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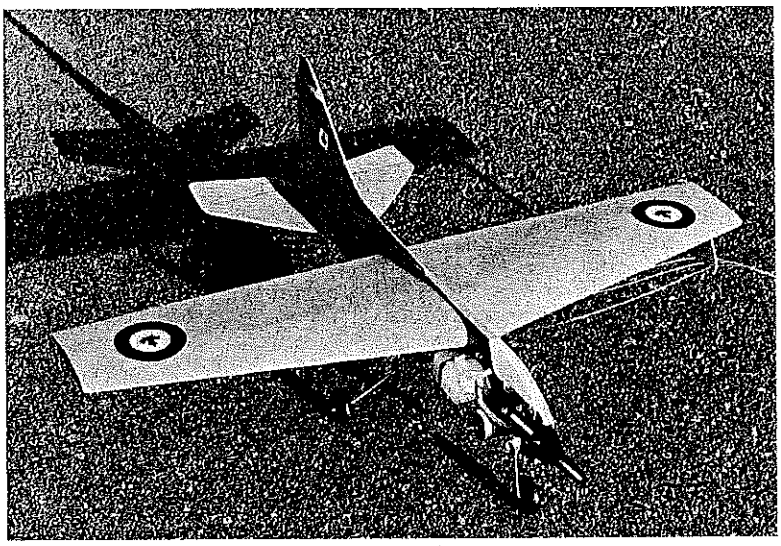
A companion to the Kingfisher in the June issue, the author's desire to model jets led to creation of this .15 Carrier version.

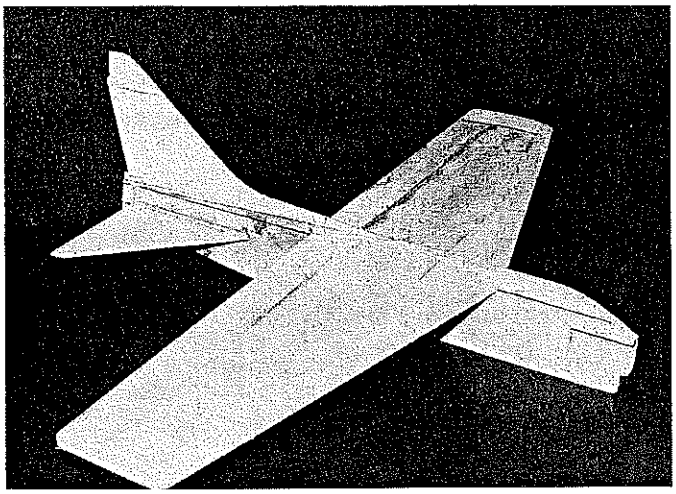
A-7E CORSAIR II



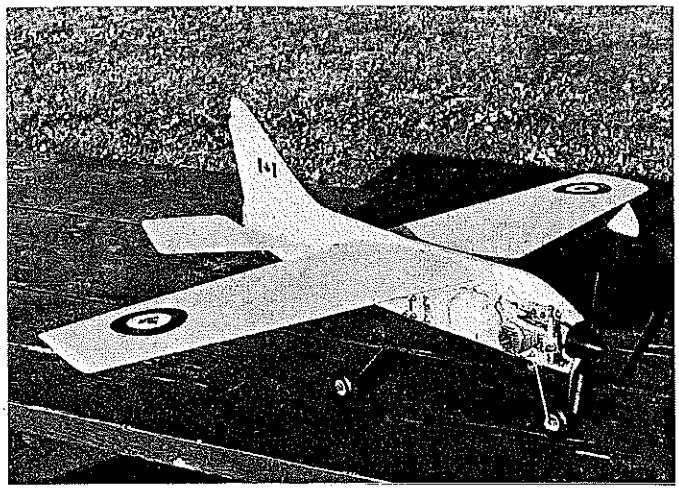
■ **Stephen Baardsen**

Like many former modelers who have returned to the hobby, I had a desire to build a particular model for a special reason.

