WACO SRE

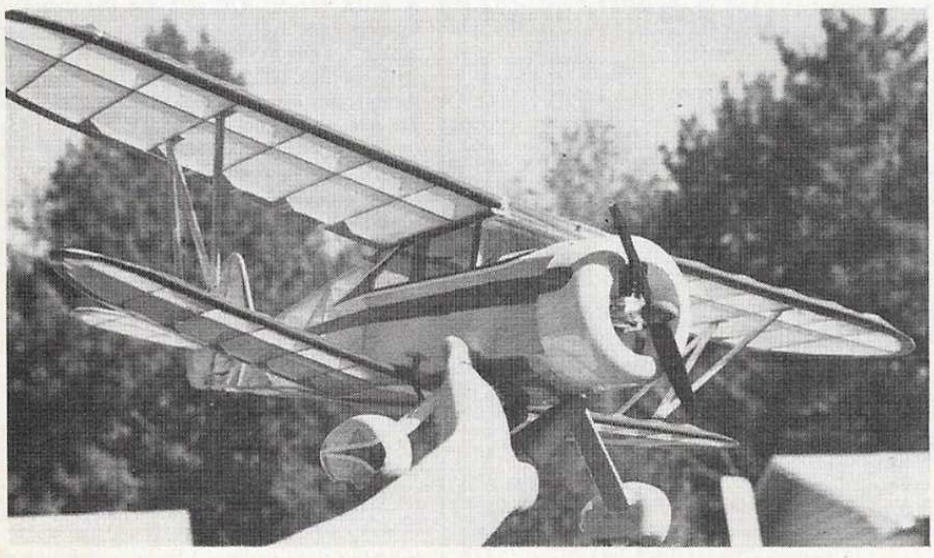
By Jim Kostecky

I have always found the lines of Waco biplanes truly appealing. The proportions and curves seem exactly right. If the old adage "If it looks right it will fly right" is true then the Wacos must have been a joy to fly. Based on discussions with pilots who have actually flown them, I have no reason to believe otherwise. The Waco *SRE* seems to me to be the ultimate expression of beauty in the long line of biplanes the company produced. From the massive cowl, balanced by a long flowing fuselage ending in graceful tail surfaces, the *SRE* is, in a word, elegant.

My first glimpse of a model *SRE* was many years ago when I watched a "Berkeley" kit built by Harold Keller (a gentleman and master modeler I admired as a kid) fly majestically at the local flying field. This was when Harold De Bolt was flying hot "low wingers" with Space-Control radios and pattern flying was on the brink of sophistication that we witness today. By contrast, this elegant airplane which flew "on its wings", not on the brute power of its engine, and controlled by this mild-mannered gentleman etched itself in my mind as something I had to build . . . someday. More than twenty years later, "someday" has come and my version has enabled me to relive some pleasant memories and to re-capture part of a time in aviation that I was too young to witness.

The model as presented is very close to scale in outline except for three compromises. The tail surfaces have been enlarged slightly for stability. With such a long tail moment I wonder if that was necessary. Better safe than sorry. Secondly: the landing gear is missing a spreader and two little braces that run from the upper rear landing gear fairing to the fuselage near the lower wing leading edge. The braces looked like they would puncture or fracture the fuselage where they connected. So I left them off. The major, and third deviation and one which I'm sure will offend some purists is in the cowl area. Since this is a "Schoolyard-Scale" model, I felt I could live with the aesthetic compromise I made in the interest of cooling my trusty "Golden-Bee" .049. Much of the beauty of the *SRE* is in the way the radial cowl makes a smooth transition into the flat fuselage sides. As you'll notice in the photos and plan I sharply pinched the fuselage from the front of the cabin forward and left the sides flat where they meet the rear of the Sig formed plastic cowl. This allows two very efficient cooling outlets and eliminates a very "draggy" area where air entering the front of the cowl would have no place to go. As always, my schoolyard models are designed with performance as the primary emphasis. I was not disappointed as this was one of the "prettiest" little models ever to fly under the football uprights at the local school.

