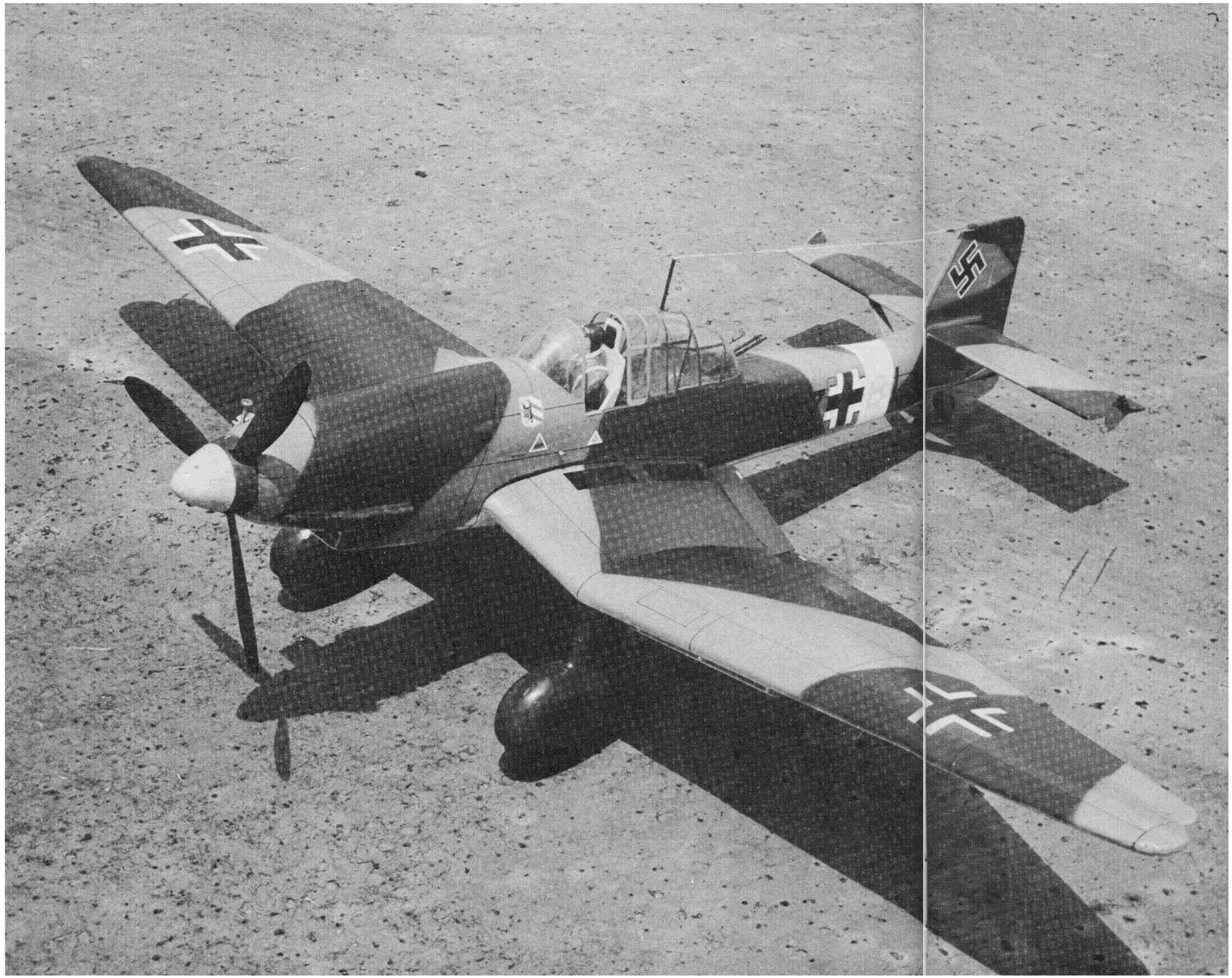


JU87D-5 stuka

A .60 powered semi-scale version of one of the most famous aircraft of World War II. For "Stand-Off" scale events and general sport flying.

BY PAT BYRNE

I've always been a scale nut and when I got to the point where I could expect to successfully put an RC plane into the air and bring it back 75% of the time, I **had** to go scale. If I'm a scale nut, I'm an even bigger WW II type nut, and bigger yet, German WW II. In the first place WW II German aircraft just ooze character, even their designations sound colorful; FW190, ME210, AR131, HE111, and on and on, a myriad of weird and wonderful aircraft, the result, I suppose of a vigorous and imaginative aircraft industry going full tilt in a major war. On top of this the color schemes are varied and colorful, and when you add the insignia, squadron badges, armament and ordnance, the result, to me, is a scale fans delight.

