Agressive is the best description of the D-VIII while at rest. McCoy 29 engine will really pull it around, can use engines from .23 to .29 size.

The Flying Razor

By JACK H. SUTTON . . . Scale control line version of the famous World War I fighter, Fokker D.VIII which set a new aerial fighting pattern and the Allies had to rush new fighters into the arena. This same combativeness can help you at the scale contest arena, also a fun machine.

► As World War I continued on into 1918, the Fokker works at Schwerin, Germany strived to produce the ultimate fighter airplane at a minimum of cost, and also minimum use of vital materials. Designer Rheinhold Platz achieved that result in his cantilever, parasol wing monoplane which was designated as design number V.26. Anthony Fokker was also pleased with this design as it utilized the LeRhone 110 HP rotary engine which he had control of through his Oberursel Motoren-Werke, and many of which were also in stock at the German Flying Corps Headquarters at Aldershof.

After many types of fighters were demonstrated at the second fighter trials at Aldershof in June 1918, the V.26 was accepted by the German Army Flying Corps for production and designated as Service Type, Fok. E. V. Production rates were set at 80 aircraft per month beginning after two months, and mass production began immediately to produce 400 of the monoplane fighters. The first units were delivered in approximately two weeks! The front line units began to receive E.Vs in July and August.

Almost immediately after the Jagdstaffels at the front began to employ the E.V.s, wing failures were experienced in rapid succession, and on August 23, 1918 the E.Vs were grounded. As usual, a full investigation was made of the failed wings, and the wing design itself. When the investigation was complete, there emerged reasons for the crashes experienced with the first models. The primary reason was that the workmanship on the wings was deplorably substandard. They were made of undersized spar sections, and the workmanship was exceedingly slipshod. The glue joints were inadequate, and the plywood skin was not firmly attached to the ribs in many places. The results of these findings placed Fokker in a very precarious position with the German Army Flying Corps. He was accused of almost everything devious in this connection, but it appears that his basic fault (*Continued on next page*)

Tied down with engine at full revs makes for an interesting view of the well detailed plane. Note line leadout guides extending beneath the wing.

