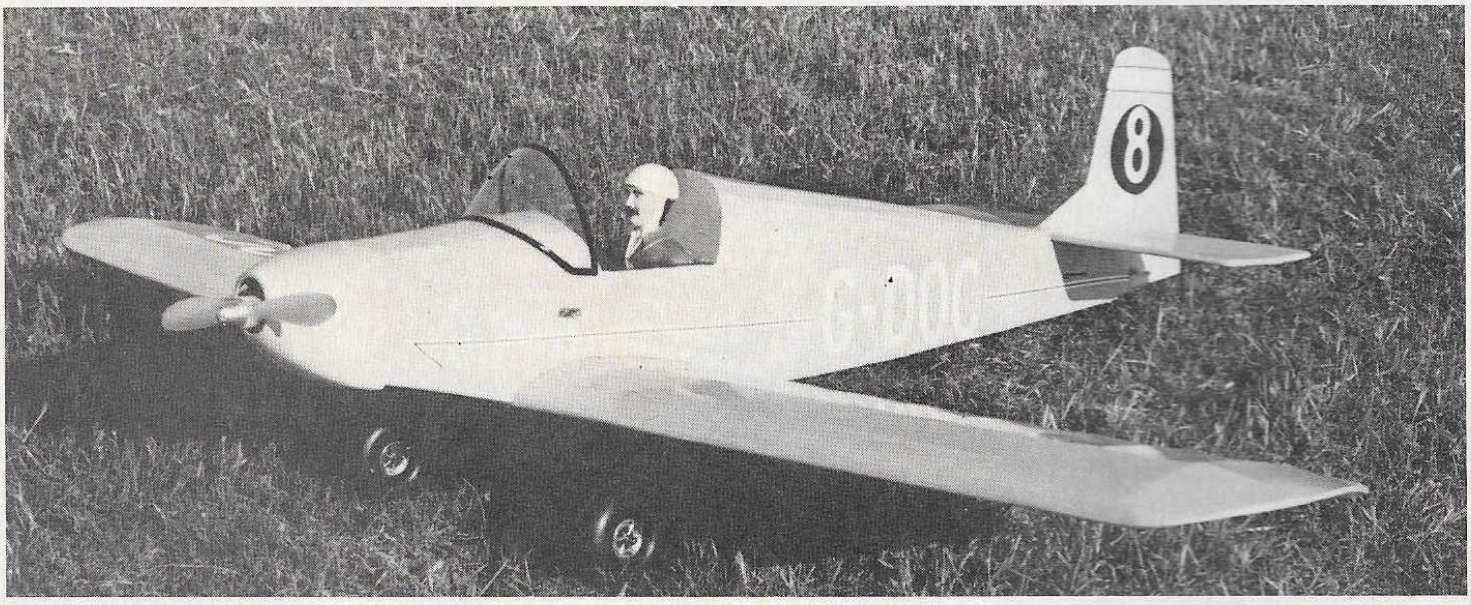
A Stand-Off Scale R/C Druine Turbulent



This is one of those rare aircraft that just fly with natural grace. A joy to build, devoid of evil habits/**Doc Mathews**

PHOTOGRAPHY: DOC MATHEWS



Certain full scale aircraft possess qualities so ideal for scale models that they are developed again and again. Such classic aircraft as the Piper J-3 Cub, the Volksplane and the P-51 are selected as subjects for scale models of every size and variety ranging from Peanuts to Quarter Scale. The Druine Turbulent is one of these repeatedly selected subjects; due in large part to it's delightful appearance and relatively simple to duplicate lines. The undeniable fact that Druines invariably result in fine flying models also contribute to this popularity.

Why then would I choose to develop a Turbulent, knowing full well that several have been published as R/C models over the years? Simply because I like it's looks, and was challenged to design a model of it with super simple construction and near trainer-like stability. The resultant model looks surprisingly close to exact scale (though it certainly is only Stand-Off) and flies exceptionally well.