One big problem though, is that unless you're Dave Platt, you won't win many AMA Scale meets. The weird and wonderful means a lot of detailing that will be necessary to make the model competitive, and real good source data on exact dimensions are a little hard to come by. For the ordinary scale builder, though, the "20 foot", or California scale, rules give you a chance with detailing and nit-picking carried to a reasonable level. Thus, you can still enjoy the sight that used to chill a WW II dog face; a Luftwaffe fighter or bomber boring in for a strafing run.

So that's the background for this model, one of the most weird and wonderful WW II German ships, the JU87 Stuka, reasonably to scale with reasonable detailing. The model picked was the JU87D-5, a late 1943, hopped-up version of the most famous early WW II JU87B. One reason for selecting the D-5 was the slightly more streamlined look of the ship, due mainly to the Jumo 211 engine installation which resulted in displacing the large chin radiator of the JU87B with separate twin radiators under the wing and installation of a smaller oil cooler under the engine. The main reason for selecting the D-5, though, was the bigger wing span – 49 ft., 4 in. – versus 45 ft., 4 in. of the earlier variety, which helps with the biggest single scale goal of any good scale RC design, low wing loading. The scale is 1¼" to the foot; the more traditional 1½" to the foot would result in a monster, since the JU87 was a big plane. The result is a nice size ship that performs beautifully without straining an ordinary 60 engine. So, if scale is your game and you want something a little different, grab a copy of Profile No. 211, buy a Monogram ¼" scale plastic kit of the JU87G (a JU87D with 37 mm anti tank cannon) and follow me! Meingott! ach du liever! and Duetchsland uber alles!

FUSELAGE CONSTRUCTION

The fuselage starts like any other balsa RC fuselage with two ¼" sheet sides, ply firewall and formers. To provide some additional strength through the narrow section between wing and cockpit 3/4" x 1/8" spruce reinforcement is notched into the formers, but no other doublers are used. Instead, after the fuselage is completed, the tank compartment and stress points back to the rear of the wing are lined with glass cloth and resin. The cowl ahead of the cockpit is formed by 1/4" sheet set at a 30 degree angle, capped by a sloping 3/8" slab. At this point mount your engine on a Tatone mount, sidewinder like mine, or inverted, (never upright, it will ruin that beautiful long cowl). Then build the tank hatch/oil cooler of ¼" sheet and spot glue to ½" triangular stock ahead of the wing cutout. Finally, build up to a 2¾" diameter spinner with ½" and 3/8" thick blocks. The aft fuselage is a simple box with ½" triangular stock inside, the only complication being the faired slope to the fin which is built up with scrap and Epoxolite. To guide the reduction of this mass of flat block and sheet to a rounded fuselage, cut out a series of templates at each fuselage station, then start hacking away with an X-Acto knife and coarse sandpaper.

EMPENNAGE

After a general roughening out of the fuselage, cut out the fin and stabilizer from ¼" sheet and epoxy in place, then build up the area ahead of the fin as noted above, lay in a fillet between fin and stabilizer with Epoxolite, and reduce the entire fuselage to finished dimensions. The tailwheel system should then be installed along with hinged rudder and elevator, and your favorite pushrod system. Finally, finish off with 1/8" stabilizer support struts and tip plates cut from 1/16" plywood.

