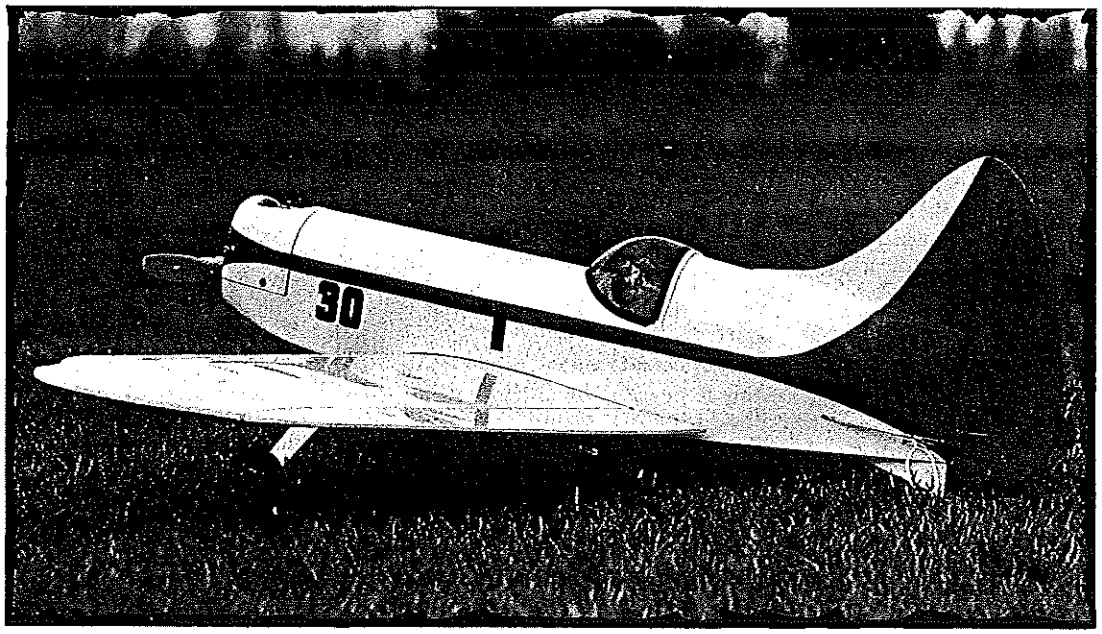
762

AMY



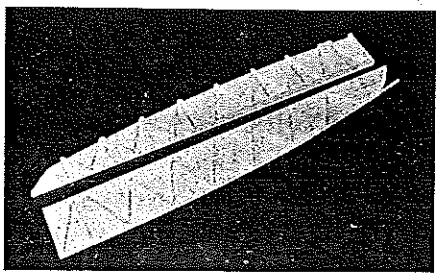
Living without a tailplane can be fun!

With all the designs available, why should anyone want to buck the system and fly a model without a tail? Why *not?*

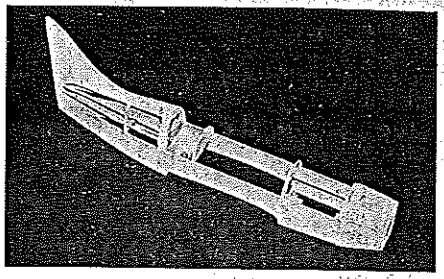
I like having the rare one on the flight line. Amy is my third tailless, and was designed to get close to a true aerobatic platform.

Amy has no nasty tricks—it wouldn't be here if it did—but it isn't for the low-hours pilot, who is a little unsure of his/her ability. It's fast, neutrally stable and very aerobatic; the only thing Amy is a 'trainer' for is to learn how to fly fast, aerobatic tailless models.

