OS2U Kingfisher

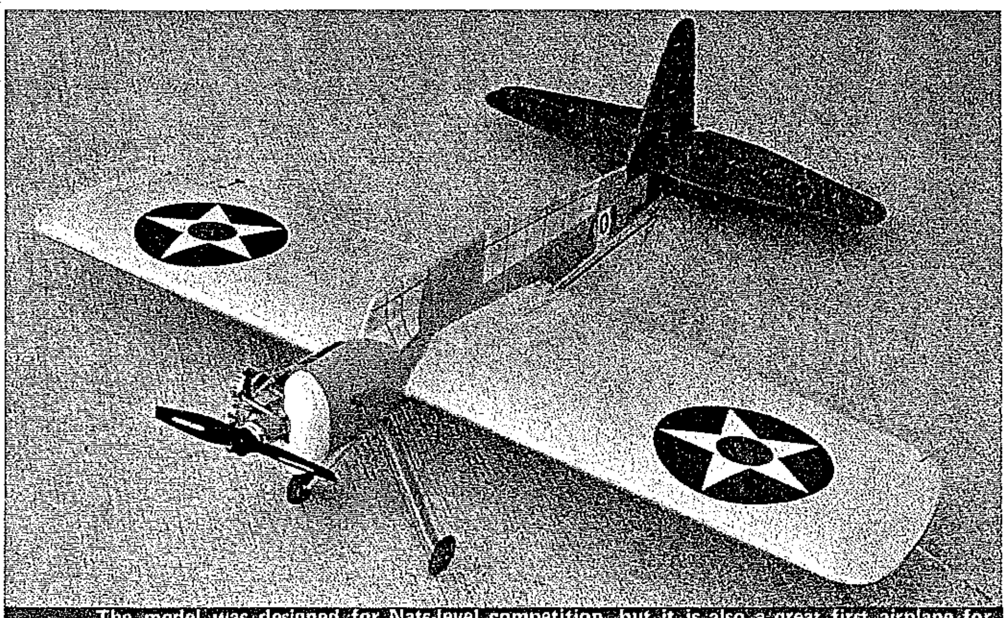
Richard L. Perry

The author's daughter, Eve, displays the near-scale outlines and proportions of the Kingfisher. With a foam wing, it's not difficult to put together.

THE VOUGHT OS2U KINGFISHER has long appealed to me as a potential prototype for the Navy Carrier event. The Kingfisher wing, with its straight leading edge and relatively low taper as compared to other aircraft, lends itself to easy building and proper proportions for modeling. Its mid-wing configuration gives good high-speed trim without dihedral and allows a low-drag fuel tank installation. The only thing that kept me from building one much earlier was previous lack of documentation of its use on a carrier.

My research revealed that there were Kingfishers assigned aboard the carriers Saratoga, Wasp, and Hornet as well as one with the Advanced Carrier Training Group (ACTG) Pacific. However, ACTG could have used theirs for utility work, as many naval air stations did, and some carriers had seaplanes assigned for scout/rescue duties. The proof I needed came from Bill Skelton, who had served aboard the U.S.S. Saratoga during the time when Kingfishers were assigned in their wheeled configuration, using the deck for landing and taking off.

In designing the Kingfisher, I wanted a model which could be competitive in Open Nationals competition and also be an easy model for my children to build and fly in competition. I wanted a model that was a Kingfisher in appearance and not in name only. Thus, the wingspan and fuselage length are proportional, and the fuselage and tail side views are to scale. The wing chord



The model was designed for Nats-level competition, but it is also a great first airplane for newcomers to the Profile Carrier event, even for youngsters. All pictures are by the author.