Let's build. Light weight with more than adequate strength is one of this design's best features. Please do not add anymore structure, it just isn't necessary.

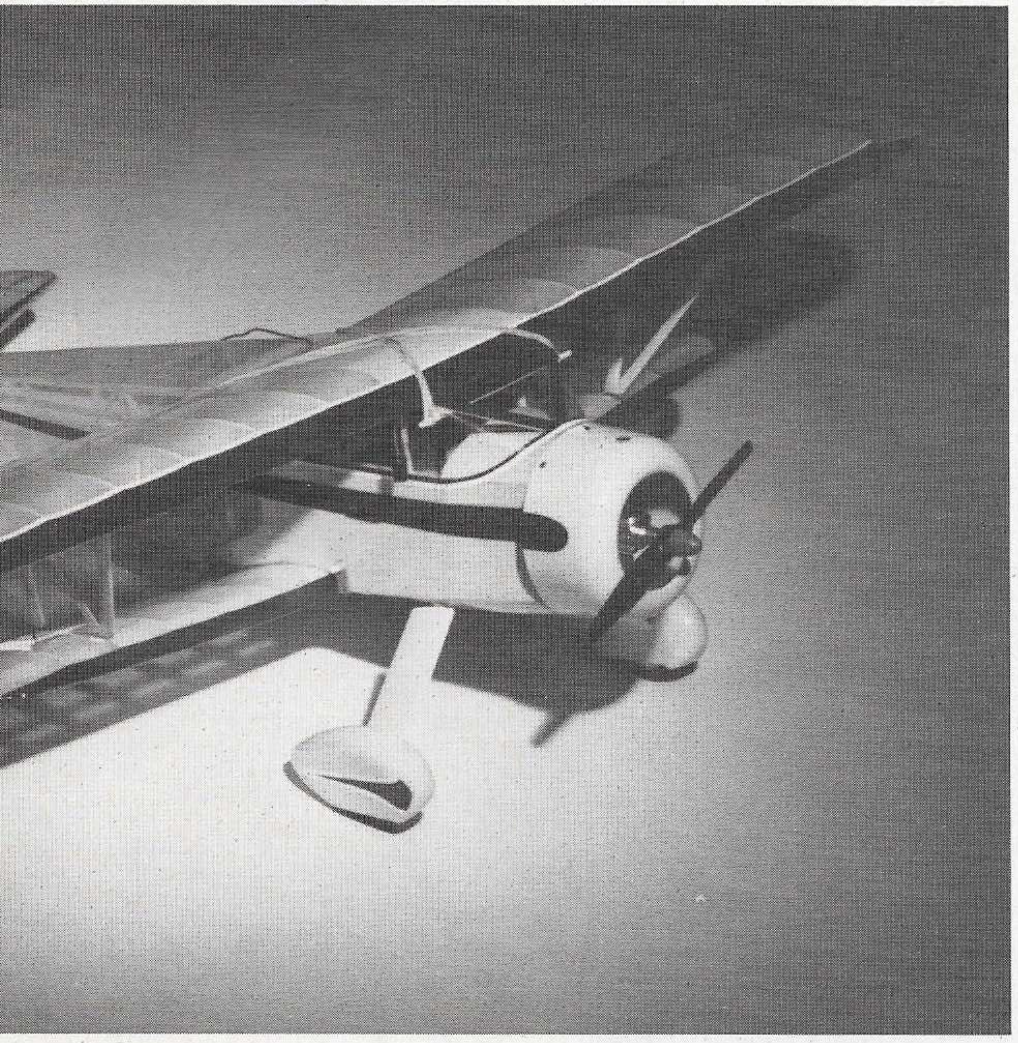


As the author says, this Waco *SRE* cries out . . . for what he wasn't sure, but every once in a great while, designer Kostecky arouses his inventive (?) genius to present darling little airplanes of distinction.

