By Alex Bouknight

OSPREY TWO

This mid-wing .45 powered beauty is a real performing aircraft designed by Alex Bouknight for all-around sport flying, and will sharpen up your pattern maneuvers.

The mid-wing airplane has long been known to offer some real advantages in terms of aerodynamics over conventional type arrangements such as high or low wing versions when dealing with aerobatics. The longitudinal center of mass is closely related to the position of the wing on the fuselage and is a little above the centerline of the airfoil on a low wing design. This means that there is more of the mass of the fuselage and fin/rudder area on top of this center of mass than on the bottom. When you apply rudder only in level flight, you get what is called rudder or roll coupling. This condition results in an adverse yaw to the opposite direction intended and often drops the nose. This condition shows up on maneuvers like knife-edge or 4-point rolls where cross controlling is needed to compensate for the effect to keep the flight path true.

By raising the wing position to a middle area, it is easier to design a fuselage with a closer to equal area above and below this centerline. This also enables the engine thrust line and the stab to be positioned on this same line which produces fantastic rolls because everything is revolving around a central axis. This eliminates the barrel rolling effect where the nose moves in a spiral instead of staying on the axis line.

The problem is where to put the radio gear with a wing panel running through the middle of the radio compartment. The answer is to have two separate wing panels positioned on a strong aluminum tube running through the fuselage. The tube gives the necessary strength to hold the panels and yet does not take up much room in the radio compartment, allowing for a standard radio gear installation. Two dowels near the leading and trailing edge establish the correct incidence and keep the wing panel from rotating around the tube. The panels are held to the sides of the fuselage with wing bolts running from the inside of the fuselage out into a spruce block in the wing that has been tapped. This makes for easy transport to the field, too, since there are two shorter panels instead of one long wing.

This method of attachment allows for super accuracy concerning incidence and dihedral if you use great care when doing your drilling and layout work. I will explain a little trick I used that will produce good results. The tube used is 1/2" T2024 aircraft grade aluminum and you will need two pieces, one for the actual tube and one for a cutting tool. The aircraft tube needs to be 15¾" long; long enough to run from the outside edge of the #3 rib, through the finished fuselage, to the outside edge of the #3 rib in the other panel when in position. The other tube needs to be about 12" long. I filed the inside edge of this tube razor sharp with a small pencil file while keeping the outside diameter the same 1/2".

After the holes in the fuselage are drilled, this tube can be used to cut the holes in the ribs and ply plates with the wing panel in position. Making sure that your tubes are perfectly straight and the original fuselage holes are positioned accurately, the cutting tool will cut exact size holes in exactly the right place. Block the panel into an accurate position and rotate the cutting tube to cut the holes. This eliminates the problem of drill bits drifting or tearing the edges of the holes. The holes in the fuselage should be drilled undersized and sanded to the correct size using sandpaper wrapped around a smaller dowel. This will clean up the drilled hole and allow for some realignment in case the bit drifted. Take your time here; an accurate fit of the tube in the fuselage will prevent slop in the panels which leads to uncontrollable wing flex in flight.

This system works great when done correctly and very unfavorably when done sloppily. There is a servo in each wing panel connected to a Y chord to drive the strip ailerons. This will produce very precise, no slop linkages, using a simple wire connecting rod attached to the control horns. The servos should be positioned in the panel so the top edge of the servo case is flush with the sheeting. If the servo sticks up too high, the laminar flow will be disturbed in the form of turbulence.

The airfoil sections chosen are the NACA632A series with the maximum camber at 35% of the chord. These airfoils were designed to achieve low profile drag and high lift while preserving as much laminar flow over the largest wing area possible. I chose to use a root airfoil on the wing panels of 17% with sheeting, and a tip airfoil of 18.5% with sheeting. The stab has a root airfoil of 10.8% with sheeting and a tip airfoil of 15% with sheeting. The leading edge of the wing is tapered at 10° and the stab is 15°. The thicker airfoil at the tips reduces the tip stalling tendencies found on some tapered wings and the taper gives effective dihedral.

The fuselage uses the box type construction that is my personal favorite. It is hard to teach an old dog new tricks. It builds strong, light, and the curved contour is achieved by sanding the balsa triangle stringers to shape. The stringers on top and bottom give the fuselage added height and yet requires only 3" balsa side stock instead of the usual 4" stock. You can make all of your alignments; wings, stab, incidence, thrust, etc., with the fuselage upside down on a flat work surface before the turtledeck is built. This also helps to get all of the bulkheads and the firewall true and square with the top block. Be sure to choose your wood carefully. Heavy wood builds heavy airplanes.