Have you thought about trying CL Navy Carrier flying? There's a certain attractiveness to the concept of flying a scalelike model at its fastest speed, then its

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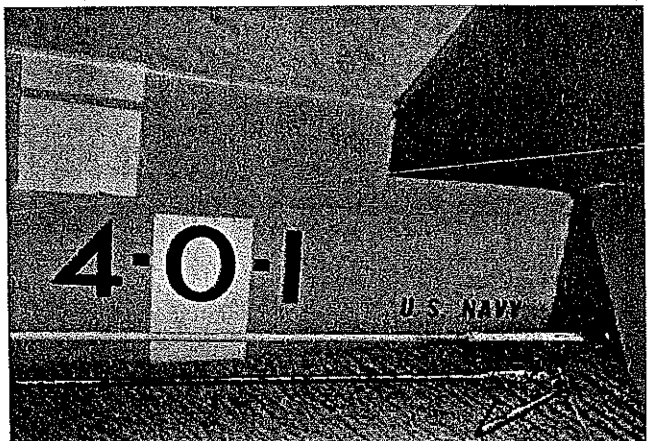
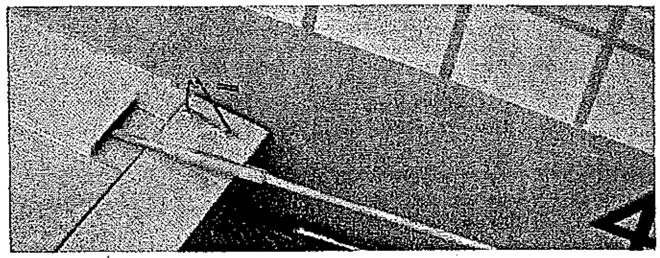
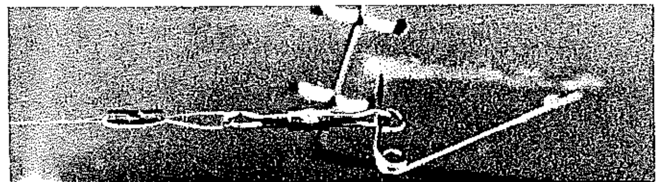






Left: The tail hook is held up by a loop engaging a wire below the elevator pushrod. Down-elevator releases the hook. The cable stops the hook after the 30 degrees of travel; it can be used as a visual reference for the 60-degree attitude limit. Top Right: Cable between the flap and rudder is used to hold the rudder straight for high-speed flight and release it for low speed. Above Right: Multiple loops on the rudder horn allow adjustment of the rudder deflection. Sewn Dacron hinges are durable and simple.

Left: An arm on the tail hook engages a wire extending from the flaps to hold the flaps up during high-speed flight. Right: Dropping the tail hook allows the rubberbands to deflect the flaps. It's a simple and reliable system.

is enlarged slightly at the tips. To allow good prop-hanging low speed, the tail was enlarged to 20% of the wing area. This brought the tail volume ratio up to 0.40.

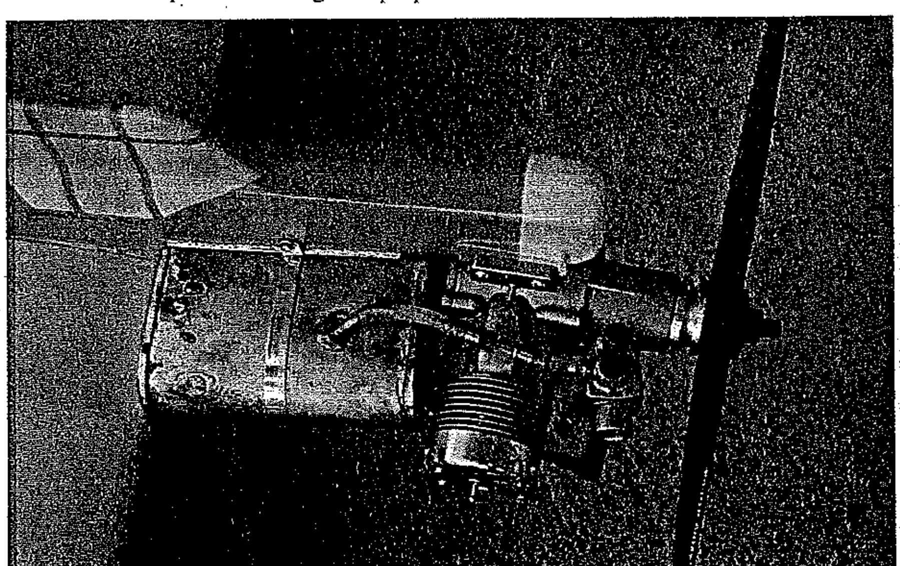
The Kingfisher was designed to be a big airplane, primarily to improve low-speed performance. Flaps were included for the same reason, but they were kept small to reduce the nose-down pitching moment when they were deployed. The Kingfisher model will fly at about 15 mph without stalling, and it is capable of low speeds of four minutes (7.5 mph) at a 60° attitude.

