#618

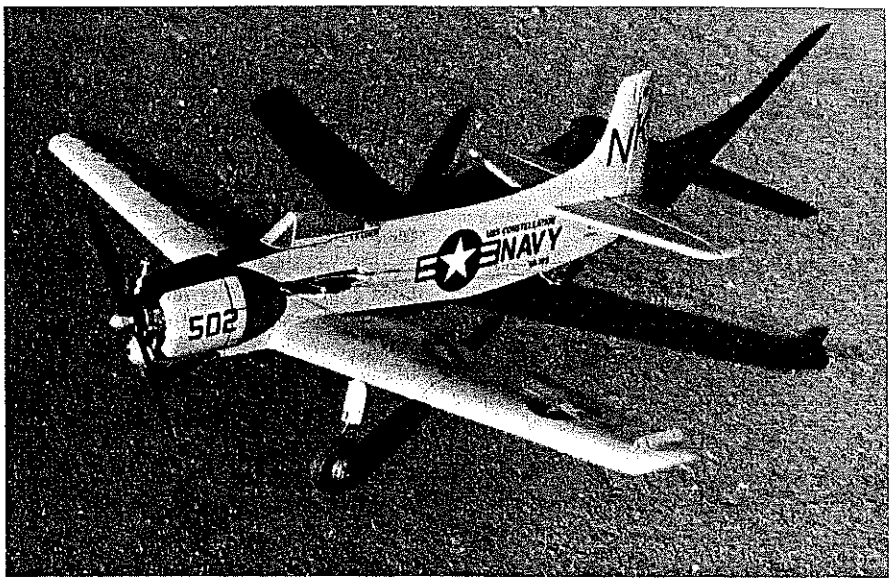
A.A. Lidberg

A1H Skyraider

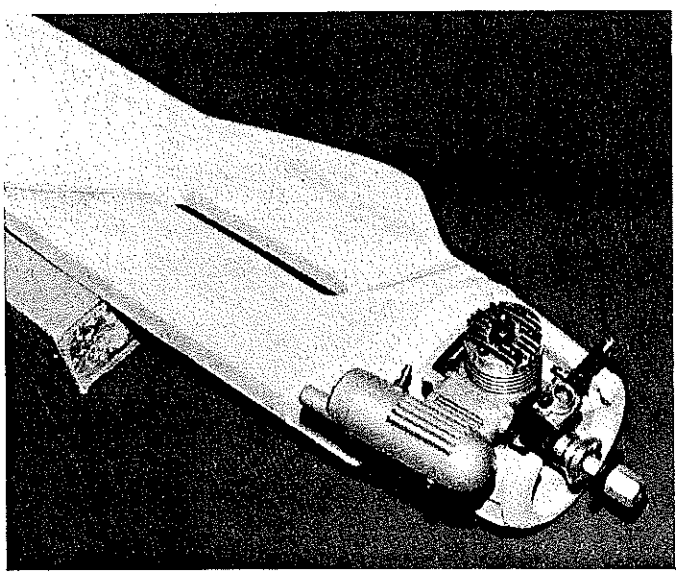
Aeronautical designers have always struggled to make their aircraft as versatile as possible. This .15-size model really pursues that goal. It's great as a CL Sport Scale model, a Navy Carrier plane, and the perfect ship for just fun flying.

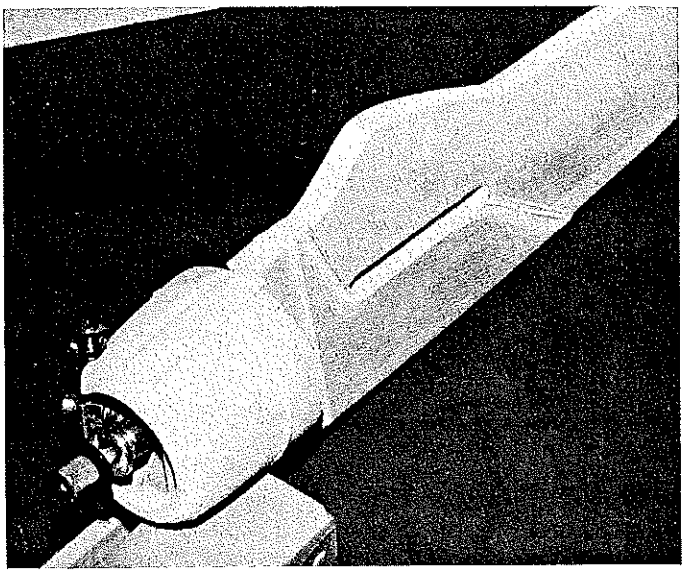
WHEN THE DESIRE for a Sport Scale Control Line model surfaced a few months ago, I decided it would be a nice change of pace from the usual stick-and-tissue Free Flight planes that take up most of my modeling time. This would be a simplified Scale subject and at the same time be designed to do more than just go around the circle.