COCKPIT

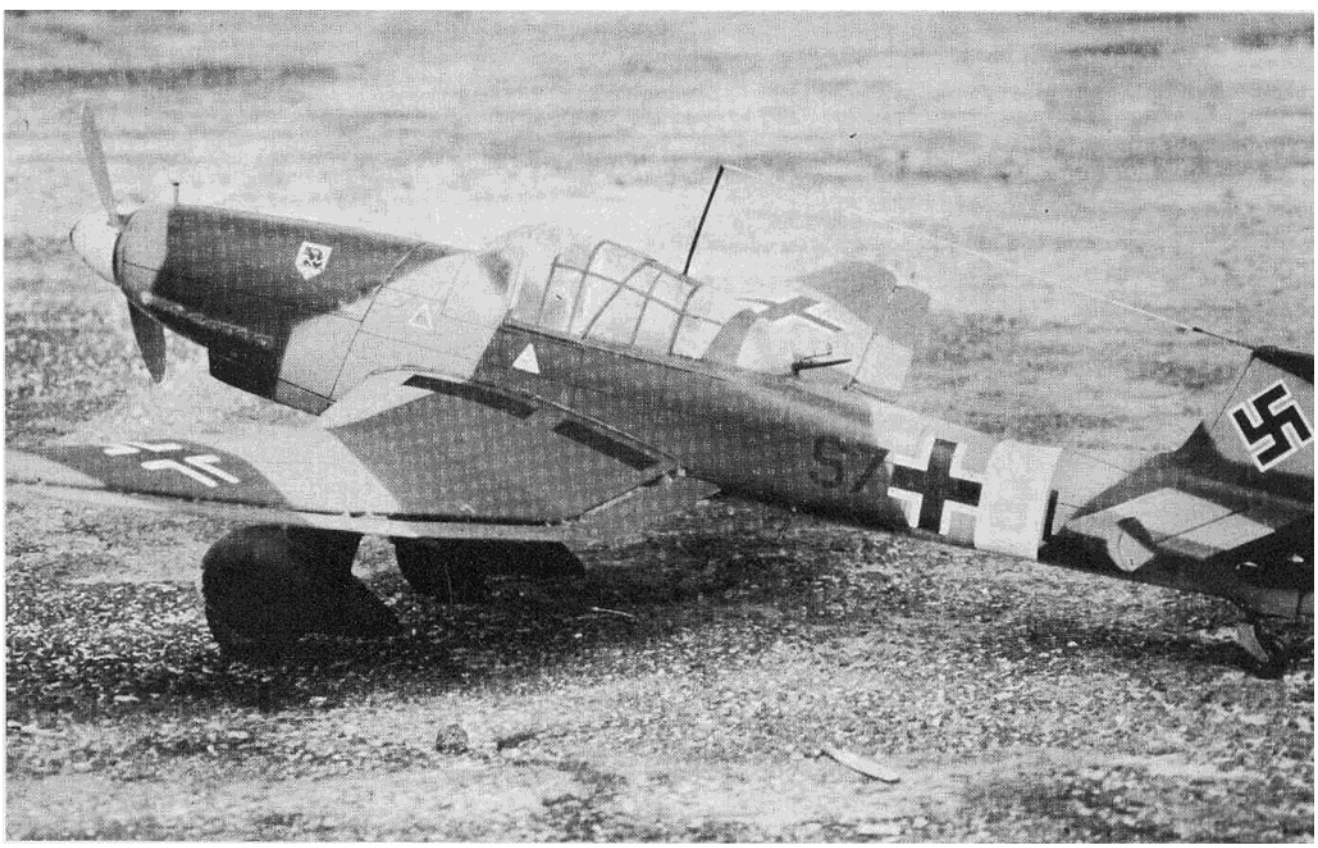
This is the beast that almost dissuaded me from the Stuka in the first place, that canopy is something else! But if you haven't learned to form your own, you just ain't going to get anywhere with WW II scale, so there's no time like now. It really isn't too tough. I used the technique outlined