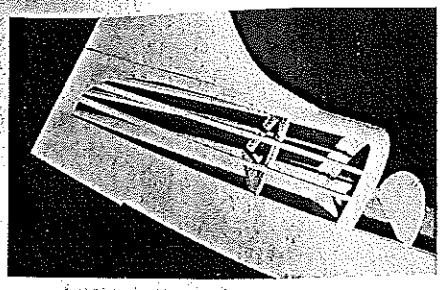
DERECK WOODWARD



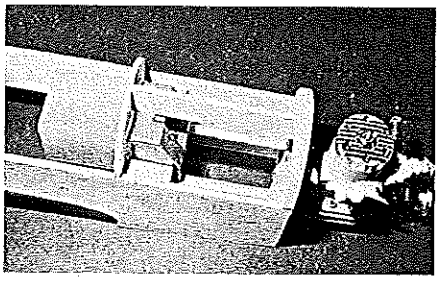
One elevon has unshaped ribs and TE fitted; the other has ⅛ spruce TE fitted before sanding ribs to section.



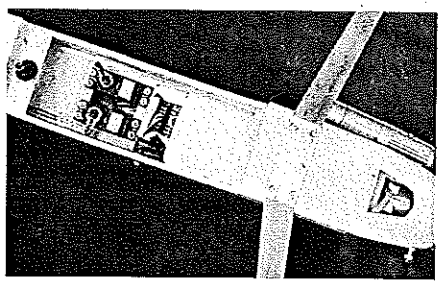
Fuselage framework is nearly complete at this point. Plywood top deck added after radio system is installed and checked.



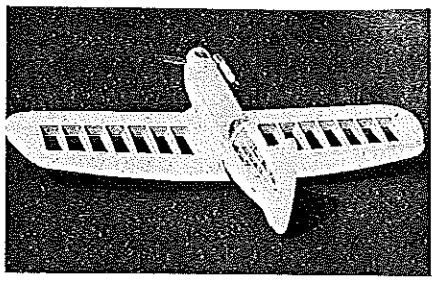
Stringers are ⅛ spruce for durability. Scrap pieces of ⅛ balsa were used to fair stringers to the fin and F4.



English SLEC four-ounce tank being slid into its bay. Engine openings stuffed with paper to keep out balsa dust.



Amy's large wing chord and only two servos means plenty of room here! Hole in cowl cools, allows drain pipe access.

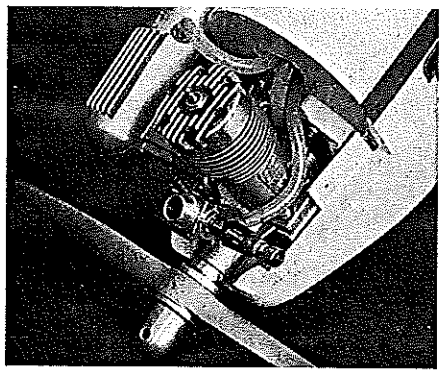


Amy's clean, curvy lines are achieved with little complexity: "There's too many ugly models around as it is."

The structure is, unashamedly, all wood. I didn't cut corners; for example, the tapered wing and curved TE came off the sketches. Straight seems easier, but didn't look right.

However, the structure is easy for anyone who can accurately cut and fit wooden parts. The upright, cowled engine makes handling easier and looks clean.

Amy flies on an OS .25 FP, which has power enough for big loops and Cuban 8s. If you put in a ball bearing .32 ABC, it won't do any more maneuvers, but it'll be fast; overpowered models usually are. I'd go for a ball bearing .25 as the top end, and believe it would fly well (and quietly) on an O.S. 26 Surpass, if built light.



Amy is powered by an O.S. .25 FP. Third line is for fuel drain/fill and is routed through cowl bottom.

Canopy was unearthed in a British hobby shop. Pilot is a ⅛-scale Williams Brothers that "fits and looks good."

CONSTRUCTION

Amy took me three-and-a-half weeks to design and build, so you have a head start.

Wing: Start with a pair of plywood templates. Align the LEs and drill holes on the centerline for 4-40 bolts, one inch from each end of the tip template. Medium soft 3/32 or slightly harder 1/16 C-grain works well for ribs. Cut blanks 1⅜ inches wide to exact rib lengths. You'll want 3/16 for R1 & R2 and wing sets for R3-R10.

