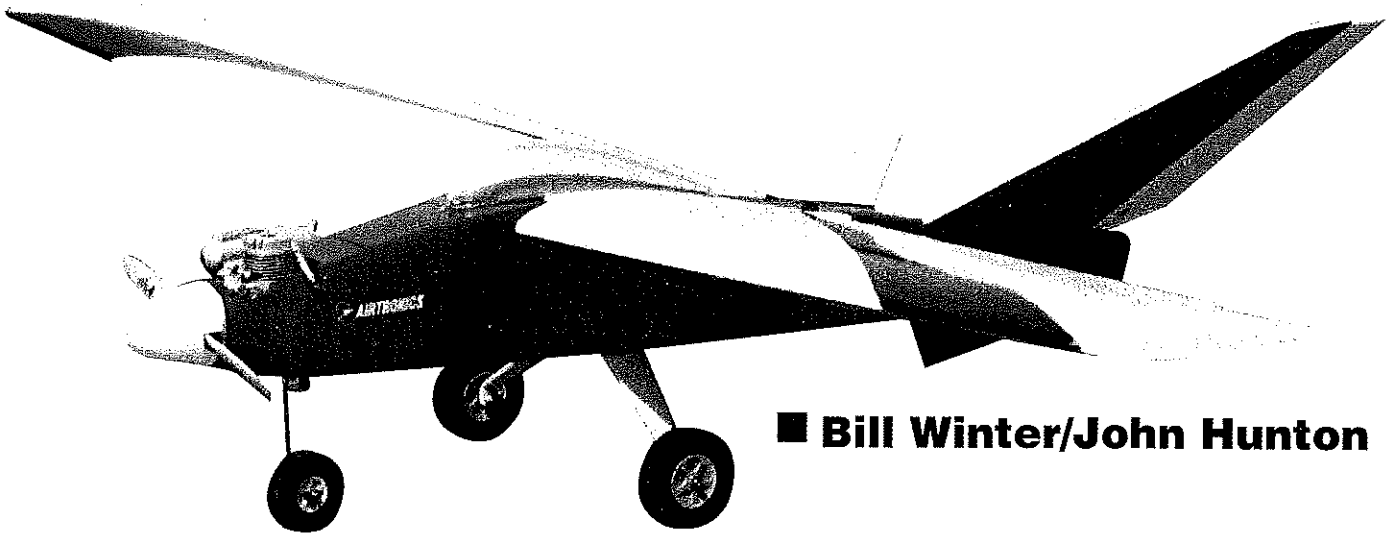
OSPREY



■ **Bill Winter/John Hunton**

Editor's note: This is the first in a series of three Bill Winter designs that will appear in MA *during the next few months. This "Winter Trilogy" features the Osprey; the Ascender, a delta canard; and the Jackpot, a .40-.55-powered model based on the 1960s Lightning Bug.*

Osprey may look somewhat like a trainer in that it has a high wing and tricycle landing gear; it is a more efficient aircraft than your average model and therefore it requires some experience and skill to fly it to its fullest capability.

Osprey is aerodynamically clean, hence it is faster than a trainer. It also has a higher lift-to-drag ratio than a typical model; for the inexperienced, that could lead to difficulty on landing. While the skill level requried to fly Osprey with confidence is above novice and well into intermediate, if you are qualified the performance rewards are definitely there.

Osprey is light on the touch and fully responsive. All standard maneuvers can be done. It is fully inverted rated, is capable of extended soaring, and its short coupling can remind one of birdlike efficency.

We fly along a rolling ridge. With an upslope breeze Osprey is capable of extended flight. It is bouyant in the wind. In a gusty wind, Bill Winter has surfed the sky with this model.

CONSTRUCTION

In general, select light balsa (less than six pounds per square foot). Some balsa supply houses will hand-pick all of your wood for a specified surcharge, or they may list some common sizes as guaranteed light weight. Order extra pieces to ensure matching substitutions if needed.

Sheet balsa for wing sheeting cannot be quarter-grain, which splits upon bending. This wood must "curl" easily along its length to facilitate matching airfoil contours and to eliminate any tendencies to pull free.

While you want light wood, eliminate anything too "mushy." You may still have to pick out a few firmer strips for wing and tail leading edges, which are ideally soft/medium. Aileron and tail spars are medium. All blocks must be light wood. Wood size specs are given on the plans and are generally not mentioned in the directions.

Wing cores are available from Evans Aircraft (454 Wildrose Ln., Bishop CA 93514). Covering materials are of your choice, but we use Coverite films and paints.

Wing: Make plywood patterns of the tip and root ribs by applying the full-size pattern with contact cement to, say, 1/16 plywood (Evans Aircraft has the rib templates on file). Note that the plan rib profiles include a chord reference line and for the tip rib another chord line indicating one degree of washout. Bring this to the attention of your core supplier if you send away.

Prepare your core blanks to serve as jigs for the core skinning operation by cutting away the portions that would interfere with the balsa inner leading edge and aileron spar.

Attach the inner leading edges and aileron spars to each wing panel. Prepare the skinning materials as described, skin, provide servo cutouts and cable access, add the root and tip pieces to the trailing edge, add the tips, only then join panels on centerline. The wing leading edge center section cutout is the very last step.

Taper the inner leading edge strip from 7/8 at the root to 3/4 at the tip. This is slightly oversize; the member will be sanded to match the airfoil after it has been pinned and glued in place (use yellow glue). Use long straight pins for alignment, then wrap with short pieces of masking tape to ensure a firm joint (sight along the wing to check that the edges are not bowed).

The outer leading edge is attached later, after skinning. It is

Photos by Bernie Stuecker Graphic Design by Carla Kunz

Osprey is an honest, nice-flying airplane with a different look and performance envelope. It was not concocted just to be different. It rolls and inverts like anything else, but the design offers the capability of flight modes not normally found in a single design.

