SKYRAIDER...

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Built around the .19, rather than the bigger .29's, this Douglas AD-1 follows authentic plans. It's light; a proven performer.

► Many Skyraider models have been built and flown in the past two or three years, but, in most instances, they were designed for the Class C and D engines. Having built several models of the large variety previously, the writer decided to try one employing a Cameron .19 engine for power. An Enya .19-powered model performed equally well, having the same flight characteristics, although the Enya was much heavier.

This model was scaled from authentic drawings of the full sized aircraft with very few changes. For instance, the airfoil section at the wing root was flattened out from the main spar aft to the TE to aid in setting up construction on a flat surface. The built-in variable incidence in the wing was retained for stability at slow speeds used in the Carrier event. Other deviations were the elimination of engine downthrust and addition of about ⅛ in. to the TE of the elevators for more positive control. This model was designed with the following points in mind: simplicity of construction, ruggedness, and conservation of weight. It has a wingspan of 33 in., a flying weight of approximately 1 lb. 10 oz. and a top speed of 38 mph on 50 ft. lines.

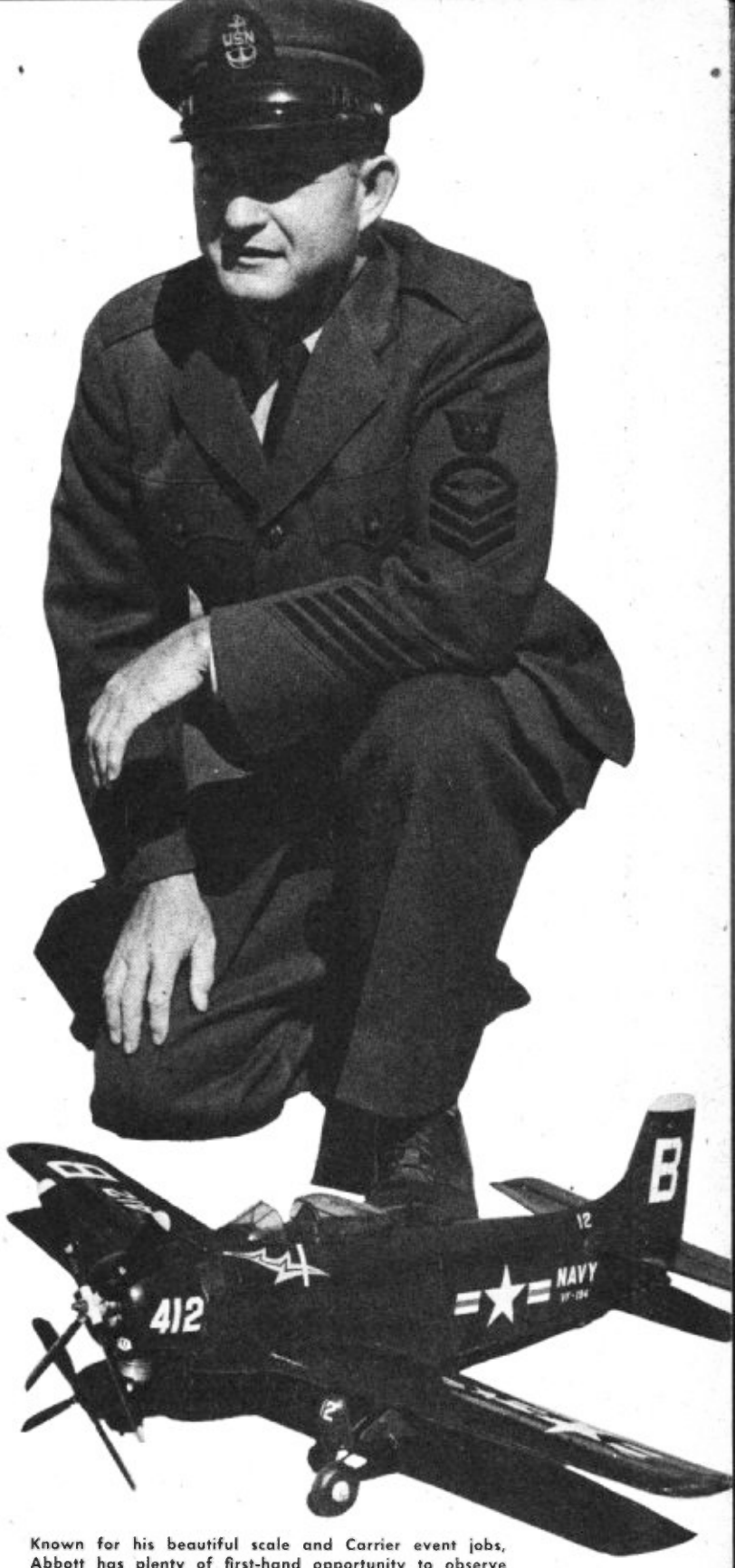
The model retains many of the flight characteristics of the actual airplane, the most noticeable one being that it flies with a tail-high attitude in full-powered level flight. For smooth take-off the control is held in neutral. It handles well in low-powered conditions and will glide to a smooth landing with no power by holding the nose down slightly.