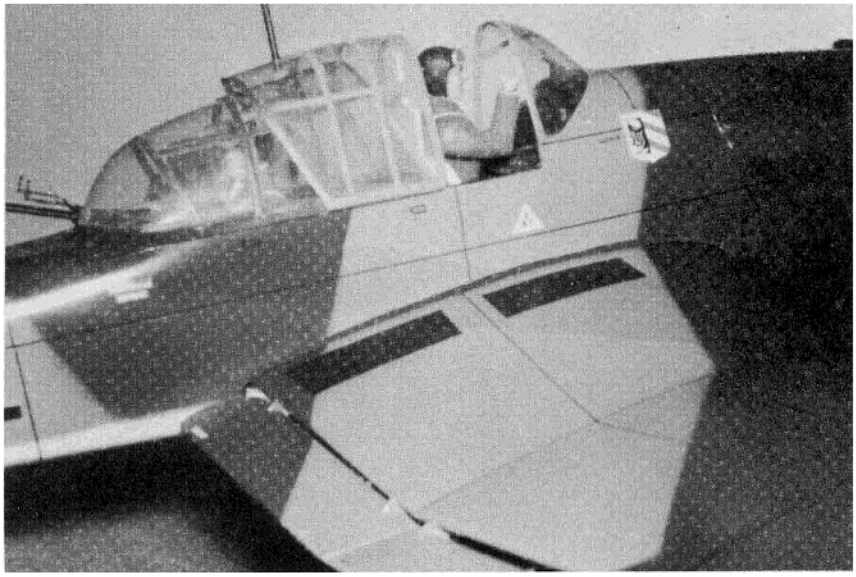
by Dave Platt in the February 1971 issue of RCM. First, a two piece balsa block form was spot glued into the finished fuselage, the junction of the two blocks being the sloping rear of the pilots sliding section. The balsa was then carved and sanded to the canopy shape and removed. A coating of polyester resin was applied and sanded smooth. The blocks were then set up on a mounting pedestal and clamped to a support near the kitchen stove. The two sections were formed by quickly pulling .040 plexiglas down over the form after heating till flexible in the oven at 450 F. I found the pilots wind screen and canopy could be formed in one piece by pulling down and back, but the larger rear section was made in two pieces as was the full scale canopy. The fixed, sloping section is simple to form. The rounded gunner's canopy is tougher, but was successfully formed by pulling forward and down. If this is your first try at canopy forming, you might find heavy celluloid or butyrate easier to work with but, for strength and appearance, you can't beat plexiglas. After forming the canopies, trim away the excess stock with a fine saw or hot knife, and, if you want a moveable pilots canopy, split the windscreen from the canopy.

Build up the two level cockpit floor and give the entire area a few coats of filler and flat black. Then add instruments, gun sight, throttle quadrant, etc. and pilot and gunner. The pilot takes a little more work than usual since his entire upper body extends above the cockpit rim. I mounted a Williams pilot on a built-up balsa upper torso with arms, crudely carved. The finished result, when painted, looks fine. After all internal detailing is complete, epoxy the canopy in place. The sliding pilots canopy is arranged by epoxying 1/16" O.D. nylon tubing to the bottom of the canopy. Fine music wire was then run through the tubing and bent to form sliding rails and epoxied in place. The result is a simple, effective, sliding canopy. The last task is the forming of the canopy frame. Some builders merely mask off the clear areas and paint on the frame with the finish paint job; others use strips of shim brass or styrene sheet. I prefer a different system since I seem to have trouble getting paint to stick, and the strip approach sounds like hard work. I lay out the frame members, one direction at a time with masking tape, and spread on a thin layer of Epoxolite. After the Epoxolite sets for a few minutes, smooth it with a damp finger and peel off the tape. The result: a raised canopy frame that sticks well, is strong and looks good.

