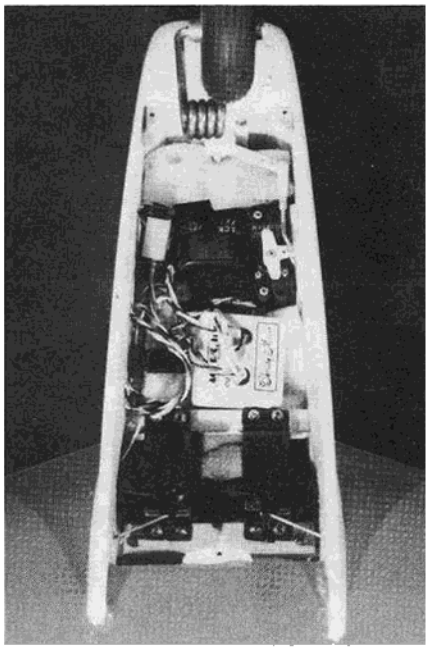


Bottom hatch cover for radio compartment.

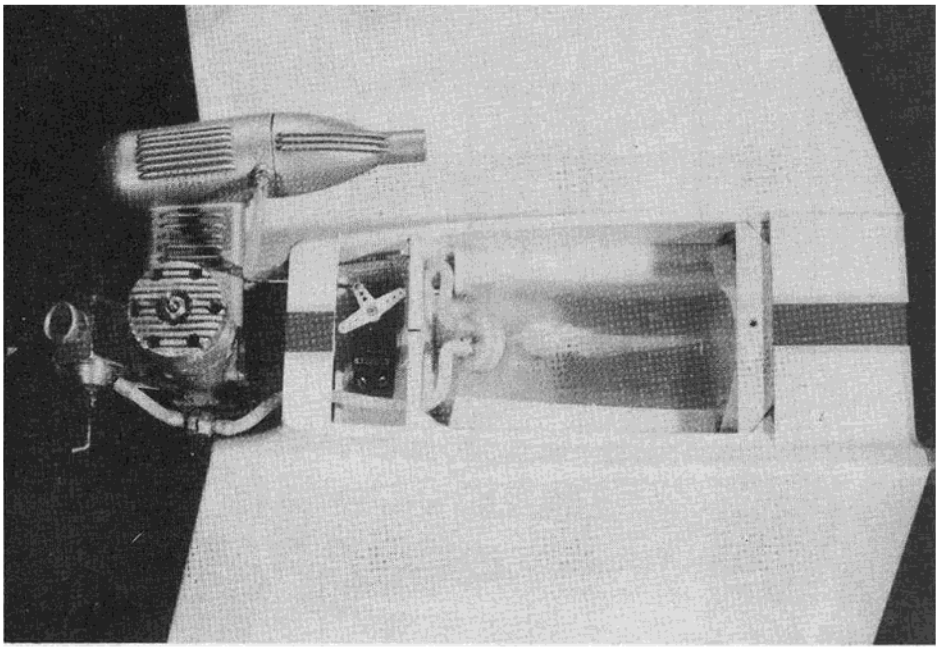




Views of completed airframe.



Radio installation. Note Ace Christy Mixer, nose gear steering servo and elevon servos.



Engine, throttle servo, and fuel tank installation.

18. Install bellcrank mounts and bellcranks.

19. Sand the whole wing smooth — rounded leading edge and tapered trailing edge.

Fuselage:

20. Cut triangle stock at 1/2" intervals, 2/3rds of the way into the wood. Glue this onto the outer edges of the fuselage sides as shown, leaving spaces for F-1.

21. Mark formers with centerlines.

22. Glue F-2 to one fuselage side, making sure it is perpendicular, then glue to other fuselage side the same. Add triangle support pieces.

23. Install F-3 and firewall. You can either put F-3 in place, epoxy the firewall in place, and then super glue F-3 later. Or, you can white glue F-3 in place, and immediately epoxy the firewall in. In either case, sight down the fuselage from the rear, and align the center marks while the epoxy sets.

24. Install nose gear mount onto F-1 and epoxy that to fuselage. Sight from rear to ensure it is straight. Glue triangle bracing onto all indicated formers and firewall. (Recess bracing 5/16" on F-1 to allow for bottom hatch.)