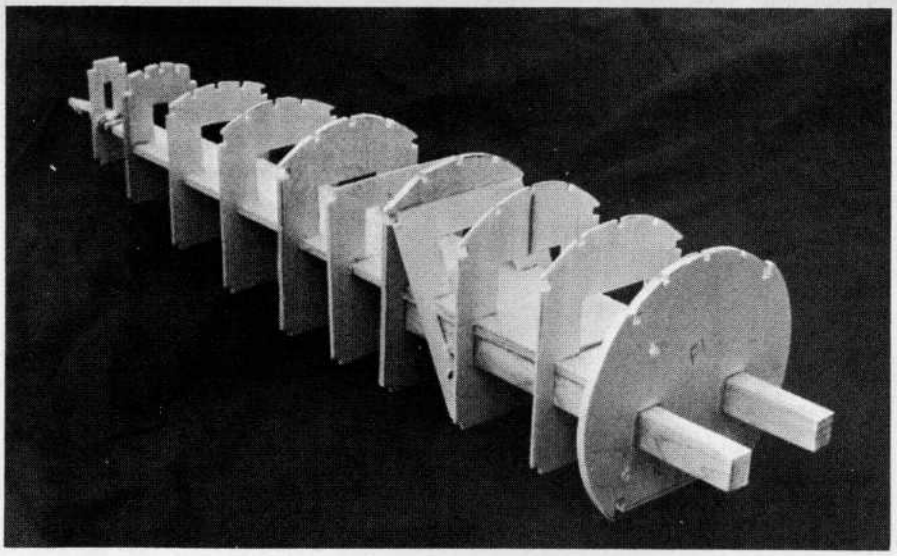
THE FLYING RAZOR CONTINUED

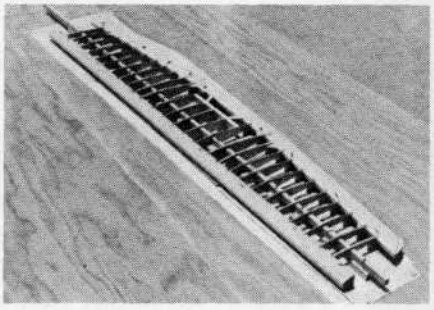
was negligence in the factory at Schwerin. Wings, when built to Platz's specifications, were found to be entirely satisfactory in all respects. Production was again resumed with proper wings, and the designation was changed to Fok. D.VIII to distinguish the good from the bad, and also to overcome the pilot's psychological fear of the E.V's.

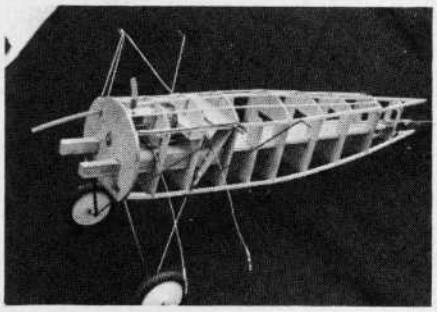
These problems prevented the Fok. D.VIII from getting to the front until late October in 1918. The record of the Fok. D.VIII at the front was very brief, but it gave a good account of itself while in service. Had the war continued beyond November 11, 1918, the improved models Fok. D.VIII with 145 hp, and the Fok. D.VIII's with 200 hp would have probably set a record beyond any other World War I fighter plane. Many D.VIII's gave good service for years after the war in the hands of the Dutch and Italians, but in general, the left over production units were left to rot as the cantilever "frail" wing was highly suspect at that time among aircraft designers and pilots. Rheinhold Platz was considerably ahead of his time in cantilever wing theory, and employed concepts of deflection stress loading not recognized by the aircraft engineers of that day.

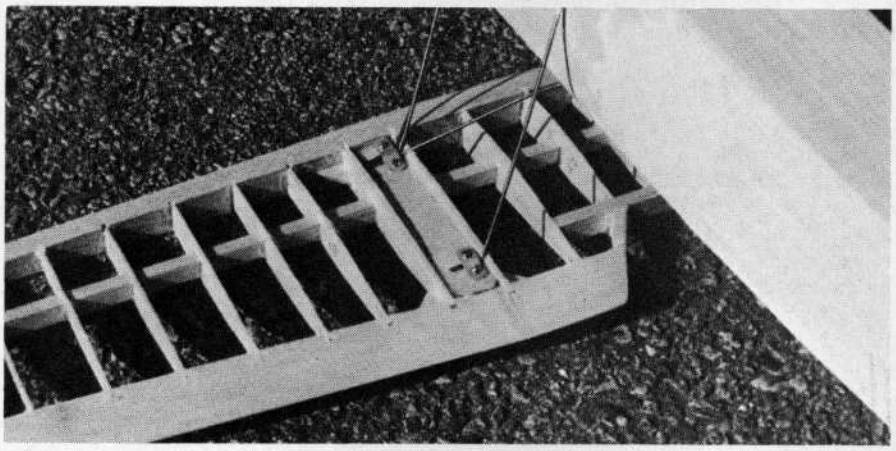
The Fokker D.VIII makes a very attractive model and, owing to its clean lines and simple struts, is easy to model in true scale. Our model was numbered Fok. D.VIII 238/18, which was a special version with a subwing fuel tank flown by Ernst Udet. The construction is relatively simple and straightforward, and produces a sturdy model.