Osprey's design philosophy derives from the electric Goblin (*MA*, July 1997) which had moderately swept-forward wings, a 45° V-tail, and extremely short coupling. The Goblin and the Osprey flew right off the board, as they say.

A 63-inch airplane that weighs five pounds, 4.5 ounces (wing loading of about 18 oz./sq. ft.), Osprey's high L/D makes it obviously efficient. The latest ball-bearing O.S. .25, which moves it as well as run-of-the-mill .40s, enables it to fly "around the barber pole." Its lift-to-drag ratio is quite high, since the airplane has abnormal power-off abilities.

Osprey is three-channel (no rudder), unless you have mixing for a butterfly tail and the servo installation for it. Control responses please "hot-dog John" and this "octogenarian" who sometimes sees triplanes. While Osprey can be flown by anyone with reasonable trainer time, we do not offer it as a trainer. Its high L/D ratio can, on small fields, call for an awareness of tactical pilotage.

While Osprey's performance envelope more than meets design predictions and desires, its personality behavior is realized through what may seem to be a strange combination of aerodynamic features. Be assured that they were designed in for a reason and don't imply afterthought, adjustments, or changes. The 23015 airfoil is normally set at 3° incidence in full-scale. It is installed here at 2°, with the V-tail set at –1° for 3° angular difference. The 2° downthrust is in harmony.

The center of gravity (CG) is located well forward, near the leading edge at the root. This is known as an "overstable" condition, which assures steady, smooth tracking and excellent wind penetration.

The forward sweep is 6°, but the wing structure is rock-solid at high diving speeds and there is no trace of adverse tip flexure. Forward sweep has been used often across the years in full-scale—the Blanik sailplane and end-of-the-war German jet bomber designs being two examples. There is an aerodynamic justification for it in this configuration.

Because of combining stabilizer and fin area in the V-tail, and the small moment arm, the total tail area is 28% of the wing area. The 5° wing dihedral allows staying in turns (sometimes as much as 360°) without annoying rock-back (a sign of excessive dihedral), and mixes perfectly with the short-coupled setup. Since, like Goblin, Osprey can easily be soared to high altitudes, vision limitations dictate hands-off turning stability in gusty conditions.

We turn an APC 10 x 6 on the new O.S. .25, using 10% fuel. If hot and humid conditions require it, use a 10 x 5. A 9 x 6 does not have the disk area to match this power/airplane combination, but will fly the airplane.

The foam-core/balsa-skinned wing is far stronger than built-up and is more efficient by providing a true airfoil from root to tip. It also seems easier to assemble. Many clubs have members with foam cutters, and a number of advertised firms provide cores to your root and tip patterns. Ours came from Evans Aircraft, as did the Core-Film thin double-sided tape for skinning. Evans also supplies iron-on X-hinge tape.

I think that you will like to build and fly this model *just for the fun of it.*

Bill Winter

tapered from ¾ to ⅝. The aileron spar is not pretapered, since block ding fits it to the foam. Attach this rear spar by the same method as the ding edge. Block-sand the edges to the airfoil contours shown.

Before skinning, sand the aileron spar and inner leading edge with a ding board (make one from a piece of plywood, to which sandpaper is ched with spray contact adhesive cement). Work in repeated spanwise hs, sanding from root to tip.

The described skinning method is one of several popular methods; you y prefer one that is more familiar. You may also favor assembling the r wing skins before starting. If so, allow at least ¼-inch overlap along long edges, as tolerance for minor layout errors.

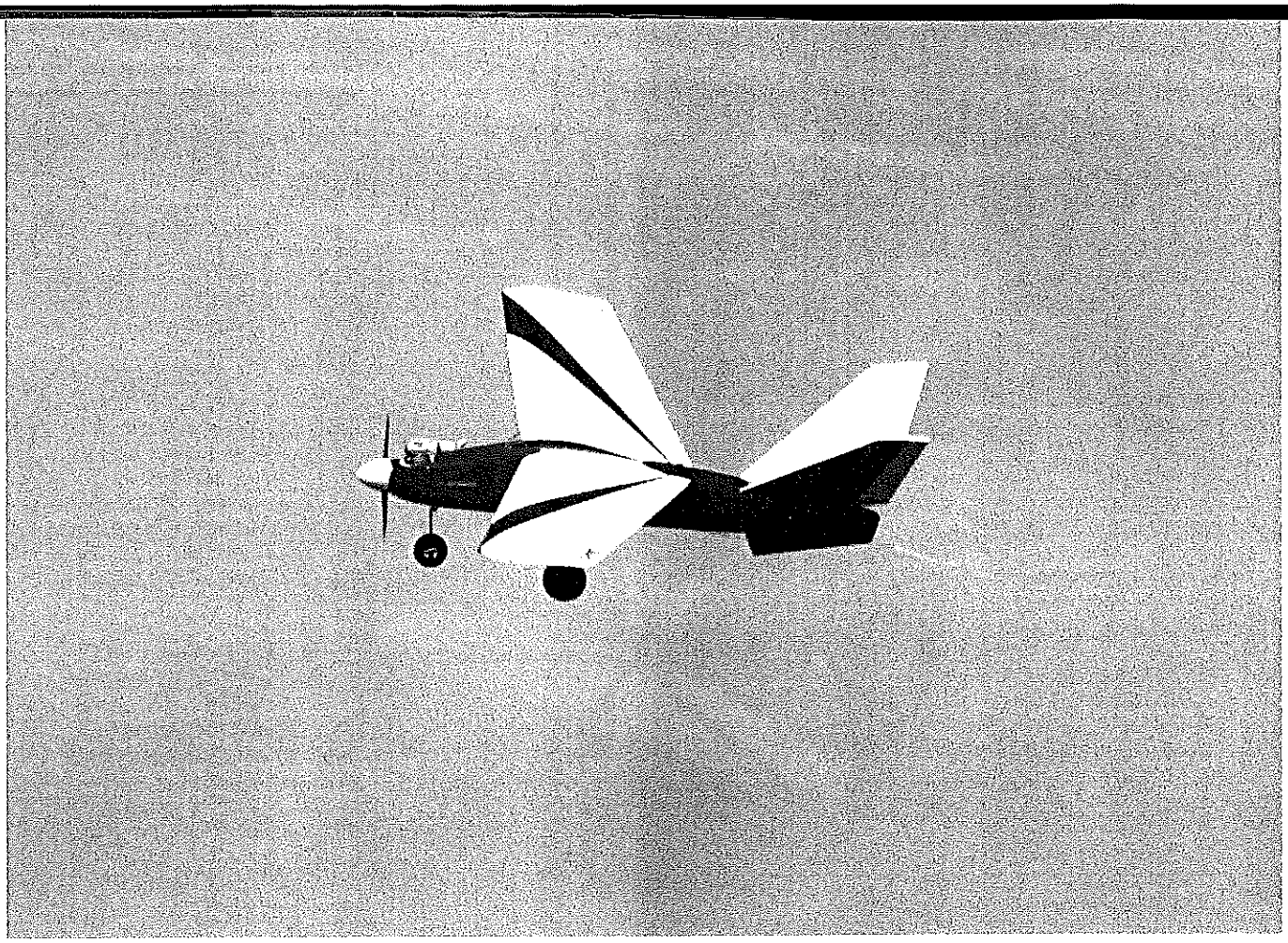
With the double-stick tape it is also convenient to put down one skin ion at a time (12 pieces in all). Either way, all sheet pieces must be isely trimmed to match, using a straightedge to insure clean butting. We put down two four-inch-wide sheets on both sides of each panel, overlapping the inner leading edge and the other overlapping the ing edge spar, with the grain parallel to each edge. The remaining n triangle is filled with a prefitted skin section (after the servo cutouts e been made).