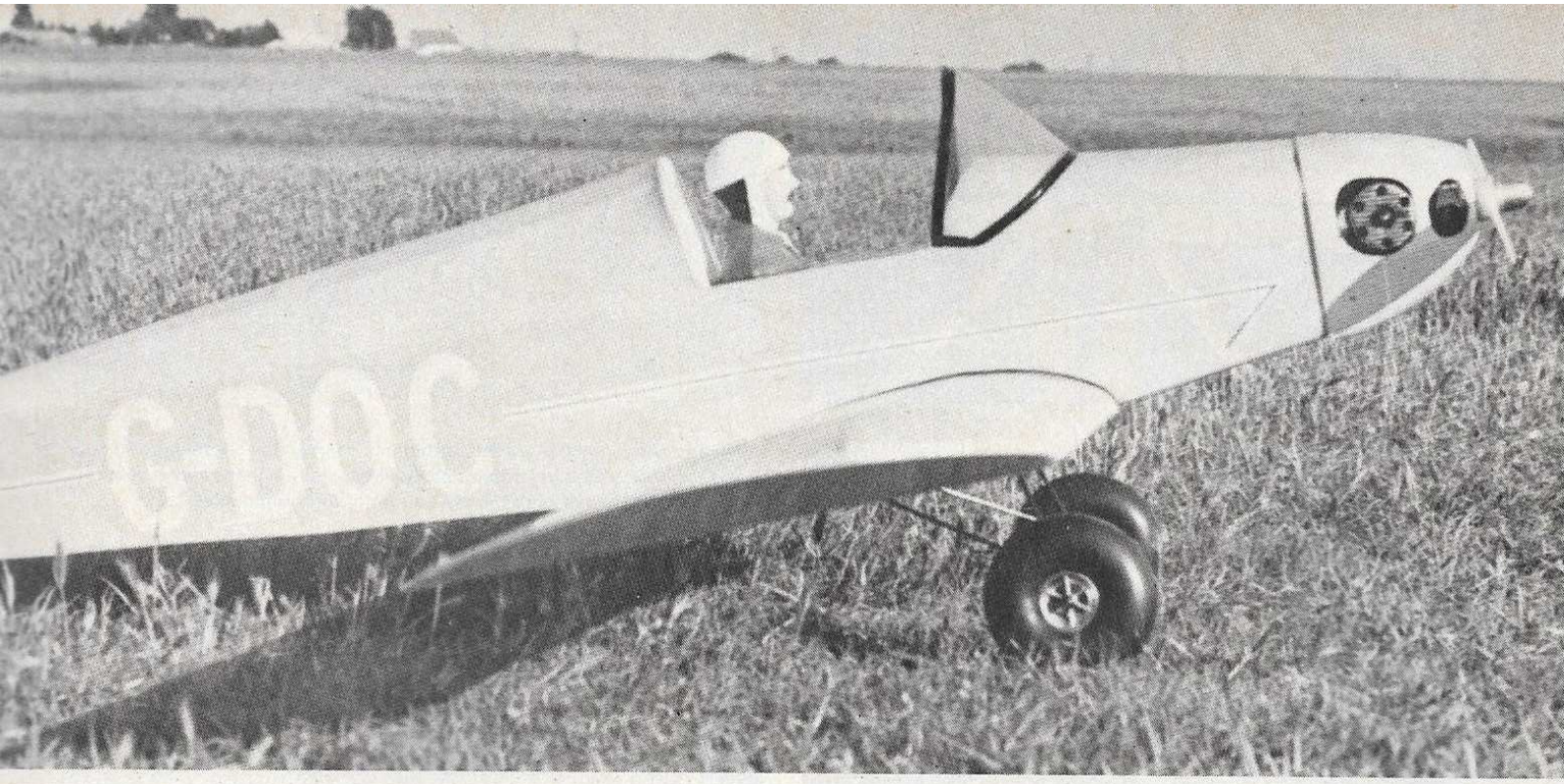
Using several of my pet construction techniques I have built three models in this series, each incorporating needed improvements in mechanics and strength discovered in flying the previous model for numerous hours. The #1 prototype featured wings held on with dowels and elastics, and used scale-like ailerons. It flew well, but the wing was constantly displaced during touch and goes. The "barn door" ailerons were felt to be an unnecessary complexity and were abandoned on subsequent models.