25. Glue 1/8" sheeting on top and nose. Add plywood pieces for hatch hold-down and throttle servo mount.

26. Lay 1/8" sheet balsa over tank area and trace outline of hatch. Cut it out and glue on 1/16" plywood. Drill hole in front through balsa and plywood and install 4-40 blind nut.

27. With hatch in place, sand all edges round and smooth.

28. Place finished fuselage in place on wing and trace around inside of fuselage onto wing. Then cut out excess balsa sheeting inside fuselage area.

29. Cut to fit the plywood pieces that go below F-2 and F-3 in wing, and glue them in place. Add triangle bracing under F-2.

30. Now is the time to install the music wire for bellcrank.

31. Epoxy fuselage to wing. An easy way to ensure alignment is to mark centerlines on bottoms of F-1 and firewall, and put a pin on center of F-2. Sight from the rear and line up marks with pin. Also, squeeze sides of fuselage in to match ribs R-1 as epoxy sets.

32. Put fillet in fuselage/wing joint. I used polyester resin and micro-balloons.

33. Use either epoxy or glass resin with glass cloth to reinforce the inside of fuselage where the wing joins the body, both at LE and in tank compartment.

34. Cut 3/16" x 4" balsa to length for bottom hatch, then trace outline of fuselage onto the sheet. Draw a line 3/16" inside these outlines. This will be the size of the hatch opening. Cut it out and check the fit. Then cut a slot to clear the landing gear. Epoxy three plywood pieces for hold-down screws.

35. Fuelproof the tank area.

36. Sand entire plane with 120 grit sandpaper.

General:

37. Cut elevon stock to length and check thickness against wing. If elevon is too thick, cut or sand the blunt edge until thickness matches wing. Then trim the sharp edge to size to match TE of wing. Measure a line 1/4" from front bottom edge of elevon and sand off the corner as shown in cross-section on plans.

38. Glue fin pieces together and sand edges round.

39. Cover plane, fins, and elevons as you prefer. Finish bottom of wing first and install elevon pushrod. Then cover top of wing. It is necessary to have the bottom colored dark and the top colored light to help distinguish its position while in the air.

40. Cut groove on top surface for pre-covered fins (and cut out strip of covering on bottom) and epoxy fin in place. It would be good to make a template from the plans using the TE and side of fin so that you can get the correct alignment of fin.

41. Install hinges, control horns, and landing gear.

42. Install servos as shown on plans. Use wiring diagram for correct wiring of servos.

43. Install engine and fuel tank. Clunk should be in the center of the tank.

Flying:

44. To start with, set elevons so that neutral is 1/8" up and they move 1/4" each way. At rest, the Vendetta should have a positive angle of attack. Adjust the nose gear so that the leading edge is slightly higher than the trailing edge. This will give a smooth take-off. You will need a 10 x 6 pusher propeller. Make sure the Center of Gravity is as shown on the plans. Check movement on all controls to make sure they move in the correct direction.

Because a pusher propeller doesn't cool the engine as well as a tractor propeller, avoid running the engine at high speeds on the ground.

Flying the Vendetta may take some getting used to due to the absence of a tail and the presence of steering on the aileron stick, so practice some taxiing to get the feel for it.

On take-off, allow the plane to gather plenty of speed before giving up elevator, and the Vendetta should rise smoothly. You will find stalls to be very smooth.

To prepare for landings I found it beneficial to practice stalls in the air. In a light wind it is easy to "float" the Vendetta in one spot in the air. After chopping the throttle, slowly feed in up elevator as the plane slows down. By working the aileron stick to keep it level, you can get the plane to slowly drop out of the sky. If it suddenly noses over too easily, the C.G. may need to be moved slightly forward.

In landing, it is best to bleed off the airspeed in the same manner --- slowly feeding in elevator as the airspeed decreases. That way when it touches down it won't have a tendency to bounce the nose up and stall. Avoid bouncy landings like the plague --- there is no tail to lessen the rotation.

With no rudder, there will be some maneuvers this plane cannot do. But then this is a sport plane, and the attention and positive comments you'll get will make up for it. I think every R/C pilot should have at least one "different" kind of plane in his arsenal, and the Vendetta is one good candidate. □

From RCModeler Sep. 1988