Make a cardboard pattern for the servo cutouts, locate the outlines, then cut through the skins with a rule and #11 knife blade. Excavate the cavities for the servo mounting rails, which mount flush with the foam. The skin overlaps the rails beyond the cavity lines. To permit this, the triangular skin pieces are hand-fitted and removed. Install these tailored pieces after the servo rails are glued in. Use spade drills or sharpened tubing to cut servo wire access tunnels.

The front wing cutout is made *after* the finished and sanded panels have been joined at the root. Note that the ailerons, inboard and outboard trailing edge chord extension pieces are ½-inch-thick stock (if you use standard trailing-edge stock for ailerons, be sure that it is quite light wood). After gluing the extensions in place, block sand the tips square and install the tip blocks. Sand the tips to proper profile.

Trim the overlapping skins true/flush with the existing structure, then attach the tapered outer leading edge piece. Sand its top and bottom faces at this time to match the airfoil. Mark the precise leading edge forward-most point with a straightedge and felt-tip pen, for guidance while shaping. The final shape of the leading edge is critical for good stall characteristics, so do this shaping accurately.

Gradually shape the outer leading edge with a balsa plane for roughing



Very clean airframe is capable of extended flights at low power, or soared in typical thermals using trim control.

and your sanding board for sculpting the desired profile. Work in paths from root to tip, removing material progressively. Finish with a fine sandpaper pad.

Cut the wing roots to the proper angles in the horizontal and vertical planes, using a table saw or just by shaping with a sanding board over the edge of your workbench. To do this, use blocks to jig up each panel at the tips. Spot-glue or pin the blocks to the bench and to the wingtip.

Use long pins or even fine wire nails at the root leading and trailing edges to prevent movement; there is plenty of wood, so this is not harmful. The sanding board is held flush to the bench face and is used in a long-stroke milling action.

Check mating of the cores for flush fit, then epoxy the roots together, blocking up the panels for the required dihedral angle. Use long straight pins and masking tape to help hold in position. If crevices remain in the joint after the epoxy has cured, fill with a mixture of epoxy and microballoons.

Outline and then cut the front wing cutout. Install facing plywood pieces (the spanwise plywood dowel plate is glued in first).

Note that the sides of the cutout are slanted to fit against the fuselage sides. Trial-fit the wing to the fuselage, checking that the two side cutout pieces fit snugly and will butt against the dowel plate. Fill any gaps with sheet-balsa shims.

To fit the wing hold-down dowel, put the wing in place, holding true with strips of masking tape, then drill through the hole in former C, which has the dowel hole predrilled. Epoxy the prepared dowel peg into the face

OSPREY

Type: RC Sport

Wingspan: 63 inches

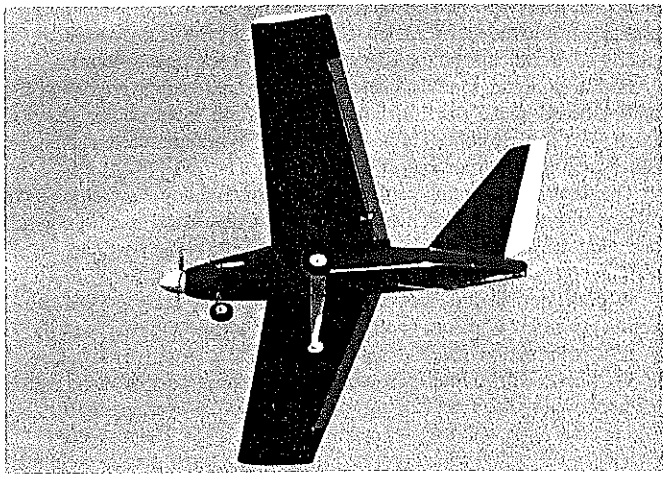
Engine: O.S. Max .25

Functions: Throttle, elevator, ailerons, nose wheel

Flying Weight: 84.5 ounces

Construction: Sheet over foam cores

Covering/finish: Coverite film and paint



Osprey's bottom is dark and top is white for orientation at high altitudes. O.S. .25 power, 15% nitro fuel recommended.

plate. To ensure accuracy, put epoxy into the hole in the plate, rub a bit on the dowel, and reposition the wing, making sure of accurate alignment. Use waxed paper to prevent gluing the plate or dowel to former C.