In general this model is of conventional construction and should not prove too complicated for the average modeler.

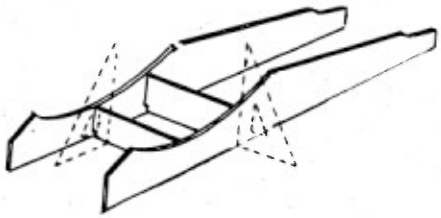
The wing is built with two parallel spars and the two halves of the wing are connected by spar joiners which extend from rib No. 4 on one side to rib No. 4 on the opposite side. The spars are full depth and notched to receive each rib. The forward spar is cut from ⅛ in. and the rear spar from 3/32 in. medium or hard balsa as are the corresponding spar joiners. The ribs are of 3/32 in. medium balsa and the wing covering (skin) is 1/16 in. sheet balsa, installed in three sections, top and bottom.

The spar halves are attached to the plan view of the wing on a flat working surface. Block up the tip ends 3/32 in. to clear the lower curve of the outboard ribs. Cement two No. 1 ribs together and insert into No. 1 slots in spars with flat lower edge against the working surface. Progressing outboard, install remaining ribs, carefully alining the lower edge of each rib with the lower edge of both spars. This should be easily accomplished if notches have been carefully cut. Note that the forward portions of rib No.'s 2 and 3 are installed at an angle and are left out until after ⅛ in. balsa LE strip is in place.

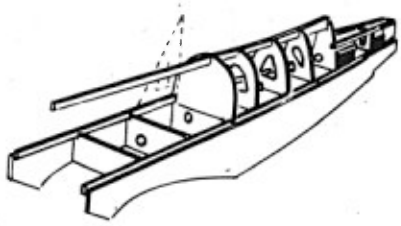
After all ribs have been cemented into place, cut LE strip and install along flat nose of ribs and insert forward portions of rib No.'s 2 and 3. The next step is to cover the upper surface of the wing from the TE to the center line of the forward spar while the assembly is still attached to the working surface, to maintain alinement. This portion of the covering is done in two sections, one from the TE to the rear spar and the other from the rear to the forward spar. Leave the forward portion uncovered until the landing gear



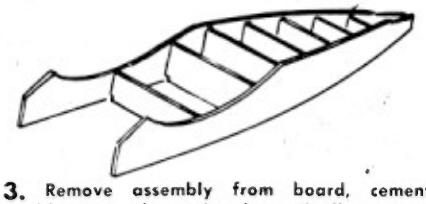
Known for his beautiful scale and Carrier event jobs, Abbott has plenty of first-hand opportunity to observe and duplicate the real craft upon which they are based.



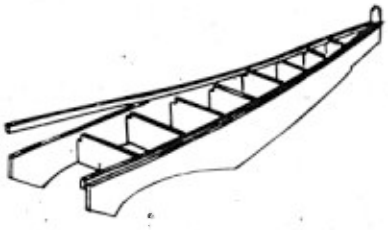
1. Invert lower side panels on top view fuselage plan; cement formers 4 & 5 in place. Check for alinement with drafting triangle, etc., shown.



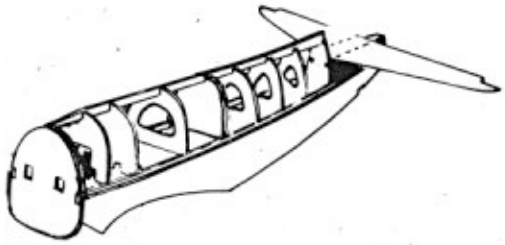
2. Assembly is continued by cementing the lower halves of formers 6 through 12 in place. Again check alinement with plans for accuracy.



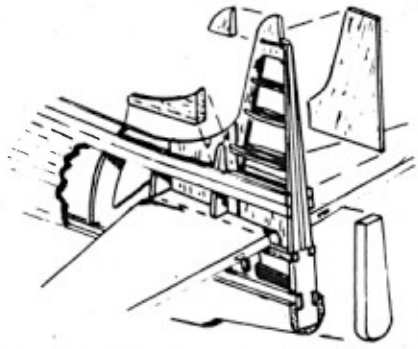
3. Remove assembly from board, cement doubler strip shown in place. Finally, cement tail former No. 12 position. Note notches.