Low-speed flight in a full stall requires a rearward balance point. The large tail provides ample control and stability, but the model will be sensitive to large elevator movement. The long-span G-S bellcrank and long elevator horn reduce elevator travel and produce very good flying qualities in both high- and low-speed flight.

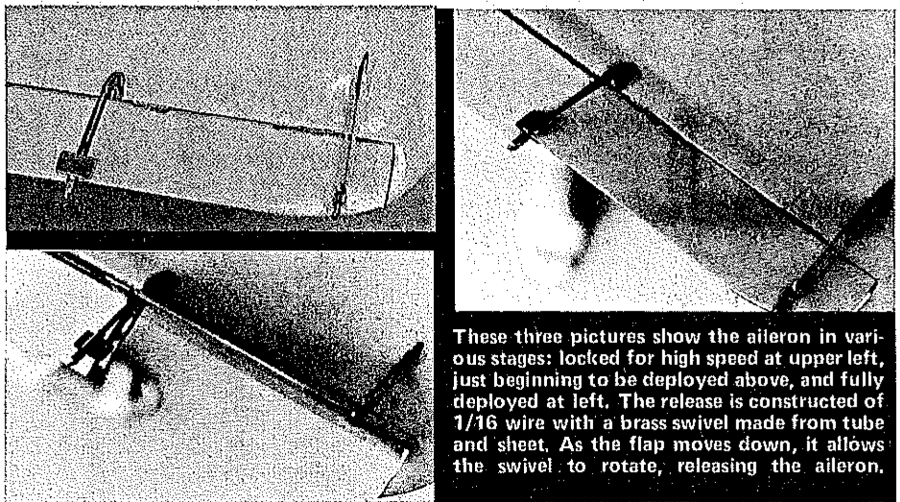
The Kingfisher lends itself very well to either conventional low-speed flight or prop-hanging. The model should be built for the particular style of flight preferred, as described on the plan. Building for prop-hanging results in a heavier model.

The Kingfisher is very straightforward in design and construction, and it should present no problem for anyone with any experience in building and flying large models. The construction details which follow will only highlight parts of the construction which are different from standard kit-model

slowest, and making a precision landing that hooks (pun intended) guys who try it. This one for the Profile Carrier class is an excellent starting point.



A large uniflow tank is needed to feed a thirsty engine during four minutes of prop-hanging, low-speed flight. The vent line (through the fuselage) is adjustable to get the optimum mixture for acceleration and high speeed. See the January 1984 Navy Carrier column for details.



These three pictures show the aileron in various stages: locked for high speed at upper left, just beginning to be deployed above, and fully deployed at left. The release is constructed of 1/16 wire with a brass swivel made from tube and sheet. As the flap moves down, it allows the swivel to rotate, releasing the aileron.

construction. The hardware and mechanisms unique to Carrier models are all shown on the plan. However, there are almost as many different styles of Carrier hardware as there are Carrier modelers. The ones shown have worked well for me.