Cut out the semicircular bolt plate from 1/16 plywood. Place it in a vise and force partial cracking along its centerline. Set at the required dihedral angle, then glue it to the top of the wing. Mark centers for the rear wing hold-down bolts; with the wing still in place, drill 3/16 holes through the wing and hold-down blocks within the fuselage.

Remove the wing and enlarge the wing hold-down bolt holes with a 1/4 drill. Tap the hold-down blocks 1/4-20 to take 1/4-inch nylon bolts. Apply two-inch-wide fiberglass (light weight) over the top and bottom of the center section joint.

Trial-fit control horns to the ailerons, then "dry run" hinges for minimum gap between the ailerons and the aileron spar. The slotting depends on the type of hinge you decide to use. Nylon strip hinges are simple, light, and as strong as anything else, if properly installed. Strip hinge slots can be accurately cut with a #11 blade. Mark the positions exactly, and use something straight for a guide in cutting. Be sure that the cut is parallel to the hinge line. Since the wing core is foam you will need an appropriate type of cyanoacrylate (CyA) glue to avoid melting the foam. Use epoxy for the other hinge types.

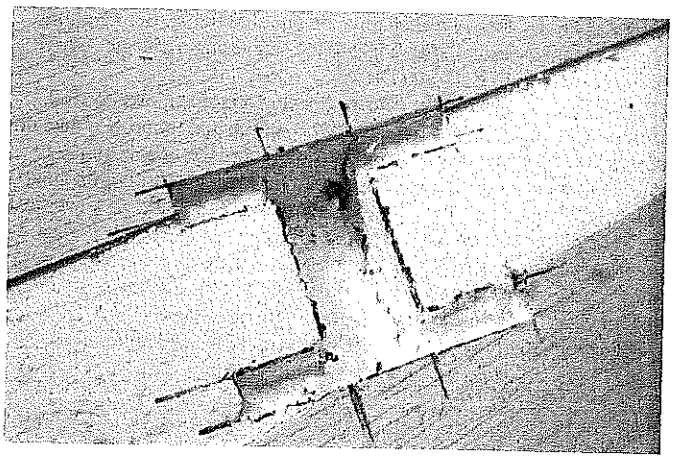
Trim and sand the wing to final profile, then clean with a vacuum. Shape the ailerons as required and sand. The wing is ready to cover. Install ailerons, servos, and linkages after covering with film.

Fuselage: To ensure precise alignment (vital to the Osprey) dress all ends of doublers and crosspieces for flush fits.

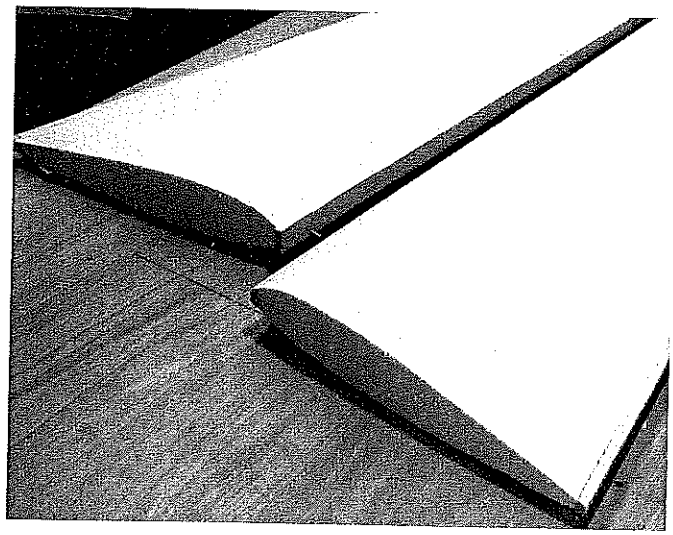
The assembly procedure for the fuselage is different from normal practice. The bottom of the fuselage "jigs" the sides, which are compelled to join on the centerline. This method ensures accurate wing and tail incidence, as well as thrustline specs, and is a platform for the rearmost formers, which lock in the fin and stab components of the V-tail for good flight tracking. The "top view" on the plans is actually looking down on the bottom and it shows structural locations.

Butt-join a three-inch and a 1/2-inch piece of 3/32, each 21 1/2 inches long. Mark the centerline and all of the station locations from C to F (inclusive) with a square, then mark the distance to the outer surface of the fuselage sides on each station line. Connect these points with a curve and ruler (or pin down a temporary strip to serve as a marking guide). *Do not* trim to outline until after the fuselage assembly is squared away. Pin the marked-off bottom piece to the work surface.