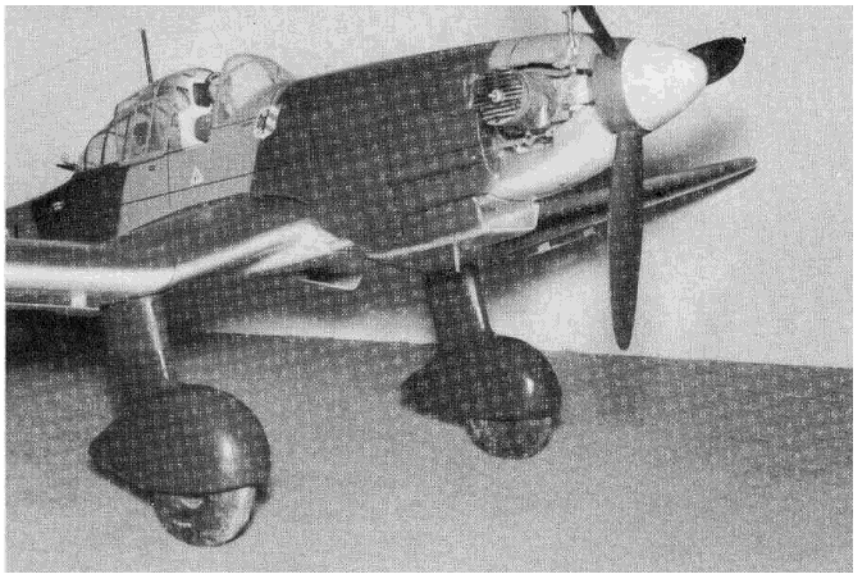
WING

The Stuka's wing is, of course, its most distinctive feature, and, like the canopy, looks tough to build. I was determined to stay away from all those different size ribs and complicated spar structure so I decided on a foam wing. Actually it wasn't too difficult a job; a careful set-up and a good end cutting jig with adjustment for cutting various angles was all that was needed. I reversed the accepted practice of cutting the airfoil first and then the end, or dihedral, cut. First, I cut the taper to allow the pattern ribs to protrude the width of the trailing edge stock to provide a starting rest. Then I cut the proper dihedral angle on both ends of the selected section by transferring the angle from the front elevation layout of the wing. Finally, I carefully spotted and secured the pattern ribs and cut the segment. The result was a set of cores that went together perfectly. After you have cut your cores and are satisfied with their fit, use a hot knife to cut out grooves in all panels for the reinforcing spars, landing gear blocks and aileron and flap pushrods. Considerable thought went into the pushrod system. They must be flexible enough to easily route through the gull wing and yet be slop free and low in friction. Ultimately, a 1/8" O.D. teflon outer and 1/16" O.D. inner was selected, was easily routed and has

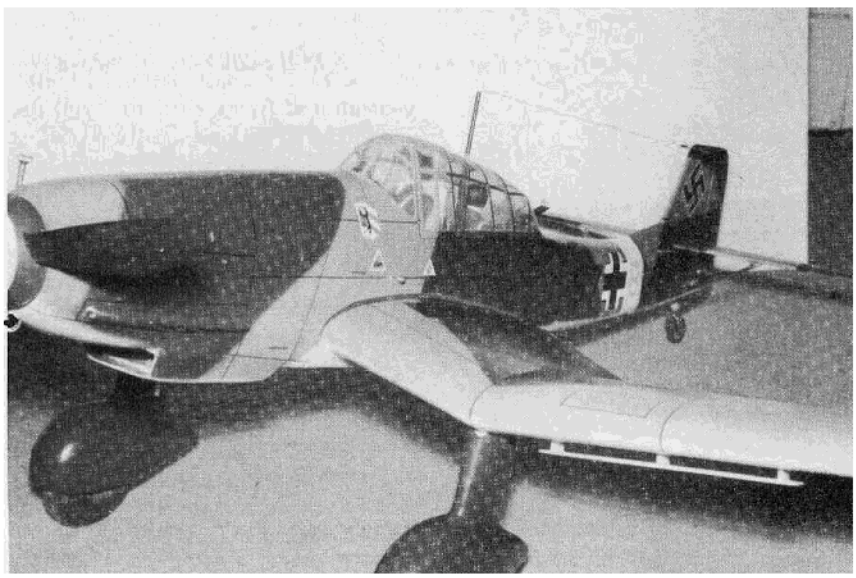




ABOVE: Detail view of sliding cockpit, pilot location and wing junction.



ABOVE: Engine position . . . don't use anything but a .60! BELOW: Front quarter view with cockpit closed.



given excellent service. The only problem was the inability to use conventional 4-40 threaded ends for clevis attachments. Instead, a tight fitting music wire was slipped into the inner teflon rod and epoxied in place. These wire ends were formed into "Z"s for connection to servo arms and surface horns. Adjustment is limited to trim range on the transmitter, but this has been no problem.

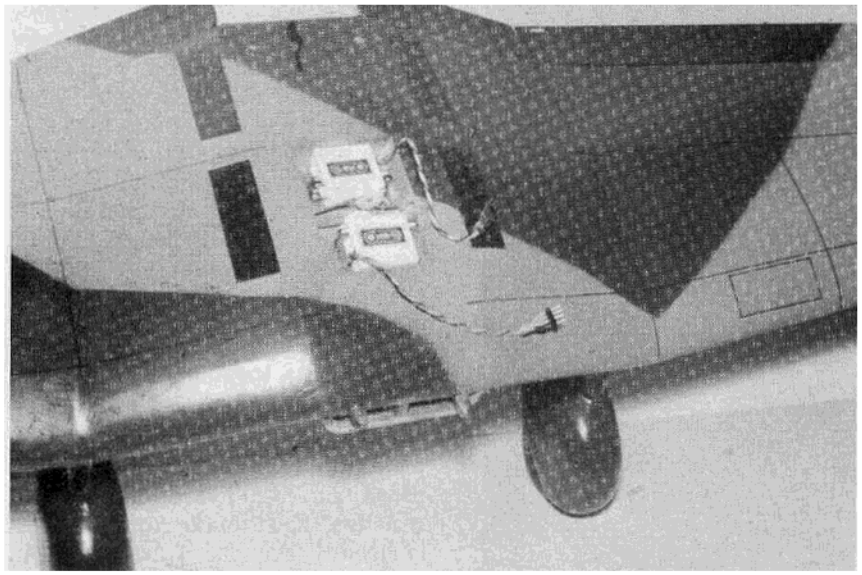
Assembly of the wing is started by joining the outer two panels and covering with 1/16" balsa as unit. The inner structure consisting of center section and two adjacent panels are joined with plywood spars. The outer panels are then joined to the inner structure and routing of pushrods completed. The inner structure is then covered with 1/16" sheet. Tip blocks are added, then the entire structure is sanded. The simple flap/aileron hinge system has worked well, the 1/16" plexiglas supports are roughened with sandpaper and then slipped into saw cuts in the trailing edge of the wing and liberally epoxied. The flaps and ailerons are cut from 3/16" sheet or trailing edge stock; grooves for the supports are cut by a saw and hinge pins recessed from the bottom surface. After fitting, check to see that the pins are epoxied in place and the reinforcing tape is glued in place.