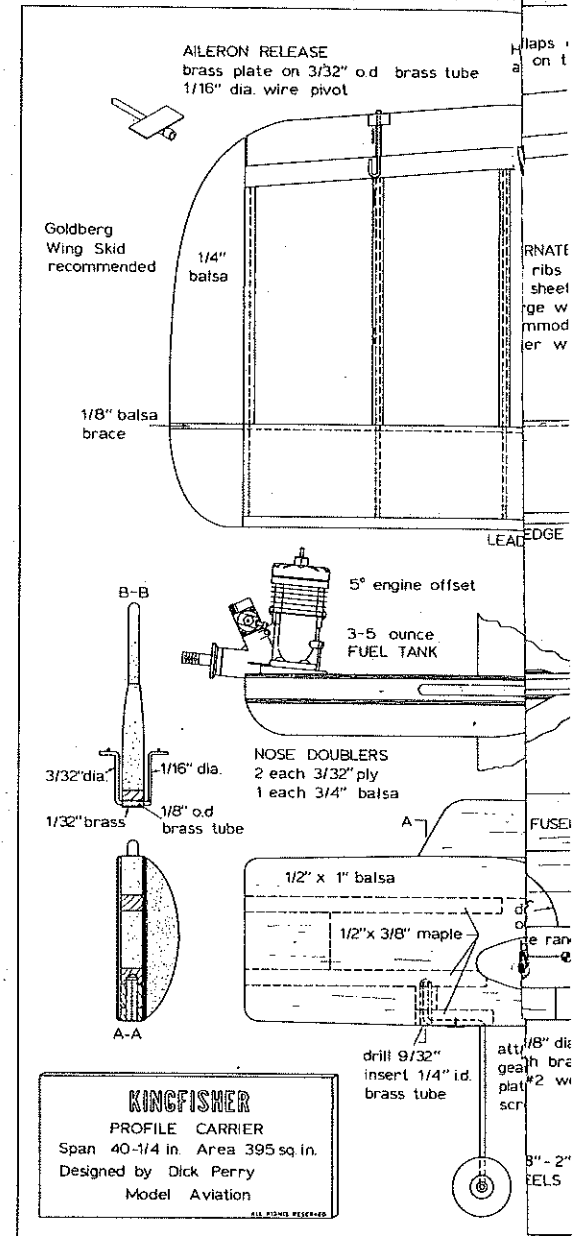
The main fuselage is cut from medium ½-in. balsa; light ¼-in. balsa forms the upper fuselage. The ½-in. parts are assembled first, along with the nose doublers. Trial-fit the upper fuselage and vertical stabilizer, and mark the edges of the ½-in. parts where the ¼-in. parts will join. The main fuselage should be sanded to shape before the ¼-in. parts are installed. The landing gear mounting as shown allows easy replacement of a bent gear, and it saves space when traveling.

Tail surfaces. The stabilizer and elevator are shaped from ¼-in. sheet stock. Basswood is required to achieve an aft balance point with a heavy engine. Balsa may be used for lighter engines or to obtain a more forward balance point. The elevator horn is made by silver-soldering an .064 × ¼ brass arm to a 3/32 music wire elevator joiner. The music wire must be roughened thoroughly with a file to ensure a good joint; a few shallow grooves cut with a grinding wheel won't hurt, either.

Wing. The Kingfisher was designed to use the Shadow foam wing cores available from Lone Star Models, 1623 57th Street, Lubbock, TX 79412. Unsheeted foam construction is easy for younger modelers, and it produces a warp-free wing. An alternate built-up construction scheme is shown on the plan. Intermediate ribs for this version are shaped by stacking the blanks between root and tip ribs and carving/sanding them to contour using the end ribs as a guide.