For me, it was the Navy Carrier event. This event fired my imagination enough to sustain a desire to compete for more than twenty years.



Completed structure ready for finishing. Note fully sheeted wing, since changed to open structure shown on plans.



Second version of the Corsair eliminated the full-flying tail, which caused problems on takeoff and at low flight speeds.

After I had decided to build a Carrier model and compete in local contests, a big problem arose: which aircraft should I build? Since I had always been a scratch builder, building from plans was not a deterrent, but finding plans to suit *was* a problem: I wanted to fly jets! The world's navies are flying jets, and I wanted to as well.

I found a set of A-4 Skyhawk plans for the .15 Profile Carrier event, and I ordered a set from Gerry Deneau of Denver, Colorado. His A-4 Skyhawk flew very well, particularly in calm air. However, due to its low-mounted delta wing, I had a suspicion that maybe another design might be better in the wind. I started asking a lot of questions of the local experts, both here in Canada and down in the state of Washington.

What emerged was a model design definition without an idea or outline of a real aircraft. After due consideration, I came up with this list for the ideal .15 Profile Carrier model design:

1) High wing location to achieve stability in windy conditions, due to a pendulum effect of the model weight hanging below the center of lift, particularly during low-speed flight;

2) Engine thrust line below the center of lift, to enable the engine to naturally rotate the aircraft's nose up as power is applied—again, particularly useful in sustaining low-speed flight;

3) Must be a Navy jet aircraft;

4) An all-flying tail for better control;

5) Larger wing area than usually considered for a .15 engine, for increased drag at high-angle-of-attack flying;

6) Bellcrank mounted outside the wing, using adjustable leadouts for trim corrections and center-of-gravity mounting considerations;

7) A lightweight model, for faster acceleration off the deck;

8) A variety of available color schemes;

9) Fuselage-mounted landing gear, for ease of maintenance and lighter overall weight.

Longtime Carrier enthusiast Stephen Baardsen and Corsair II. Wing area is 206 square inches; weight is 26 ounces.

I mulled these criteria around in my head for a while, and while reading an aircraft magazine, it hit me. There on the page was an A-7E Corsair II being catapulted off a carrier! This aircraft was made to order for my ideal Carrier design. LTV (Ling Temco Vought) must have thought so too, as the full-size version has been an excellent carrier attack aircraft over the years. I immediately obtained a set of three-view drawings and drew up a rough set of plans. The profile of the fuselage was made to fit a four-inch-wide plank of balsa, and this scale worked out quite well for the fuselage length.

The fin and rudder were directly scaled up. Since the A-7E Corsair is an attack aircraft, the fin area is more than generous for this model. I borrowed the wing from Gerry Deneau's Wildcat, using a straight trailing edge as it happened to be the proper wing chord size.

When finished, the model balanced exactly right with no weights required; the only problem encountered was the use of the all-flying tail. More on that later!

I have flown this model at various contests, and with a more experienced Carrier pilot than I, it will beat most any .15 Carrier model that I have seen to date. It will continuously maintain a 60° flying attitude at very slow speeds in windy conditions better than any model I have seen.

Since the first flight of the prototype, I have worked on the Mark II version presented here. This version performs even better, due to its slightly larger wing area, different airfoil section, bellcrank mounting location, and lighter weight.

I promised more information on the all-flying tail: After flying the prototype with it, I cut it off; I guess one is entitled to at least one mistake per design.

The model was too sensitive on takeoff, and most important, while flying at low speeds at high angles of attack, the aircraft wouldn't slow down! It was zipping around the circle while the engine was idling. Apparently you need the drag of the stabilizer assembly to slow down this design.

Check the area of this model's tail. More than anything, it's for drag in the low-speed flight regime. On to the building!