Thoughts about the project began to jell, equipment and materials to accumulate, and a large file of "someday I'm going to do this one, too" Scale three-views and photos

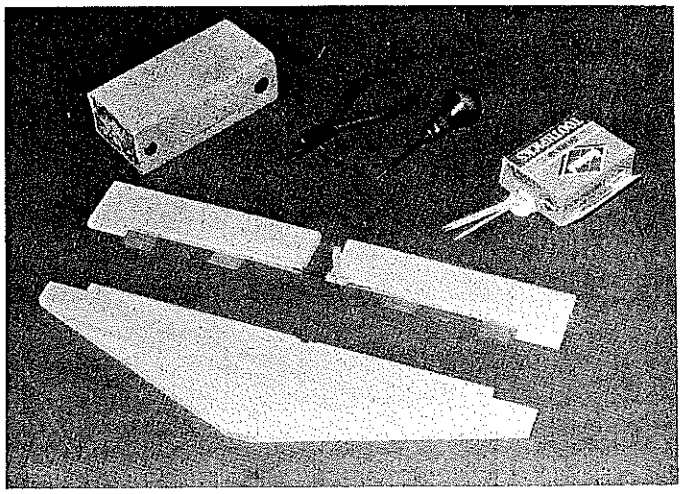


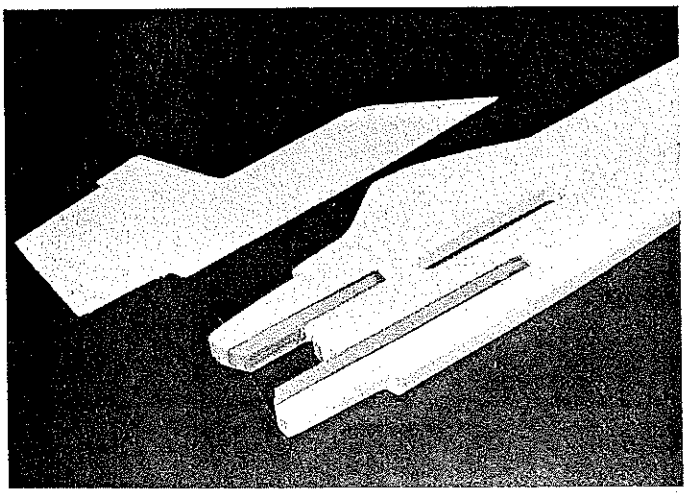
Top: Finished with automotive spray paints in light gray, black enamel, and white lacquer on the rudder, the A1H is simple to do and comes out looking very realistic. A coat of clear spray epoxy protects the colors from the fuel. Above left: On the first time out of the shop, our author and his A1H ended up in an unexpected contest. Upon arriving at the field, he discovered a contest in progress and decided to fly in the Sport Scale event. Not being able to get the engine to run slow enough for touch-and-goes or taxiing cost AI the extra points options and a trophy, but the model received many positive comments. Above right: Sig's 4-in. star-and-bar insignia turned out to be the easiest part of the finish, and they really complete the look. The text describes an easy way to duplicate the black letters and numbers to make your own stick-on decals.





Left: Our author chose the RC version of the O.S. .15 engine to power his model. Temporarily mount the engine to determine exactly where the cowl blocks should be placed. Right: Tapering the fuselage doubler will give the model a nicer appearance later on when the finish is applied.





Left: The stab and elevator were joined with plastic strip hinges and pinned in place with toothpicks. The control horn shown here is from Sig. RC-type leaf hinges could also be used for more free-moving controls. Right: The fuselage plank with the engine mount sticks and the right side doubler already epoxied in place. The left side doubler is about to be coated with epoxy in preparation for laminating it onto the fuselage plank.

was just waiting to be raided. Every time I rummaged through the pile, some photos I'd taken of an A1H Skyraider rose to the top. Obviously that was the one I was ready to build; and because the photos were clipped to a Douglas Aircraft three-view and a copy of Profile Publication #60 there was enough data on hand to begin.

In keeping with a sport plane the A1H was designed as a profile model, but with enough detail that the usual necessary model elements wouldn't overly detract from scale effects. The end product shows conventional Scale outlines, dihedral, and landing gear type (in the wing), with the ¼ in. of excess width in the elevator and the skinny body being the only giveaway nonscale features. I chose the authentic markings and worked up a simplified method for duplicating them.

The resulting model is quite satisfying in looks as well as flying abilities. Already it's drawn two interesting comments from other modelers. One fellow said that it doesn't fly like a .15 but looks and acts like a much larger model. He's right; the model flies fairly fast with a good speed range and stays out on the lines very well. The other comment was that the Skyraider doesn't look like a profile in the air. Credit for that thought probably goes to the cowling, which definitely sets the A1H apart from pure profile-bodied models.

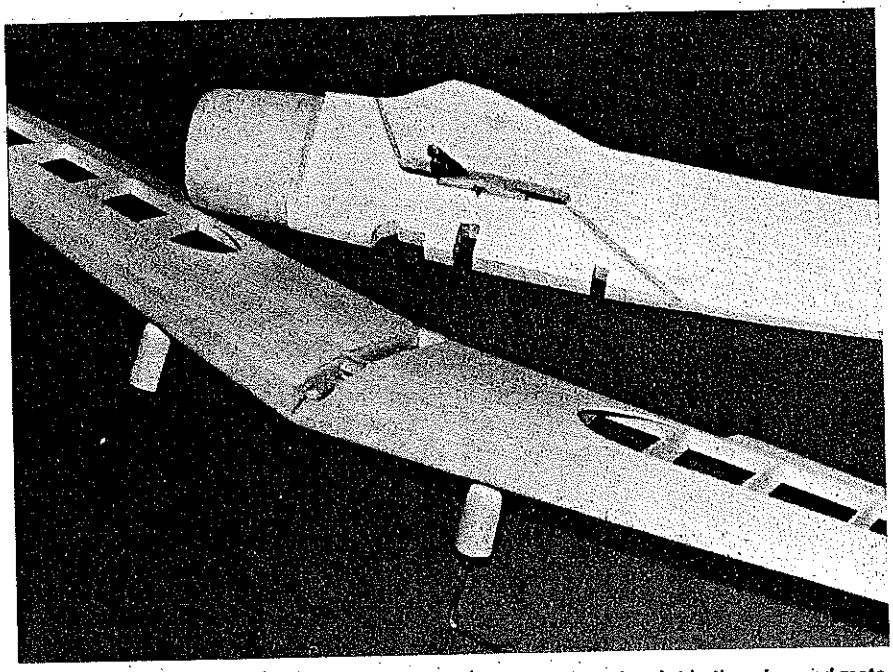
The AD series of Douglas Skyraiders have been fascinating airplanes from the start. Quite a few variations have been built, all interesting-looking planes and hard workers. Design efforts on the AD, initially designated the XB2D-1 Dauntless II, began in 1944. Its first flight was made in April of 1945, and 548 aircraft were ordered shortly afterward. Very early in its life the name was changed to Skyraider, and the Navy's new designation system changed the BT2D-1 to AD-1. The plane was assigned a variety of roles and continued to evolve up through the AD-7 version. AD Skyraiders flew in Korea and Vietnam, confirming their expected performance.