Stack a set, align with a square on the LEs, pin together and mark a centerline on the root. Align the tip template on LE and centerline, then drill a ⅛ hole through the stack (use a drill press to ensure a vertical hole).

Position the root template, bolt together and carve to shape. Setting the LEs in line takes care of the front ends, but don't cut the rear to length yet; save that for the building process. Make the other set the same way.

Glue the ribs to the bottom spar over the plan, then add the top spar, LE and TE. I fitted the spar webs in between the spars, flush with their aft edges, at this stage.

Since the interspar gap is constant, cut vertically grained 1/16 sheet to depth, join into a long strip, and fit pieces between each spar. This is little more fuss than the usual route, and the dihedral joiner sits snugly onto spars and webbing.

Repeat for the other wing half and join them together. Cut two strips 1¼ inches deep and tack onto each tip rib, top edges on the rib centerlines, to support the tips at the correct height.

Be sure there is no washin, washout, or sweep. Trim the LE, spars, and TE until you're happy that all mate up. Pinning the wings onto the board against a yardstick works well.

That should leave you with a lightly joined pair of wing panels. I made the joiner from ⅛ spruce, so all the wood's grain runs across the joint, but good birch plywood will do fine. Cut rib R1 apart to fit in place, and glue it in.

AMY

Type: RC Sport

Wingspan: 44 inches

Engine Size/Type: O.S. .25 FP

Number of channels: Three

Flying weight: 47 ounces

Construction: Built-up

Covering/finish: Film

Why only one? Well, it only holds up the center-section sheet, which you can fit now, along with the LE top and bottom sheet.

Servo trays: A Lite Ply base fits between R2 & R3, and vertical rails are glued into cutouts. The 1/16 plywood hatches screw onto plywood blocks and retain the servos. The

