WALT AND WAGGER BUILD THE

MOCK 15

LOREN DIETRICH PRESENTS A COMBINATION OF DESIGN IDEAS THAT ADD UP TO THE YEAR'S MOST REMARKABLE .19-.23 SIZE AIRCRAFT.

"Wait up a minute, Wagger!" puffed Walt as he wobbled along behind the Bassett. "Since I've taken up the controlled crashing of model airplanes I'm not in the shape I used to be!"

"You never were," sniffed the feisty talking dog. He nosed the door of the shack open and pawed on the light so his master could see his latest creation. Walt finally came wheezing into the hobby house and then gave one large grunt as he spied the 'Mock 15'.

"You blockhead!" said Walt woodenly. "That will never fly!"

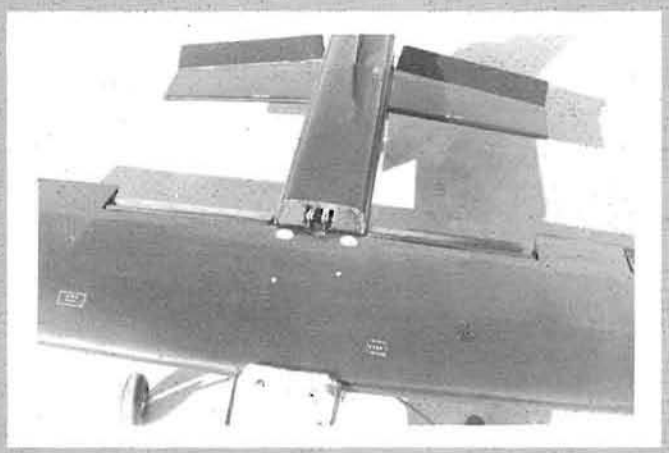
"Give me credit," said Wagger takingly. "It already has."

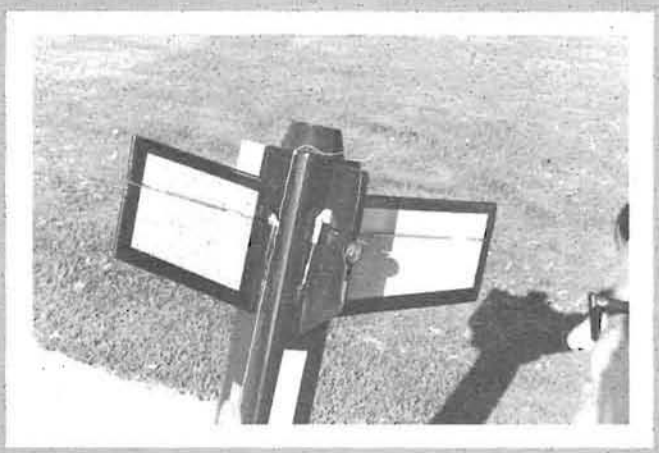
"Not much wingspan," Walt said shortly. "The fuselage is good sized though," he added longingly. "How's the weight?" Walt asked lightly.

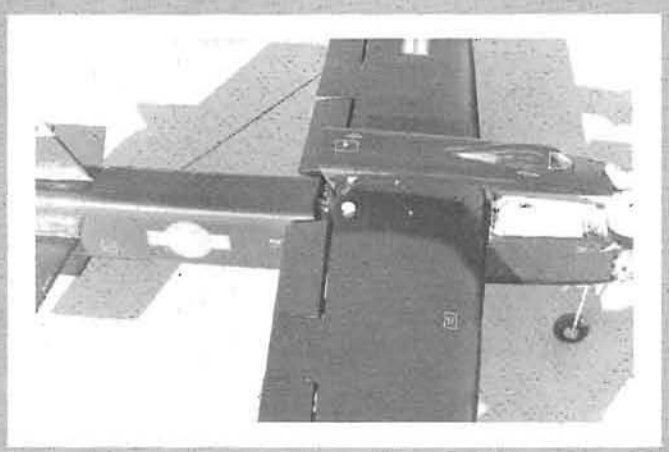
"Not as light as it could be," replied Wagger heavily. "It gained some weight after I hit a hangar on landing," he added crushingly.

