OV-1 MOHAWK

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PHOTOS BY KEITH SPARKS

? MODEL AIRPLANE NEWS

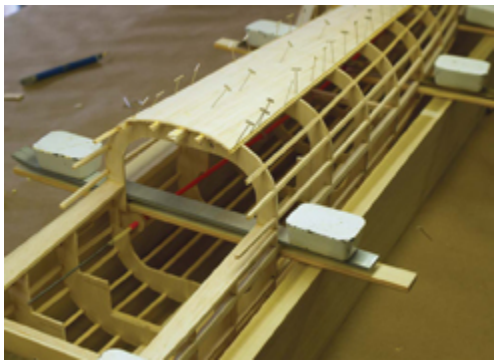
SCALE SPECIAL ?

THIS ?-SCALE ELECTRIC IS A GREAT FIRST TWIN

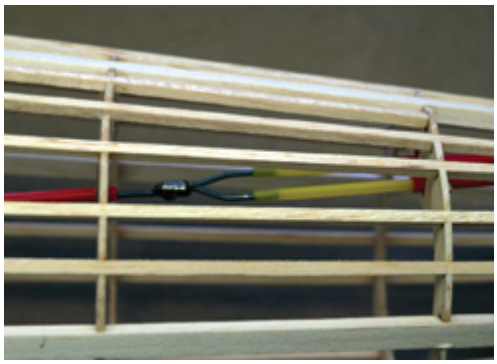
The first OV-1 Mohawk was produced in October 1959, and it was the first turboprop-powered aircraft in the U.S. Army's inventory. It served in Europe, Korea, Vietnam, Alaska, and Central and South America and during Operations *Desert Shield* and *Desert Storm* in the Middle East. The Army retired it from service in September 1996 after 380 original Mohawks had been produced. I think that the Mohawk has seldom been modeled partly because it is a multi-engine plane, but mostly because of its nacelles' and canopy's complex shapes. With advances in electric flight, the first problem has been solved. As for the canopy and nacelles, they are available from me at sparky2@att.net.

Flying a scale model should not be an ìeventî every time you take it out. With this in mind, I made a few subtle changes from scale to make it enjoyable to build and fly. If you have never planked a fuselage before, this one would be a good first experience; the only compound curve is near the nose.

CONSTRUCTION



Note the fuselage building fixture; the stringers are being added to the bottom of the fuselage. Rubber bands hold the water-line stringers together.



The split-tail pushrod is easily installed before the sheeting.

The fuselage is needed during the first few steps of wing construction, so start there. To build the left

half, secure the centerline stringers over the plans, and bond formers B-6 through B-15 to the stringers. (Make sure that they are at 90 degrees to the work surface.) Attach the left water-line stringer to the formers, and double-check the 90-degree angles before you bond them permanently. Remove the left fuselage half from the plans.

The rest of the fuselage frame must be assembled in a fixture. Two parallel boards at 3.5 inches from the work surface will support the main stringers while you build the airframe. It's important that the boards be free of warps if you're to build a straight fuselage. I supported the fuselage between the boards by using sticks of equal thickness to span the gap between them. With the ìspan sticksî under the centerline stringers and weighted sticks above, the stringer is held firmly in place and remains true. You'll need six of these stick sets at first; as the framework progresses, it stiffens and requires less support.

I used a fixture I found in the finished-wood section of a home improvement store and made sticks out of paneling trim strips. Paint-stirring sticks would work, too.

Put the left fuselage half in the fixture, and clamp it there with the weights. Install the formers to match the ones already installed. Add the right water-line stringer. Again, check the angle before you bond these.

To add the remaining formers, put the fuselage frame in the fixture with the bottom facing upward. Using the plans as a guide, measure from one former to the next to determine their positions. Note: wetting the water-line stringers forward of former B-4 will make them easier to bend to shape.