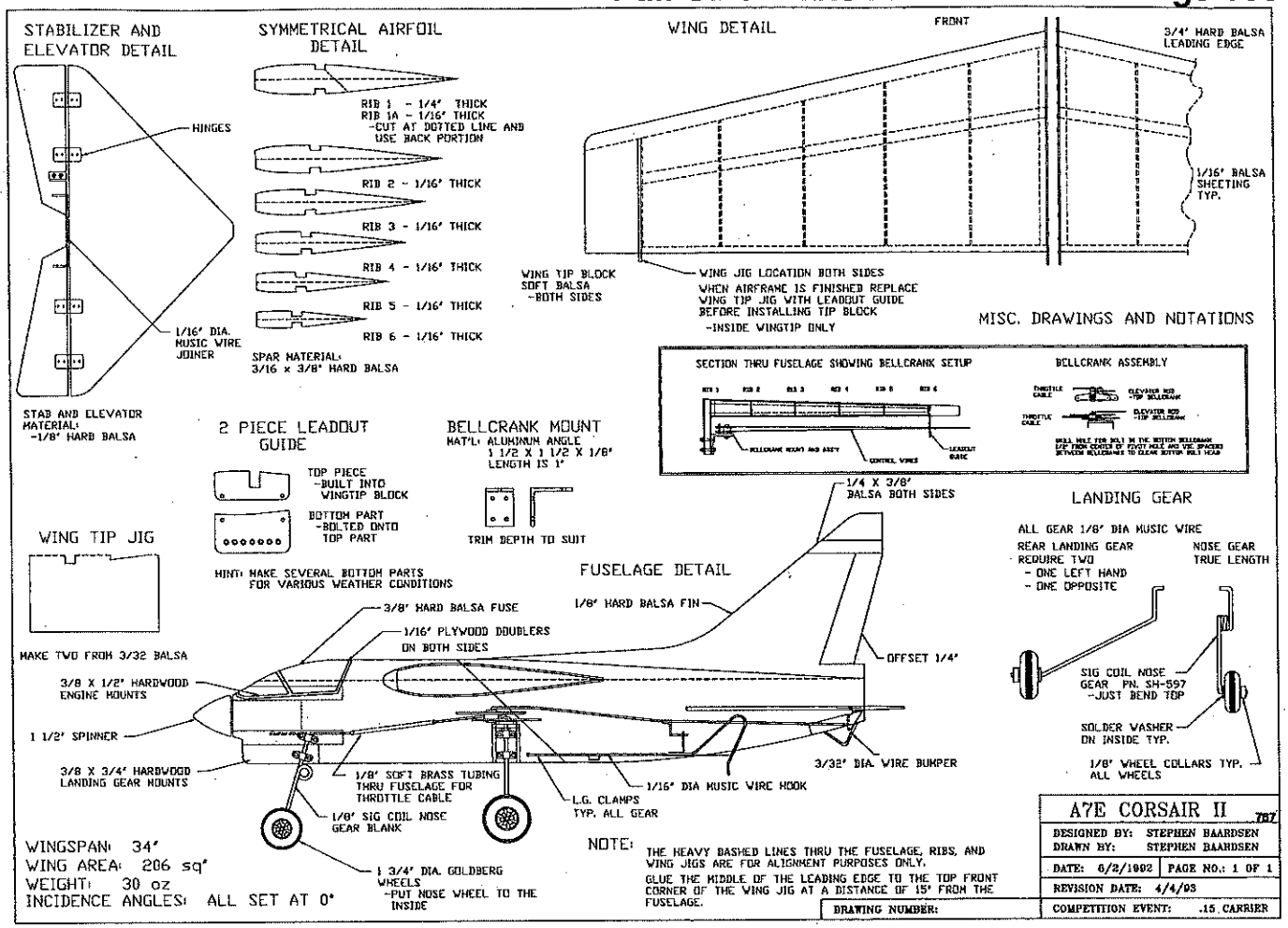
CONSTRUCTION

Fuselage: The fuselage is used both for the aircraft structure and as a jig for the wings. Start by cutting out the body from a sheet of hard ⅜ x 4 balsa. Next add the engine, bumper, bellcrank and landing gear mounts, which are made from maple hardwood. The front landing gear mount also serves as a rub block to protect the nose in case of hard landings.