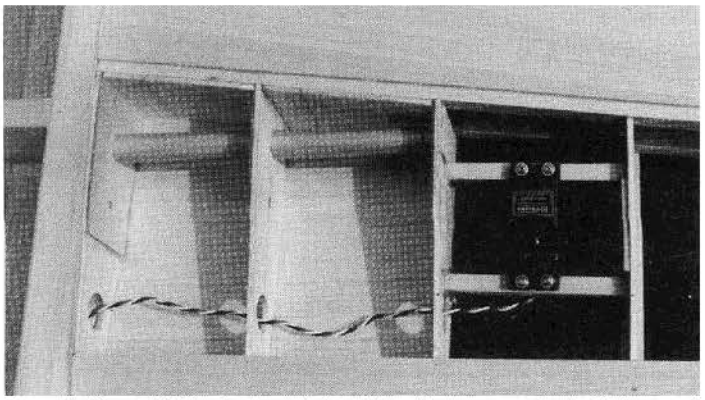
On the subject of weight, the plans are drawn using a Hallco B105 gear and my own wheel pants. I think that wheel pants dress up the appearance and the gear takes the punishment of the grass fields I usually fly on. If you are striving for the lowest weight possible, and fly on a paved strip, substitute music wire gears and much smaller tires than those shown and leave the pants off. This could save 5 to 6 ozs. Use MonoKote to cover the wing and stab. I usually paint the fuselage because of the compound curves but, in any event, keep it as light as possible. I always assemble the aircraft with all components after I have finished with the final wood sanding. This is so I can get an idea of the C.G. before I begin the finishing process so I know beforehand where I can put paint and where not to put paint. There is nothing more distressing than finishing a gorgeous paint job and finding out that the nose needs a half a pound of lead because it came out tail heavy with that gorgeous paint and trim scheme.

Before you begin the construction, study the plans carefully and order the materials from the material list and the necessary components to finish the ship. No need to hold up the whole project on a missed part. I find it easier to cut out the parts first, and then begin construction so it builds like a kit. Take your time and do an accurate job on the parts and you will need less glue to hold them together. Less glue and better fit mean less weight and better vertical performance.

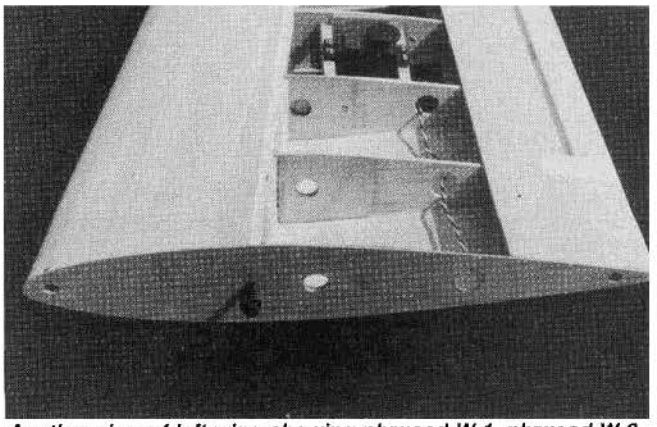
CONSTRUCTION

Wing:

Begin the construction with the wing panels. I would suggest the use of a wing jig to be sure that the panels are straight and true. These panels have no wash-in or wash-out and the jig insures that accuracy. The ribs drawn on the plans have the jig holes drawn in place. Draw centerlines on all of the ribs and cut out the spar notches. Drill holes to route the servo wires in ribs #1 through #3. Place the ribs on the jig rods in the proper sequence and use the spacing on the plans. I used a table saw and a fence to trim the excess material off of the front portion of the L.E. triangle while keeping a uniform thickness from the back edge. Draw a centerline on the front and back side of the triangle leading edge. Notch for the rib locations and pin into position. Add top main spar. Draw centerlines on the front and back side of the rear spar after cutting from 3/8" sheet and notch for the rib locations. I also used a table saw to cut the taper, 5/8" to 1/2" to the rear spar. Pin into position. Be sure that all the centerlines on the ribs and the L.E. and T.E. line up and the stock



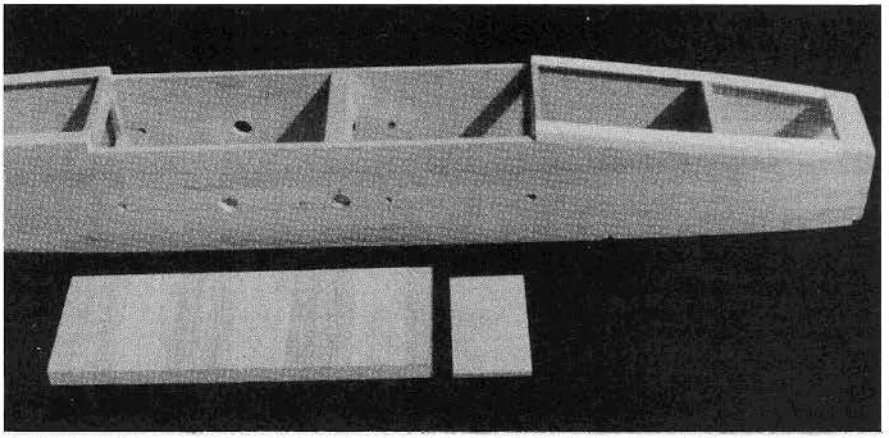
Bottom of left wing panel showing aileron servo installation and carry through tubing. Note plywood doubler (W-3) on W-2 rib, and tube stop on rib 4.