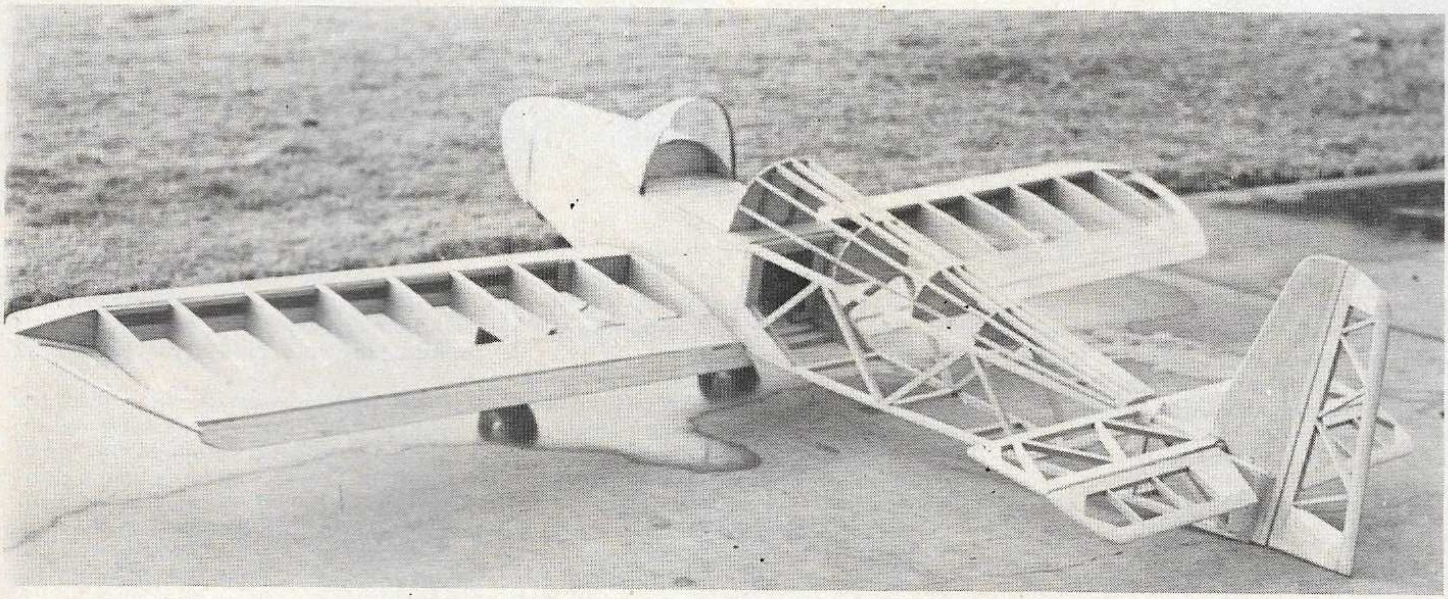
The second prototype used strip ailerons and nylon bolt wing hold-downs. It was a highly satisfactory model, but was destroyed in a transmitter battery failure. It flew free-flight in slowly tightening right turns for several minutes before impacting, exhibiting excellent inherent stability.

Number three, as presented in this article was then developed incorporating some wing saddle and tank plumbing lessons learned, plus a shortening of the tail moment for improved looping. That this final model has attractive esthetics is apparent in the photos. What is not visible is the superb flyability. I would recommend this Turbulent to any flier who can handle an H-Ray or Kadet and feels ready to move on to the Sunday fun type flyer.