LANDING GEAR

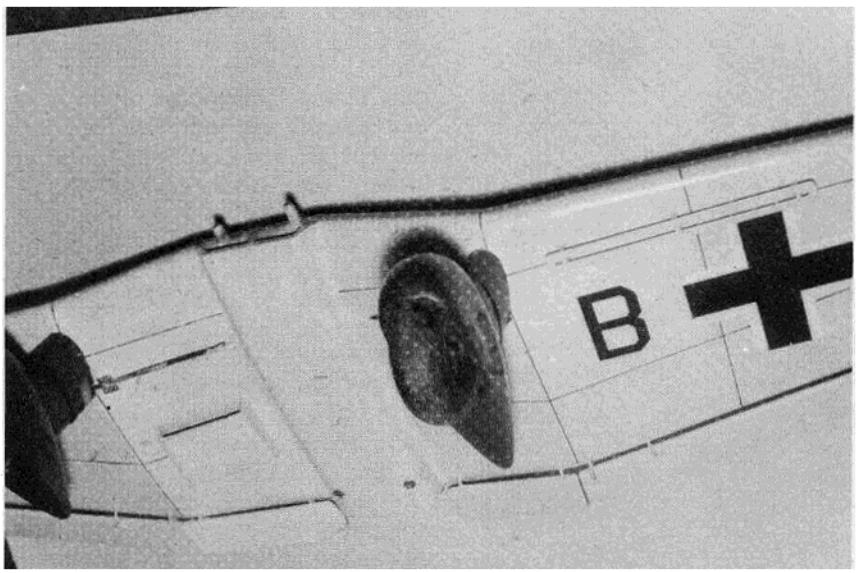
The landing gear is built up around 3/16" wire struts using balsa or fiberglass. The Hobbypoxy "Easy Does It" method was used on the prototype. The pant is slipped down the wire over the wheel and epoxied in place and reinforced by bolting to a metal clip soldered to the gear wire. The streamlined leg is then slipped over the wire, epoxied to the pant and faired with Epoxolite. This entire unit is then free to spring and absorb landing shocks. A sheet aluminum fairing closes the upper strut area while leaving the assembly free to flex.