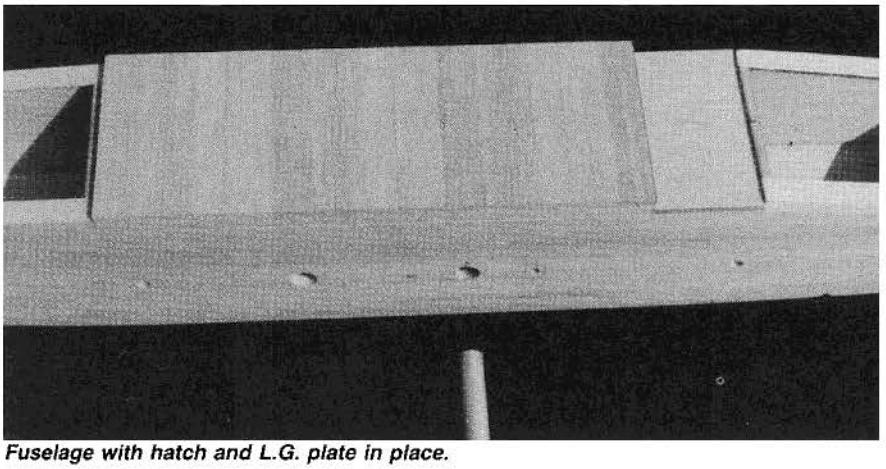
Another view of left wing showing plywood W-1, plywood W-3, and W-5 doublers.

is not bowed. You can straighten bowed wood by wetting it slightly and clamping it in the correct position until it dries. Glue with a cyanoacrylate type glue.

Add the 1/2" gussets. Trim the edges and glue together the sheeting pieces for the front section on a flat work surface. There is one 3" sheet and one-half of a 2" sheet, since you do not need a whole sheet because of the taper. Cut the 2" x 36" into two equal parts 18" long. Make one right and one left. Hold in position and mark the taper cut. Cut against a straightedge and glue in place. The end scrap off of this sheeting makes the center section sheeting. Trim to length and glue the



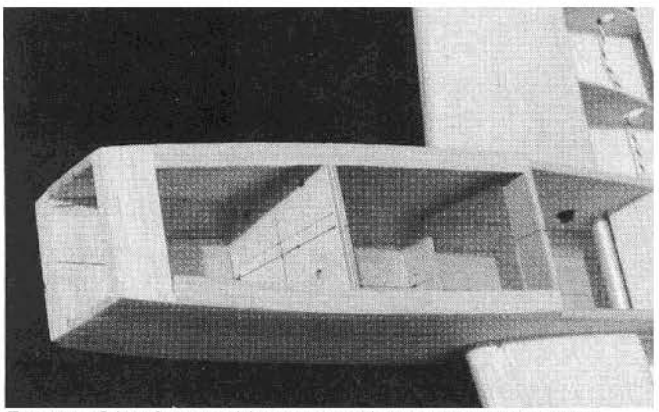
Bottom of fuselage ready for main L.G. plate and radio compartment hatch. Note cross grain sheeting on hatch.



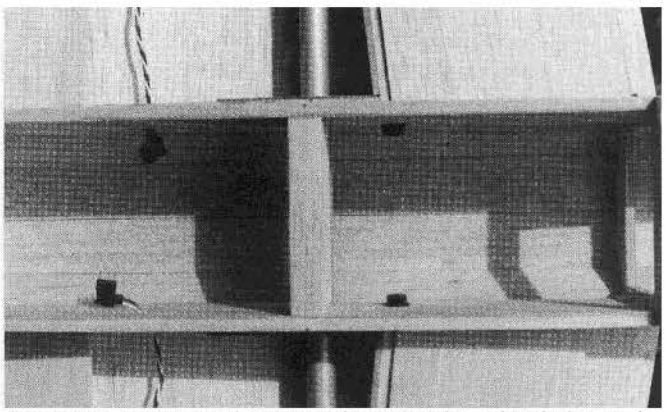
Fuselage with hatch and L.G. plate in place.

2" sheeting over the rear spar, top and bottom. Finish the center section and capstrips on the top surface. After the glue dries, the panel should be strong enough to be removed from the jig. Add the bottom main spar.

Repeat the same process if you are building the panels one at a time. I built mine on an A-Justo-Jig, building both at the same time. Be sure to build one right and one left panel. Cut the 1/2" balsa tips a bit oversized and glue into position. These will be shaped after the sheeting on both sides is finished. Be sure to use light wood of the same weight so the panels will end up close to the same weight. Add the 1/2 ribs and servo rails to the servo bay



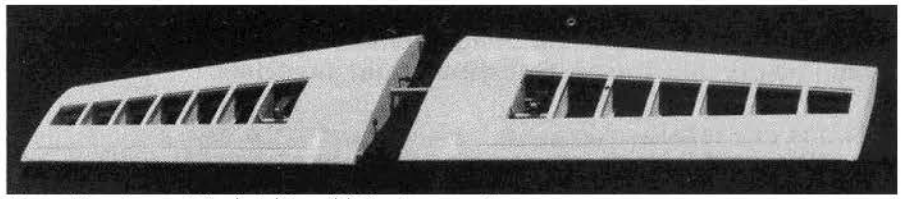
Bottom of fuselage looking into engine and fuel tank bays.