Anyone who has built a Kadet will quickly recognize the wing construction as coming straight out of Montezuma, Iowa. I certainly offer no apology as the Kadet wing is almost impossible to build incorrectly. It is light, but strong, and after all who am I to try to outdo the crew at Sig?

The fuselage frame is unlike prevelant contemporary technique in that it uses full length sheet siding for several reasons. Foremost is a much higher strength to weight ratio, second is cost and thirdly, alignment control. I would suggest to anyone who feels uneasy about this construction method that he take a look at the roof trusses in his home or the girders in a bridge or high-rise structure. When the #2 prototype splattered everything from the trail-





ing edge rearward remained intact without so much as splitting the covering or separating the empennage.

The empennage itself is of mixed sheet and built up construction to alleviate tail heaviness. If a heavy engine is to be used, full ¼" sheet surfaces could be substituted although this would *not* represent any increase in strength. The construction as drawn is easy to build and is recommended.

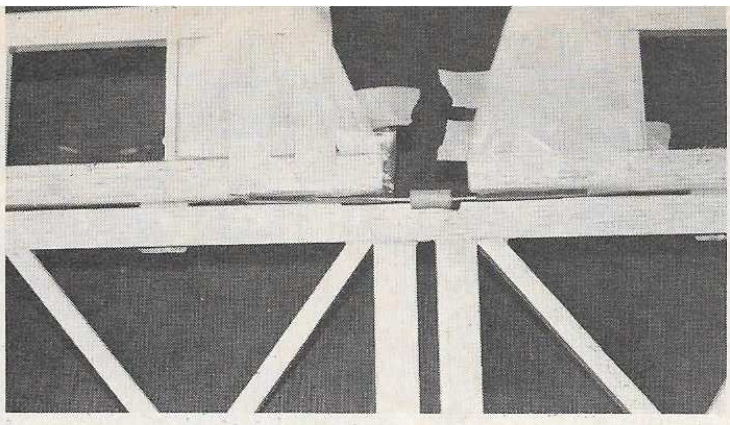
In General

Do not use balsa as a substitute for spruce members. All adhesive, unless otherwise specified, is aliphatic resin (See Tite-Bond etc.) Epoxy refers to slow setting products such as Formula II, please do not use 5-minute polyester type epoxies. The abreviation C.A. refers to cyano-acrylate, the chemical name for the "fast" glues such as Jet, Hot Stuff, Zap, etc. All Sig items are available direct or through your dealer. There is no exotic or difficult to locate hardware in this model.

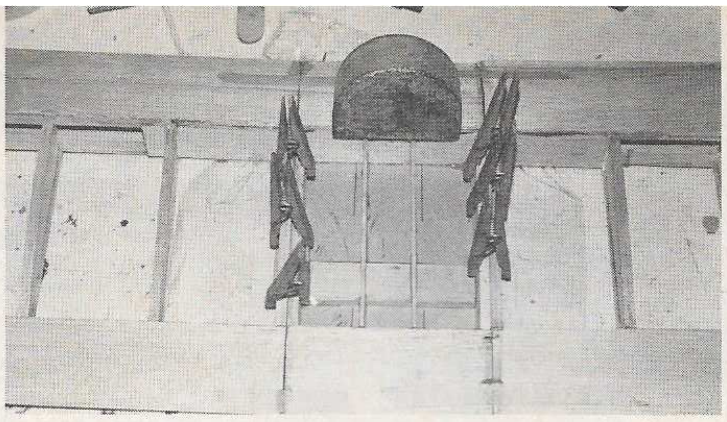
The Wing Assembly

As mentioned, this is Sig Kadet style construction with ailerons and a center-section. A quick study of Sig's instruction manual would be helpful, but for those who do not have ready access to one, the sequence of assembly follows:

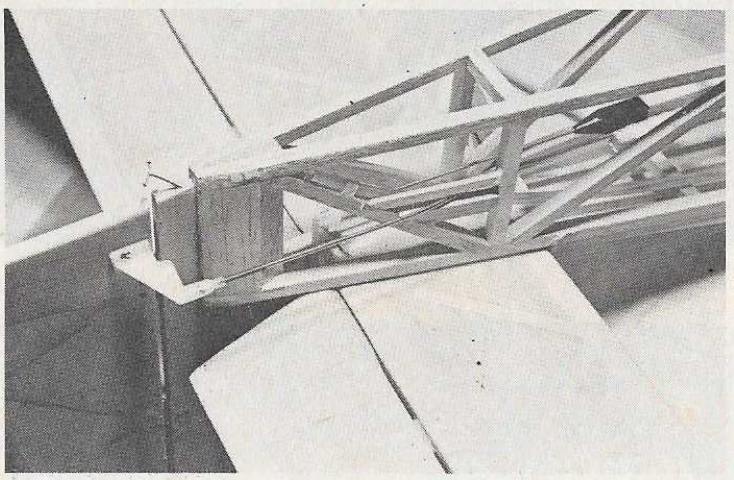
1. Pin the leading and trailing edge sheeting over the plans.
2. Add the bottom capstrips.
3. Position and glue the spars using the wing ribs to locate them.
4. Glue the wing ribs to the spars and sheet.
5. Glue the leading and trailing edge stock to sheet and ribs.
6. Contour the tops of the leading and trailing edges with a razor plane and sanding block.
7. Glue the top spar into the notches.
8. Glue top sheeting and capstrips into place.
9. Glue tips and braces, blocking up for the desired angle.
10. Remove, sand, add hinges and ailerons.
11. The center-section uses 3/32" ply on the bottom and balsa on the top. Ribs should be epoxied to the floor as should the spars and landing gear blocks. The ply dihedral gussets are built integrally with the center-section.
12. Block up tips and block sand end ribs for proper angle. This is the classic H.L.G. technique.
13. Join the panels to center-section by cutting appropriate slots with two hacksaw blades taped together. Try for a sliding fit of the gusset against the outboard panel spars.
14. Epoxy the panels to the center-section with the tips blocked up and the center-section flat on the building board. Hold the gussets against spars with clothespins.
15. Complete the wing by planking the

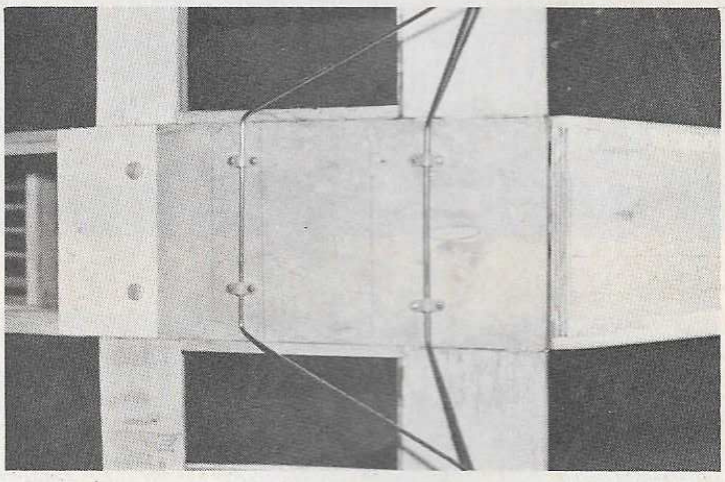


The two separate pieces of the elevator are joined with a wire U-shaped piece. The tape you see is to keep the epoxy from joining the stab and elevator. The elevator horn is nearly buried in the tail section.



The wing center section on the Turbulent uses 3/32" ply on the bottom and Balsa on top. Ply dihedral gussets are built integrally with the center section. Gear is simply bolted onto the ply bottom of the wing center.





center-section top, then wrap with glass and tape.