FINISH

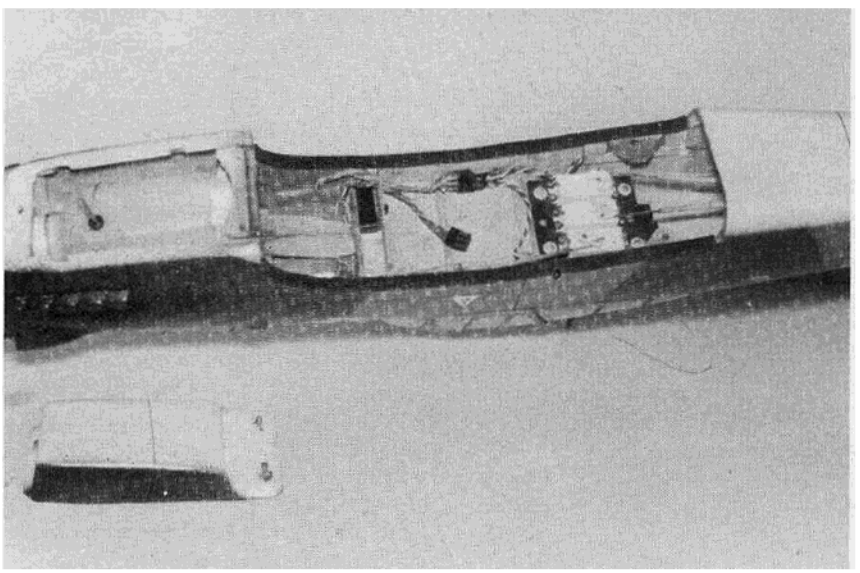
Use your favorite finishing method; the prototype was finished with silkspan covering followed by 3 coats of clear dope. Aero Gloss military flat dope was used for the color coats. Originally, the model was finished in the standard Luftwaffe colors of dark green upper surfaces and light blue lower. This was a little drab so, after a month or two of flying, a desert scheme of dark and light earth in a splinter pattern was applied. Mono-Kote insignia and fuselage letters were cut out and applied, while fuselage and



ABOVE: Aileron and flap servo installation in the Stuka's wing. BELOW: Underside of wing.



BELOW: Front hatch removed showing tank installation. Orbit servos installed three across.