Laminate the outside plywood doubler, and when the epoxy has cured, drill the holes for the engine, bellcrank mount, landing gear straps, and carrier hook while it is easy to see the hardwood blocks. Laminate the inside plywood doubler and drill out the holes to clear them of epoxy.

Drill the hole for the throttle cable to pass through the fuselage and install the ⅛ soft brass tubing by epoxying it in at the

Full-Size Plans Available—See Page 168



correct angle. The throttle cable must be able to move freely through this tubing to activate the carburetor throttle arm. Watch this installation to make sure it works with your engine's carburetor.

Running the cable through a tube leaves the other side of the fuselage free of controls, and allows proper mounting of the fuel tank and muffler. Leave the mounting holes for the fuel tank until later. Finish-sand the whole fuselage, install the fin and stabilizer, and put the fuselage aside.

Fin and Stabilizer: Cut the parts from hard ⅛ balsa and sand to shape. There is nothing difficult or unusual about these assemblies, except that at the junction on the top of the rudder, I put small ¼ x ⅜ blocks of hard spar balsa on each side of the fin. The grain on the fin should run top to bottom, which leaves the fin weak above the rudder. Full-size aircraft use this housing for ECM electronics; on the model, these blocks are used to reinforce the fin top.

Offset the rudder only slightly; a great deal of offset is not needed during low-speed flight, and it slows down the aircraft during the high-speed segment.

Slot the stab for the Du-Bro hinges and 1/16 music wire connecting rod. I have recently been notching the elevators to fit the hinges so the gap between the elevators and the stab is minimized. Apparently, this makes the action of the elevators more

Corsair

Type: CL .15 Carrier

Wingspan: 34 inches

Engine size/type: .15 glow

Flying weight: 26 ounces

Construction: Built up

Covering/finish: MonoKote on wing, epoxy all else

efficient. The control horn can be added later.

Add the fin assembly and stabilizer to the fuselage. Usually I wait until just before finishing the model to add the elevators. I would suggest a small fillet of triangular balsa stock on both sides of the fin/fuselage junction to strengthen this joint. Carrier aircraft do take a real beating—at least when I fly them—so light reinforcing should be done wherever possible.

Wing: This is where my construction methods differ from the usual profile model design: I build the wing and fuselage as an integral unit. Since these parts are built as a unit, the usual cracking at the fuselage/wing joint does not occur.

Be sure that the bottom of the fuselage is sanded flat and square. The bottom of the fuselage was drawn so that it is parallel to the engine thrust line and wing chord line, so setting the incidence at 0° is automatic.

Join ribs 1 and rib 1A before gluing the assemblies to each side of the fuselage, taking care to place them exactly where shown on the drawings. Glue these securely; the ribs act as a stub mount for the wings. Rib 1A is only used as a spacer between rib 1 and the fuselage, to compensate for the 1/16 plywood doubler. Take extra care to properly locate these ribs, since they control the wing incidence angle. I have drawn heavy dashed lines on the plans to help with this alignment.

Set up the fuselage bottom on a building board and put the two wing building jigs parallel 15 inches from each side, just outside of rib 6. These jigs must be set so that the trailing edge of the wings is square to the body and jigs. If care is taken at this step, then the wings will come out straight and perfect.

Note that the spar on the bottom of the wing has no dihedral and is installed flat. All anhedral is built into the top of the wing!

From here, building the wing is a snap. Add the bottom trailing edge, the leading edge on both sides, and all of the ribs. The ribs also have the heavy dashed lines drawn on them for alignment purposes. Draw a line down the center of the leading edge and glue the alignment lines together.

Install the top spar, top trailing edge, planking, and wingtips. The model now can be taken off the board and jigs to plank the

bottom of the wings. Install the outside wingtip counterweights (about one ounce) and the inside wingtip control wire guide.

Finishing: To save weight and to protect the finish from high-nitro fuels, I MonoKoted the wings and epoxy-painted the fuselage and tail surfaces. Be sure that the joint between the paint and MonoKote has sufficient overlap to prevent fuel seepage.