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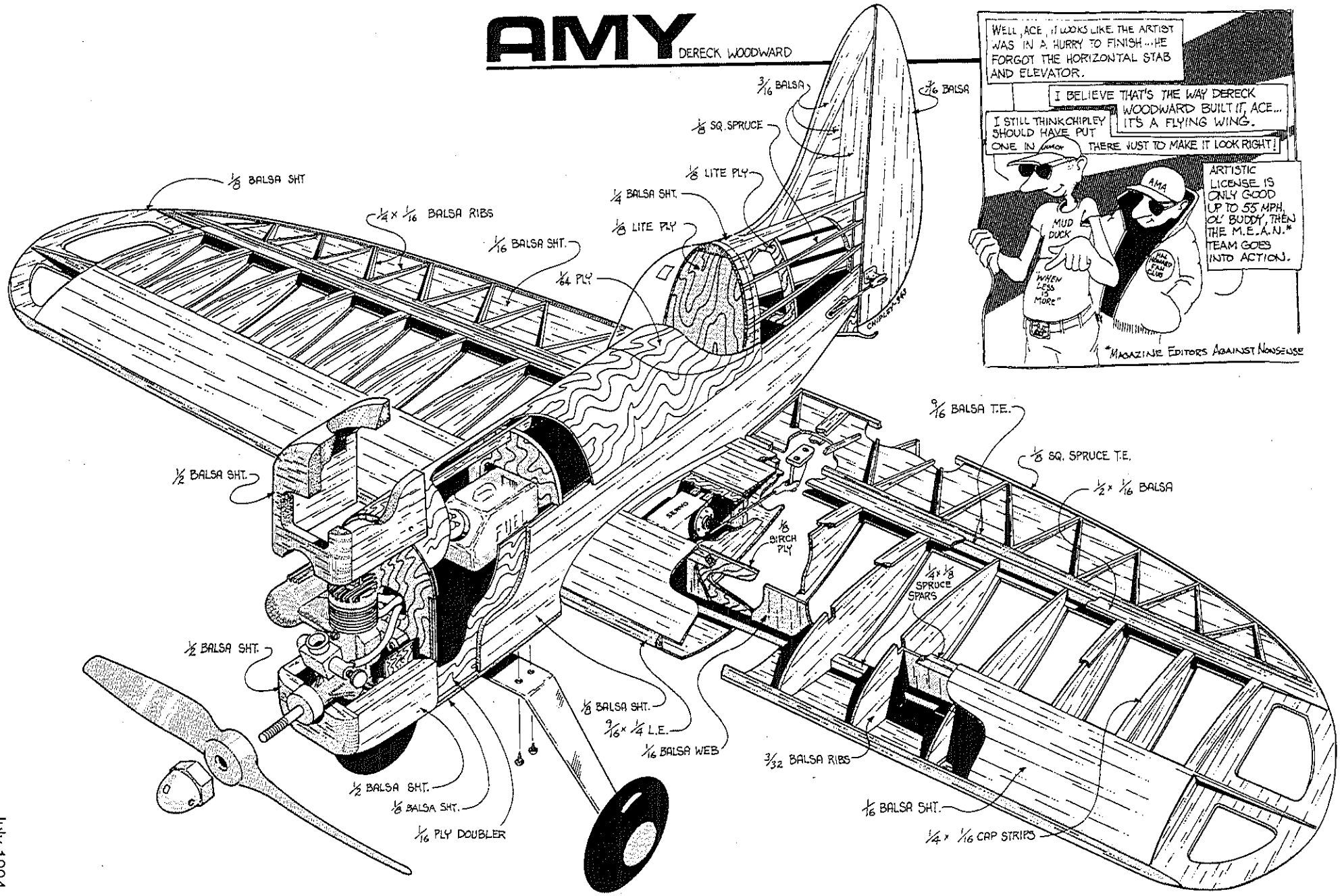
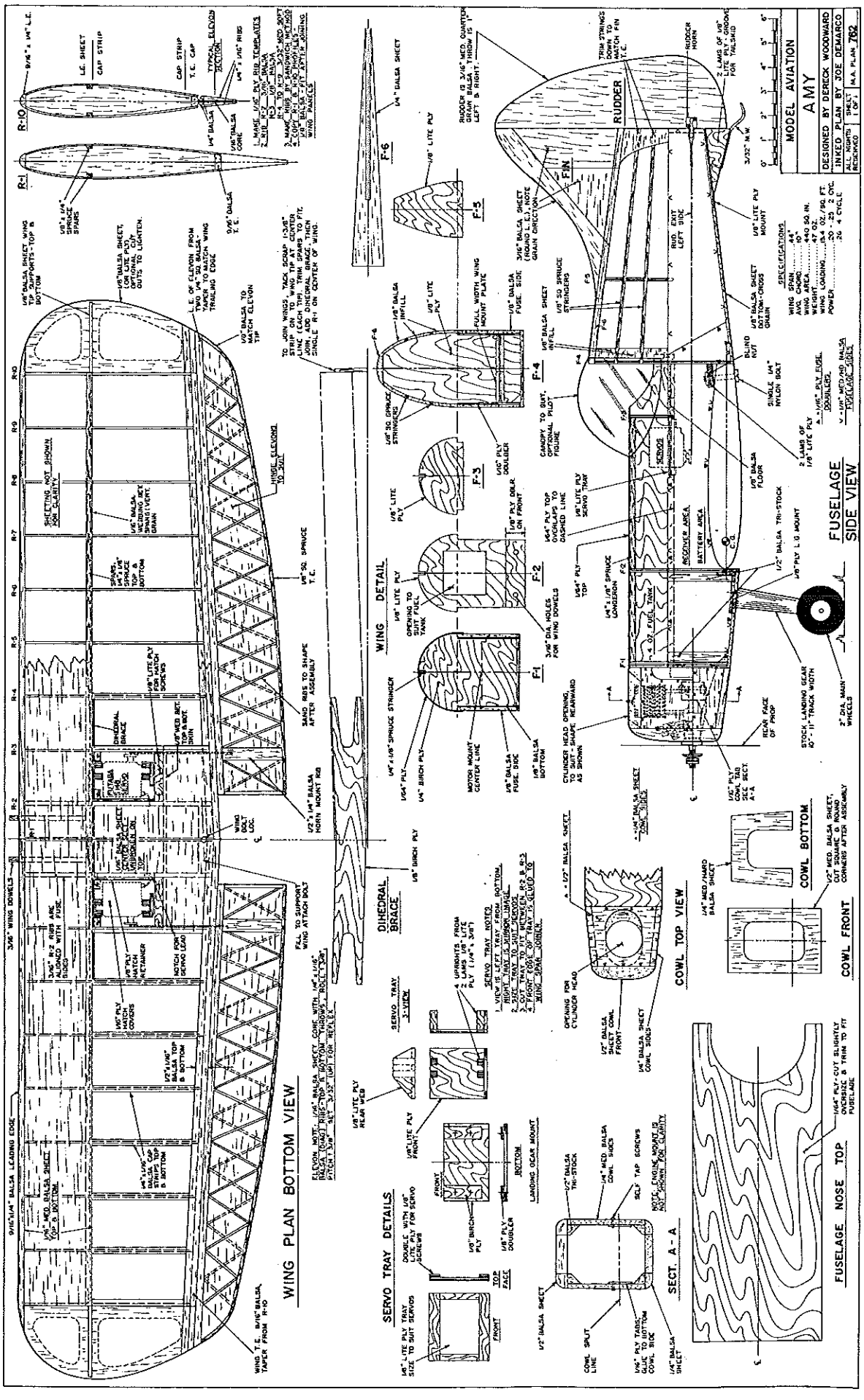
DERECK WOODWARD