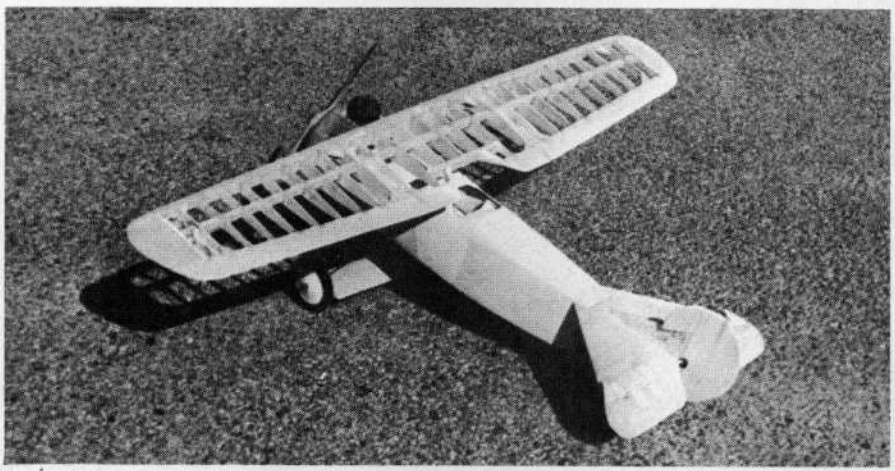
Fuselage: Begin the fuselage by cutting the keel "K" from fairly hard ⅛" balsa to be the base for the bulkheads. Be sure to mark the keel for location of F2 through F5. Cut out the bulkheads F1 through F10; F1 from ⅛" plywood; F2A and F3A from 1/16" plywood; F2, F3, F4, F6, F9, and F10 from ⅛" balsa sheet; F5, F7, and F8 from 3/32" balsa sheet. Start the assembly by placing F6 on the keel K from the rear and cement in place. Continue with F7, F8, F9, and F10. The notches will locate them properly. Cement F5 and F4 in place per the locations marked on the keel. Slip F3A on the keel but Do Not Cement at this time. Check the bevel edges required on F3A and bevel now before further assembly. Cement F2 on K in position, and cement F2A on to K between F2 and F4 and under F3A. F3 is split down the center and is now cemented on the keel in the notches of F2A. When F3 is dry, cement F3A to F3 at the bottom and F4 at the top. Insert the ⅜" x ½" hardwood engine bearers through F2 through F4 (*Continued on page* 60)











Above photos show the Flying Razor during various parts of the building program starting with fuselage keel and bulkheads at the top and progressing through the wing, fuselage, wing mountings and tie-down using bolt-on method, right down to finished plane sans covering.

7.	R. Walters	original	250
8.	S. Woodward	Mini-Sailer	185
9.	R. A. Simmons	Zephyr	110
10.	P. Simpson	Halfback	172
11.	L. Gray	Hangar Queen	85

Note: Results really tell nothing of the true story, since many entrants did not fly duration at all, while all winners did.

The Flying Razor

(*Continued from page* 13)

and cement in place very thoroughly. Now form the tail skid from 1/16" music wire and cement and wrap with thread to the keel "K". Slip F1 over the engine mounts, and cement flush to the forward end of the keel. This completes the primary structure of the fuselage.

The upper longerons are ⅛" square balsa and are now cemented from F1 to F9, and from F9 to the tail position of the rudder post as shown at the top view of the fuselage.

The landing gear and cabane struts are now formed of music wire in accordance with the full size layouts on the plan. It is very important that these parts be accurately formed so as to insure proper wing and landing gear alignment. W5 is made of ⅛" music wire, and has a secondary bend as shown on the side view. W1, W2, W3, W4 and W6 are made from 1/16" music wire and should lie perfectly flat and do not have secondary bends. Loosely fasten W5 in place on F1 with "J" Bolts or the equivalent. Insert W2 under W5 and against F1. Loosely bolt W6 to F3A and join lower ends of W5 and W6. Now, bind W6 to W5 with soft copper wire and solder the joint well. Be certain to properly align landing gear before soldering, and provide sufficient axle length on W5 beyond the soldered joint. Cement the F3B plywood platform to the upper longerons between F3 and F4. Install lower ⅛" square balsa longerons from F1 to rudder post. Landing gear struts should exit from fuselage inside of the lower longerons. Laminate ⅛" sheet to ½" sheet to make front side panels, and shape to fuselage contour from F1 to F6, and conform to upper and lower longerons. Do not install permanently at this time.