I used finishing resin on the fuselage, the fin assembly, and stabilizer before spraying on the epoxy paint. A variety of paint schemes are available, so have at it.

Hardware: Install the engine, tank, and landing gear on the plane as normal practice. I use is a two-ounce Du-Bro plastic rectangular tank, set up to feed in a uniflow style. These tanks have proven to be most reliable in my airplanes, and I rarely have any feeding trouble, even at high angles of attack (like vertical!).

The bellcrank system I use is one that Gerry Deneau showed on his drawings, using two small Perfect or Fox bellcranks joined together. I actually prefer this system over the standard three- line bellcrank, as it seems to give a better feel when flying. It is also cheaper and easier to make.

Install the control system, making sure that everything works smoothly—no binding. Since everyone seems to drop the hook via a different method, all I will say is I like to drop via down elevator, and I have shown an arrangement on the drawing for dropping the hook this way.

Engines: I have primarily used Conquest engines made by K&B and Rossi .15s with excellent results. Any ball-bearing Schneurle-ported engine that will throttle well will be competitive. The old Perry carburetor (now made by Varthane) has run well on my engines, but only on high-nitro fuels. It bogs down on anything less than 25% nitro, and can cause trouble with low-speed throttle response; however, on 35% nitro and higher, it works great.

Fuels: Carrier competition involves flying at low air speeds with high engine rpm using high nitro fuels, which can combine to cause high operating temperatures in the engines. The various functions of the fuel components becomes critical—particularly the lubricants.

Lubricant oil performs two functions in our engines: 1) to lubricate engine parts, and 2) to carry away heat. For Carrier engines, the ability of a lubricant to carry away heat is the most crucial element for success. The synthetic oils used in some fuels sold today appear to not have the ability to carry away heat to the same degree as plain castor oil.

I have had nothing but trouble with fuel manufactured using strictly synthetic oil—even when I added castor oil to the basic mix. Sig 35% nitro fuel contains a 50/50 blend of synthetic/castor, which seems to work the best when augmented with six ounces of pure castor per gallon.

I would recommend any fuel that contains

an overall amount of lubricant in the 22-23% range (with at least 14-15% pure castor). The castor oil amount appears to be critical, and since switching to this blend, I have had no trouble with any of my engines. It has eliminated the high-nitro blues (at high ambient temperatures) that I used to have, and I don't have to worry so much about cooking an engine during a lean run.

Foam Wing Cores: John Hall of Tacoma, Washington has made wing cores available for this model. He can be reached at (206) 535- 1034, or write to him at 10917 50th Ave. East, Tacoma WA 98446- 5301.

Flying and Trimming: Balance the aircraft about two inches back from the leading edge for the initial flights, then move the balance point back until the airplane begins to "hunt" during high-speed flight. Then move the balance point forward until the hunting stops.

To set up the adjustable leadouts, hang the airplane by the control wires and use the holes that allow the nose to hang down slightly. This should put the leadouts behind the canter of gravity.

Check the wing angle from the front. If the control wires exit the top of the guide at the 12 o'clock position, the wing should hang slightly angled, with the inside wingtip at 11 o'clock and the outside wing at 5 o'clock. This will ensure that the model flies with the outside wingtip slightly down at all times. This attitude is very stable in all flight conditions, especially in the wind. The location of the rear landing gear makes landings very smooth; however, it doesn't allow the model to rotate much for takeoff during the deck run. Therefore, the front nose gear must be at least ½-¾ inch longer to position the model properly for takeoff. If you look at pictures of the full-size Corsair, it sits on the deck with the same attitude.

I hope that you enjoy building and flying the Corsair as much as I have and have as much good luck in the contests. Keep your hooks dry!

Acknowledgments: Thanks to Gerry Deneau, Ron Salo, Bruce Duncan, John Hall, Greg and Ron Beers, Orin Humphries, Paul Gibeault, and all the others whom I pestered for information over the past years. ✈