Because it went through so many permutations, as a model project for Sport Scale the AD can be finished a number of ways—in silver as the XBT2D-1, in silver with a 1½-in. spinner as the #4 BT2D-1, in navy blue with white markings as an AD-6, or in light gray as an A1H (the designation changed from AD-6 to A1H along with the color change in 1960). The prototype is an A1H in gray, mostly because it would be fairly easy to make up black markings based on the old photos.

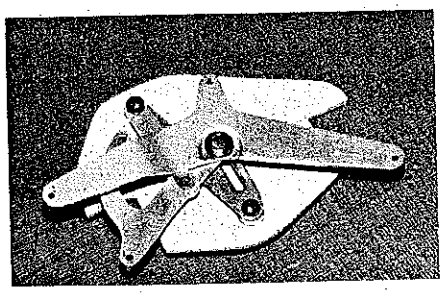
Much as I'd like to, I suppose it's possible I won't build all of the planes represented in the "someday . . . " file. The A1H photos, I must admit, were taken in 1965!

Construction. The body of the A1H is based on a plank of ½-in. sheet balsa. Before doing any cutting for the engine mounts, determine what size it will be—a suitable range is from .15 to .25 cu. in.—and check the engine mount size required. The O.S. Max .15 fits the 1-in. spacing shown in the plan, but yours may require moving the mounts farther apart.

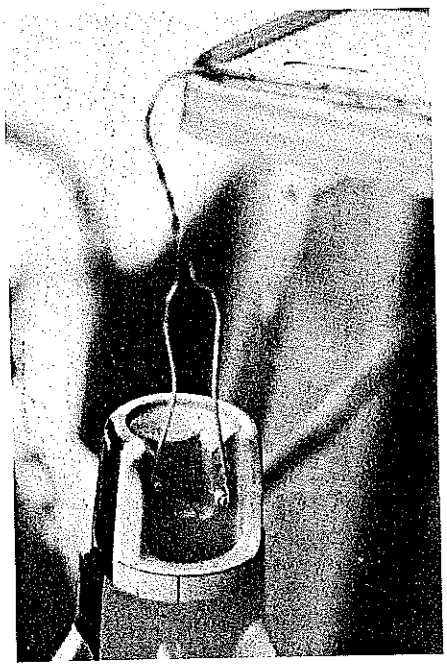
Cut the two doublers from 1/16 ply. Depending on the depth of your engine's crankcase, the left-side piece may need to be cut



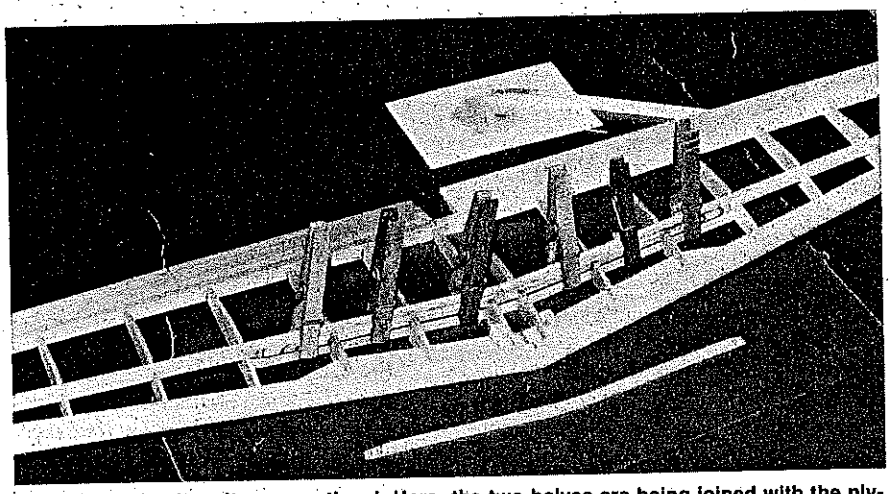
The cutouts in the bottom of the fuselage are designed to fit into the slot in the wing and mate with its interior. The result is a very strong center section and an overall very rugged model.



Al chose the J. Roberts 3-line unit for his model. As shown here it's already mounted on the ply platform. It's easier to drill the mounting holes and fit the blind nuts in the platform first, then epoxy it inside the fuselage.



To make painting easier, use a hook made from a coat hanger. Fasten it to the engine mount to hang the model up where it can conveniently be sprayed and allowed to dry.