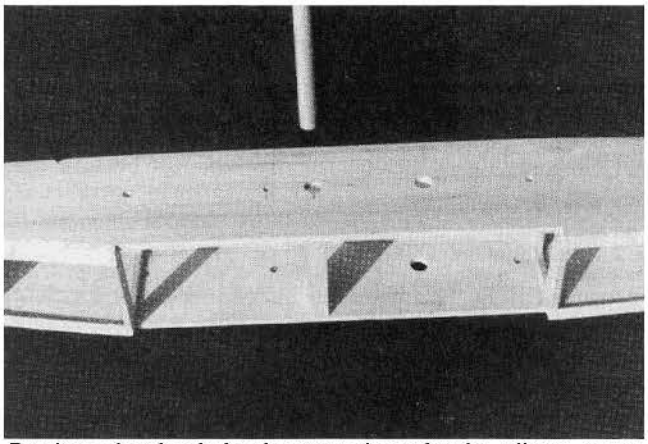
Radio bay showing wing carry through tube, wing bolts, and aileron servo leads. Note cut-out in forward former for fuel tank installation

in each panel. Use epoxy on these rails so the servos will have a firm mounting surface.

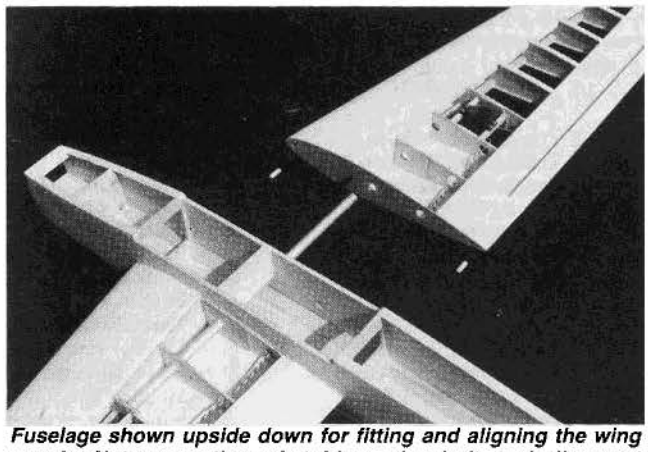
Construct the trailing edge section and the aileron as if it were one piece. Pin the bottom sheeting to a flat work surface. Taper the L.E. piece of the aileron, 1/2" to 3/8" after cutting from the 3/8" sheeting (see plans). Glue into



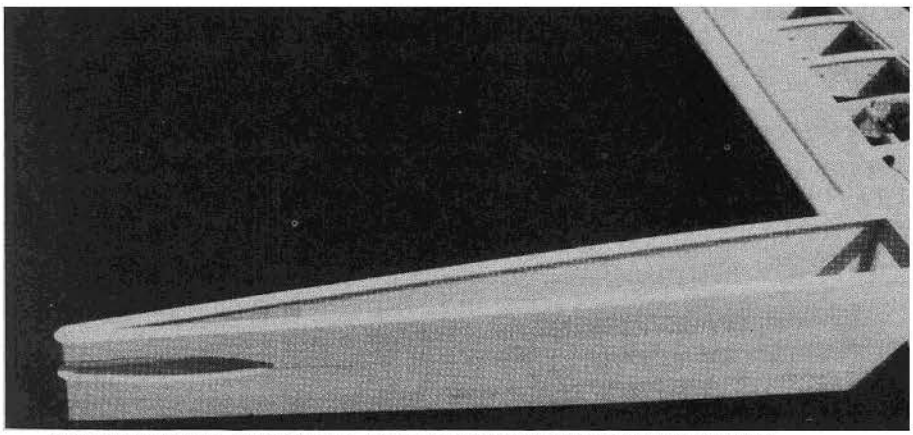
Top side of completed right and left wing panels.



Fuselage showing holes for carry through tube, aileron servo leads, fore and aft alignment dowels, and wing bolt.



Fuselage shown upside down for fitting and aligning the wing panels. Note carry through tubing, wing bolt, and alignment dowels.



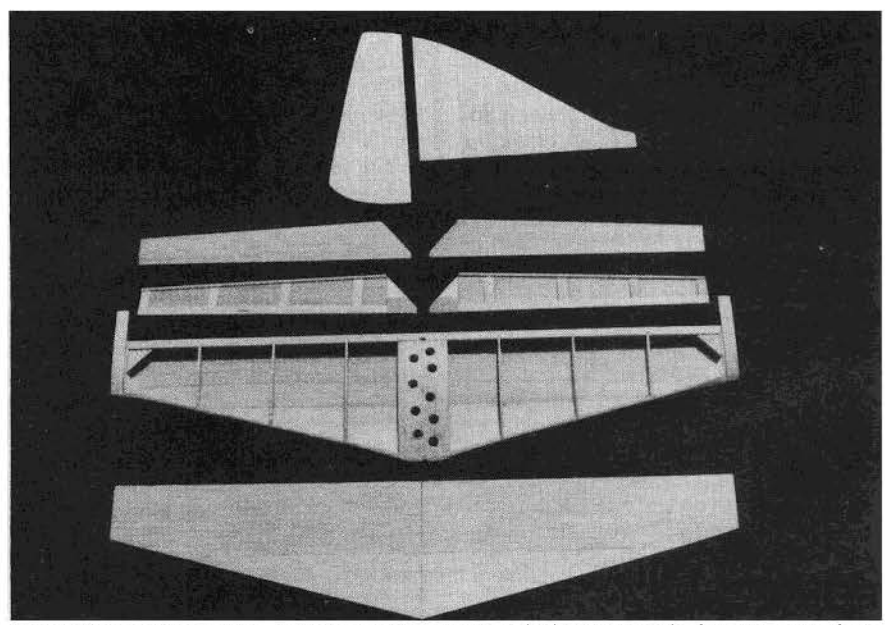
This photo shows stab cut-out. Be very careful to get incidence correct.

place. Add the ribs and T.E. Cut a notch for the aileron horn block and glue in place. After the glue has set, sand the top surface with a large sanding block so that the top sheeting will fit flat with the L.E., ribs, and T.E. Finally, add the top sheeting. Mark your hinge line and drill for your hinges. Cut the aileron away from the T.E. piece that goes against the fuselage. Make the cut straight and true since this will establish the aileron edge. Butt glue the T.E. to the rear of the rear spar. Be sure the centerlines that you drew line up and the centerline of the airfoil is straight. To get a good constant taper to the hinge surface on the L.E. of the ailerons, I ran them through a table saw with the blade tilted at 35° to allow freedom of movement when the control surface is worked. Place the T.E. against the fence and make the cut just below the hinge line.