MODEL AVIATION
AMY
DESIGNED BY DERECK WOODWARD
INKED PLAN BY JOE DEMARCO
M.A. PLAN 782
WING PLAN BOTTOM VIEW
WING DETAIL
FUSELAGE SIDE VIEW
FUSELAGE NOSE TOP
COWL FRONT
COWL BOTTOM
COWL TOP VIEW
SECT. A - A
SERVO TRAY DETAILS
DIHEDRAL BRACE
RUDDER
FIN
SPECIFICATIONS
WING SPAN..... 44"
AVG. CHORD..... 10"
WING AREA..... 440 SQ. IN.
WING WEIGHT..... 47 OZ.
WING LOADING..... 14.4 OZ./SQ. FT.
POWER..... .20 - .25 2 CYC.
.36 4 CYCLE

wing center section sheeting and R3 capstrips keep everything smooth and flush.

For antivibration padding, I stick thin wing-seat foam tape on the top and bottom of the servo. I admit this means a little work and isn't what you normally find, but it's a cheap and effective way of providing a solid servo drive.

If the built-up elevon framework leaves you cold, use stiff, light balsa sheet, ¾ inch thick, and cut, carve, and sand to shape. In England, such wood is rare—hence the built-up structure.

Cut 1/16 balsa 'cores', add ¼ square LEs and ¼ x 1/16 ribs. Edge the TE with ⅛ spruce and taper the ribs from LE to TE with a sanding block, checking that the elevon LE matches the wing TE.

Add the local reinforcement for the four elevon hinges, and dry fit them. I used Sig Easy Hinges; they work as advertised, and you can't ask more than that.

Fuselage: The sides are medium-hard balsa, doubled with 1/16 plywood.

My way to laminate doublers and sides is the cheapest and cleanest I've found. You'll need woodworkers' white glue (such as Elmers) and an iron.

Mark where the doubler covers the side and spread glue thinly over both mating faces. Aim for an even coat—just enough to cover the surface. Try a test piece first; it's surprising how little is needed. An excess will expand the glued face and look shiny; too little and dry patches will show up.

Let the glue dry thoroughly, then heat the iron to a cotton setting. Place a side glue-face-up on a flat, clean surface, and position a doubler on it.

Tack in place at one end with the iron's tip. Hold the iron on the plywood for a few seconds, remove and let cool. This causes a reaction with the glue and bonds the pieces. Work along the piece, keeping the pieces flat on the board.