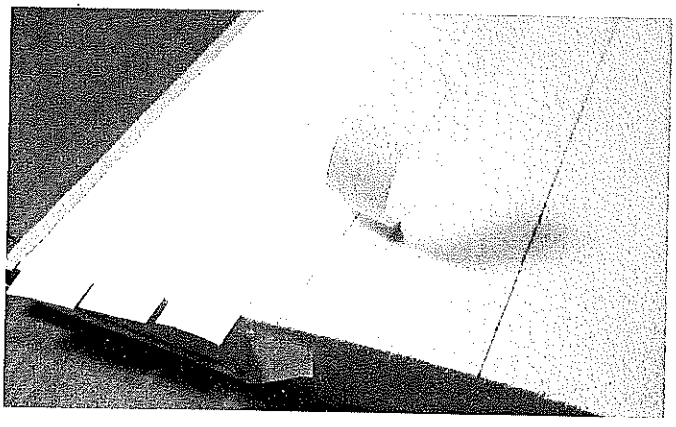
In the same manner, lay out the 1/4 forward bottom piece and pin it down in line with the aft piece, leaving a two-inch-wide gap. Align with a



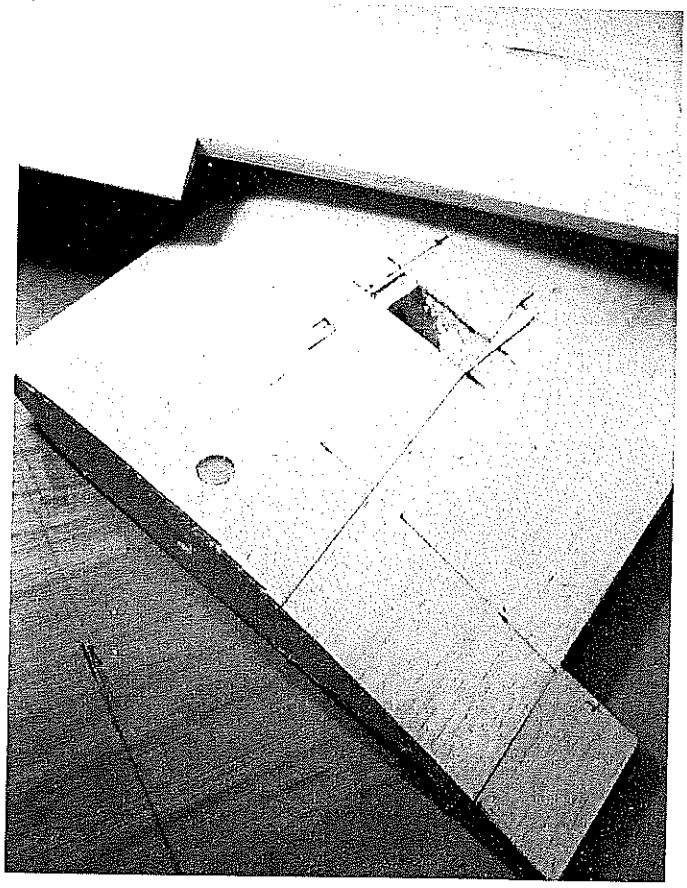
Wing servo cutouts are made, hardwood servo rails are inserted, then final sheeting is added. Sheet covers mounting strips.



Sub-leading and trailing edge members are coated with Titebond and are held tightly in place with masking tape.



Evans Aircraft tape is used to adhere wing sheeting. Full-width sheets are used at LE and TE; center filled in later.



Final servo mounting hole, servo wire access hole, and fixed trailing edge parts are visible here.

straightedge along both centerlines.

Lay out the fuselage sides, each from a 36-inch length of 3/32 balsa, duplicating the outline on the plan. The edges must be straight, except for the jog at the ¼ sheet juncture. Trim with a straightedge if necessary, and butt-join any sheet necessary to make the sides wide enough.

Use the straight bottom line to guide a square to mark upright positions. Trim to outline. Use this blank to trace outlines on the second blank side, pin the blank sides together, and sand the outlines to conform. Mark L or R on inside face of each side.

Locate all longerons, doublers, crosspieces, etc. (excepting those forward of the firewall) on each side frame, checking the width of the slots for fit of firewall and former C with scrap wood. Cut the firewall and all formers. The ¼ sheet fill pieces at the V-tail seat must be cut precisely (note the elevation measurement on the plan).

Drill firewall holes for blind nuts, fuel lines, and linkages. Install blind nuts for the combination engine/gear mount. Check B, C, and D for identical widths, then install all three on one side frame. Before gluing, check for snugness and a 90° angle to the side, using a triangle. Dry fit the opposite side to B, C, and D.

Rest this structure on the bench, checking alignment over the full length, with no daylight showing between bench and frame. See that all parts are fully seated before using CyA, or before the yellow glue sets.

Cut the plywood landing gear plate to fit, mark and drill screw holes, and install blind nuts. Glue the plate on as seen on the side view (vertical and side pieces butt to its top surface). Glue the triangular side corner pieces to plate. Cut all bottom crosspieces to length over the plan, allowing ¼ plus 3/32 for each side thickness aft of the landing gear, and at station C, an additional ¼ to allow for doubler thickness.

Pin the partially assembled sides to the bottom sheet as far aft as station D and glue. Before joining the sides at the rear, install the mid-cabin crosspiece, hardwood servo rails, and hold-down block (helps prevent distortion when the sides are bent).

Join the sides at the rear; pinning, then gluing from station D to the tail. To ease bending, moisten the local area, and cut tiny wedges (or Zona saw cuts) into the inner face of the longerons in the to-be-bent area (see top view).

Glue ¼ sheet pieces E, F, and G in place, only to the bottom, and to the rear faces of the bottom crosspieces.

To pull the sides square at top for gluing, use clamps (protect the side surface with plywood scraps). Before closing in the fuselage top, locate the wing (as described in "wing construction") and drill dowel holes. Add the two top crosspieces that are forward of the tail surfaces.

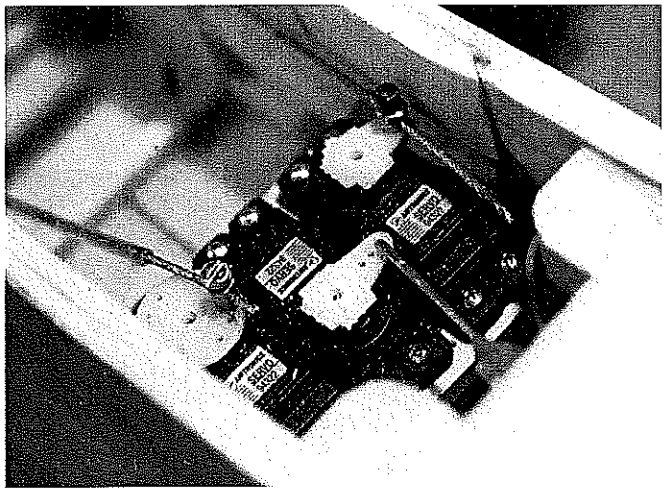
Fuelproof the tank compartment with epoxy. Complete the tank, steering arm, and involved linkage installations.