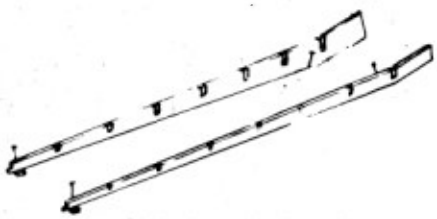
4. Follow with top halves of formers 6 through 11, beginning with 6 & 10. Place upper keels on, then install horizontal stabilizer supports.



5. Firewall, then upper halves 2A through 6A, positioned. Wax paper between 2 & 2A; 6 & 6A, facilitates hatch removal. Pushrod, flippers.

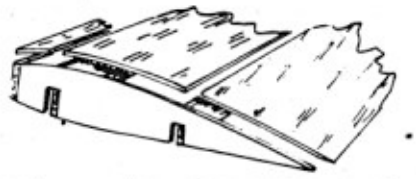


6. Two butt-jointed fin center pieces installed, then vertical spar pieces; ribs, sanded; then various blocks, etc., and finish skin pieces.



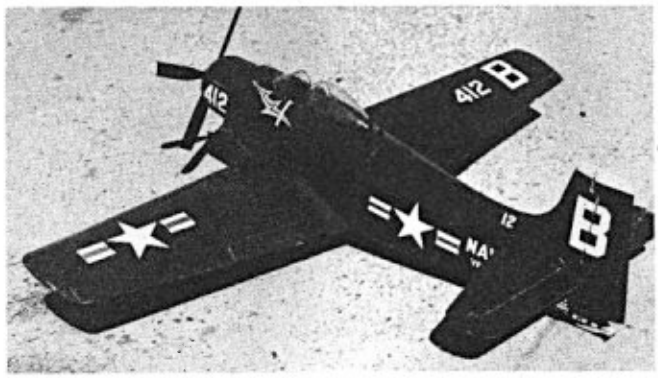
7. Wing assembly begun by fastening spars over wing plan, blocking up tips 1/16 in. as shown. Note rib notches that are cut in spars.

8. Cement ribs 1 & 8 in place. When dry, add the remaining ribs and finally install the leading edge cap strip shown. Wing light, strong.



9. Before removing wing panel from plan, install three top balsa skin pieces, using spars for dividing lines. Add spar joiners, sheet bottom.

Only the exposed head of the inverted engine differs from true scale. Landing gear, for example, is most realistic, but is durable in use.



Authentic markings, sliding bubble canopy. Carrier hook (and striped, too), four-bladed "fan," cowling cooling flaps typify fine details.

platforms have been installed. When cement has dried, remove wing halves from working surface and join together by slipping spar joiners into place from the bottom. Check for proper dihedral by measuring 1-13/16 in. from flat surface at tip rib on each wing tip.

After the two halves of the wing have been joined, the lower wing surface is covered from the TE to the forward spar in the same manner as the upper surface. The landing gear platform is built in next. It is cut from 3/32 in. plywood and has a nut plate either screwed or riveted to the upper surface. This plate is one of two types depending upon which type of landing gear strut is being installed. Plain flat nuts, soldered to a piece of brass or tin, may be substituted for the aviation-type anchor nut shown on the plans. The plywood platforms are then installed between the converging rib No.'s 2 and 3 and blocked in with strips of 3/32 in. balsa cemented into place on all sides on top and bottom of platform. It should be noted at this time that the forward spar joiner is notched at the bottom between rib No.'s 2 and 3 to form a socket for mounting landing gear anti-drag struts. Wire part of anti-drag strut is cemented to 3/32 in. dowel or swab stick and wrapped with thread. Then it is cemented into aforementioned slot using plenty of cement.

Tubular sections of anti-drag struts are then soldered to main strut at lower ends and wire fitting, just installed, at upper ends after main strut has been screwed into wing fitting. This method of landing gear construction may seem rather complicated but is actually easier to make and install than other types because it is rugged, removable for repair or replacement, and localizes damage. It affords better scale appearance.