Wing construction is quite conventional. Here, the two halves are being joined with the plywood spar joiner. Use epoxy for strength and to allow yourself time to get everything aligned.

out for clearance between the mount sticks. Taper the rear edge of each doubler with a rasp or sandpaper for a nicer finish later on. With the mount sticks in place, epoxy the doublers to the body.

Cut out the clearance space for the bellcrank and its platform. Blind nuts work well for mounting the bellcrank and should be installed at this point. Drill the engine mounting holes, and fit the blind nuts for the cowling. The cowl is strictly decorative, but it does look nice and is worth a bit of extra work.

Begin roughing out the cowl from two blocks (add ¼-in. sheet to the right-side block to increase its width) and the ¼-in. sheet ring. Quite a bit of the right-side block will need to be removed to clear the engine, throttle, needle valve, fuel line, and muffler. The suggested method is to cut the engine clearance holes first, hollow the block out enough to fit over the throttle and crankcase, then carve the exterior shape. The cowl pieces are permanently attached to the fuselage after enough clearance has been created to allow installation and removal of the engine through the openings.

The plan shows the cowling somewhat offset. This is a compromise in shape necessitated by the profile body, where the propeller's center lies on one surface of the flat body. The offset isn't obvious in the completed model, because one's eyes are distracted by paint, markings, and the engine.

The muffler is removed to allow access to the engine mounting screws, and then reinstalled. The use of a muffler is highly recommended—it might make a difference in keeping or gaining a flying site. Exciting though the sound of an unmuffled model engine may be, I've discovered that using a muffler takes away some of the flight line jitters. That's a personal observation I've never seen in print anywhere else, but one that's worth considering.

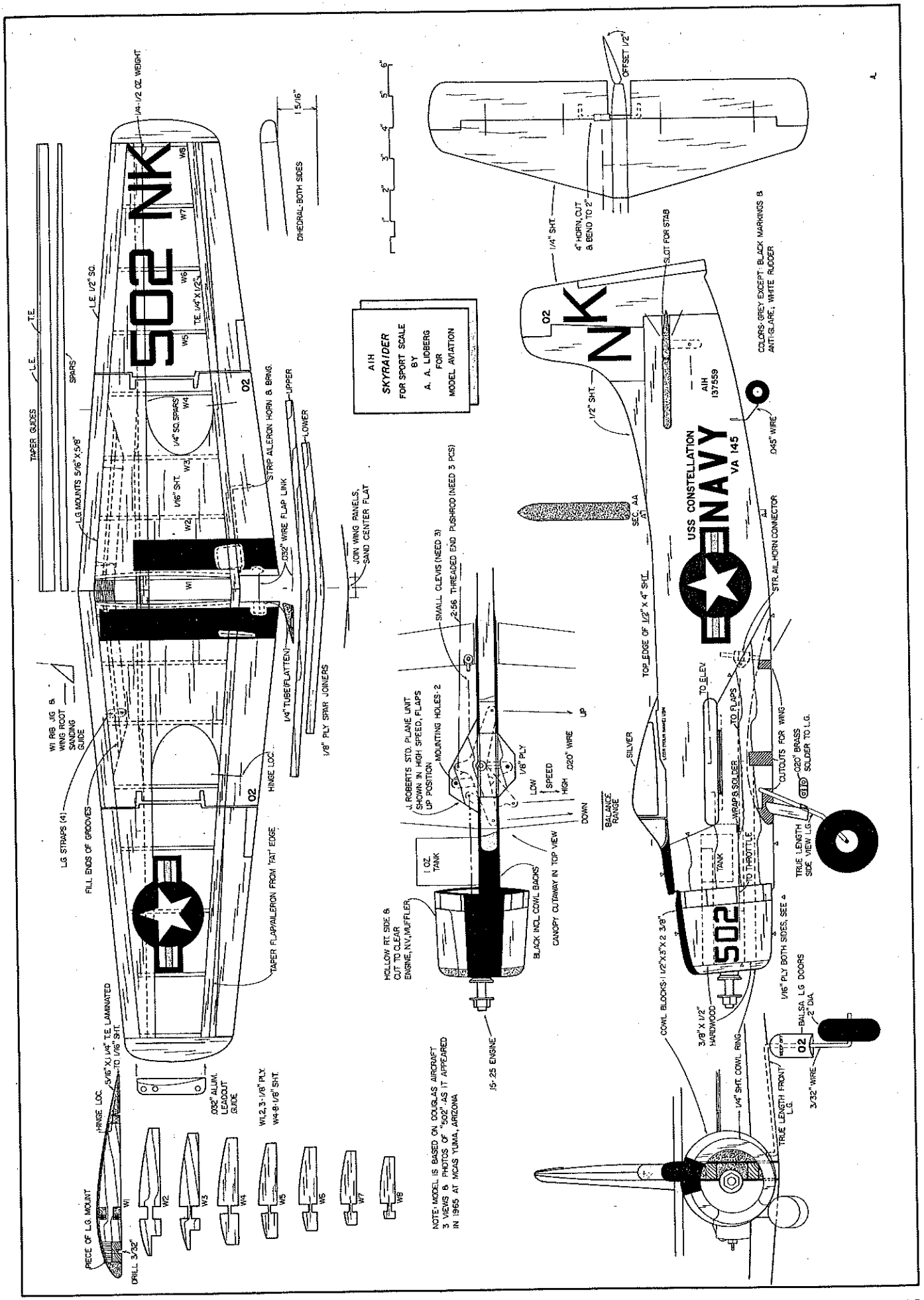
Wing. Begin by cutting out the ribs. Plywood ribs are used to help share the load of the wing-mounted landing gear (LG). Notch each rib to fit over the LG mount blocks.

