HERE'S THE PLANE YOU HAVE TO BUILD IF ONLY TO HEAR THE SOUND OF THREE OUT-OF-SYNC ENGINES. FLIES FAST AND PULLS HARD.

BV-170

by ROBERT ANGEL

Design and photos by Terry Aldrich

One evening just before the club business meeting, Terry Aldrich came rushing in, waving a set of plans. "Fellas, I'm going to build a model airplane." "That's fine, Terry, how many engines?" "Only three this time, it's semi-scale."

Our question was a logical one, since Terry probably holds the international record for sheer number of engines on a control-line model. His XB-9, which appeared on the April 1967 cover of **AAM**, had nine engines then. Since that time, two more have been added making a grand total of eleven.

Terry sometimes uses fewer engines (only two on his F-82 featured in June 1968 **AAM**), even an occasional single engine. But there is a distinctive drone to a multi-engined model that causes heads to turn among model builders and spectators alike. For this reason, our BV-170 makes an excellent crowd-pleasing demonstration model. Terry brings it out for local airshows and club promotions and between flights it is usually on display at the local hobby shops, promoting the hobby and helping solve a home storage problem.

The full-scale BV-170 was a German plane—one of the many experimental "hot" aircraft developed during WW II. It was a single-seat light bomber, built by Blohm-Voss and powered by three BMW engines producing 1600 hp each. Wingspan was 18 meters, or just over 59 ft., including engine pods. Top speed was very respectable for the time at 478 mph.

We rediscovered the ship in a Japanese publication called *Aireview*. Published in 1959 by Kantosha Co. Ltd. (601 Kojun Bldg., 6-Chome, Ginza, Chuo-ku, Tokyo), the book is in two volumes, one of which featured German aircraft of the second world war. For those few readers who may not read Japanese, there are some sections translated into English.

A few words of caution: Do not attempt any multi-engined model until after you have successfully flown at least one other control-line plane. The BV-170 is quite stable and not tricky to fly; however, it is large, fast, and pulls on the lines like a demon. It could make a sizeable and disappointing heap of splinters unless the rudiments of construction, engine settings and control-line flying have been learned.

In reworking the full-scale aircraft plans into a profile control-line model we have held optimum fidelity to scale; however, there have been a few deviations. The very slight wing dihedral was removed and a symmetrical airfoil employed to provide ease of building, along with stable inverted flight and stunt capability. The thrust line of the engines was moved slightly upward, to the wing centerline, for the same reasons. After test flights, the landing gear was moved forward of the scale position to eliminate a tendency to nose over on landing.

Construction

The full stunt version with wing flaps, as shown on the plans, is described here. However, for simplicity and ease of construction, you may elect to make the wing without flaps. If so, simply make all 25 wing ribs to the upper rib pattern shown on the plans, and make the trailing edge solid.

Cut out 25 assorted wing ribs and the 22 false trailing edges. Pin the bottom wing spar to the plan and build the wing directly over the plan. Slide all the ribs onto the center

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spar, space them out, and fit them over the bottom spar. Cement all ribs to the bottom and center spars. Add the top spar, cementing it in place. Cement the 1/4 x 1/4" leading edge in position, then add the two short outermost sections of trailing edge. Cement the 3/32 x 3/4" cap strips along the trailing edge of the shorter wing spars. Leave the trailing edge off the wing center section until the flaps have been installed.

Remove the wing from the plan, sand and shape the leading edge, and perform final sanding on all ribs, etc. for sheeting. Install the bellcrank, leadouts and pushrod. Leave the outside leadout ends unfinished until the engine pod is in place. Use a long bolt through both plywood bellcrank mounts, adding hardwood bellcrank spacer blocks epoxied between the plywood mounts. (A strong bellcrank assembly is needed.)

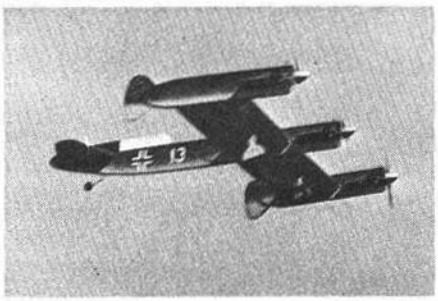
Construct the two wing flap assemblies directly onto the plans. Pin the bottom 3/32" sheeting and then glue the 3/8 x 1" trailing edges over the sheeting. Add the false ribs, control horn, upper sheeting and the front cap strip. Remove the linked-together flaps very carefully, and sand the front cap strip to a rounded contour.