Temporarily install the hinges to the ailerons and test fit to the rear spar. Check for freedom of movement and be sure the surfaces mate properly. Sand with a large sanding block to insure a uniform height and to correct any irregularities in the surfaces. The T.E. should taper down to just the pine trailing edge. Drill for the control horn and test mount. The mounting position to the rear of the gap will give differential movement, more up than down for the same throw on the servo horn. This is desirable since there is less drag when the aileron is in the up position.

Fuselage:

We cannot go any further with the wing until the fuselage is blocked up so the alignments on the wing tube



Empennage components. Horizontal stabilizer and elevator ready for upper surface sheeting. Note lightening holes in soft balsa center block.

Here is a list of the wood components that you will need to finish this ship along with a list of components that I used. Substitute your favorites.

4 — 1/16 x 3 x 36 Balsa
6 — 3/32 x 2 x 36 Balsa
12 — 3/32 x 3 x 36 Balsa
2 — 3/16 x 3 x 36 Balsa
2 — 3/16 x 3 x 48 Balsa
1 — 3/16 x 4 x 48 Balsa
1 — 1/4 x 4 x 36 Balsa
1 — 3/8 x 3 x 30 Balsa
1 — 1/2 x 3 x 36 Balsa

4 — 1/2 Triangle x 36 Balsa
3 — 3/4 Triangle x 36 Balsa
2 — 1 Triangle x 36 Balsa

6 — 3/8 x 3/8 x 36 Balsa Stick
1 — 5/16 x 1 x 3½ Balsa Block
1 — 5/8 x 1½ x 3½ Balsa Block
1 — 3/4 x 2 x 5¼ Balsa Block

2 — 1/8 x 1/8 x 36 Pine Stick
1 — 1/4 x 1/4 x 12 Spruce Stick
1 — 1/2 x 3/4 x 9 Spruce Stick

2 — 1/32 x 6 x 36 Ply
1 — 1/16 x 3 x 3 Ply
1 — 3/16 x 4 x 12 Ply
1 — 1/4 x 4 x 4 Ply
1 — 1/4" dowel x 6 Spruce
1 — 3/8 Triangle x 12 Spruce

1 — Spinner, 2¼" C.B. Asso.
1 — Engine Mount, Hayes AL-40 MT
1 — Engine, O.S. .45 ABC, Como .51, Supertigre .45 ABC, etc.
1 — Fuel Tank, SS-10
1 — Pkg. Fuel Tubing
1 — Main Landing Gear, Hallco B105-4, B105-5
2 — Axle Bolts, 8/32 x 2
2 — Main Tires, 2¼ or 2½"
2 — Wheel Pants, available from U.S. Eagle, Inc.
1 — Canopy, available from U.S. Eagle, Inc.
1 — Tail Gear, C.B. Asso. Tail Gear
1 — Tail Wheel, 1" with 3/32" Wheel Collar
21 — Hinges, Robart Steel Point
2 — Rolls of covering material, Wing/Stab/Elev.
1 — Roll for fuselage if you do not paint it
1 — Radio set, 4 ch/5 servos, 2 servos for ailerons
1 — Y chord for ailerons
2 — Pushrods, 5/16" spruce dowel, etc.
1 — Throttle Cable with ball link hook-up
4 — Control Horns
5 — Metal Clevises/Pushrods
3 — 10-32 or 1/4-20 Wing Bolts
8 — 6-32 Bolts, Washers, Blind Nuts
5 — Sheet Metal Screws #4 x 1/2
1 — Wing Jig, the jig is optional
2 — Pcs. 1/2" O.D. Alum. tube 15¾, 12"
Any painting supplies that you need for the fuselage

Alex Bouknight, P.O. Box 1902, Greenville, Texas 75401, offers .040 ASA wheel pants $7.00; .030 Canopy $5.00; Wing Jig $8.00. Add $5.00 with each order to cover shipping.

can be made. Start by drawing centerlines on the top and bottom surface of the top block. Mark locations of all the bulkheads on the top block at 90° to the centerline, top and bottom. Also mark centerlines on the nose ring, firewall, bulkheads, landing gear plate, and tail gear plate. Assemble the two piece tail post and mark the centerlines.

The sides are built as a sub-assembly before they are joined to the top block. You will notice that the balsa triangle stringers have the edge cut so they will glue to the sides and have the same 3/16" thickness. I adjusted the fence on my table saw so when the triangles were fed through the saw, the cut left a 3/16" edge. Prepare all the edges of the triangle stock according to the plans. This is the area that will be sanded to the profile shape later.