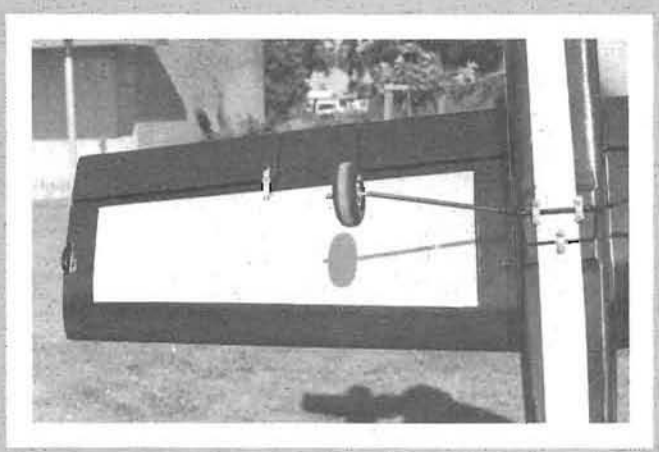
"Oh, KNOCK IT OFF!" shouted Walt, "and let's get on with it. Now, the last time we got together (see WAGGER column in October issue) you explained why you thought that such features as the split rudder and coupled flaps would be desirable. I'm sure you're aware that aircraft like Chuck Hayes' 'Sceptre' have used many of the features in combination before this, although I'm interested in they way you've opened the door to using jet and rocket type appearance. How about letting me take some pictures of your 'Mock 15' for reference while I build mine?"

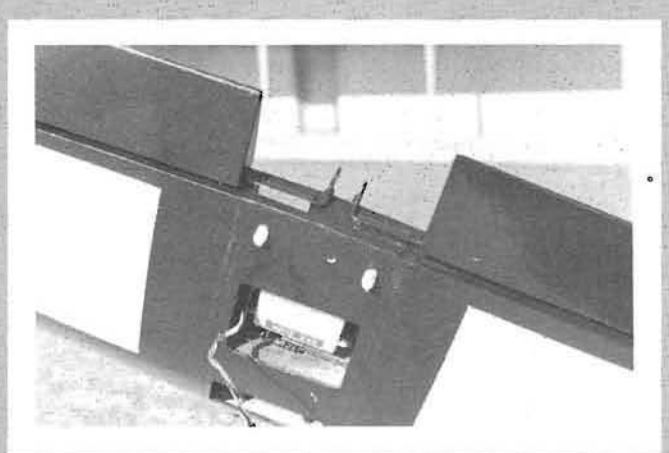
"Happy to oblige," murmured Wagger. "I'll pose it in different views for you. Then, after the pictures, I'll give you a detailed construction sequence; it's built from the tail forward and COULD give you some trouble even though many of the techniques are very conventional."