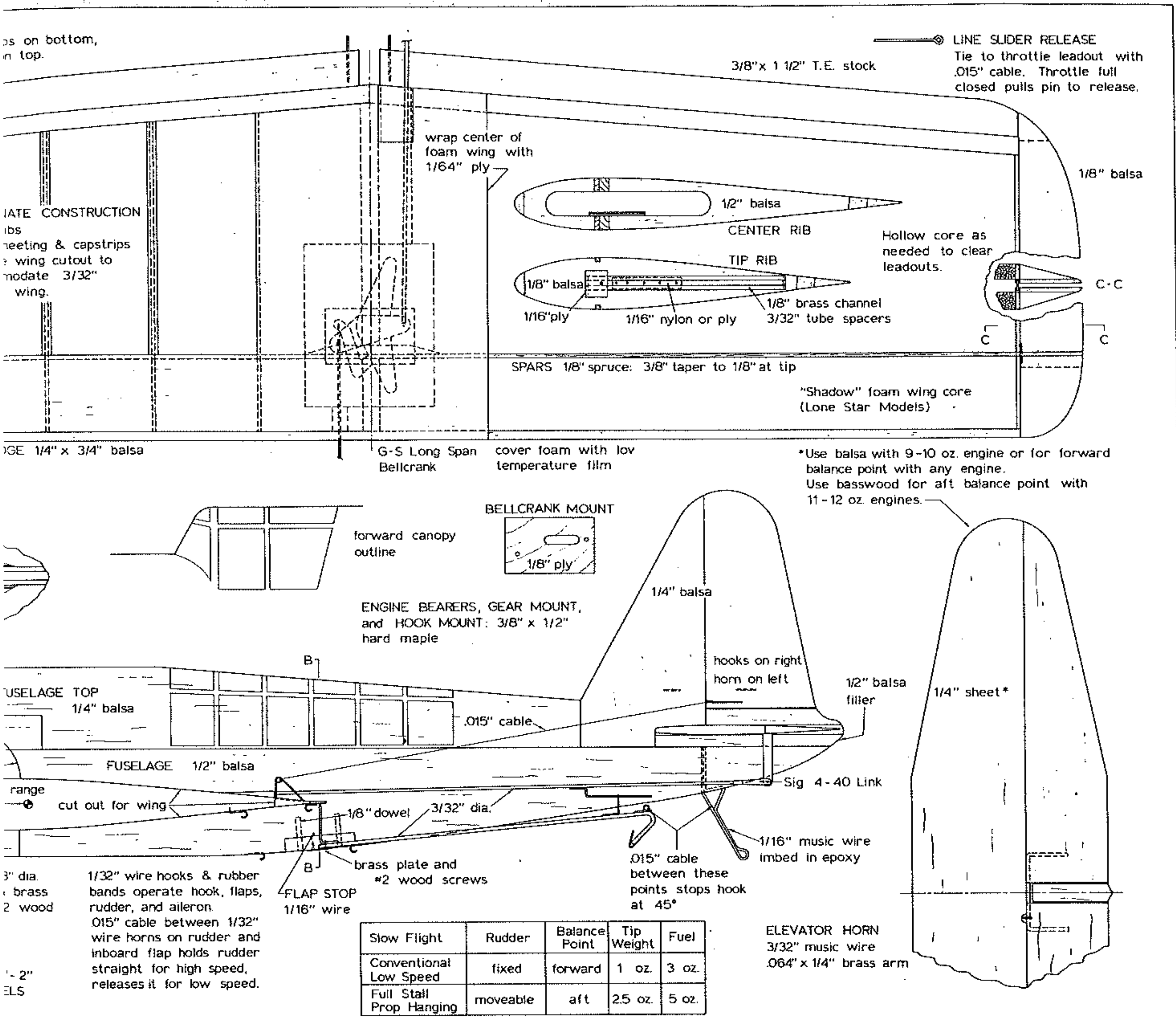
Foam is easy to work with, but some care must be taken to avoid damaging the foam during construction. Aliphatic resin glue (Titebond) or epoxy may be used, but polyester resin, cyanoacrylates, and conventional model cement will dissolve the foam. Aliphatic resin glue will be slower to dry than usual, because moisture is not absorbed by the foam.

Lead-out clearance holes may be cut using the hot-wire method with a .008 or .010 dia. steel wire about 30 in. long. A hot wire or thin, sharp knife may be used to cut the trailing edge of the foam core to accept the balsa trailing edge and flap. The bellcrank and pushrod cavities can be formed with a soldering iron or a large wire (3/16 music wire is about right) that has been heated by a torch. The heated rod may also be used for melting lead-out holes if care is used. Always use adequate ventilation when melting foam. Read the "Safety Comes First" column in the February 1984 issue for some wise precautions.



The 1/64 plywood center-section sheeting provides reinforcement and a place to attach the plastic film covering. It is cut with the external grain running spanwise, and it is wrapped completely around the wing from

Left: Rudder, flaps, aileron, and tail hook are all actuated by rubberbands. The sewn Dacron hinges (½A control lines) are flexible, easy to install, and provide minimum control surface gap. OS2N-1 is the designator for Kingfishers produced by the Naval Aircraft Factory. Right: The landing gear is removable for replacement and/or to allow for easier storage and transit.