IF YOU HAVE NEVER PLANKED A FUSELAGE BEFORE, THIS ONE WOULD BE A GOOD FIRST EXPERIENCE

To install the ?-inch stringers, start from the top and work down. Make sure that the centerline stringer is straight before you bond it. With the fuselage top-side up in the fixture, add the rest of the stringers and the bottom hatch-frame plates.

Install the wing-mount filler blocks; they should be flush with the outside of the fuse-lage-frame sides. Use the fixture to make sure that the blocks are not warping the frame before you bond them into place. Formers B-8 and B-9 will need the °-inch-square cross-braces to strengthen the wing in case it touches a solid object while the model is taxiing.

Since it was easy to access the inside of the fuselage at this point, I made the ìsplit tailî pushrod and installed it and the nose-gear steering bracket.

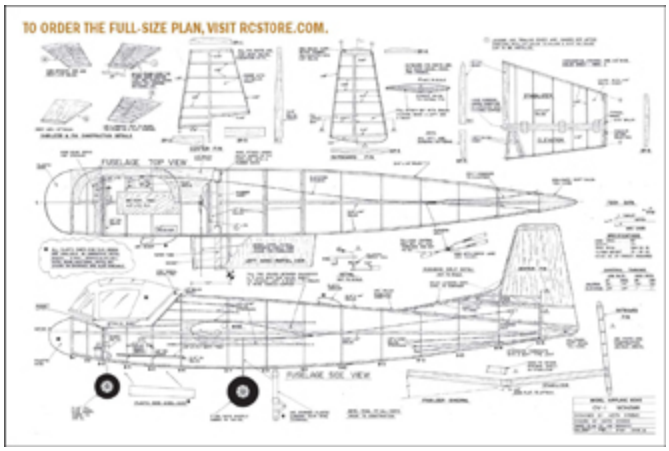
With the frame in the fixture, I bonded as much sheeting to it as I could. Alternate between the top and bottom sheeting until the fuselage is about half sheeted and is stiff enough for you to remove it from the fixture.

When you've sheeted the sides, push a pin through the sheeting from the inside at formers B-6, B-7 and B-9 to position the top of the waterline stringer. You'll use these pinholes to position the spar tube and to set the angle of the wing to the fuselage.

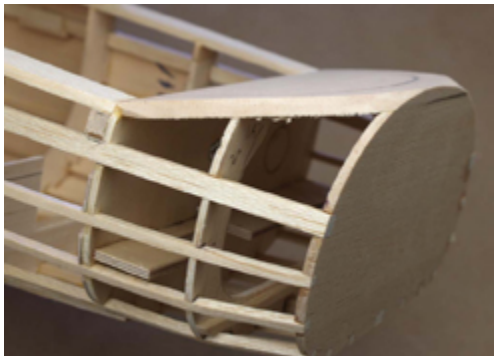
The skin forward of former B-3 is sheeted in small sections with 3/32-inch-thick balsa. The additional thickness is needed so that you'll be able to sand the curve of the nose properly. This area is sheeted last when the hatch plates are in place.

SPECIFICATIONS

- **MODEL:** OV-1 Mohawk
- **TYPE:** twin sport-scale electric
- **WINGSPAN:** 59 in.
- **LENGTH:** 47 in.
- **WEIGHT:** 70 to 80 oz.
- **WING AREA:** 408 sq. in.
- **WING LOADING:** 5.4 oz./sq. in.
- **DRIVE SYSTEM REQ'D:** Speed 500 brushed (or equivalent brushless) motor (43 oz.-in. of thrust)
- **DRIVE SYSTEM USED:** Axi 2028/24 w/9◊4.5 prop, Castle Creations 25A ESCs, Tanic 2450 Li-poly battery
- **RADIO REQ'D:** 4-channel (throttle, elevator, nose gear, steering; a fifth channel is needed for flaps)
- **RADIO USED:** Futaba T6XA transmitter, Hitec Electron 6 receiver



HATCH



The forward hatch plate is sanded to shape before the sheeting is completed.