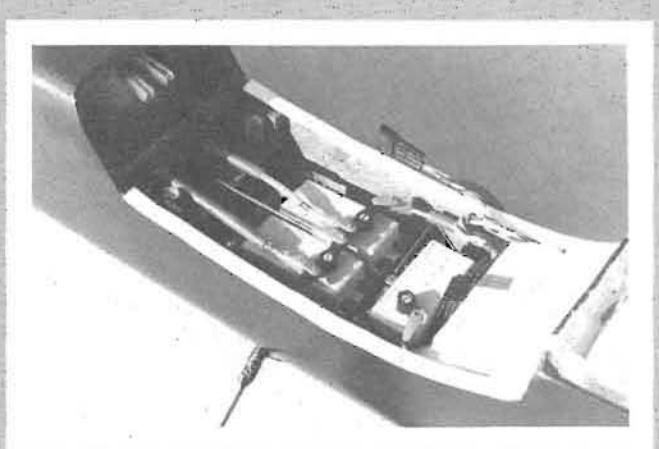


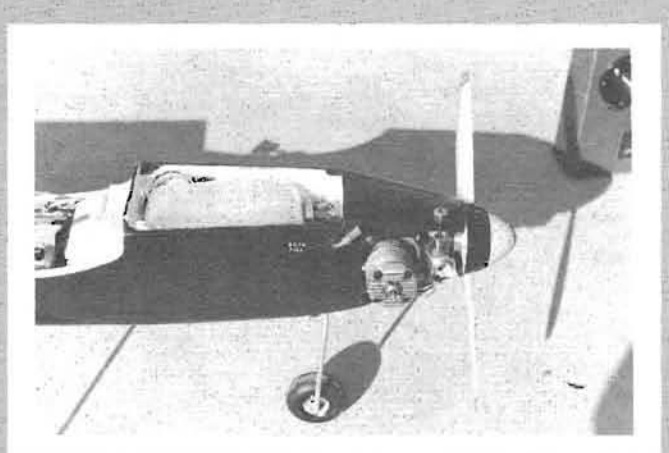










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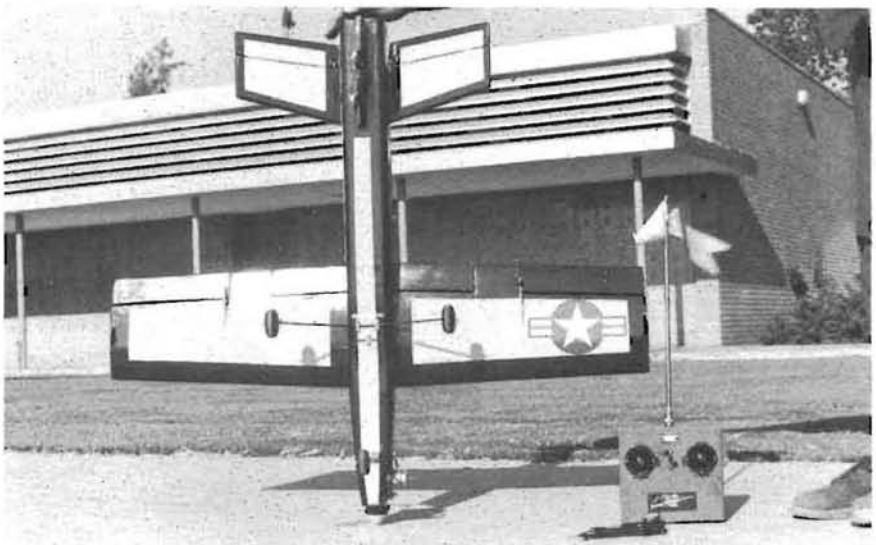

CONSTRUCTION SEQUENCE

1. Take the 1/16" x 3" x 36" sheets. Draw lines on both edges the full length, 1/4" from the edge. Glue a 36" x 1/2" triangle stock to each edge, with its inner edge flush with thy line. (Check cross-sectional views for clarity.) When dry, turn one side over; this gives a right and left side. (Triangle stock is toward the inside.)

2. Cut sides to shape by removing wing cutout, stabilizer slots, and so on.

3. Laminate 1/16" plywood doublers to insides of fuselage sides using contact cement with a little Titebond around the edges.

4. Add diagonal 1/8" square braces to inside rear.

5. Assemble sides using bulkheads at front of stabilizer, rear of fuselage, and rear of wing. Use cross-sectional views for bulkhead shapes.

6. Insert ply crossbrace at rear of stabilizer slot, slide 3/16" dowel into place and glue. This assembly will determine the zero incidence of the stabilizer, so work carefully.

7. Build two stabilizers and elevators over the plan. Turn one set over to obtain a right and left set. (Very handy.) Fit and insert hinges but don't epoxy them in at this time. Mount the horns temporarily. (See photos for horn size, type, and location.)

8. Use sandpaper over a dowel to round out the inside edges of stabilizers for a neat fit over the dowel in the fuselage. Insert stabilizers, check for equal and symmetrical 'droop' with the fuselage. Glue in firmly.