Wings

I build the wings first because I find them the least fun and this plane has twice as many as usual. Both wings are the same (except for size) so I'll only describe the construction of the upper wing. Cut all the ribs from firm, straight-grained light balsa. Remember the center section ribs are smaller to accommodate the 1/16 inch center sheeting. Cut the spars from firm but light 1/8 × 1/2 inch balsa. Make sure the angles at the center section ends are correct. Pin the spar down on the plan, pinning on each side but not through the spar. (You did cover the plan with wax paper didn't you?) Now position all the ribs except those for the center section. Add the leading and trailing edges and the 1/8 inch sheet tip outlines. The tips are positioned flat on the plan and small filler scraps may be added where they join the leading edge. Add the trailing edge gussetts. When

Who can resist the classic beauty of this all time favorite?
A natural for "School Yard Sale" R/C fun.



dry, remove the wing panels and sand smooth. Blend the bottom of the tip into the leading edge. I shaped the trailing edge before I glued it to the wing. Pin the wing panels back on the plan but elevate the tips the appropriate height for the dihedral angle. Add the trailing edge center section and 1/16 inch bottom sheeting between the rear of the spar and trailing edge. Add the 3/16 inch square center section leading edge and spar splice/filler piece. When dry (or cured) add the bottom forward sheeting and all the top center section sheet. Make sure you glue the radiused corners at the leading and trailing edge dihedral joints or you'll never be able to achieve a wrinke free covering job at these points.

The mounts for the "N" struts should be done at this point. It probably would be just as well to get the struts out of the way now too. They are fabricated out of hard 1/8 inch balsa the approximate size shown on the plan. Add 1/16 inch diameter aluminum tubing to the parts that attach to the upper wing. Wrap a little piece of silk or glass cloth over the tube and onto the strut ends and glue well. The bottom tubes will be added after the strut bottoms have been trimmed to their exact length. You'll be able to do this only when the fuselage is built and wings can be trial mounted. Wire hook strut receivers are bent from 1/32 music wire as indicated on the plan. Sandwich these at the correct locations on the appropriate ribs between some 1/4 inch square balsa reinforcements.

Notch the trailing edge center section 1/16 inch and glue a 1/16 inch music wire reinforcement to it. A bit of glue and silk is good insurance at this point.

Tail Surfaces

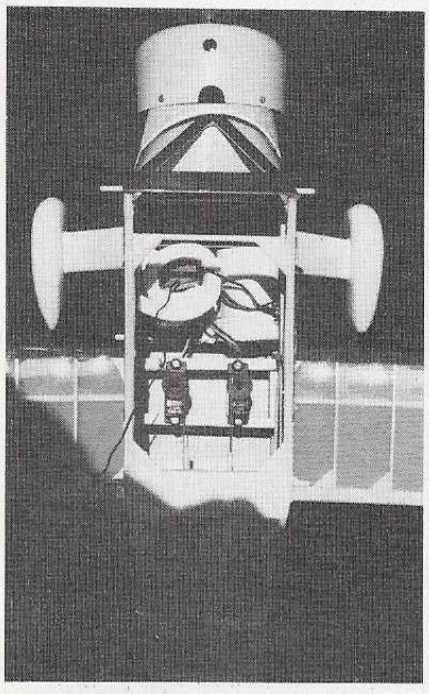
These are so simple as to be inconvenient. Don't be in such a rush that you do a sloppy job. Just build them over the plans from the correct size stock but settle for nothing less than perfect joints. These parts are so minimal that any poor joint or misaligned piece sticks out like a sore thumb. Consider hinges at this point. I discovered a plastic sheet hinge that has some kind of fabric on both sides. A simple X-Acto slot in each surface allows the hinge to be inserted and a carefully applied drop of CyA finishes the job. Don't glue the adjoining surfaces together though. These hinges are manufactured by Rocket City and I found them at my local hobby shop.