Make up two landing gear assemblies as shown on the plans. Install only the left one at this time. The right LG assembly must be installed after the fuselage is in place on the wing. Install the outboard wing tip weight.

Using lightweight 3/32" balsa, sheet the wing, except for a sizeable opening around the right landing gear mounting area. Attach the wing flaps with linen cloth hinges on each side, using at least three pairs of one-in. wide hinges. Make sure the cloth is cemented to the outer (upper and lower) wing surfaces only, and not on the thick interior surfaces of the hinge area. Install the short center section trailing edge. Sand the wing at this time, finishing the areas where the fuselage and wing pods will be mounted, then connect the front pushrod.

Trace the main fuselage and the two engine pod outlines onto lightweight 3/8" balsa, four in. wide. Note that the fuselage is spliced at the wing cutout to allow use of 36" long balsa stock. Size the engine openings to fit the engines you intend to use, allowing for the hardwood motor mounts. Trace the six plywood doublers onto 3/32" ply, again sizing the F1 and F3 sections to fit your engines. Cut out the plywood doublers.

Cement the fore and aft halves of the fuselage together and onto the left side plywood doubler all at the same time. Cement the two engine pods to their respective left-side plywood doublers. Three sets of hardwood motor mounts are then cemented into place, as are the three right-side plywood doublers. Make up the six small hardwood engine offset blocks as shown on the plans. These blocks provide the engine sidethrust and also act as spacers so that the crankcases do not project through the left-side plywood doublers. Check their dimensions against your particular engines and alter if necessary. Epoxy these blocks into place, and when dry drill the engine mounting holes and the tank mounting holes. Fabricate the tail-wheel assembly as shown on the plans and cement it into place in the fuselage.



Shape and sand the engine pods, rounding off all outer edges. Make up two rudder assemblies as shown on the plans and install them centered on the pods with no offset. Finish sand the rudders to a streamlined shape; shape and sand the fuselage, rounding off all edges. Leave the upper aft section flat for the cabin and elevators. Shape and sand the upper aft (cockpit) section, but do not yet cement it in place.

Cut out the stabilizer and elevators, and round all edges. Sand the leading and trailing edge to a streamlined cross section. Install a combination elevator linkage and control horn. Connect the elevators to the stabilizer using figure eight hinges of carpet thread, or your own pet method.

Fit the fuselage onto the wing from the right side and cement into place. Cement the right landing gear assembly and complete the wing sheeting around this area. Fit the outboard engine pods and cement them into place. Install control line leadout eyelets and form the leadout wire ends.

Connect both ends of the rear pushrod, letting the formed wire pushrod guide hang loosely on the pushrod at this time. Align the stabilizer in all directions, and cement into position. While the cement is still wet, move the stabilizer fore and aft to the position where flaps and elevator are exactly neutral at the same time. Wait about 10 min. and then fit the upper rear fuselage section, carving out for the stabilizer and the elevator linkage.

Apply plastic balsa to all fillet areas, dents, cracks and outright mistakes. Sand the model completely. Brush on at least four coats of sanding sealer, sanding between each coat. Mask off all areas not to be sprayed. The plane pictured had six coats of sealer and was finished as follows.

Spray equipment was used after the sealer coats. The base color, a pale sky blue, was applied to the entire plane. Next, a light green dope was sprayed on all upper surfaces, blending it into the blue color. Finally, a dark green was sprayed in a camoflauge pattern on the upper surfaces over the lighter green. The cockpit area was masked and painted separately. The final finish was several coats of clear dope rubbed between coats. The last clear coat was left unrubbed for better fuelproofing. The white numbers and crosses, and the black and white swastikas were cut out of vinyl (scotch-cal) material.

Mount the engines and tanks, each with an in-line fuel filter. Install the pushrod guide into the fuselage. Put on wheels, and wheel pants. Install props and spinners and your model is completed.

Flying

Never attempt to run a multi-engined plane without fuel filters. Before flight, start each engine separately and set the needle valve to the usual slightly rich setting. Once you have adjusted each engine and are starting all three for flight, never touch any of the needle valves. Start the engines by choking and priming alone. Adjusting a needle valve in and out is not an aid to starting. If any engine will not hold a steady setting with a fuel filter installed, you have a maintainance problem which should be corrected.

This model has been flown on just the outboard engine during testing; however, this is not generally recommended. Just before launching, have a helper top off the center and inboard fuel tanks so that these engines will quit last. For safety, use .018" flight, 70 ft. lines as a minimum diameter and pull-test the control system. Ear plugs are seriously recommended for the flight crew.

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