9. Install 1/16" balsa sheeting to bottom of fuselage, with grain running crossways. LEAVE OFF the segment from forward stabilizer bulkhead to the butt-end of fuselage for now. (You have to install the fin and elevator yoke yet, you see, and that yoke is ornery.) Note also that the 1/16" ply on the forward bottom is NOT installed at this time.

10. Install a segment of the top 1/4" sheet, from the butt-end bulkhead to where the FRONT edge of the fin spar will be. Make a 1/4" notch in the sheet for that fin spar.

11. Cut the 1/4" spruce fin spar and insert and EPOXY it against the notch. Epoxy it also to the plywood crossbrace holding the stabilizer dowel. Make sure this spar is vertical while it is setting-up.

12. Build both upper and lower fins over the plans, simply eliminating the fin spar. Remove from plans, then slide them over the fin spar and glue to spar and fuselage bulkhead. (When

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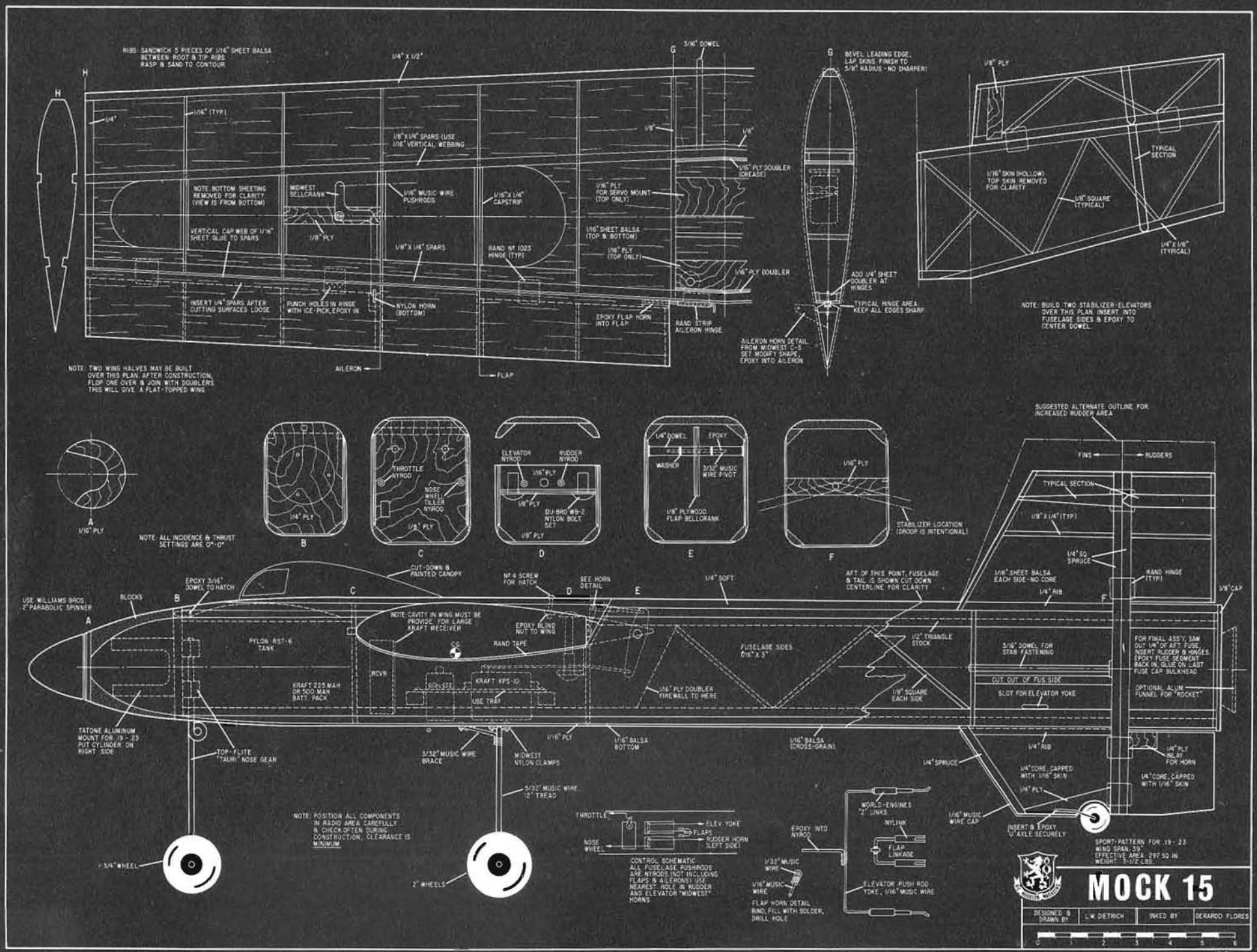