Fuselage

At last the fun part! Build one fuselage frame from 1/8 inch square and 1/8 inch sheet balsa over the plan. While it's drying, cut out the firewall from 1/8 inch plywood and mount the engine with blind mounting nuts. I used a Golden Bee but a Black Widow or, if you're gung-ho, a throttle equipped Cannon G-Mark or Cox TD would add an extra dimension. While we're dealing with plywood, cut out the F-3 landing gear mount and front windshield cabin brace. These are 1/16 inch ply and very adequate. Bend the landing gear and tail wheel mount from 1/16 inch diameter music wire and sew the main gear to F-3 and epoxy or CyA the sewn portion.

Build another fuselage side frame. Apply the 1/16 inch balsa sheeting to the forward portion of the side frames. Boy, were we ever lucky we made a right and a left one! Now score the outside of the sheeting at the point indicated on the plan where the sharp break

A lovely, graceful pair. Kim Donacik holds the finished *SRE*, a blend of traditional stick and frame construction. It's close in scale outline.



The trusty Tower miniature radio easily tolerates the "deft" touch of the author's flying ability. There's ample room for those who would like to add a third servo as a throttle control.

occurs. Cut a slight "V" into the 1/8 inch longerons on the inside of the score line. Place the side on a table with the score mark parallel to the table's edge and crack it inward slightly. Don't break it off! If you do, assembly just becomes a little harder.

Place the fuselage sides upside down on the plan's top view of the fuselage. Brace with balsa or drafting triangles so they are perpendicular to the building surface. Add the top and bottom cabin cross-pieces. Draw the sides together at the nose and epoxy in the firewall. Make sure the firewall is centered! We don't need a banana shaped fuselage. Draw the tail together and add the top and bottom cross-pieces. Remove from the board and add F-2. Sheet the nose between F-1 and F-2 with dampened 1/16 inch sheet. Hold with masking tape until dry. Glue in F-3 and the landing gear. Add the 1/8 inch longerons from the lower wing leading edge cut out to the fire wall. Add the 1/8 inch fillers as shown on the plan and the triangular gussets around the landing gear so you have something to adhere the covering to.

Back up top, add the front cabin filler block (that you carved and sanded to a triangular cross section, right?), the 1/16 inch ply windshield support, and the 1/8 inch dowel wing hold down. Sand the 1/16 inch balsa rear filler to a wedge shape and glue it on so the wing fits between it and the front snugly. Drill the other holes for the remaining wing hold downs but don't glue them in yet.

Landing gear fairings are two 1/8 inch balsa laminations with a slight groove for the gear wire scored into them. Epoxy these in place. When cured, sand to a streamlined section. You have to use the wheel pants! The center is 1/2 inch balsa with 1/8 inch sides. This allows you to achieve a beautiful, full, streamlined pant. Epoxy these onto the wire and fairing (don't forget the wheels!)

Pin and rubber band the whole thing together. Insert the struts into the upper wing mounts and trim and fit the bottoms then glue the aluminum tubes to the strut bottoms.

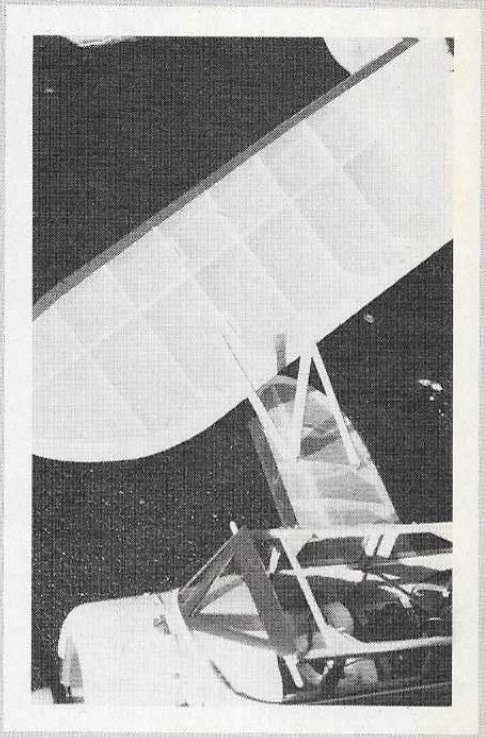
Mount the tail wheel wire in the rear fuse using a scrap of 1/16 inch ply and thread.