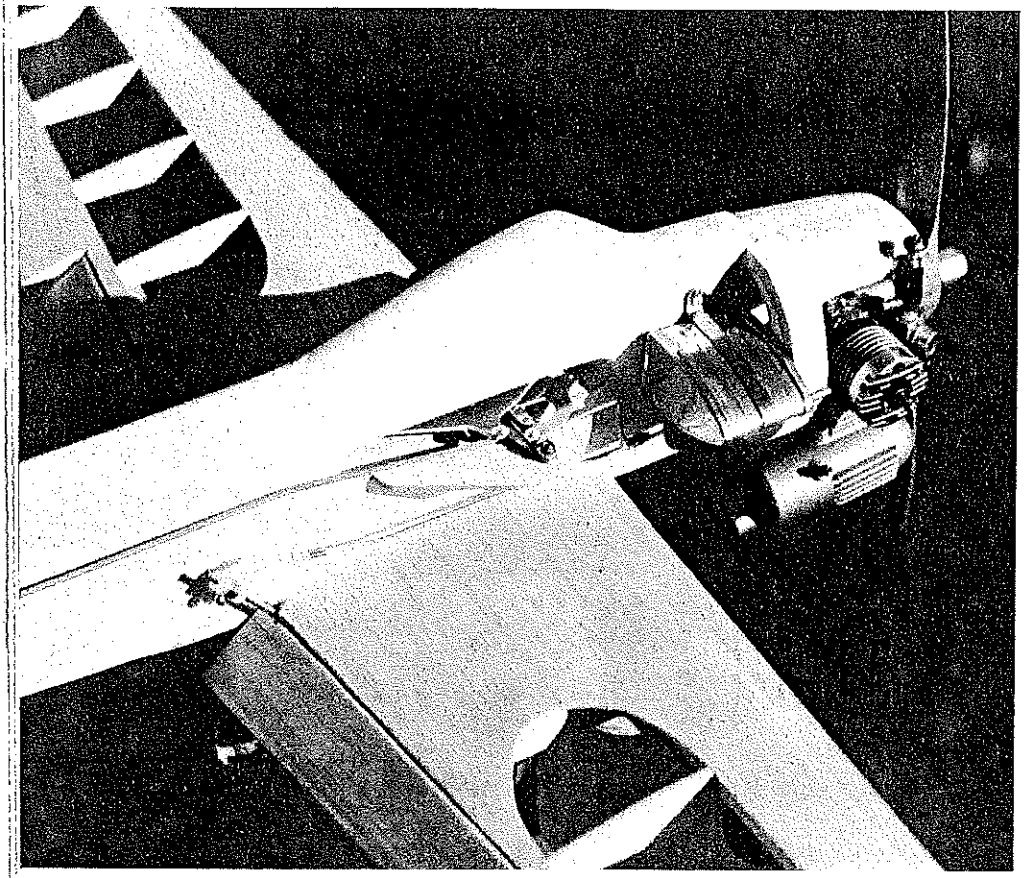
To save some sanding later on, the leading edge (LE) and trailing edge (TE) strips can be tapered now, before they are pinned down. The spars must be tapered so that they will fit the wing out toward each tip.

Use the W1 rib jig to set the center ribs at a slight angle. Ultimately these ribs will lie adjacent to the body when the completed wing is ready to install. Add a small piece of LG mounting gear stock to each W1 rib to create a strong anchoring point for the wire LG. Use a 3/32 drill bit to connect the grooves of these pieces. Fit all the ribs carefully at their LE and TE ends to ensure strong glue joints.

Glue the flap and aileron pieces together as a sandwich (or carve them from ½ x 2-in. sheet), and taper them by cutting material from their thickest edges. Cut apart the flap and aileron pieces.Glue the aileron portions to the TE, and tack glue the flaps in place. Add the tips and the upper spar.

Use the W1 rib jig again to gauge how the LE, TE, and spars must be sanded when the wing panels are joined with dihedral. Cut out the ply spar joiners, being sure to make each slightly different as shown, since the