MOCK 15

(continued from page 20)

you fit the rest of the top and bottom sheeting around them they will be plenty strong.)

13. Build rudder assembly and lay to one side for later. (Note that top and bottom rudder are built on a one-piece spar which is also spruce.)

14. Epoxy-in the firewall and forward wing bulkhead. When set, add 1/2" triangle stock in all four corners of the tank compartment. In addition, I later added a piece of 1/8" x 3/8" spruce to each side of the tank compartment. Epoxy them flat to the sides, about 1/8" down from the top edge. They will add a little rigidity when you hit a hangar on landing. Dumb, dumb, dumb.

15. Fit Top Flite nose gear and Tatone .19 mount, epoxying under them before the last tightening. Use planning here, because some screws interfere. Also, use the short Tatone mount, since the ship tends to be nose-heavy. (Scout's honor.) Either the O.S. .19 or the ST .23 will fit the mount AND the same holes, but the different shaft length will change the nose length; make up your mind before proceeding farther. If you build LIGHT as you are supposed to, either one will perform well.

16. Install your RST-6 tank for a trial fit, and bore a hole in the firewall for fuel line if necessary. This might vary depending upon engine, since OS and ST have their outlets on opposite sides. Incidentally, for the OS I had the battery pack on the bottom and tank on top which CAN lead to fuel-soaked batteries. After the first flights with the ST .23 (after the pictures were taken) I moved the tank to the bottom and the pack to top. (I prefer this.) Also incidentally, I preferred the Kavan carburetor on the .19 as a modification. Fuel draw and idle are just marvey-poo. I couldn't get a Kavan for the ST, but I can GUARANTEE I would prefer that, too.

17. Install the 1/16" ply on the forward fuselage bottom, face grain crossways again. I added an additional small doubler with grain lengthwise to the outside of this, right where the gear bolts on. Helps keep the gear from tearing off when you plop in while swerving to miss a car. Dumb, dumb, dumb.

18. Cut the servo tray mounting crossbraces from hardwood engine mount stock. Make them rather snug fitting. Put them approximately in place, then put in servos and servo tray; adjust the crossbraces for position before you epoxy them firmly to ply doublers. NOTE: Position of servo tray is VERY CRITICAL, as there is minimum clearance above and below! Have the servos clear the bottom floor by 1/16" maximum or you'll have trouble with the pushrod keepers hitting the wing. Also, make sure you have adequate clearance forward of

the servos for the padded receiver.

19. Fit and epoxy-in the plywood crossmounts and doublers for the DuBro nylon wing bolts. Epoxy the female parts of the bolts in at this time.

20. Install the servo tray and servos with a couple of metal screws, then install the two Nyrods for the tail. NOTE: Make the elevator pushrod yoke of 1/16" wire, using World Engines' 'Z links' to allow for field adjustment due to temperature growth of the Nyrods in warm weather. Wiggle this into place, hooking to elevator horns. Make sure it moves fore and aft freely, then use the front end of the yoke to determine the position of the aft end of the Nyrod. Epoxy the yoke into the inner Nyrod, roughing-up both surfaces first for adhesion. See the photo for position of the rudder Nyrod; make sure it comes out close to fin, since the rudder horn will be short. When everything is as set-up as a bride's first wedding, add the rest of the bottom 1/16" sheet.