From the top view of the wing, make a strut position pattern on ⅛" plywood, and drill holes for No. 2 rd. hd. wood screws. Form the 4 aluminum strut clamps as shown on plan. The front clamps have space for three 1/16" wire struts, and the rear clamps have space for one 1/16" wire strut. Fasten W1, W2, and W3 to front of strut pattern plate with the clamps and insert W4 through fuselage in front of F3A, behind F3 and fasten to strut pattern plate with clamps. Align strut plate for proper incidence and lateral position and epoxy hardwood blocks over W1 to F1 and W2 to F3B as shown in side view. Tighten bolts on W5 and W6 and epoxy a wedge over W4 between F3 and F3A. Apply epoxy to all bolts and nuts and to W5 on F1 and W6 on F3A, and allow to cure properly. After proper cure, the strut pattern plate may be removed for better access, and the wire struts will maintain proper alignment.

The elevator control is now installed. Mount a 2½" bellcrank assembly with 6" flexible lead outs on F2A in the position shown on the pattern for F2A, and clear the movement in bulkheads F2 and F3 for adequate control. Before finally mounting the bellcrank, install the 1/16" music wire elevator push rod and allow suffcient length to extend 1" beyond rudder post. Notch F2 to accept suitable fuel tank. We used a Perfect No. 8 which fits well into the allowable space. Connect the fill and drain lines made from fuel tubing, and also the fuel line from tank to the engine. Replace the removed portion of F2 to support upper fuselage stringers.

Install the 3/32" sq. balsa top stringers from F1 to F9 in notches provided. Do not remove portion in cockpit area at this time. Fit the previously formed forward side panels to clear the W2 and W4 struts and also drill clearance holes on the left side for the control lines to the bellcrank. Cement panels into place from F1 to F6 securely, and allow to dry. Cut 1/16" balsa sheet side panels to fit from F6 to rudder post and cement to longerons and bulkheads. Cut clearance on left side panel between F10 and rudder post for the elevator push rod. Allow sufficient vertical movement of rod so as not to restrict control motion. The upper skins are made from 1/16" balsa sheet in two pieces. The front piece from F1 to F6, and the rear from F6 to F9. Do not cut cockpit opening until both skins are installed and dry. Wet the balsa skins on the outside and pin in place to dry formed to the curvature of upper fuselage. When thoroughly dry, cement well to stringers, bulkheads and longerons and trim to fuselage contour. Bottom skin is also 1/16" balsa sheet, and is now installed from F1 to tail in one piece. Notch for landing gear struts and tail skid, and cement well. Trim to fuselage contour and sand fuselage surface all over. Notches in side fairings should be filled with plastic balsa to permit smooth fuselage contour. Give entire fuselage two coats of clear dope or sealer and sand well. Cockpit can now be cut out as shown on the plan.

Glue or epoxy ½" hardwood cowling support blocks to sides of engine mounts, and when dry shape to fuselage radius. Drill engine mounts for engine bolts and install chosen engine. Be sure that needle valve is installed to feed fuel from the right side of engine. Needle valve will need to be lengthened to fly with cowling on. Cowling can be of spun aluminum or fiberglass as facilities permit. We made a male form and made one from fiberglass which worked out well. Trim the cowling to fit engine and provide cooling holes and bottom cut out. Fasten cowling in place with two No. 6 wood screws into the hardwood blocks on both sides. Dummy rotary engine cylinders may be made and mounted below the engine for appearance if desired.