Slow Flight	Rudder	Balance Point	Tip Weight	Fuel
Conventional Low Speed	fixed	forward	1 oz.	3 oz.
Full Stall Prop Hanging	moveable	aft	2.5 oz.	5 oz.

trailing edge to trailing edge. The easiest way to attach the sheeting is to coat both the wing center section and the plywood with a light film of Titebond. When the glue is completely dry, place the plywood in position, and use a 230°F iron to attach the plywood much as one would attach iron-on coverings. The iron should be set just below the temperature at which it will melt the foam.

Sand the wing smooth using 320-grit sandpaper and a sanding block. Sand only in one direction to avoid pulling out foam beads which will roll up under the block and

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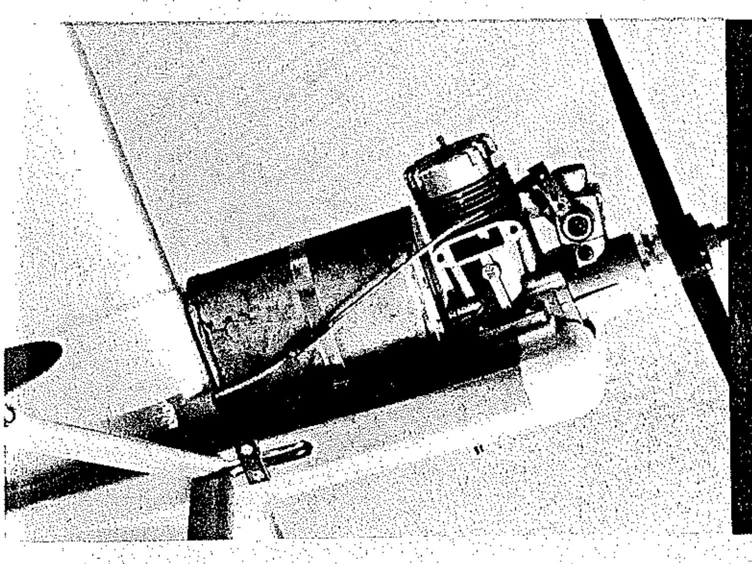

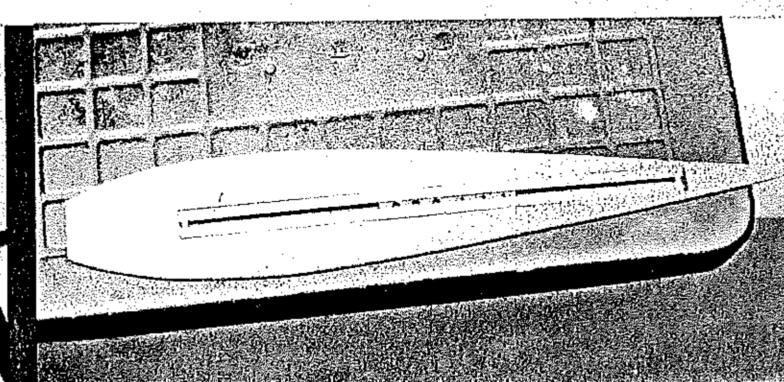

Above: The line-slider mechanism is made of 1/8-in. brass channel and 1/16-in. sheet nylon. A pin attached to the throttle line engages one of the large holes at the front of the slide. Left: Five degrees of engine offset aids in keeping line tension during slow flight. The throttle arm extension allows use of the full control range of the bellcrank.

mensional growth to many places in any model. Large surface areas, such as fuselage side doublers, can be adhered with contact cement; smaller areas can be handled with conventional modeling adhesives. I use ply wing skin to line the holes in balsa nose blocks that serve as structural motor mounts (shown in an earlier installment).

Another very useful material is ⅛ Lite Ply. This material (poplar, I think) is stronger and heavier than balsa but not as strong or heavy as birch ply. It has many useful applications where ⅛-in. thickness and properties of three-ply laminate are advantageous. I often use it for formers in structural motor mounts (pictured in Part 2).

Whichever technique and materials you choose, think about what you're doing when you pick up each piece of wood. Spend a few bucks on a 16-oz. postage or diet scale, and use it while you're building; it can be quite educational.