Cut the necessary tapers to the side stock and be sure the top surface is straight and true. Mark the locations of the firewall, bulkheads, and tail post. Mark the #3 and #5 bulkheads on the outside surface, making one right and one left side. These lines will help align the wing panels later. Draw alignment lines on the outside surface to show the thrust, wing incidence, and stab incidence. Glue the balsa doublers to the tail area and cut out for the stab.

Pin the sides to a flat work surface, inside up, over waxpaper or Saran Wrap. Glue the stringers to the sides, top and bottom. Leave off the area from the #3 to the #5 bulkhead on the bottom surface since that area is a hatch and is built separate. Also, cut the length of the top stringers at the front so they will mate with the balsa block when the sides are joined to the top block. Cut to size and epoxy glue the four ply doublers into position. There should be a slot left at each bulkhead position, except the #4 (see plans). Wipe any excess glue that gets in the slots so they are clear for the bulkheads.

Prepare all the bulkheads and firewall by cutting the corners off for the stringers. Plan your tank and radio installation and remove the necessary material. Lay out your engine mount on the firewall and drill for the blind nuts and fuel tubing exits. Remember that there is a 2° right thrust required and the mount will have to be shifted to the left to have the spinner tip end up on the centerline. Epoxy the blind nuts in place and fuelproof the front and back surfaces. Use the same technique for the landing gear plate, although it has no offset.

Place the top block on a flat work surface, upside down. Epoxy in place the firewall and bulkheads #3, and #5, making sure that everything is square and 90° from the top block. Add the tail post and be sure it is exactly on line with the centerline. Add the balsa nose block. Let everything dry. You can now add the side assemblies to the top block. I used the slow-type epoxy on all the side to bulkhead joints since it gives you time to get the alignment right. Aliphatic resin works well on the rest. Add the bottom nose block to pull the sides together at the front. The nose ring will be added later. I used a sponge to wet the sides slightly so they would bend a little easier. The #4 balsa bulkhead is used to pull the bow out of the sides so the wing panels have a square surface to mate with. After the alignment is right, clamp and let dry overnight.

Using your incidence lines and a wing panel, find the exact location of the wing tube holes to be drilled in the fuselage sides (see plans). Mark the hole locations and drill undersized. Use a dowel wrapped with sandpaper to finish the holes to size. Go slowly, and be sure not to make them too large. Also, drill the servo wire holes. Slide the tube in place and check to see if there is an equal distance from each side of your work surface to the tube. If accurate, clamp one panel into position and use the cutting tool to cut the hole in the #1 rib. There is a ply plate that covers the full surface area on the outside of the #1 ribs that gives you a good hard surface to mate to the fuselage. Hold in position, and mark the tube and servo wire holes. Drill undersized and sand the hole to the final size. **Do not glue yet.** It will be

added later. Epoxy the three inside ply doublers to the ribs that the tube passes through. Repeat this same process for the other panel.

Place the fuselage, upside down, on a flat work surface. Clamp one panel into position. Use the cutting tool as the wing tube. Measure the centerline on the T.E. that you drew from the work surface at the tip and at the aileron/trailing edge junction. Block up the tip so that you have the same reading with both measurements. This will give each panel 0° dihedral. You can now accurately cut through the #2 and #3 ribs with the cutting tool and have the exact panel placement that you want. Repeat for the other panel. If you have trouble cutting through the material, use the tool as a marker and drill undersized and sand to size each hole separately. You should end up with holes the exact size in the right place. Install the wing tube and test fit your panels to see if they fit properly with the correct dihedral.

Install the vertical grain webbing to the front side of the main spar. Cut to fit the spruce wing bolt block between the spars and epoxy in place. Finish by adding the back vertical grain webbing.

With the wing tube in position, slide the outside ply plate on the tube followed by the panel. Apply epoxy glue to the outside of the #1 rib and glue the ply plate to it with the panel clamped in position. Be sure that the ply plate mates with the fuselage side and you do not get any excess glue that will glue the plate to the side. It glues to the panel only. Let the glue fill any gap between the ply plate and the #1 rib.

The next step is to drill the dowel holes in the fuselage sides; see plans for the locations. This will set the correct incidence since the panels will still revolve around the tubes. Hold the panel in position and align with the incidence line that you drew on the sides. It should be 0°. Mark the holes to be drilled in the panels through the fuselage holes. Drill and test fit. You may want to add some small ply plates to the outside of the #3 rib holes so the wing tube will not move past that point. Be sure that the tube is exactly the right length, flush with the plates on each panel.

Drill the holes in the sides for the wing bolts, as per plans. Slide the panels into position and mark through the holes. Drill undersized and tap for a 10-32 or 1/4-20 wing bolt. The accurate alignment is now finished. Finish by sheeting the rest of the bottom surface of the panels. The sheeting covers the servo bay on the bottom side only. Cut out for the servo. Sand the leading and trailing edge to shape. Sand the outside ply plate to the airfoil contour, flush with the sheeting, at the #1 rib. Shape the tips to the airfoil shape at the tip rib. The panels in the finished sanding stage with hinged ailerons and servos should weigh 9 to 10 oz. each.