AIH
SKYRAIDER
FOR SPORT SCALE
BY
A. A. LIDBERG
FOR
MODEL AVIATION
502 NK
W1 RIB JIG & WING ROOT SANDING GUIDE
LG STRAPS (4)
FILL ENDS OF GROOVES
TAPER FLAP/AILERON FROM 'FAT' EDGE
HINGE LOC.
1/4" TUBE/FLATTEN
1/8" PLY SPAR JOINERS
JOIN WING PANELS, SAND CENTER FLAT
STRIP AILERON HORN & BRKG.
UPPER
LOWER
.032" WIRE FLAP LINK
TAPER GUIDES
L.E.
T.E.
SPARS
L.G. MOUNTS 5/16" X 5/8"
L.E. 1/2" SQ.
T.E. 1/4" X 1/2"
1/4" SQ. SPARS
1/16" SHT.
1/4-1/2 OZ. WEIGHT
DIHEDRAL BOTH SIDES
5/16"
1"
2"
3"
4"
5"
6"
OFFSET 1/2"
1/4" SHT.
4" HORN, CUT & BEND TO 2"
SLOT FOR STAB
1/2" SHT.
COLORS: GREY EXCEPT: BLACK MARKINGS & ANTI-GLARE; WHITE RUDDER
AIH 137559
USS CONSTELLATION
NAVY
VA 145
.045" WIRE
SEC. AA
SEC. AJ
STR. AIL. HORN CONNECTOR
TOP EDGE OF 1/2" X 4" SHT.
SMALL CLEVIS (NEED 3)
2-56 THREADED END PUSHROD (NEED 3 PCS)
J. ROBERTS STD. PLANE UNIT SHOWN IN HIGH SPEED, FLAPS UP POSITION
MOUNTING HOLES - 2
1/8" PLY
LOW SPEED HIGH
.020" WIRE
UP
DOWN
BALANCE RANGE
SILVER
TO ELEV.
TO FLAPS
CUTOUTS FOR WING
WRAP & SOLDER
.020" BRASS
SOLDER TO L.G.
1 OZ. TANK
TO THROTTLE
TRUE LENGTH SIDE VIEW L.G.
HOLLOW RT. SIDE & CUT TO CLEAR ENGINE, M.V., MUFFLER
CANOPY CUTAWAY IN TOP VIEW
BLACK INCL. COWL BACKS
.15-.25 ENGINE
COWL BLOCKS: 1 1/2" X 3" X 2 3/8"
3/8" X 1/2" HARDWOOD
1/4" SHT. COWL RING
1/16" PLY BOTH SIDES, SEE 4
BALSA LG DOORS
2" DIA.
3/32" WIRE
TRUE LENGTH FRONT L.G.
PIECE OF L.G. MOUNT
DRILL 3/32"
HINGE LOC.
5/16" X 1 1/4" T.E. LAMINATED TO 1/16" SHT.
.032" ALUM. LEADOUT GUIDE
W1,2,3 - 1/8" PLY.
W4-8 - 1/8" SHT.
W1
W2
W3
W4
W5
W6
W7
W8
NOTE: MODEL IS BASED ON DOUGLAS AIRCRAFT 3 VIEWS & PHOTOS OF "502" AS IT APPEARED IN 1965 AT MCAS YUMA, ARIZONA



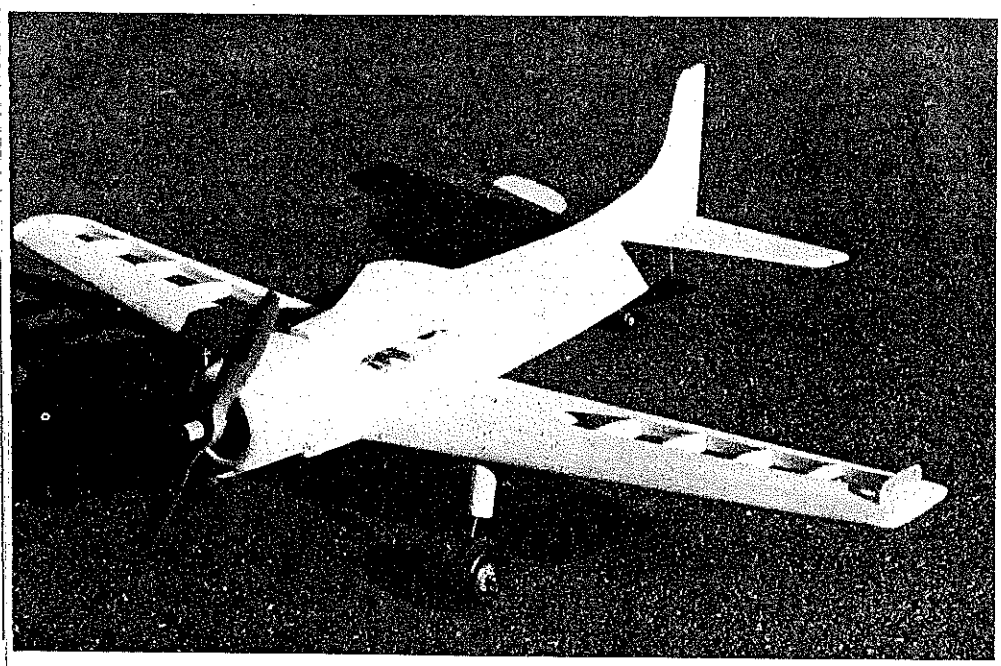
The fuel tank was mounted on the original model with a brass strap and two screws. Of course, the more traditional hook and rubberband arrangement could be used equally as well.

wings taper in thickness.

Join the wing panels either "in the air" or pinned down to the board with the tips blocked up, using whichever strategy seems easier. My method was to block the tips on the board, glue the panels together, then remove the wing from the board to allow fitting the joiners. A handful of clothespins will help to clamp the joiners in place.

Add the wing sheeting, sanding the bottom of the center section flat so that it will blend with the fuselage.

Join the fuselage and wing. You may have to thin the fuselage a bit or open up the wing's center slot to allow things to fit together. This becomes a very strong joint, especially when epoxy is used. Double-check the alignment before the epoxy sets up.



The Skyraider takes shape even in bare wood. The cowling and landing gear doors are simple to include, and they add realistic touches that are not normally seen on a profile model.

Landing gear, stabilizer, and elevators. Make up the landing gear wires to fit, and glue ⅛-in.-sq. filler pieces at the ends of the grooves. Make the LG doors, which will be held to the LG with some small wood screws through the brass clips. A drop of Hot Stuff in the holes will make stronger threads in balsa. Bend the tail wheel wire with its folded-over top end. Anchor the wire in an epoxy-filled hole in the fuselage.