Glue in nose laminations forward of the firewall. Sand the front of the nose with a sanding block for an even fit of the nose plywood ring A. It is suggested that you first mount the spinner backplate to the engine, then temporarily mount the engine and trace the outline of the spinner plate as a guide for location of former A. Use a #11 blade to carefully slope the rear longerons to 45° where required for mounting the tail assembly.

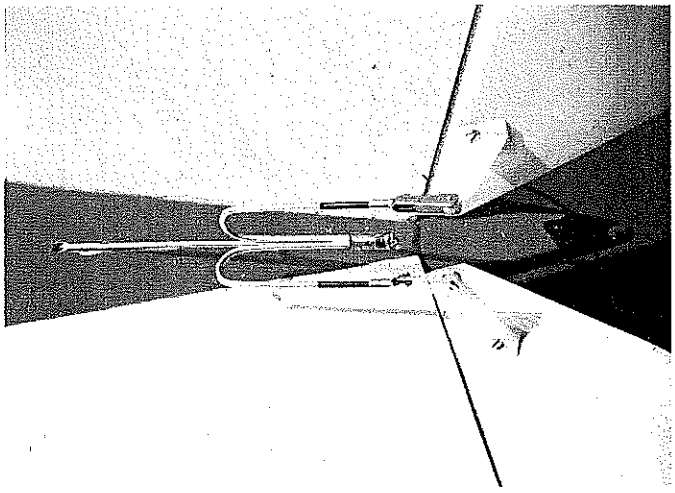
Trim the wing saddle for a close fit (slope to match wing dihedral). Make the elevator pushrod assembly before sheeting the rear fuselage top. Sheet the nose top fore and aft of the hatch ends (note that the ½ square side top corner pieces extend beyond the firewall to former A).

Fit the wing into place and mark where the flat areas should remain to fair with the ribs on each side. Spot-glue the tank hatch in place and take down to matching contours during sanding of the fuselage.

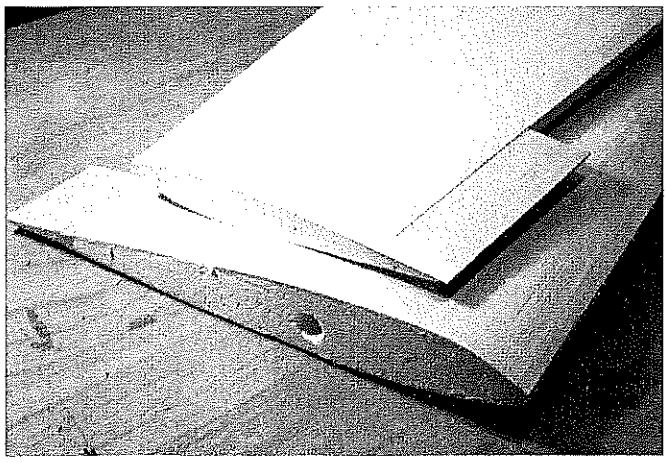
Rough-shape the nose contours with a coarse sanding block,



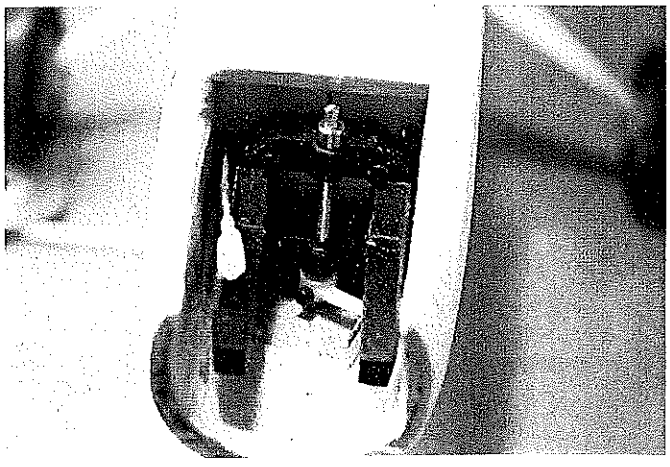
Left servo is for nose wheel steering; center is for elevator; right for throttle. For simplicity, rudder not used.