Take the four inch Sig cowl (plastic) that you ordered from our friends in Montezeuma, Iowa at the same time you sent for the plans. (Or if you forgot, fabricate one from two 1/4 inch balsa rings and 1/16 inch balsa sheet) Trim the cowl opening and then a hole for the needle valve and glo-head. A needle valve extension or filed slot cures adjustment problems. The cowl is held in place with three wood screws which thread themselves into little hardwood blocks glued to the firewall.

Finish

Hope you worked out your radio and pushrod installation before adding the covering and finish. My wife thinks I'm a study in contradictions. Why else would I build a model that cries out for lightweight silk and six coats of clear dope and maybe even a light airbrushed coat of color and beautifully masked trim and then MonoKote it? Why? Because I had a whole roll of transparent yellow and couldn't wait to fly it, that's why. Anyway, with some blue trim sheet and white pinstriping it came out acceptable. Wheel fairings and pants got a coat of surfacing resin and one coat of brushed K & B epoxy. The cowl got the yellow epoxy too.

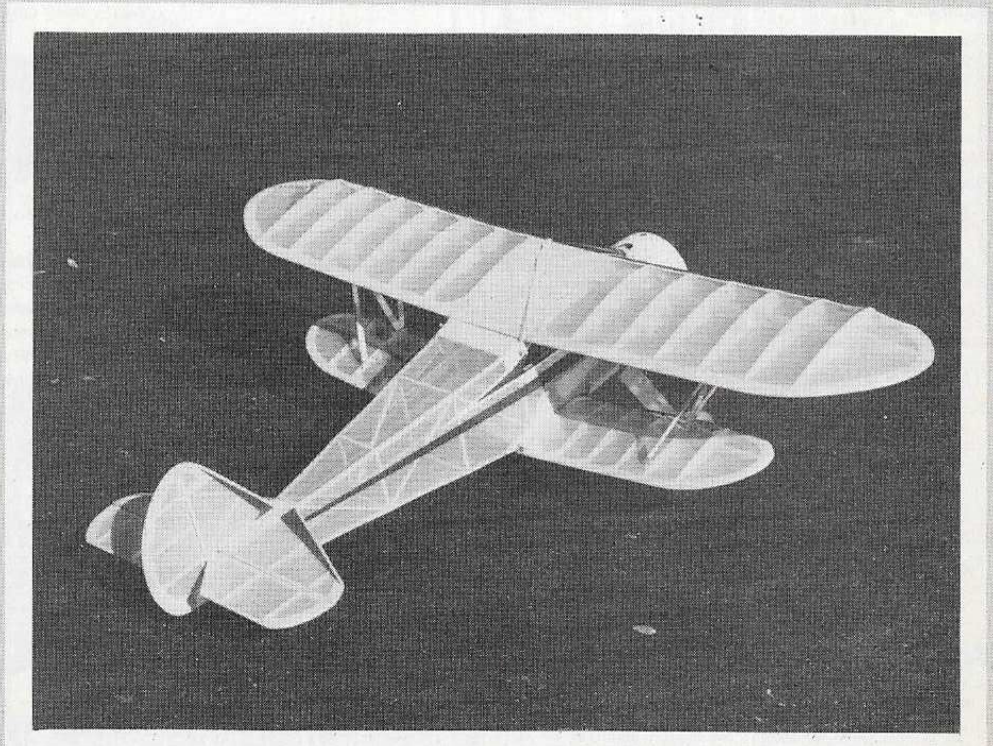
The windshield was a paper pattern cut-and-fit ordeal which was then finally cut from Sig butyrate sheet and adhered with R/C-56 glue. Poke the wing hold down dowels through and glue in place.



The wings' interplane struts nest in hardwood brackets in upper and lower wing. The lower part of each strut is trimmed to length after the wing has been mated to the completed fuselage.