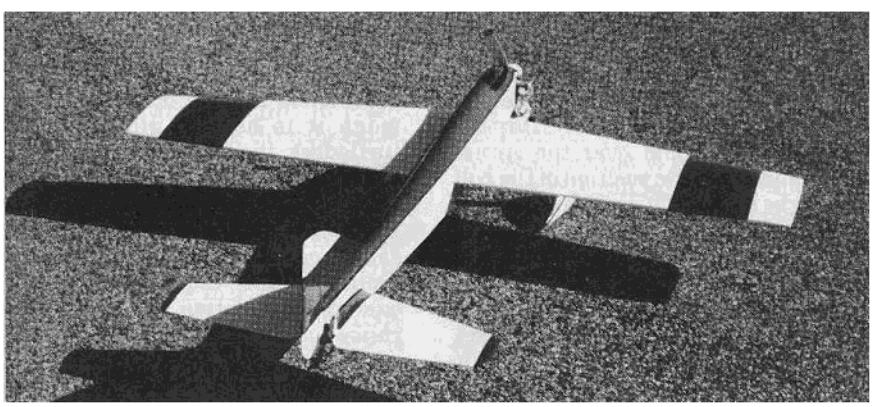
Tail Group:

Before we go any further with the fuselage, the stab and elevator need to be constructed. Begin by drawing centerlines on the back side of the leading edge triangle stock and both sides of the ribs. Use a one-piece T.E. for the entire stab span. Draw a centerline on both sides of the T.E. after it has been tapered and notched. I decided to beef up the center area of the stab with a balsa block. Use the stab block pattern and cut the airfoil shape with a bandsaw. It will span 1" on either side of the centerline of the fuselage. Choose very light wood for this block since the sheeting on top provides most of the strength.

I made a little jig using two pieces of 5/32" music wire and pine end blocks to hold the ribs during the construction, but this is optional. Pin the L.E. and the T.E. in place to the ribs and balsa block. Be sure everything is straight and glue with Hot Stuff. Edge-glue two pieces of 1/16" sheeting together over waxpaper. Repeat for the top sheeting. While that is drying, add the gussets. Sand the stab until all the edges at the T.E./rib junctions are flush, being careful not to alter the airfoil shape. Cut to size and sheet the top and bottom surface. The sheeting scrap from the stab will be used to sheet the elevators. Sand the L.E. to shape. Add the tip blocks and shape to finished form. Draw the elevator hinge line on the trailing edge and drill for your hinges.

Begin the elevator construction by pinning the top sheeting upside down, to a flat work surface, over waxpaper. Glue the tapered L.E. to the sheeting. Add the elevator ribs and horn block, and T.E. When dry, sand the surface to accept the bottom sheeting flat and glue the sheeting in place. Sand taper to elevator L.E. for the control surface movement. Mark and drill for your hinges and control horn. Test fit with the stab and sand to finished shape.

Edge-glue the 3-part fin together over a flat work surface. Mark the



OSPREY TWO

Designed By:
Alex Bouknight
TYPE AIRCRAFT
Sport/Pattern
WINGSPAN
58¾ Inches
WING CHORD
Root 12½" — Tip 7¾"
TOTAL WING AREA
600 Sq. In.
WING LOCATION
Mid-Wing
AIRFOIL
Symmetrical
WING PLANFORM
Tapered L/E
DIHEDRAL EACH TIP
0
O.A. FUSELAGE LENGTH
51 Inches
RADIO COMPARTMENT SIZE
(L) 11¾" x (W) 3" x (H) 3⅞"
STABILIZER SPAN
25-3/16 Inches
STABILIZER CHORD (incl. elev.)
5-11/16 Inches (Avg.)
STABILIZER AREA
141 Sq. In.
STAB AIRFOIL SECTION
Symmetrical
STABILIZER LOCATION
Mid-Fuselage
VERTICAL FIN HEIGHT
6¾ Inches
VERTICAL FIN WIDTH (incl. rud.)
7¼ Inches (Avg.)
REC. ENGINE SIZE
.40-.51 2-stroke
FUEL TANK SIZE
10 Oz.
LANDING GEAR
Conventional
REC. NO. OF CHANNELS
4 (5 servos)
CONTROL FUNCTIONS
Elev., Rud., Ail., (2 servos)
Throttle
BASIC MATERIALS USED IN CONSTRUCTION
Fuselage ..... Balsa, Ply & Spruce
Wing ..... Balsa, Ply & Spruce
Empennage ..... Balsa, Pine, Ply & Spruce
Wt. Ready To Fly ..... 80-96 Oz. (5-6 Lbs.)
Wing Loading ..... 19-22¾ Oz./Sq. Ft.

hinge locations to the fin and rudder and drill. Cut out for and add the horn block to the rudder. Test fit with the hinges in place and sand to a finished shape. Leave a nice rounded L.E. to the fin and taper the T.E. of the rudder.

Epoxy the spruce triangles in place that will support the main landing gear plate. Fit these carefully and clamp until dry as these need to be very strong. We do not want to rip your landing gear off on the first hard landing, and these give more gluing area for the L.G. plate. With the blind nuts installed, fuelproof the entire top side of the L.G. plate with epoxy and glue into position.