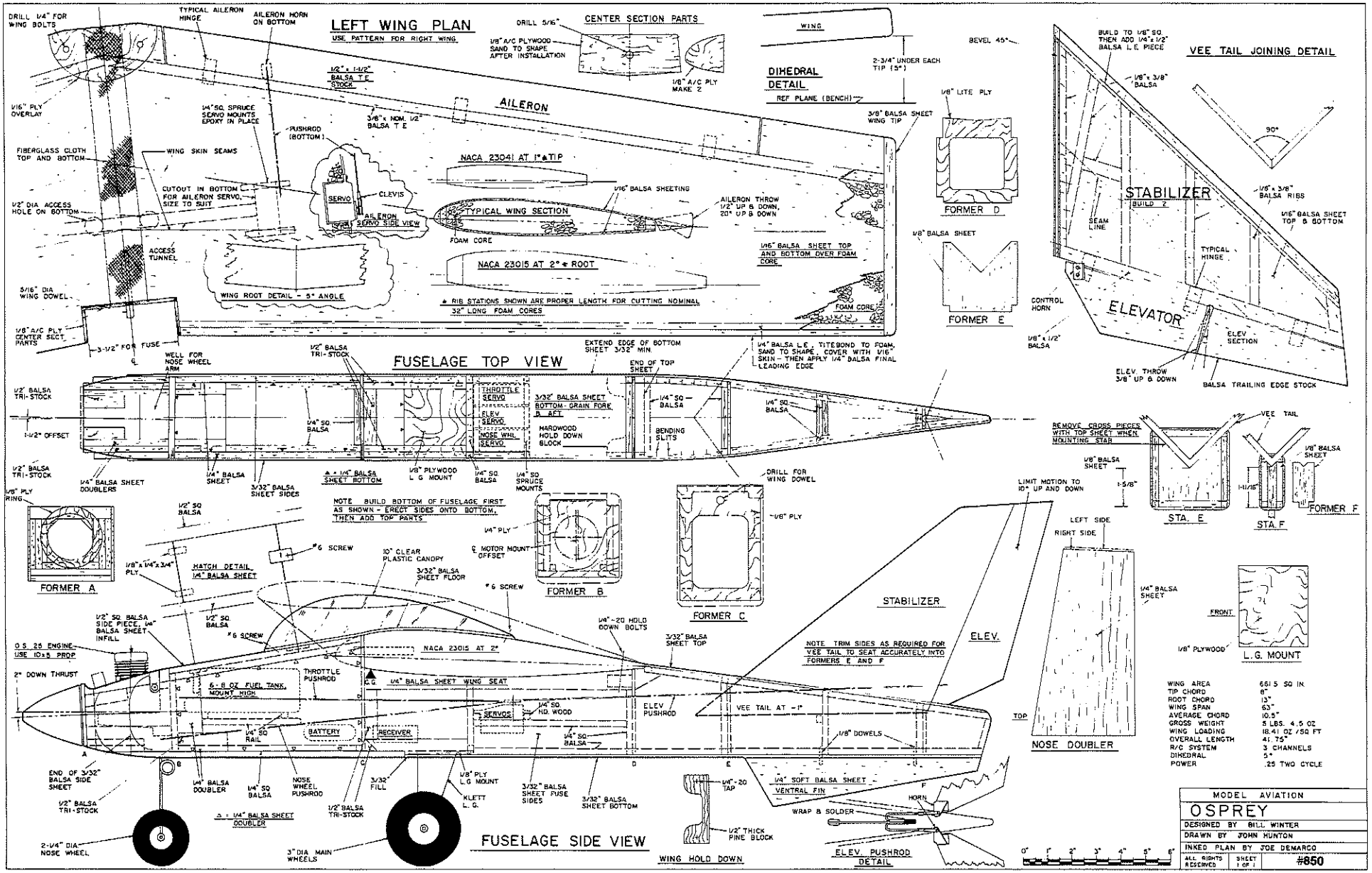
The elevator linkage requires flexibility in two planes, so this "looped" setup was devised.



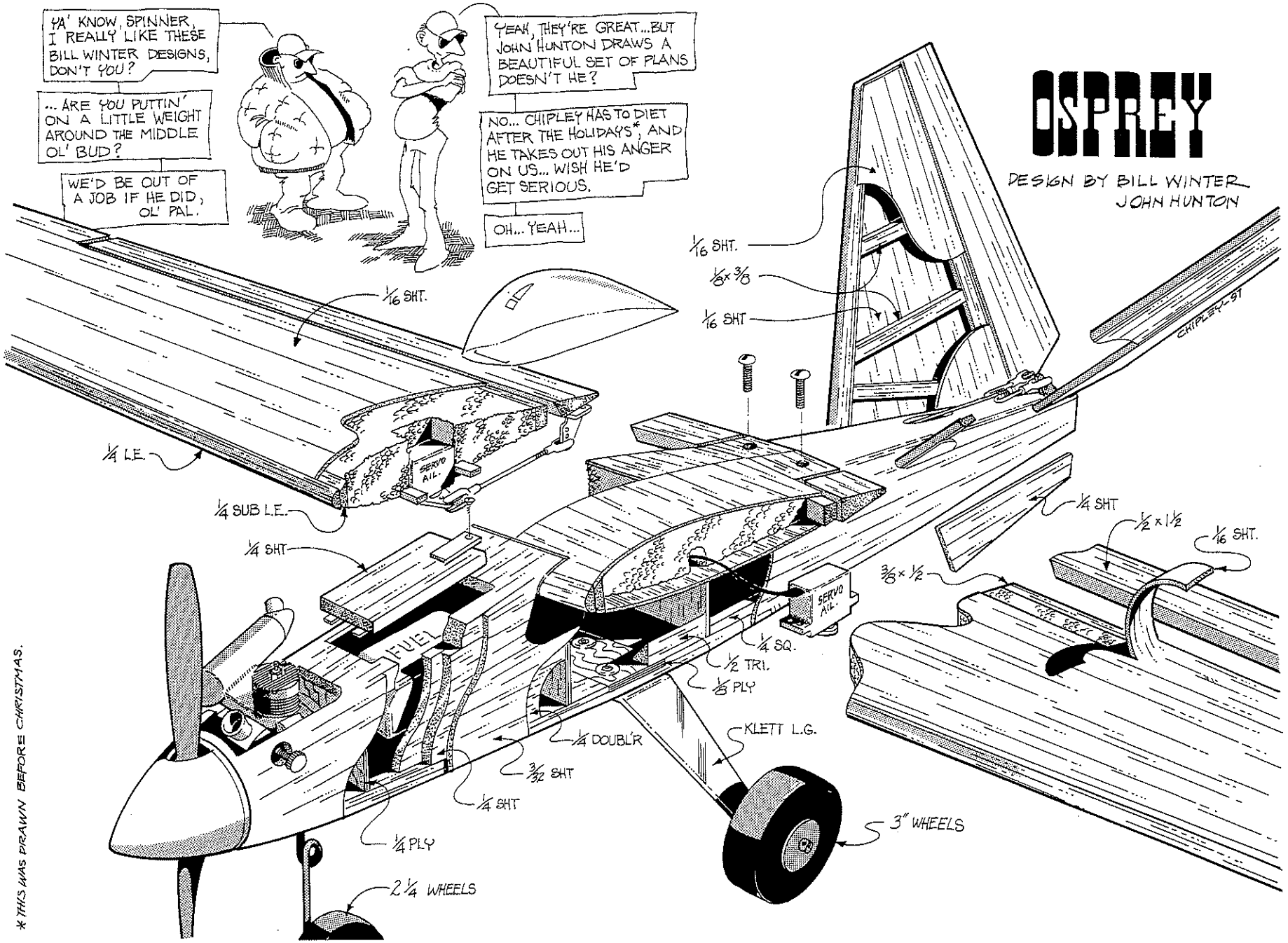
Wingtips are placed and center section sanded to proper mating angle. Finish-sand each panel prior to joining.