Tail Assembly: The tail group is made from medium grade ⅛" balsa sheet. The stabilizer is spliced from two pieces as shown on the plan. Fit stabilizer to fuselage from F9 to rudder post. Cut out the elevators and cement to a ⅛" sq. hard balsa spar and shape and cement the balancing portions forward of the spar. Install a 3½" control horn assembly on

MODEL AIRPLANE NEWS • June, 1969

the under side of the elevators by recessing and cementing well, and reinforcing with cloth cemented over the recess. The edges of the tail group are rounded to simulate the prototype construction. The original aircraft had welded steel tube tail surfaces covered with cloth producing flat surfaces with no contour. Fasten the elevators to the stabilizer with 8 cloth hinges ½" wide cemented well to both surfaces. When thoroughly dry, mount the stabilizer-elevator assembly on the fuselage, cementing to the upper longerons, F9 and side panels. Carefully align stabilizer to be laterally horizontal with no longitudinal incidence. Center bellcrank motion and fasten elevator push rod to elevator control horn with elevator in neutral position. Since the elevator area is large, only minimum elevator travel is required. A motion of 30 degrees up and down is plenty for this model. Cut fin and rudder from ⅛" sheet balsa. Mount fin on stabilizer centerline, and align rear vertical edge with fuselage rudder post. Cement rudder to fin and fuselage offset to outside of flying circle ½" to right. Be sure that elevator movement is clear in cutout area of rudder. Install ⅛" x 1/16" basswood struts from bottom of fuselage to tip of stabilizer. Give tail surfaces two coats of clear dope or sealer and sand well.

Wing: The wing is a double tapered design from the strut mountings outboard, and is a straight section between the struts. The struts were widely splayed on the original to reduce the cantilever span. The original wing was designed with wooden spars and ribs and was covered with a plywood skin providing a very smooth surface. The small ailerons were unbalanced and inset into the tips of the wing. The cutout over the cockpit was reinforced with a

laminated former to firm up the trailing edge. The plywood skin produced a straight trailing edge, and omitted the characteristic Fokker scalloped trailing edge produced by a cloth covered wire trailing edge.

Our model wing has been designed for simple flat assembly on the plan to preserve maximum alignment and ease of assembly. Begin by cutting out all of the ribs from 1/16" and ⅛" sheet as shown on the plan. Two of each rib are required except for R1, the center rib. Be sure to cut spar cutouts carefully to produce proper alignment and clearance over spar. The leading edge is made from a standard ¾" x ¾" formed balsa leading edge. Notch to conform to rib thickness and spacing shown on plan. The trailing edge is made from ¼" x 1" formed balsa trailing edge at the R4 positions and when dry, cut the notches for the ribs per the plan. The central cutout is not made at this time.

Assemble the ribs loosely, in order, on the ¼" x ⅜" hard balas spar. Place the spar over the plan on ⅜" support blocks and pin into place. Align all ribs with the position shown on plan, and be certain the jig feet of the ribs rest squarely on the plan. Place the prepared leading edge on the ribs and over the plan and with a 1/16" spacer between leading edge and the plan. Now cement all ribs to the spar and to the leading edge with the top of each rib flush to top of leading edge. Pin trailing edge in place on ribs and cement all ribs to the trailing edge. Be certain trailing edge has no "wash-up" before cementing. Cut a piece of ¼" x ½" balsa to fit between the R3 ribs and cement in place to R1, R2, and R3 ribs. Also, install the small ¼" x ½" pieces between the trailing edge and the sub spar just cemented. Make 12 triangular corner blocks from ⅛" balsa sheet, and cement as shown to R4, R5, and R13 ribs to reinforce the stress areas. Let wing framework thoroughly dry before removing from plan. Carefully draw out pins holding wing to plan board, and cement ⅜" sheet balsa wing tip blocks to R14 and between leading and trailing edges. At this point the wing structure is complete except for shaping. Remove the jig feet from the ribs and taper ribs to contour of the trailing edge. Cut wing tip outline shape per drawing and remove the excess portion of leading edge in plan view. Trim excess of leading edge from lower side to match rib height at leading edge and shape leading edge cross section to proper shape. The vertical taper is on the bottom only, the top of the wing is flat. Trim lower side of spar from rib R11 to R14 to conform to ribs. Now, sand wing all over to finish all contours to required shape in both plan and profile views. Cut pieces of ⅛" sq. balsa and ⅛" x ¼" balsa to fit between ribs R4 ad R5 and cement in place to support R15 plywood strut plates. Cut two pieces of 1/16" plywood to R15 shape and mark properly for strut mounting screws. Cement both R15's firmly into place between ribs R4 and R5 on both sides being careful to place strut mounting holes in proper position. Cut a piece of 1/16" plywood to fit between R13 and R14 on the left wing tip to support the line guide. Make the line guide from 3/64" music wire as shown on the plan leaving the ends unbent for insertion into wing. Insert ends of line guide into plywood support plate in left wing tip. Bend over ends to provide proper angle and crinkle bend in a horizontal plane to lie flat on support plate. Drill small holes near wire bends and sew with heavy thread to support plate and apply cement liberally. Fill space between R13 and R14 on right wing tip with balsa scraps, and cement in ½ oz. weight to provide lateral balance. The cut out in the trailing edge is now made and the strips carefully sanded to proper contour. The wing is now complete.