One surprising source of "free" structural strength is the covering material. Specifically, proper application of MonoKote (and other plastic covering) to sheet balsa structures will add significantly to the finished strength and durability. This is probably the case with other covering materials, as well, but I don't have firsthand experience with them. I call this a "free" benefit, because certainly some kind of finish (and its associated weight) will always be used. All that's needed to claim the benefit is "proper" application. Loose and bubbled MonoKote on sheet surfaces does not do much good; smooth, evenly-adhered covering does. Thus, I suggest you pay a little extra attention when you next cover a sheet surface, such as a fuselage side or a tail surface.

Virtually all of my building is now done with CyA adhesives. This includes *all* those sticks in my Playboy OT! There are a few places where I still use epoxy; my favorite is Hobbypoxy Formula 1. This epoxy is neither real fast nor real slow, and it does an excellent job on dihedral joints and a few other select applications.

My dihedral joints are always butt joints first, doubled later. By this I mean the wing centers of each panel are completed with planking, etc., and the dihedral mating surfaces are then sanded *flat* for good fit of L.E. to L.E., spar to spar, planking to planking. Then all this nifty end-grain gets a thin finger smear of Formula 1. This soaks in for 15-20 min. Then a new batch is mixed and applied, following which the surfaces are held together for a few hours. Finally, the dihedral braces, if any, are installed.

Remember Part 1? There, I said that Electric can make you a better builder. The careful choice of materials, careful fitting of joints so the CyA can do its job, epoxy in the right places (no globs please), and careful covering adhesion are true "quarter ouncing" techniques with no penalties in the strength department and only a minimal premium in building time. If I ever returned to glow-engine flying, I'd still build this way!

Next month we'll have a continuation of "Planes and Flying," taking a look at some successful Electrics flown at recent KRC Electric Fly events. We'll also develop a list of motors, props, and batteries and their associated operating power levels. The latter information, combined with previous sections and the rules of thumb herein, should allow you to plan your own successful Electrics.

At this time I want to express a sincere thank you for your many letters expressing appreciation and encouragement—and the requests for more information. Your letters have resulted in some new thinking on my part for this series and possibly some follow-up articles.

Any questions, comments, etc., on this section or previous ones may be directed (with SASE) to the author: Bob Kopski, 25 West End Dr., Lansdale, PA 19446.

Kingfisher/Perry

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dig into the wing surface. Vacuum the wing before applying a low-temperature covering film, such as Solar Film.

Flying. For conventional low-speed flight, particularly for a young or inexperienced pilot, I prefer to use a forward balance point and limit up-elevator so that the model will not stall. Set the engine idle so that the power is just sufficient to maintain level flight under dead-calm conditions. Normal flying conditions will require only slight

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changes in the throttle setting to compensate for wind.

Full-stall, prop-hanging low-speed flight requires practice to be proficient. Smooth, precise control of the throttle is necessary. An extension on the throttle control arm will allow the full control range of the G-S bellcrank to be used, and it will improve engine speed control.

To avoid yaw oscillations, transitioning through the stall should be accomplished smoothly, without throttle bursts. Should oscillations occur, the easiest way to stop them is to recover to level flight and increase speed to improve line tension and increase rudder effectiveness.

I hope you enjoy the Kingfisher as much as I have. May all your landings be 100-pointers.

Boston/Pelly-Fry

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tricycles; fast landings avoided porpoising. It does not take long; in the Boston you taught yourself. From the second landing onward, the whole business was a joy.

Almost the first thing that happened on joining 88 Sqdn. (apart, that is, from an attack by the Luftwaffe upon our arrival!), was to arrange to fly somewhere in the back of the formations to learn what the game was all about. As we became more proficient, we moved up in easy stages closer to the front. Excellent training, indeed. You cannot lead anything in this life properly until you have first started from the bottom of the ladder. Finally, we promoted ourselves to being the lead aircraft. Easy to do if you are the commanding officer—but you also carry the heavy responsibility. There were no shortcuts in this business.