When landing mounting platform has been installed, finish covering the forward portions of each wing and sand flush with ⅛ in. LE strip. Both wings are then capped off with a tapering ¼ in. thick (*Continued on page* 51)

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(*Continued from page 10*)

balsa LE cap strip. The LE is then sanded to shape using rib templates to check for proper contour. Bellcrank platform is then installed in the center section blocking it in on both sides, top and bottom. Next, install bellcrank and lead-out wires. Details, such as landing gear strut fairings, wheel well doors, bomb and rocket racks and flap hinges should be added after finish has been applied to wing. They should be finished separately and then attached to wing and landing gear assembly. The landing gear strut fairings for the original models were formed from 1/16 plastic sheet and attached by means of tin strips soldered to the strut and squeeze riveted with a pair of pliers using 1/16 in. dia. soft aluminum wire to the tin strips. However, they may be carved from balsa and cemented to the struts if more convenient. The other details were carved from balsa and cemented to the wing, being reinforced by steel straight pins with the heads removed, to fix them into position.

The fuselage is started by cutting the two lower side panels from ⅛ in. medium sheet balsa and attaching them, in an inverted position, over the top view of the fuselage plan on the flat working surface. Next, cement the lower halves of former No.'s 4 and 5 into place and allow to dry sufficiently. When they are dry, continue working aft, cementing lower halves of former No.'s 6 through 11, checking for proper alinement as you progress. All formers are of 3/32 in. sheet balsa with the exception of No.'s 1, 2, 4-A and 12. Former No.'s 1 and 12 are ⅛ in. balsa and No.'s 2 and 4-A are 3/32 in. plywood. The two plywood formers are slotted for installation of engine bearers; however, these formers cannot be installed until after the inverted assembly has been removed from the working surface. This is the next step.

When the assembly has dried, remove it from the working surface and install firewall No. 2 and former No.'s 4-A and 12. Next, cement upper halves of former No.'s 6 through 11 into place and insert backbone piece, which extends from No. 2-A to No. 10, into slots at the top of each former. Former No.'s 2-A and 6-A are installed next, inserting waxed paper between No.'s 2 and 2-A and No.'s 6 and 6-A. Also insert waxed paper along lower edge on each side where joint of removable section of fuselage will be, making this section easier to remove when necessary. Now install remaining upper halves of former No.'s 3, 4 and 5. Note that the lower half of former No. 3 has been left out until fuel tank has been installed. Moving back to the tail of the fuselage, we now cement into place the ⅛ in. sq. balsa mounting strips for the horizontal stabilizer. These strips extend between No.'s 10 and 12 as shown on plan.

The horizontal stabilizer and elevators are cut from ¼ in. medium sheet balsa and are sanded into shape. It is suggested that the center portion of the stab be left unshaped and flat for easier mounting. Assemble stabilizer, elevators, horn and pushrod before mounting on fuselage. When this assembly is completed, it is then slipped into place, cemented, alined and allowed to dry. It may be noted that the upper edge of the lower side panels are on the thrust line and may be used in checking the incidence angles of the wing and horizontal tail surfaces.

The vertical fin is built up around a ⅛ in. sheet balsa frame or core. Cut out as shown on the plan side view and cement along center line of horizontal stab and back side of former No. 10. Next, cement tapering pieces of ⅛ in. sheet balsa to each side of rear edge of fin to form fin spar as shown in cross-section No. 12. Finish frame structure by adding to each side rectangular pieces of 1/16 in. sheet balsa of sufficient size to permit sanding ribs to shape. Sand leading edge of core at the same time. Note that lowest rib is double thickness where 1/16 fin covering meets 3/32 side planking. Portion of former No. 11 that is above the horizontal stab is also installed at this time.

When the vertical fin structure has been completed, planking of the upper half of the fuselage may be started. Using ¼ x 3/32 in. strips of medium or soft balsa, lay on planking from the thrust line up to the reference line shown at the tail of the plan side view. The remaining planking up to the backbone extends to former No. 9 only. Area from No. 9 to No. 11 is filled with soft balsa blocks on each side of the backbone. The remainder of the vertical fin is then covered with 1/16 in. sheet balsa. This covering may be held firmly into place while drying by using strips of masking or adhesive tape to strap around the LE and TE. Tip of fin is capped with ⅛ in. balsa on each side.

The rudder is ⅜ in. thick at the heaviest point and may be made from balsa sheet when the heavier engines are used or laminated, as shown, when the Cameron .19 is used. For the laminated type, use ¼ in. sheet balsa and cut out center as shown. Sand rudder to a thin TE. Then the two ⅛ sheet balsa laminations are cut out and cemented to each side of this hollow core. When cement has dried, sand rudder assembly to final shape and cement into place on vertical fin after balsa tail block has been installed.