Cut out the stab and elevators; cut down and bend the horn as shown. Sand these pieces to shape, and add the hinges—either the plastic RC variety or cloth over/under type. My model has plastic strip elevator hinges, but these are fairly stiff and don't allow the very free controls traditional in Control Line flying. The plastic (Klett type) pinned hinges would produce more flexible controls, still a good idea for Control Line models.

Flaps, bellcrank, and controls. Cut the flaps away, and fit the Du-Bro aileron horn (or your homemade equivalent) to the right-side flap. Fit the other flap hinges as well, but don't glue them for the time being.

Due to dihedral and wing taper, the left flap needs a flexible link to the right one. Bend the link wire, and glue it in place flush with the lower surface of the flap. Make a socket for the left flap, necessary because the link wire needs to move a bit fore and aft, from a piece of flattened tubing. With these parts in place, the link wire can be bent as needed to make the flap positions identical on each side.

While we're still working on the wing, add about ¼ oz. of weight at the right tip to help maintain line tension.

Mount the bellcrank, and begin making the controls. Make the flap/throttle rod first since it's a little harder to get at. Two pieces of threaded-at-the-end rod are used, one each for the throttle and the flaps, while a third piece of plain rod hooks into the throttle hole of the bellcrank. Bend the three pieces to a close approximation of their final shape, join them together with wrapped copper wire or a piece of 3/16-in. brass tubing, and solder. A clevis at each end allows for some adjustment in length. Bend the rod to the bellcrank as needed for free and maximum movement.

Make the elevator pushrod. Since the threaded-end rods are quite stiff, a guide for the rod isn't necessary. Attach both rods at the bellcrank with soldered washers. Washers with a small enough hole can be made by punching through scrap brass or tin can stock with an awl. Trim the pieces round with snips and files.

It's advisable to get the flaps and elevators working well before the model is covered and painted. Hinges should be fitted into place, although you might find it more convenient to avoid gluing the flap hinges until after covering and painting are done.

Covering, painting, and finishing. Use your favorite method, or follow the method

Continued on page 168

chased by the club from Percy Pierce in Philadelphia, was divided among the members. It was black, "pure para," 1/32 in. thick, and came in 1/8-in. and 1/4-in. widths. Talc was the usual lubricant, although some members used liquid soap. Motors were made up with an S-hook on each end held in shape with rubberbands at the hooks, which were also covered with small rubber tubing. Thus, a motor could be easily used or interchanged on the flying field.

In general, all models were "flying sticks" with exposed motors. The most common type was the twin pusher, with occasionally a twin tractor or a single tractor. (Good flying models with the rubber enclosed in a fuselage were not to appear until the late 1920s, 10 years later.) Ambroid was the glue generally used; many joints were bound with fine silk thread.

Almost every component of a model built in 1914 was made by the builder. Besides rubber, the only material not locally available was goldbeater's skin (like doped white tissue), which was purchased from supply houses in the East. All other materials could be found right in Milwaukee. Tissue used was lens tissue from the drugstore. Piano wire was sold in hardware stores. Wood shops sawed sticks and prop blanks from pine and basswood. A bamboo blind from a curtain store provided fine bamboo for splitting as needed. Lynn often purchased group supplies, but the other members provided a lot on their own as well.

As time went on each member had stacks of models, the parts of which were often interchanged. Building and flying was a continual process; each model was a bit more advanced, lighter in weight, cleaner in design.

Flight was a matter of launching into the wind and letting the model take its own direction—some had a natural circle, others went in a straight line. Glide was never a prime factor for duration. Since the original aim was distance, straight flight was to be desired. Besides the twin pushers at which they excelled, the club was possibly the most advanced in the country in design and flying of single tractors. Contrary to some contemporary writings, the Milwaukee tractor was a smooth-flying model with a good transition from power flight to glide. It flew so slowly that a builder could trot alongside the model as it gently glided in for a landing. Generally wheels or floats were fitted to models only for ROG and ROW flying. Hand-launched models had no landing gear. A twin tractor with wheels, held by Ervin Eiring, can be seen in the photo.

The Milwaukee Model Airplane Club was an enterprising forerunner of today's clubs. Next month we will wrap up the history of this early, innovative group.

SAFE FLYING IS NO ACCIDENT

Skyraider/Lidberg

Continued from page 74

used on the prototype as shown in the photos. My choice of finish was driven by three factors: First, the color selection, gray, isn't commonly found in dope or epoxy. Second, I wanted the finish to be easy to duplicate. Third, I had decided to decorate the model with painted-on and stuck-on markings.

In the end, the need to protect the markings from fuel became the decisive factor. Clear spray-on epoxy shielded the markings—and opened the door to all sorts of possibilities for dope or paint, none of which had to be fuel-proof. Searching for a light gray disclosed a Dove Gray used on 1979 Fords, available as acrylic lacquer in touch-up spray cans at an auto parts store.

Two coats of clear nitrate dope were applied to the whole model, which was then covered with wet silkspan tissue. After drying, two more coats of nitrate clear were applied. A small amount of powder/dope filler (about two tablespoons of talc to four ounces of clear dope) was applied, and the plane was sanded thoroughly. A few extra coats of filler were applied wherever the silkspan overlapped. After additional sanding, the Dove Gray spray was applied.

You'll need to devise some type of hanger

Continued on page 174

for use during the painting process—the plane is painted a single color, and the landing gear, which as a rule can serve as a hook, isn't yet attached. I suggest bending one from coat hanger wire. By hooking the hanger securely under a couple of engine mount bolts, you can hang the plane from a stepladder or clothesline while you paint.