Trial-fit engine mount, then remove for finishing. Throughly fuelproof engine compartment to guard against fuel soak.



Full-Size Plans Available—see page 187


YA' KNOW, SPINNER, I REALLY LIKE THESE BILL WINTER DESIGNS, DON'T YOU?
... ARE YOU PUTTIN' ON A LITTLE WEIGHT AROUND THE MIDDLE OL' BUD?
WE'D BE OUT OF A JOB IF HE DID, OL' PAL.
YEAH, THEY'RE GREAT... BUT JOHN HUNTON DRAWS A BEAUTIFUL SET OF PLANS DOESN'T HE?
NO... CHIPLEY HAS TO DIET AFTER THE HOLIDAYS*, AND HE TAKES OUT HIS ANGER ON US... WISH HE'D GET SERIOUS.
OH... YEAH...
OSPREY
DESIGN BY BILL WINTER
JOHN HUNTON
1/16 SHT.
1/8 x 3/8
1/16 SHT
CHIPLEY '87
1/16 SHT.
1/4 L.E.
1/4 SUB L.E.
1/4 SHT
SERVO AIL.
1/4 SHT
1/2 x 1 1/2
1/16 SHT.
3/8 x 1/2
SERVO AIL.
1/4 SQ.
1/2 TRI.
1/8 PLY
FUEL
1/4 DOUBL'R
KLETT L.G.
3/32 SHT
1/4 SHT
3" WHEELS
1/4 PLY
2 1/4 WHEELS
* THIS WAS DRAWN BEFORE CHRISTMAS.

ollowed by medium paper before final anding. Round the fuselage, according to ormer sections, with long sweeping strokes, xcept at the wing root and at the landing ear plate, where it should remain square. emove the hatch and complete its details. uelproof the inside of the nose forward of ie firewall, using tabs of masking tape to rotect the holes and blind nut threads. You iay prefer to do this after covering.

mpennage: Build internal frames for the -tail first. Note that the surface is built with 1/8 square inner leading edge. The final eading edge is applied after the sheeting is omplete.

Preassemble butt-jointed sheeting. Lay ie completed frame over one full side sheet nd glue in place. Apply slow-curing glue to ie open side of the frame, then press it own on the other prepared sheet. Sand the eading edge flat with a block, then install ie final leading edge piece and shape it.

Kerf the butt end of each V-tail half at 5°. Finish-sand the surfaces, then join the alves at 90°. This is done best if the joint is iade similar to any dihedral joint: Pin down ne surface and jig up the second surface at 0°.

Cut the elevators and shape to profile. and the assembly smooth and to proper ontours. Precover the V-tail, then score the overing with a #11 blade and strip it away here the surfaces mate for good glue dhesion. If the V-tail assembly is properly eated in the guide formers shown, it will utomatically assume the proper incidence ngle. Dress the fuselage sides as required ntil the V-tail is seated accurately into the ormers, then install after covering the iselage.

inal assembly: Coat all raw balsa with overite's BalsaRite. This will ensure good dhesion of the film. Sand lightly, then cover ie model. Since this model will be capable f reaching very high altitudes, cover the ottom with a dark color and the top with a ght color for good visual orientation.

Trim flange from the stock canopy, block p the front and rear, then run a felt-tip pen hich has been taped to an elevating block ong its outline. Cut to the line, then do final imming. Cut the canopy base sheet to utline, prefinish, then install in the canopy. Install the canopy hold-down screws.

Install the engine, landing gear, and RC equipment (we use Airtronics). When assembly is complete, check that the model is balanced exactly where shown. Shift the battery pack or add ballast if necessary to get the proper balance point. Also check the lateral balance.

Flying: The first difference you will notice when flying Osprey is at takeoff. While directional steering is quite fine, the model just seems to be light on its wheels (fairly close to the CG) and will be airborne before you are ready for it. For this reason, for initial flights let Osprey run for a while with neutral elevator, then fly it off gently. Never yank it off or "bully" the airplane.

The next difference you will notice is that Osprey looks different in the air, so keep it close in when first flying until you feel comfortable with it. Also, while Osprey's high efficiency is good for thermaling and soaring, compared to other models it just does not want to come down, and you must compensate. You do not have to worry when flying this model at its best L/D velocity, which is slow. It will just mush if stalled gently, and will remain straight ahead in a forced stall.

The final difference is at landing. Do not hesitate to do a circle or two on final to lose altitude, if necessary. Just like full-scale, get the wheels right onto the ground to kill excess speed so you don't run out of runway. Try some high, simulated practice approaches first to get used to your Osprey.

With Osprey you will have a unique-looking model with distinctively better flight characteristics. Osprey is a truly efficient model airplane, which you will enjoy as we do. Let us hear of your successes. With your Osprey, you will literally be able to soar with the eagles. ✈

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