21. Install the engine temporarily, then epoxy-in the Nyrods for nosewheel and throttle. (Same location for OS or ST.)

22. Make the flap bellcrank from 1/8" ply, then epoxy it to that short center piece of dowel. This whole thing pivots on the center piece of wire which is epoxied into the two outside pieces of dowel. Those, in turn, are epoxied into holes in the fuselage sides. Ah, well, look at the drawings; they show it. We had pictures during construction but they didn't come out since there was no film in it at the time. Dumb, dumb, dumb.

23. Remove the engine, add top and bottom blocks to fuselage and carve to shape. Save the final forming until you can knock the knobs off the whole fuselage at once.

WING CONSTRUCTION SEQUENCE

24. Build two panels over the plan, then flop one of them over. I hate to draw plans, and besides the other part never comes out symmetrical. Join with doublers. The TOP side of the wing is now lying down on the workbench. It will be flat, you see, with the BOTTOM tapering slightly for a dihedral effect. If your workbench is not flat, you are now designing your own airplane.

25. Remove from bench, add leading edge sheeting after tapering leading edge strip to accept it. Notice that the sheeting goes OVER the leading edge strip to allow a big radius later.

26. Add the 1/16" ply crossbrace on top near the rear spar. The nylon bolts will seat on this later, so make it at right angles to the centerline of the bolts. Now add the top centersection sheeting.

27. Turn over to bottom, and add crossbraces for servo opening and dowels. Add dowels. Add blocks for nylon screw to tighten down on. Sheet the bottom of the centersection and sand smooth. Cut out for servo and receiver if it is going to stick up. (Mine did.)

28. Cut loose the ailerons and flaps, add spars and ribs to them where necessary, then shape their leading edges as shown on the butt rib template. Make these sharp corners; don't just round them. Fit the Rand hinges to the wing and ailerons (don't epoxy yet) and fit ailerons to the wing. Same with flaps, except you have to make torque rods here that DO epoxy to the flaps after fitting. Be sure to install the Rand special bearing before bending; again, refer to plans and photos for clarity. In case you're wondering why

I left that small section of trailing edge between the ailerons and flaps, it is for ease of rigging the controls to neutral. Just line them up with this little fixed segment. Otherwise, the whole stupid trailing edge moves and who knows where neutral is?

29. Put masking tape over trailing edges to secure ailerons and flaps in neutral.

30. Put short, pointed pieces of dowel in the female nylon bolt halves and then engage the wing dowels in the fuselage bulkhead. Press down on the trailing edge, which will cause the position of the nylon bolt holes to be neatly marked on the centersection skin. (CERTAINLY the pointed dowels have to be the right length, Percy.)

31. Remove the wing, drill holes for the nylon bolts, and then remove the 1/16" top skin around the bolt heads. This will allow the bolt heads to seat firmly against that plywood crossbrace. Assemble and check fit.

32. Remove wing. Install servos and tray, receiver and batteries. Make and install the pushrod from elevator servo to flap bellcrank. Hook up all Nyrods, being sure to stick the pushrods into the servo arms from BELOW, which takes less vertical space. I used Rand keepers, also upside-down of course. Make a small wire to stick through the fuselage side for switch actuation.

33. Add a strip of foam tape to the wing saddles, then install wing and bolt down. Make the pushrods from the bellcrank (flap) to the horns on the flap torque rods. As shown on the drawing, the angle of the horns and the bellcrank must be the same with everything in neutral. Also, be sure to use Nylinks where shown since we don't want to draw and quarter the fuselage when the wing knocks off.

34. Hook up flaps. Now, operate all controls. If any evidence of dragging on wing is noticed, you may have to shim the wing saddles to raise the wing slightly. At any rate, check for zero incidence when you are satisfied.

35. Now remove the wing and install the aileron bellcranks, horns, and pushrods. I installed the servo with a Kraft aileron servo mount, screwing it to a 1/16" ply inlay in the top sheeting.