Assemble the wing to the fuselage struts with the aluminum clamps and #2 x ¼ lg. round head wood screws. The wing should be level and have about 2 degree positive incidence. Check all alignments and make any necessary corrections now. Remove wing and cover both sides with silkspan tissue and dope twice with clear dope. (Note: A more realistic treatment would be to cover wing with 1/32" sheet balsa. If reader chooses this method, cover in three pieces. First R4 to R4 in center section, and then from R4 outboard to tip on both sides.)

Details: Make subwing from ½" balsa sheet as shown. Make two Spandau type machine guns from ⅜" diameter dowel. Windscreen is made from heavy celluloid or plastic per plan. Steps and handholds are wire.

Finishing: Fokker D.VIII's were painted in many colors to suit the pilot who flew them. Factory colors were the lozenge shaped camouflage cloth on fuselage and tail, and the wings were similarly painted to match. For our model a blue and white combination was chosen as follows:

Fuselage: The engine cowling is entirely white, and the balance of the fuselage is light blue except for the white areas under the German cross insignia.

Tail: Entire tail group is white.

Wing: Upper surface is light blue and white checkerboard between white insignia fields with solid blue wing tips. Lower surface is entirely light blue with white field for the black insignia.

Subwing: Entirely light blue.

Wheels: Entirely white with black tires.

Struts: All struts are black.

Details: Machine guns—black and silver.
Cockpit rim—black tubing.
Steps and handholds—black.
Lettering—black.

Apply finishing color in several spray coats for a good finish, and be sure to use fuel proof butyrate dope. Decals for the insignia can be found of the proper size, and after application should be covered with a coat of decal protector or fuel proofer.

Final Assembly: When sub units are completely finished final assembly can begin. Mount machine guns, handholds, steps, windscreen on the fuselage. The subwing is held to landing gear struts with a strong rubber band under subwing and over axle on each side behind washer. Mount 2½" diameter vintage wheels. (The Williams Bros. style is perfect.)

Cut covering away from strut mounting plates between R4 and R5 on under side of wing in both places. Fasten struts to wing with screws and clamps and check alignment. When straight, epoxy over the mountaing points and let cure. Recover these areas of wing, and apply colored dope to proper finish. Reinstall engine, engine cowling and proper size propeller for your engine. We used a 9-8 on our .29 McCoy.

Check model for longitudinal balance at the position shown on plan. Add weight as necessary to bring balance just behind strut mountings. Never try to fly model if it should be tail heavy. We flew our D.VIII on 50 foot lines, and it performed very well. The large tail surface produces lots of control so first flights should be made cautiously until you get the feel of flying this great fighter from the Fokker works.