When finished, it's worth going over it all again to ensure you've caught all the glue. My English iron won't get hot enough to start scorching the wood; that would be too hot anyway.

This is far cheaper than using instant glues, and allows you to dry-fit parts before making serious commitments. Give it a try!

Join the sides with F1, F2, and F4, and add the gusseting around the engine bay. The hole in F2 matches a SLEC four-ounce tank, as supplied by Hobby Lobby. These tanks are very good, virtually ready to fit with no tubing to bend, and pack their capacity into a short length. If you prefer another tank, adjust to suit.

Glue a couple of scrap balsa rails between F1 and F2 to hold the tank up. A piece of foam closes off its escape route, yet allows removal for service.

Now fit the Lite Ply fuselage servo tray. It will hold the shape forward of F4 when you pull in the rear fuselage sides. Finish the ends, fit the RC gear and the plywood top decking.

Cowl: Begin by filling up the holes in your engine with paper! A cowl can clear leftovers from your scrapbox, so feel free to substitute sizes.

Make up the lower fixed part with the plywood lugs glued in place. Assemble the top, drill through into the lugs so you can hold it on, then carve to shape. Remember to make some holes for silencer bolts, needle valve and such. O.S. silencer fittings are great for cowlings, needing only two holes to access the bolt heads.

While the fuselage bottom is open, drill the LE for the fixing dowels, using F2 as a guide. Fit the fuselage bottom, which is mostly ⅛ balsa with a ⅛ birch plywood landing gear plate. That is doubled with ⅛ plywood where the screws fit.

Any commercial landing gear close to what I've drawn should do fine. Retain the gear with four 4-40 socket head sheet metal screws.

Wheel size can be adjusted to suit your flying field. Use the minimum size your experience tells you to; most of the

time they're just drag, so small is beautiful. I get by with two-inch Sullivan Skylite wheels on short, rough grass.

At the back, glue the ¼-inch top deck onto the fin, then glue that assembly to the top of F4 and the fuselage rear. When set, add the ⅛ square spruce stringers. Spruce is far more crush-resistant than balsa, and looks far sharper than sheet when covered.

The shape of the 1/64 plywood top deck drawn on the plan is a guide. Check the fit by cutting the deck a tad oversize and trimming to fit. The weight penalty of 1/64 plywood is minimal, and the strength is vastly superior to balsa.

The canopy was unearthed in a British model shop and altered to suit. Unfortunately, I have no idea what make it was, so feel free to use whatever is available and fits!

Radio: This model was designed around Futaba FF7 computer gear elevon mixing, hence the wing servos drive each elevon directly. If you don't have such a transmitter, Ace R/C's Christie Mixer has a good reputation.

With many electronic options around for elevon mixing, I didn't bother with a mechanical mixer. However, there is plenty of room, and I'm sure the modeler contemplating such a device will be well capable of doing the task.

Be sure that adequate clearance is maintained between the wing-mounted moving parts and fixed gear in the fuselage cavity. Use really hefty torque rods, as those elevons are far larger than the ailerons you'd find in a similar-size conventional model.

The receiver goes in the forward top deck atop a flat Ni-Cd fourpack, suitably padded. You'll need two extension leads for the elevon servos. Marking them and their matching servo leads is a good idea.

If Amy is your first elevon-equipped model, be methodical in setting up. I recommend setting up the controls before covering, so try this sequence:

Mount gear, switch on to establish servo neutrals, set servo arms and pushrod lengths to achieve an elevon position of 3/32 up (at the elevon TE) from neutral. "Neutral" is with the elevon lower surface parallel to the fuselage bottom.

Move the elevator stick and establish a "pitch" throw of ¼ inch each way. When happy with pitch, set "roll" to ⅜ inch each way by moving the aileron stick only. At this stage, the controls move in the same manner as on a conventional aircraft.

Happy with individual throws? Check for "full and free." Move the controls through their full combined range to ensure that nothing binds. For example, "full up and left" will move the left elevon up ⅝ inch at the root TE datum, and the rest in due proportion, so you can check that there's no binding.