36. Now remove all radio gear. Apply 1/4" top sheeting to fuselage. Re-install the wing.

37. Laminate balsa sheets for fuselage hatch, using contact cement. Add blocks and strips where necessary, carve to fit wing so the whole mess will lie flat on tank compartment and be flush with aft fuselage top also.

38. Remove wing again, reinstall hatch and spot-cement it to fuselage. You've been dying to knock all the corners off, so have at it. Remove hatch, add ply and dowel to front. Add 1/16" ply inlay for top screw. Install wing and hatch, adjust for final fit. Drill hole for attach screw through hatch and top wing skin. Enlarge hole in wing skin and epoxy a blind nut in the hole.

39. Now disassemble things and then sand smooth. Just remember that water will flow AROUND a round corner and cause drag, when it would just break off and LEAVE a sharp corner. I suspect that air is the same, so leave the edges sharp at such places as the butt end of the fuselage, wing rear spars, leading edges of controls, trailing edge of rudder.

40. Coat the inside of the engine and tank compartment with epoxy, followed by a coat of white Hobbypoxy.

41. Give all structures a coat of clear dope, then cover everything

except the wing with one layer of silkspan. Cover the wing with a first layer of silkspan spanwise, give one coat of dope, then add a second layer of silkspan chordwise. Now fill and apply color. Keep it light!

42. Now saw the slot out of the rear of the fuselage, insert the rudder, and glue the piece back into the slot. Install all controls and hinges at this time. NOTE: I punch about 4 holes in the flat web of each hinge with an icepick and then smear it with epoxy before inserting into surface. No toothpicks necessary; you have to destroy the surface to remove them.

43. Now you can dude it up with decals, tape, 'press-on lettering', and so on. I protect tape and lettering with a thin smear of epoxy, then the decals and everything else with Aero Gloss Fuel Proofer. The X-15 had signs all over it for every conceivable purpose, so have a ball.

44. Add the main landing gear with nylon u-straps from the Midwest C-5 kit. Make from 5/32" wire as shown for minimum bending, and put screw heads inside so you don't jam up against a servo. Countersink a little bit, if you used the outside doubler like I did. I haven't added brakes yet, but they will be drag brakes operated from down elevator, as usual.

FLIGHT

Needless to say, (so I will), the flying of this machine gives you a chance to check-out the operation of all these strange features. I could write a book, (so I won't), but I will, instead, list several points of interest to get you over the rough spots.

"The large sub-tail restricts takeoff angle so you must get off by speed and flaps."

1. Which ever engine you use, have it reasonably well broken-in and reliable in all attitudes BEFORE testing! The large sub-tail obviously restricts takeoff angle so you must get off by speed and flaps. I HAVE staggered off (no, no, the AIRPLANE has!) with a sick .23 and full 'up' elevator with full aileron control and no sign of snap rolls, but it shortens the life of your lower intestine by 4½ years. Normally, just get good speed and then slowly give full 'up'. When it comes off, reduce the angle of attack.

2. Practice stalls at altitude first. It will not spin unless you have full elevator and rudder; rather, it simply mushes with full aileron control. Add a little power, and you're ready for landings. Don't try for full stall landings, just a real nice flare. When the tailwheel touches, it will knock the nosewheel down for bounceless landings.

"Well, Walt," gurgled Wagger as he guzzled his Gator Ade to relieve his dry throat after the long tirade, "that's about it. I'm sure it seems complicated, but the TELLING is really much more work than the building. Just keep thinking 'light but strong' while you build it and I'm sure you'll find that the .19 or .23 is adequate power here at sea level. The ship is not the LAST word in anything, but it DOES check-out a lot of ideas we'll be able to use in future aircraft. After all, that's supposed to be the name of the game, isn't it?"

"Wagger, I agree with you and I have enjoyed your tale," Walt said foxily.

"That takes away the sting," nodded Wagger waspishly.

"Oh NUTS!" cracked Walt. ●