To create the markings it isn't necessary to follow the somewhat tedious method I adopted. A considerably easier procedure can also be used.

On the prototype, I masked each of the block letter/numbers using artist's frisket, then sprayed with black enamel. For the smaller letters I used Leroy lettering in India ink on clear, sticky decal material from Peck Polymers; these were cut out and stuck on. Sig's 4-in. star-and-bar insignia were also utilized.

An easier approach is to make a Xerox copy of each letter desired, cut and arrange them on an 8½ x 11-in. piece of paper (holding with Scotch tape or rubber cement), and take them to a blueprint shop. Ask the clerk to Xerox the markings onto sticky-back material, which can then be cut apart and used like a sticky-back decal. This will cost about $1 per sheet.

The antiglare panel, rear faces of the cowls, and step panels are masked and painted black. Silver, white, or a light blue can be used for the canopy; the rudder should be white. A few lines representing panels, hinges on trim tabs, cowl flaps, etc. significantly enhance the scale appearance. Use a drafting pen-and-ink or a marker meant for writing on film or plastic and usually labeled "permanent." Let everything dry for about four days, and then apply two coats of Black Baron clear spray epoxy. This material will withstand up to about 15% nitro fuels after aging for a week.

Final assembly. Once the epoxy is dry, fit the LG with its doors, straps, and screws, attaching the wheels with soldered washers or wheel collars. Add the bellcrank and pushrods, and make the solid wire lead-outs. With the elevators in neutral and the throttle in high-speed position, the throttle lead-out is made up 3⅛ in. longer than the elevator lead-outs.

Add the engine and muffler. Attach the fuel tank with silicone glue, rubberbands, or a brass strap and wood screws. If the muffler has a pressure fitting, run a line from it to the lower vent of the tank. Remove this line at the muffler end for overflow when filling the tank, then reattach it. Cap the top vent with a plugged or folded-over piece of fuel line—a very neat arrangement that does away with fuel dripping out of the vents and all over the plane.

As shown on the plan, the A1H can balance over a considerable range and still be flyable. With the balance point far forward, the plane will be highly stable and fairly slow to respond to control changes. As the balance point is moved rearward, the model becomes more sensitive. The prototype balances just behind the leading edge of the wing at the fuselage with the tank empty. It's a nice plane to fly since it's very stable and doesn't require constant elevator corrections. It also glides well with the engine off.

With a heavier engine, it would be wise to add some weight at the tail to bring the balance point at least to the wing's leading edge. Some serious fliers have in fact advised that balancing even farther back makes for better slow-speed flight.

Once you've achieved the desired balance point, do a dry run at home with the model, hooking up the flying lines and handle. Make sure the throttle and flaps move correctly in response to commands from the third line.

Flying. Bear in mind that the A1H is a taildragger. Be sure to maintain *up* elevator to keep the plane from nosing over as it's released on takeoff, especially from grass. Have a helper hold the model for the first few flights, and release it at high-speed, flaps-up position. As you learn more about the plane you may want to try taxiing around at low speed and opening the throttle to take off. Set the throttle speed sufficiently low to allow touch-and-go maneuvers or landing under power, taxiing, and taking off again.

The linked throttle and flaps are an unusual arrangement—not by-the-book Scale, but a bit more orthodox than the latch-type flaps used on Carrier models. If you prefer,

Carrier-type flaps and a hook can be easily adapted even after the model is completed, due to the profile construction.

Other possibilities for the flap configuration can also be explored, such as sliding link to the flaps. In this arrangement, the flaps would be pulled to the lowered position by a spring, and the sliding link would be set to raise them only during the last third or so of throttle rod travel. Takeoffs could be made at nearly full power, but with the flaps down as in full-scale flight. After takeoff, that last bit of throttle movement can raise the flaps for high-speed flight.

Model projects such as this one often require some assistance. My thanks go to old flying buddy John Patton for his technical help and dedicated efforts.

If a Sport Scale model for Control Line answers your present needs, the A1H won't disappoint you. It's a durable plane that should bring many hours of flying pleasure.

Hardware, etc. Used on the A1H

(All items available from a well-equipped hobby shop or from Sig.)

- O.S. Max .15 with throttle and muffler, 8-4 Master Airscrew prop (Engines between .15 and .25 are suitable.)
- Perfect #21 short Senior wedge tank, 1 oz. capacity
- ¼ x .025-in. brass strip (K&S) plus screws for tank mount
- 4-40 engine and bellcrank mounting bolts with blind nuts (need six)
- J. Roberts standard upright plane control unit and handle. (Can use LR products which are essentially similar.)
- Du-Bro strip aileron horn and connectors
- Sig 4-in. horn
- Goldberg Klett hinges (need seven)
- Threaded pushrods (one at least 24-in. size, two 6-in. size)
- Nylon small clevis (need three)
- Perfect 2-in. wheels
- ¾-in. or 1-in. tail wheel
- Sig landing gear mounts, 5/16 x 5/8 in. (need two)
- Sig landing gear straps
- Flying lines, .015 stranded wire, three 52-ft. lines
- Plasticote Car Color touch-up spray, 1979 Ford Dove Gray, stock #FM 8084, available at Pep Boys (need two 6-oz.-size cans). Other brands and sources probably OK if contents are marked "acrylic lacquer."
- Balsa, etc. as noted on plan
- Hot Stuff Super T for most joints
- Epoxy glue for specified joints
- Black Baron clear spray (need one can)
- Nitrate dope (need about ½ pint)

When responding to advertisers, mention that you read about them in *Model Aviation*