Of course, you can tweak the throws later to suit your style. It's almost light relief to set the rudder to move one inch each way, and figuring how far the throttle goes is easy.

Finish: I was hurrying to prepare Amy for a major model meet, and my lack of color matching and finishing skills are legendary. So Joe Gizinski, my resident 16-year-old artist, was tasked to come up with a color scheme based on Amy's lines, my limited painting abilities, and two rolls of cream Econokote.

The color is British Solarlac and Solartrim; any paint or adhesive trim compatible with your finish will do fine. I would recommend a film covering material for Amy, to keep the weight down. The structure is stiff enough for the covering to be just that, with no extra rigidity being needed. Keep the color scheme bright, with good "this way up" clues.

Balance: An aft center of gravity will result in what the big guys call "a departure from controlled flight." *We* call it a *crash.*

Frightened? Good! Balance the model *accurately* before leaving home. Out on the flying field, saying "Near enough" as she sways in the breeze atop your fingertips, is *not* good enough. I use an Ace R/C balancer for this task. The trivial

cost of such a gadget is far less than the cost of an RC model!

Flying: Like any taildragger, hold in *up* until it's rolling, and ease the throttle open. Amy runs straight, and will be off soon.

If you try to horse the model off early, the large elevon pitch deflection can temporarily stall the wing, causing the model to drop back onto the ground. Since Amy accelerates quickly, the ensuing bounce off the gear usually tosses the model airborne. It has never caused any damage, but it looks untidy, so make your takeoffs smooth.

Go for height and check the low speed first. If you pull up hard, a wobble in pitch indicates that you need to move the CG forward. Having to pull hard to raise the nose indicates nose- heaviness.

The stall should be straight ahead. Amy takes a lot of pushing into a spin. Spin recovery is near instantaneous, as is the snap roll.

I get the feel of the model, then crank up the throws to get my spins and snaps with full throws. It makes life far less exciting knowing that you just drop the inputs and she's out of it. For regular flying, I just use less stick deflection.

If you're looking seriously at Amy, I won't tell you how to fly aerobatics; you can do them as well as I can. It will do anything you fancy. Inside or outside looping maneuvers can be big or small; the avalanche or Chinese Loop looks really spectacular, especially with a negative snap roll on top of the loop (instead of the usual positive snap). Roll rate is fast and axial. Four-point and slow rolls look great too.

Virtually neutral in yaw, Amy will fly level or climb in knife-edge. I've 'persuaded' Amy through most of a knife-edge loop; with more power up front, I believe it would really do one. (Where did I put that O.S. .32F?)

Rudder really kicks her over stall turns, comes on and off fast in four points. Try flat turns—no bank! Turn with full rudder—left or right, hold the wings level, and watch the height. I wouldn't want to be *in* an aircraft doing this, but it's fun to stand and *watch*.

What went up has to land eventually, so fly Amy smoothly into a tail-high wheeler. Trim the descent with throttle until it is just skimming ground, then go to idle and flare gently. Amy isn't stall-free like a delta; get too nose-high and the drag piles up, it sinks fast and whacks down heavily.

If you end up deadstick, don't let the speed decay until you're lined up on approach. If you end up in a high-drag situation here, try to unload by getting the nose down and the bank off. That way Amy will descend under control; with the nose high, it'll just descend out of control.

Amy has the best aerobatic capability of my tailless designs. I make no claims as to competing with conventional aerobatic models, but she has left a few wondering why their regular-shaped model won't fly some maneuvers quite like it does.

If you asked me for one moment that makes 'flying tailless' so worthwhile, it would be when that stubby little shape (that looks like it has no right to fly) breaks ground and climbs out just like it is going to fly anyway.

This is what sport RC is all about. We don't have to sweat fuel economies, design regulations, what size numbers to paint on it, or what's on our license; we just do it!

So, join in the fun. Try Amy as a stepping stone to go farther away from the cookie-cutter models. Perhaps you'll make the next step yourself. ✈