On operations, the Spitfire pilots were happy because they were escorting a fast bomber force and could fly at efficient speeds without the fear of being jumped by the Luftwaffe Me.109s and FW 190s. Meeting-up correctly with escorting Spitfire squadrons, of course, still had it's problems. In order to get a smooth rendezvous—and this at under 200 ft. altitude to keep out of the enemy radar system—we aimed to arrive precisely over the designated meeting point en route to the target with a timing error of no more than 15 seconds.

Jock, the navigator, never missed a trick, and everybody was happy. However, I smiled one day when a message came through from Fighter Command Hq. asking the Boston force to slow down on the outward journey across the English Channel, because the Spitfires were burning too much fuel! Quite a change from earlier times. We settled for a nice, easy 240 mph at sea level until just short of the enemy coast. That was fine for everybody. Fine, that is, for 12 Bostons—sometimes many more—and up to 150 Spitfires on the same mission. Quite an armada, when you come to think about it. We used to call it a 'Balbo,' after the prewar Italian air general who clearly thought that big was beautiful.

One fascinating impression, when outward bound at wave-top height, was seeing the close escort Spitfires looking for all the world like model airplanes. Thank heaven they were for real; this was definitely not aeromodeling time.

Bostons by then were making a notable contribution to the war effort; at last losses were beginning to come down. We began completing missions, mostly in daylight, with all aircraft returning—maybe with holes, but they got back. Things were looking up, as they say.

In 1948 No. 88 Squadron moved to France to support the Allied armies, the job for which the A-20 was designed. The writer then moved into the heavy bomber business. From Yorkshire we operated the four-engine Handley Page Halifax, a good, tough, reliable airplane. Although it was a night bomber, supporting the complimentary U.S. 8th Air Force by day, in practice it was not long before we ran a 24-hour service. I missed my Bostons and their crews. I also missed the historic stately home called Blickling Hall in Norfolk that accommodated us in style. The big house, with a moat around it and some 3,000 acres of parkland, together with good fishing on the lake, was once the home of Anne Boleyn, who married King Henry VIIIth—one of the eight wives!

Eventually, the Allies won the war in Europe; and things began to get better. Could I resume aeromodeling? Not yet. Overseas assignments again: Australia, East Africa, Iran, NATO in France. However, I managed a couple of Free Flight planes in Australia and later a nice Power job with a small diesel engine in Teheran when air attache commitments allowed. It flew well despite the 5,000-ft. altitude and summer heat.

About that time my thoughts began to turn to Radio Control, then the new look for aeromodeling. Apart from a trainer, I had visions of an RC Boston. Pure dreaming, maybe, but what was the harm of that? Even if it never became a reality, it was wonderful to ruminate about. Clearly, that Douglas airplane had left its mark on my memory. With some 70 different kinds of flying machines recorded in my pilot's log books, I rated the Boston as one of the top three. As much as I wanted to begin the model, it took time and opportunity before any practical action could be taken with my RC Boston. After all, around 1958 (and even some years later), who had heard of a twin-engine bomber in scale form operated by remote control from the ground? Meanwhile, the best thing for me to do was to collect data from the model publishers and, if possible, go to contests to see what others were doing—the look, listen, and learn formula.

What would be a practical starting point? With no Scale experience (and very little powered flight experience—zero radio know-how) the best way was to collect data on the Boston and relate it to such theoretical knowledge as I could acquire. Already it was 1978; at least I had succeeded in making a powered Sailplane of just over 9-ft. wingspan that flew well—to my great satisfaction! Where the Boston project was concerned, the model publishers in London came up with excellent drawings; and the bush telegraph told me that Bob Wischer in far-off Wisconsin had constructed and flown a Douglas A-20G. Both he and John Alcorn from California (John had drawn up the original A-20 drawings) sent off fat envelopes across the Atlantic that were full of data, pics, drawings, etc. Even helpful people from Douglas Aircraft came up with material. Clearly, I had passed the stage when I could chicken out. Yes sir, I was trapped; the game was on. Darn, even John Alcorn's drawings specified No. 88 Squadron.

The first step was to examine the factors from available materials. For various reasons—probably more guesswork than calculation—it seemed that a scale of one-tenth was a starting point. It was easy to work out conversions, and at this scale the wingspan would be just over 73 in. This was a good size for construction, equipment ac-