The sheeting must be prepared to accept the aft hatch plate. You'll need a wide sanding pad to keep it flat.

Use a wide sanding block to sand away the sheeting and stringers at an angle from the top of former B-6 and B-5. A wide sanding block will keep the area flat, and you'll avoid making low spots in the sheeting.

Repeat this step between the tops of formers B-1 and B-3, and then bond a solid sheet of balsa to the sheeting's sanded edge. Sand away any excess balsa here so that it is flush with the fuselage skin. Installing these two plates before you cut out the hatch opening keeps them flat. When they're in place, cut out the hatch.

To make the hatch cover, cut balsa plates
to match the hatch cutout. Cover the edges of the hatch opening with plastic wrap, and assemble the plates on the fuselage. After you've installed the hatch dowels and the hold-down magnets, sand the hatch to match the fuselage. When you bond the canopy to the hatch, the plastic wrap will prevent you from bonding the hatch, too.

TAIL GROUP

The tail frames have been sanded, and the first side of the sheeting is drying.

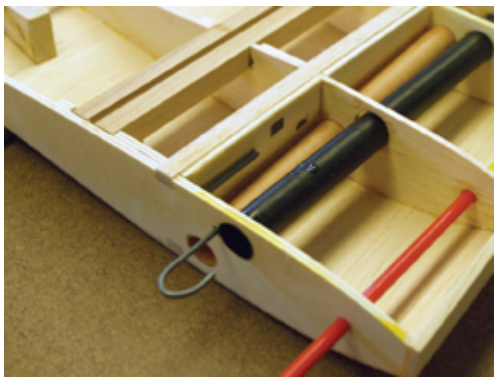
The outboard fins are installed and ready to paint. Note the relief that will accommodate the fin. The center fin must have its top installed before the leading edge can be completed.

The tail group is assembled with a slightly different approach, but the procedure produces a fast, strong and very light result. Because the horizontal stabilizer and elevators are assembled at the same time, you get a perfect match every time. First, assemble the airfoil frame in a ìshadow boxî over the plans. Mark the ends of the ribs with the airfoil shape using a template as a guide, and then sand and sheet it on one side. Do all of this on a flat surface. When the sheeting has dried, the panel will be rigid. Now sand the other side to an airfoil shape and sheet it. Be sure to support the leading and trailing edges when you bond the sheeting to the second side, particularly if you use a weight for clamping pressure. Be sure to protect the hinge line from glue when you bond the sheeting. Putting plastic tape on both surfaces is an easy way to avoid the problem. Set the stabilizer dihedral by raising the tip and sanding at a 90-degree angle at the edge of the work surface.

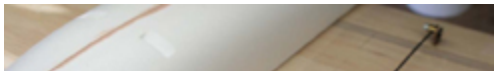
The method used to attach the tail group to the fuselage is a little different. The lower half of the vertical stabilizer is part of the fuselage. Because of this, the top half is attached after the horizontal stabilizer has been installed, and then the leading edge is completed.

To attach the outboard fins, hold the fin against the tip of the stabilizer at the attachment point and mark its position. The balsa that covers this area will be thick enough for you to dig a hole in its surface to mount the fin. Work slowly and test-fit often. Use epoxy so that any gaps in the bond will be filled.

WING



When you’ve sheeted the tops of the wing panels, add the rest of the components.



The speed controls and motor are easier to install before the nacelles have been put into place.

The servo installation is easily achieved through the cockpit/battery hatch.

Check the motor-mount plates before you install the mounting blocks. Note the shims positioned under the main wheels to obtain the correct angle.

The plan shows two motor-mount options: stick mounts for geared brushless motors and firewalls for outrunners.

Although the first model I made did not need flaps, I put them on the second one for windless days. Adding flaps to the design complicates the construction, but you can't make that scale approach without them.

One servo mounted in the fuselage moves the ailerons through a cable push-pull system. I did this to keep the servo leads short, so you could also install dual servos with very little engineering.