Construct the hatch by cutting some of the 3/16" sheeting into 3½" pieces and edge-glue together over waxpaper. Be sure to have the wood grain running cross-wise and the edges straight. Add the triangle stringers to the edges of this sheeting as shown on the plans. Cut to the exact length to just fit between the landing gear plate and the #4 bulkhead. Drill a hole large enough in rear end of the hatch so the bolt head top will be flush with the sheeting (see plans). Add the 1/32" ply hatch bolt plate to rear end of the hatch. Glue the 3/16" balsa end plate to the front end of the hatch. Epoxy the spruce dowel block to the hatch and the spruce hatch bolt block to the #4 bulkhead. Drill for the bolt in the rear end of the hatch through the ply plate. Hold over the spruce block and mark the position of the bolt hole to be tapped. Drill undersized and tap for a 10-32 bolt. Drill for 1/4" dowel in hatch block and spruce landing gear triangles; test fit.

Position the turtledeck top block upside down on your work surface. Glue the T.D. bulkheads to the top block. Add the sides to the bulkheads. leaving the bottom edge a bit too tall. The top of the sides will have to be beveled to mate properly with the top block. You will need to wet the sides to get them to form the proper contour. After the entire assembly is dry, sand the bottom surface on a large sheet of sandpaper attached to a flat work surface. This will true up the bottom surface and give a good fit to the fuselage. **Do not glue to fuselage yet.** Add the canopy bulkhead. Trim the bottom surface of the canopy so when it is held in place with the turtledeck, the height is just below the top of the top block. Trim close with scissors and use the same sanding surface; moving the canopy, not the sandpaper. Cut out the canopy base plate and taper the sides so when the canopy is in position, the sides and the canopy make a good fit. **Do not glue yet.**

Fuelproof the engine and tank area of your fuselage with resin or epoxy. Permanently mount your engine mount and thrust plate to the firewall since the mounting bolts will be hard to reach after the nose triangles and nose ring are added. I used a 2° right thrust plate and predrilled my mount for the engine mounting screws. Using the engine as a guide, carefully cut out the nose so the engine can be put into position through the hole. Go slowly and remove only enough material as necessary. With the engine in place, mark and drill for the throttle cable. Fuelproof and add the nose triangles.

Fuelproof the inside of the tank compartment bottom block and glue in place. Sand the length of the nose to be flush with spinner when the engine and nose ring are in place. Glue the nose ring in place allowing about 1/32" clearance between the backplate of spinner and nose ring. A little trick is to use some 1/32" cardstock covered with Saran Wrap between the spinner on the engine and the nose ring to hold it in position until the glue dries.

The nose may now be shaped to flow to the spinner, but avoid the canopy outline on the top block. Put tape on the spinner so you do not scrape it up during the sanding process. Remove any necessary material to clear the muffler or header on the engine.

Make up your elevator and rudder pushrods and add the antenna tube if you plan to run an internal installation. Use a Y on the end of the elevator pushrod so you can trim each elevator separately. Epoxy blind nuts to the inside of the tail gear plate and glue to the tail. With the stab in position, use your pushrods to determine the exit holes and cut in fuselage. Do the same for the rudder. Add the cross grained bottom sheeting. With the hatch in place, sand the bottom surface to a nice round contour.

Covering and Finishing:

Glue the turtledeck and canopy base plate into position. Finish the interior of the canopy as you wish and glue into place. Cover with newspaper and tape it to protect it during the finishing process. Add the rear canopy filler block and fin block using the fin for spacing. **Do not glue fin yet.** Sand the entire turtledeck to shape and blend the sides to match the canopy.

Cover the stabilizer with MonoKote, etc., leaving the center section, the area to be glued to the fuselage, bare. With the wing panels in place for alignment, use slow setting epoxy and glue the stab in place. Be sure it aligns at 0° incidence and 90° from the centerline. It should be parallel with the wing panels as viewed from the rear. After it is dry, cover it with newspaper and tape to protect it during finishing. Add the fin, making sure it is 90° from the stab. It should fit into the slot in the fin block and top block. Add fillets to any area that you wish. Give the whole fuselage a good final sanding.

Finish the fuselage as you desire. Build the wheel pants as per instructions. Cover your wing panels, ailerons, and elevators, and trim as needed. Install the remaining hardware, engine, radio gear, landing gear, tank, tail gear, etc. After the control surfaces are hinged, check for proper control surface movement in direction and amount of throw. Check the C.G. location and shift equipment as necessary to start out right. The throws listed on the plans are good trim flight settings. Adjust to your own taste after the trim flights. With the proper C.G., the aircraft should perform inverted flight hands-off with no trim adjustment necessary from normal attitude.

Flying:

This completes the construction phase of the Osprey Two. Before you fly, be sure to have the engine completely broken in and do a complete radio and battery check. Do a vibration test with the engine running. Pressure test your tank for leaks. Make sure everything is in working order before you fly. You can ruin an awful lot of work if you get too hurried at this point. If you do not have a lot of experience with flight testing, let one of your more experienced buddies do the trim flights. **This is not a beginner's aircraft.** It is easy to fly, but has no self correcting tendencies.

To give you a point of reference, I used a Como .51 ABC with a stock Zinger 11 x 6 prop on the prototype. With 2° right thrust, the ship will pull a straight vertical climb for over 5 seconds with no rudder input or trim needed. Knife-edge will require rudder input only to hold the position. The ship proved to have a very slow stall speed and good stability. It will groove through maneuvers with a smooth grace and constant airspeed, and change attitude only when you feed in a new input.

I hope that you have as much fun with this aircraft as I have had designing and flying mine. Fly safe and enjoy. □

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