Flying

Don't rush. Check for warps and correct center of gravity. My *SRE* is equipped with Tower's great little miniature radio. All up weight, ready to fly, was 12.5 ounces. I couldn't believe it either! Another servo and



Just about every design produced by the Waco Aircraft Co. had a solid elegance. Fulfilling a promise to "someday" build one, Jim designed this version for Schoolyard Scale (small R/C aircraft with .049 engine).

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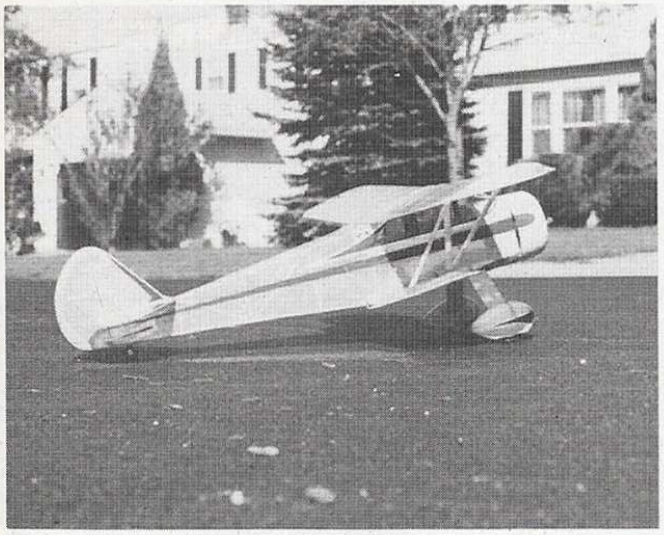

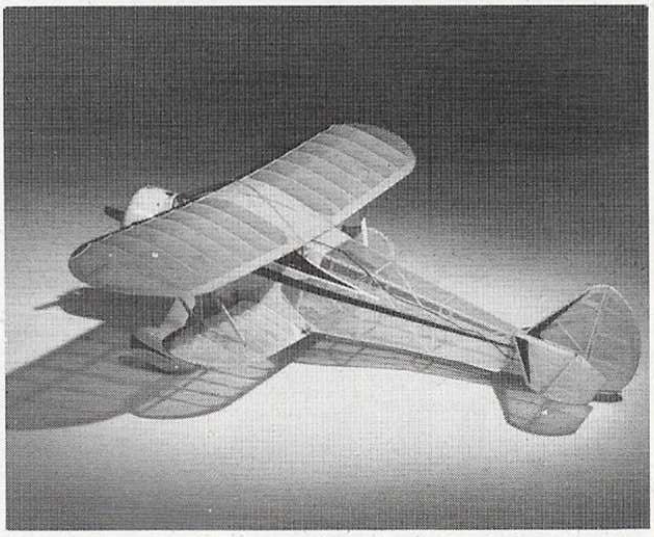

Whatever you do, says the author, don't forget the wheel pants! Since the plane is hand launched, they won't hinder take-offs and shouldn't hinder landings too much. The cowling can be purchased from Sig Manufacturing or made from some soft 1/4 inch thick balsa rings and 1/16 sheet.

225 mA pack with a throttled engine probably would be a great combination.

I've always been suspicious of the "It flew right off the board" claims but it did! All flights to date have been hand launched. First flights were without the cowl using a 6-3 prop, engine screaming. Wow! Smooth and beautiful but like a little pylon racer. Quick! With the cowl and a 7-4 prop it was calmer and prettier. Either way I can't believe how smooth it is. It flies not flits. the plane slows up rapidly when the engine quits. No big deal. Just feed in some down trim or else it settles rapidly. You need the speed to allow the wing to do its job. It's fun to get it as high as you can and then just glide around for a while. I think it will thermal but I've only flown it evenings. You had better land on the smooth dirt of the ball diamond or walk over to the black top parking lot. The small wheels, light weight, wheel pants, and grass make an interesting combination. To date the resulting somersaults have resulted in only a bruised ego. Try it, you'll like it.