Construction of the cowling sections is next: the engine cowling and the accessory cowling. After the engine bearers have been installed, laminations of thicknesses shown on plan are cut to the shape of former No. 2 with engine bearer slots cut out the same as former No. 2. These are stacked on the engine bearers and tack-cemented together. The last lamination forward is of ⅛ in. balsa and is perfectly round as shown in cross-section No. 1. The reason for this construction is to allow ample balsa thickness for carving exhaust troughs and air scoop details. While this may be accomplished by using a solid balsa block, the writer found the hollowing-out process much easier by employing this lamination method. Also, the sheet balsa is easier to obtain than the block material. To continue with this type of construction, carve and sand to shape and finish out the details. Now remove the externally finished accessory section by sliding forward from engine bearers. Pop tack-cemented laminations apart, with the exception of lamination No. 1; cut out the center of each, leaving approximately ⅜ in. wall thickness. Leave No. 1 solid except for engine bearer slots. When reassembled, this will automatically aline cowl section. Alinement at the rear of this cowl section is maintained by a ⅛ in. balsa ring cemented to former No. 2 which fits snugly into the inside contour of the cowl at this point. However, since this section is rarely removed, it may be cemented into place for much easier installation. Next, cement alinement ring for engine cowling section to the forward face of former No. 1.

Start engine cowling by spotting holes for mounting of engine. Then make the two engine cowl mounting brackets from tin, using the template shown on the plans. Slip these brackets over the forward ends of engine bearers and spot holes in the engine mounting holes. Secure them in place with machine screws and nuts. Next, cut the 3/32 in. plywood cowl mounting ring and the balsa rings required to build up the speed ring. Sand speed ring to shape and mount to brackets previously installed on forward ends of engine bearers by means of two screws as shown. Provisions should be made to safety-lock these to prevent them from loosening and letting cowl fall into propeller. The writer chose drilled Fillister head screws, such as used in radios, with a semi-circular piano wire safety clip to fit in and between the heads of the two screws. Between the speed ring and the front face of the accessory cowl, fill in ¼ in. balsa strips. These will have to be beveled a little as they are installed around the circumference of the cowl. When these strips are installed, they are cut to length for snug fit, resting against the alinement ring on No. 1 and cemented firmly on the forward end only. Leave the front end of each strip about

1/16 in. high to allow for sanding. To insure proper alinement, install a strip at top, bottom and one on each side; then fill in between. Complete by sanding to shape and cutting openings for engine cylinder, exhaust stack and needle valve.

The next step is to manufacture and install the fuel tank. The rigid feed tube should be long enough to extend through the accessory cowl section for ease in replacing plastic feed tubing. After tank has been installed, cement wing assembly and lower half of former No. 3 into place. Bottom of fuselage is finished by planking between station No. 2 and the forward wing spar with ¼ x 3/32 in. strips and the remaining with 3/32 in. sheet balsa, installing tail wheel and hook assembly before covering bottom from station No.'s 6 to 11. From No.'s 11 to 12 on bottom, fill with ¼ in. sheet balsa to allow for sanding of curved contour.

The tail wheel and hook assembly is built up on a piece of formed 1/16 in. piano wire and attached to a 3/32 in. plywood platform. The wire assembly is attached to the plywood by means of screws or by stitching with soft copper wire. Refer to plan for making wire assembly. When assembly is completed, it is installed between former No.'s 10 and 11 and locked into place by using ⅛ in. sq. balsa in the corners as shown. A tail wheel well opening is cut into the 3/32 balsa sheet bottom, allowing it to be slipped into place around the tail wheel assembly.

The tail hook release and engine speed control are not shown since most modelers have their own preferred mechanisms. However, on the original models, the tail hook is springloaded to hang down at about a 60° angle and is locked in the up position by a piece of .020 in. piano wire which extends forward to the bellcrank. A 90° arm, soldered to the elevator control pushrod, pulls the hook release wire forward as elevators are controlled for down. The release is adjusted to drop the hook on the last ⅛ in. of downward travel of the elevators. To drop the hook in flight, the control handle is snapped full down and back to neutral, releasing the hook before the plane has had time to respond to the down control. A return spring on the release wire makes it easy to recock the hook in the up position.

The finish on the original models was Corsair blue Aero Gloss, using red, white and yellow Aero Gloss to stencil the markings. Most of the job was done in the conventional manner: sealing, sanding, then painting with several coats of colored dope, wet-sanding and rubbing with compound between coats, the only deviation being that talcum powder was mixed with some of the blue Aero Gloss for sanding sealer since the prepared sanding sealer was not available at the localities in which they were built. One was built in Alaska and the other aboard ship in the Pacific.