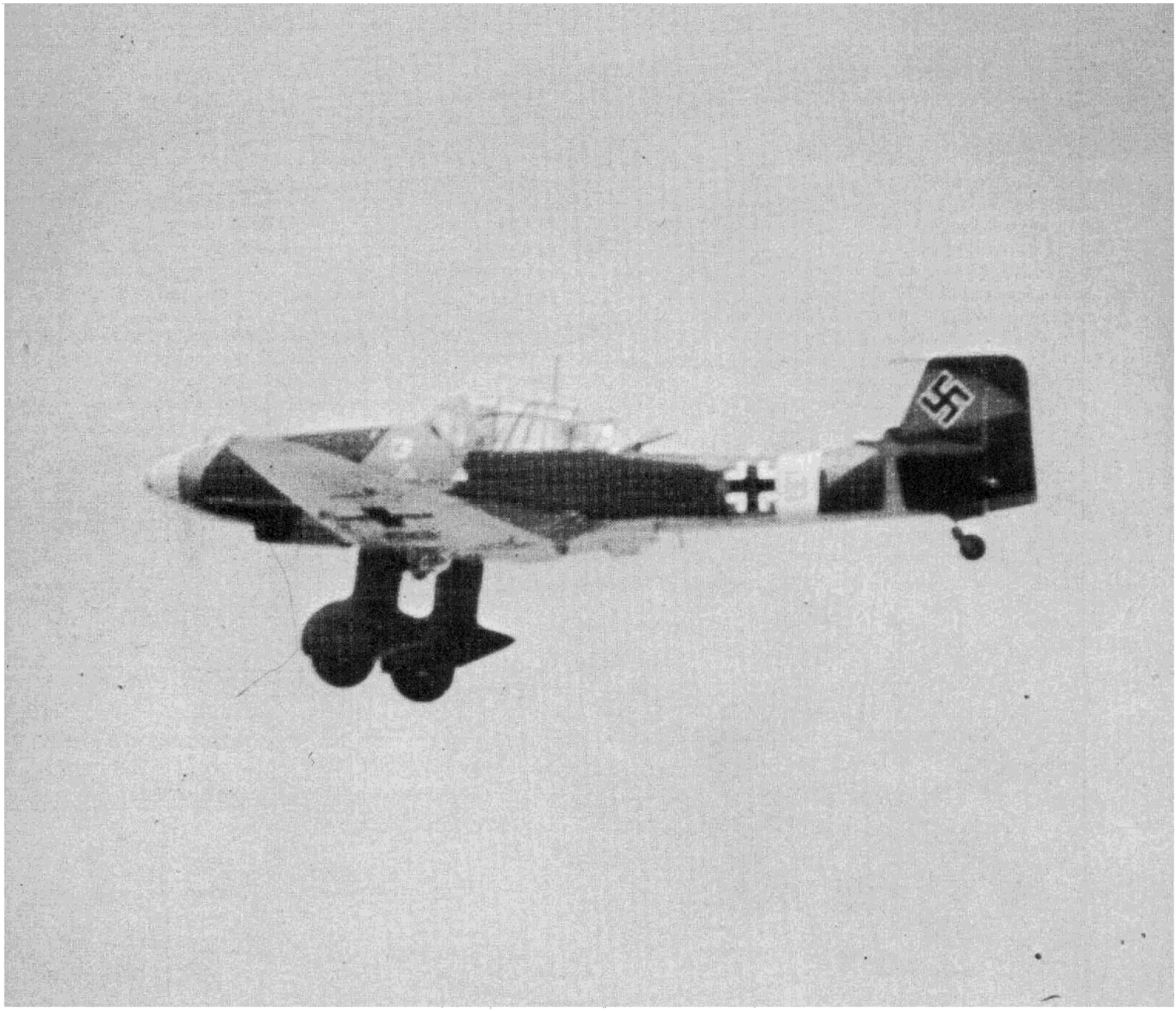


wing panels, access hatches, etc., were outlined with drafting ink and the entire plan sprayed with 2 coats of Aero Gloss flat clear.

Final detailing can suit your fancy. The twin MG81 guns in the cockpit were built up with brass tubing and bits of wire. Tubing was also used to simulate MG151/20 cannon in the wing. A bomb drop mechanism was installed, tied to the flaps, and a 500 kg bomb was carried. Another fascinating approach would be to build up the huge 37 mm Flak 18 cannon of the JU87G. Photos in Profile 211 and the Monogram JU87G kit provides adequate information on these guns. Other details like steps, wing walks, dive brakes, etc., go a long way to giving the model a realistic look. The radio antenna running inside the hollow mast and then back to the tail takes care of the antenna nicely and duplicates the original. No adverse effect on radio operation has been noticed but watch routing near the servos.

FLYING

In its original form my Stuka weighed 6¾ pounds, ready to go with a 5 channel Orbit installation and Enya .60 engine. This calculated to a wing loading of 27.6 oz./sq. ft. which met my goal of staying below 30 oz./sq. ft. This limit has been evolved from past experience with home brew scale designs and is considered an upper limit for ease in landing. Power loading with the .60 engine calculated out at .089 cu. in/lb., a high figure in my experience which was confirmed later. The Stuka was too fast at full throttle compared to what a realistic scale speed should be, thus I generally cruise at half throttle. After all these calculations there was no excuse but to put the thing in the air. I've always felt that this hobby is so fascinating because of the combination of craftsmanship and flying challenge, and the first flight of an unusual scale project is the most challenging. I am always scared to death but wouldn't miss it for the world, and I wouldn't consider a proxy pilot. Thus, I arrived at the first flight apprehensive, but curious to see the answer to a lot of questions; like how would those Mickey Mouse ailerons work? Would those tiny tapered outer wing panels induce aileron stall, etc. To make a long story short, the Stuka leaped off in about 30 feet after a straight takeoff run and handled beautifully. Landing was handled pretty carefully, a slight amount of power was kept on and the



Pat Byrne's JU87D-5 Stuka in flight. Grainy photo due to extreme enlargement from 35 mm print.

ship flown in to a wheel landing to insure against a stall and snap. Subsequently I learned to use the flaps, they did not appreciably change the trim and did provide extra lift to allow slower landing speeds and beautiful flare landings. The prettiest landings were still flown into a two wheel contact under power, but I found I needed plenty of runway to shoot them this way.

After a year of contest and Sunday flying a couple of bad accidents had occurred and repairs to the wing and weight increases began to cut into the landing performance, thus it appears that 7 lbs. is about the maximum weight practical unless you have plenty of runway. One mistake I made was trying a .45 displacement engine once, since I rationalized I wasn't using the power in the air. Takeoffs were so doggy I finally yanked the thing in the air after an unusually long takeoff run one day and you guessed it, it finally snapped. The lighter engine had let the C.G. drift back and the attempt to pull it into the air did the rest. My advice is stick to the extra power, at least a strong .50 unless you beat 6½ pounds.

One final point - - - you will find that landing gear position and C.G. location are important relationships to keep from nosing over. If anything, my Stuka spent more time on its nose than it should, a product of my desire to keep the C.G. forward and the backward spring tendency of the landing gear. My ship used 5/32" landing gear wire, while the drawing shows 3/16" to eliminate this tendency. My recommendation is to try out the location shown and be ready to move the gear slightly forward if you find nose-over is a problem.

That's the Stuka story, welcome to the staffel and good luck on your bomb runs, Wolfgang!