Before you assemble the wing panels, use rib W-1 and the marks made on the side of the fuselage to identify the positions for the wing tube and the other holes in the fuselage.

Start assembling the wing by building the wing-panel frames over the plans. Tack-glue a º-inch-square balsa stick to the aft of the ribs to support them while they are being bonded to the spars; this keeps them aligned until you've finished sheeting the top. The flat spot on the ribs' leading edges have a 3/32-inch balsa strip to support the forward end of the ribs while the wing is being sheeted. This strip also keeps the top sheeting straight and helps you to avoid making thin spots when you sand the leading-edge balsa to shape.

With all the shear webbing in place, you can install the wing-spar tube sockets and the spar tube. This sets the dihedral of both panels while the panels are on a flat surface. Support the panel tips 2.5 inches above the work surface and parallel with it while you bond the sockets into place. It's important to have a good epoxy bond between the socket and the lite-ply shear webbing. This is where all the flight loads will be transferred from the spar tube to the wing panel. Note: if you need to adjust the socket holes in the wing ribs to obtain the proper alignment, rolled sandpaper makes a handy tool. Be careful not to alter the size of the hole in R-1; it's critical to proper wing placement.

After you've installed the spar sockets, sheet the top surface. To find out where you should put the weights while the glue dries, just mark the work surface to identify the rib positions. After you've sheeted the wing-panel frames, they'll be fairly stiff. For the rest of the assembly, you'll need to support only the trailing edge. Mark key points on the upper panel by pushing a straight pin through the upper sheeting. This method gives you the most accurate marks to use when you cut the ailerons or flaps free of the wing panel later. It also helps you to position the motor-mount bays or flap servo bays (depending on the options you choose).

Before you close the wing panels with the bottom sheeting, add the aileron cables, the balsa blocks on which you'll mount the flap hinges and the rest of the bits and pieces you'll add to the panel. After that, you have only to cut the ailerons and flaps out of the wing panels, add leading- and trailing-edge balsa strips, and then install the control surfaces.

FINISHING

Here is the prototype model painted in high-visibility colors. Without the flap options and underwing ordnance, it weighs 5 ounces less than the green model and can fly on less power.

I covered my model with clear MonoKote and painted it with enamel Oregano satin straight from the can. I think that the absence of pigment in the MonoKote makes it stick better because although my plane sits in the Texas sun, the MonoKote has not wrinkled; I believe that it's protected by the paint. I tested the finished covering and found that a low-tack tape didn't lift the paint, even off a non-scuffed surface.

I assembled the nacelles with model-airplane cement and test-fit them on the wing with the motors installed. I marked their positions with a felt-tip pen, made hundreds of holes through the MonoKote for a good bond and then epoxied the nacelles into place.

FLYING

In a crosswind, the model tends to weather-vane on the takeoff roll when its nosewheel gets light. Adding some width and toe-in to the main gear helped the problem. Rotation and liftoff are very predicta
ble. The model has a good climb rate and gives you plenty of warning when it's approaching a stall. On a calm day, the Mohawk will cruise on half power. With throttle management, you can fly for 12 minutes, but if you put on a show, expect 7-minute flights with two, 3-cell, 2100mAh Li-poly packs.

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Because of its slow roll rate, it needs a little down-elevator while inverted going through a roll. Use a little power on approach, and there is plenty of airflow over the tail for positive control. When it's in ground effect, nose-high touchdowns are the norm.

I strongly recommend a 2-blade prop for your test flight. A 3-blade prop might look better, but the loss in efficiency will limit your reserve power and shorten your flight times. Adding wing tanks and weapons under the wing had very little effect on the model's flight. They are mounted on the CG, so you could add them after a few flights.

LAST THOUGHTS

I hope you enjoy building and flying the OV-1 Mohawk as much as I did. It makes a great twin, and you'll certainly have a unique model at the field.

See the Source Guide on page 176 for manufacturers' contact information.

Construction