I assembled the undercarriage wires in place, the nylon brackets were screwed on (keep outside edge of bracket well up against the wire bend to prevent movement from left to right to hold wires in place. The swept forward angle was held with a scrap balsa frame while legs were being wire wrapped and soldered.

Remove the undercarriage and brackets while covering and painting.

The Tail Feathers

The tail structure is really completely straight forward, just be sure to install elevator strengthener and hinges before cutting at the trailing edge. Note the rudder sets in a stabilizer slot and must be trimmed accordingly.

The units should be covered and painted at this time to assist in locating the servos for optimum C.G. position in a later step.

The Fuselage Structure

1. Build two identical sides, one on top of the other, using masking tape to prevent glue from sticking the sides together.
2. Remove and separate the sides, epoxy the doublers and triangular stock. Make a *left* and a *right* side.
3. Invert the fuselage (top down) over the top view and epoxy bulkheads 1, 2 and 3 to the sides. Hold together with clamps and masking tape and check alignment with triangles.
4. After a complete epoxy cure place a "C" clamp in the mid area of the wing saddle and tighten. Use two additional "C" clamps to slowly pull the nose sides up tightly against epoxied bulkhead B. It may be necessary to score or crack the sides at #2. Epoxy triangular stock to the front face of #2.
5. Pull the tail post together over the plan top view and add cross-members of hard 3/16" balsa or use spruce.
6. Remove box from the plan, add the turtledeck, formers and stringers. Cut the notches for the stringers as you go as this makes a neater job than using pre-cut notches.
7. Epoxy #1 after pre-drilling for the engine, tank, plumbing and throttle pushrod. After the epoxy has set, complete holes by drilling on through #2 Add 4-40 T-nuts by temporarily installing the engine.
8. Plank the top front wire with cross-grained 3/32" sheet balsa.
9. The front cowling is formed of moistened 3/32" sheet wrapped over top of #1 and #C. Use C.A. to hold, then glue from the underside.
10. Position the wing in the saddle at this time and drill for the dowels and nylon bolts.
11. Temporarily install radio and pushrods with elevator and rudder pinned in place. Adjust the rods and clevises for neutral. Check the throttle action etc. Epoxy servo side rails in place, then remove all hardware and cover fuselage.

Finishing Up The Details

My aircraft were all covered with acetate sheathing from the fabric shop. I detailed this technique in the Porterfield Collegiate article in FLYING MODELS Feb. 1978 issue. I clear doped the fabric with nitrate (do not use butyrate dope) then sprayed the colors with Perfect brand polyurethane. Letters and numbers were vinyl stick-on from an office supply store. Pin stripes were of vinyl tape.

Install all the hardware, then adjust the C.G. by moving the servo mount fore and aft. I find Buckeye Balsa's Servo-Mounts ideal for shifting a servo tray for optimum position. I did not need any lead in the third model. The battery is located in the tank area, separated with a scrap of 1/8" lite ply member. Epoxy or polyester should be applied liberally to this whole area.

Flight Notes

Check the radio with the engine running and be absolutely sure all control deflections are in the proper direction. It is amazing how frequently new models arrive at the flight line with reversed controls, particularly in the ailerons.

The flight profile is much like the Kadet, takeoffs are a throttle-rudder function, landings are gentle and slow and the time inbetween is a delight. Rolls require some down elevator when inverted and inverted flight is possible, but does require careful altitude thanks to the flat bottomed wing section.

My third Turbulent is one of those models I drag out to fly for fun after sweating out some newer design's test flights. I have absolute confidence in its manners and reliability. Build one for yourself, you'll find it to be such a loveable model you'll be tempted to build a second one as the original wears out from hours and hours of flying. I'm seriously considering starting on a fourth version. Let's see now, could a foam semi-symmetrical airfoil be used?