AN RCM CONSTRUCTION FEATURE

THE CLASS MATE

A classic, unequal span sport Biplane reminiscent of aviation's yesteryear. Strictly a fun job, you're not likely to win any contest with the Classmate.

By Ken Willard

WHAT happens if a Schoolmaster spends a lot of time in a workshop with a Sophisticated Schoolgirl? Well, they find that they have many things in common — they both like to fly, they've both been around for a while, they both like Cox's Red Label better than Johnny Walker's, and their MonoKote matches. So what else? They get married — and not long afterwards they produce a little Classmate!

And that's just how the Classmate was born. You see, I built the Sophisticated Schoolgirl for the specific purpose of showing how the Bonner 4RS would fit into a standard ½A kit, and the combination was first shown at the Toledo Conference in 1967. After the show, I brought the Schoolgirl back home, flew her a few times more, and then went on to another design. The Schoolgirl hung on the wall, with the wing setting on top of some others on my wing rack.

At the time I was doing some experimenting with test samples of SuperMonoKote, and in the process I covered the old prototype Schoolmaster wing with it. It turned out very well, and I thought "Gee, I ought to put another Schoolmaster together, now that I've got this wing looking so good." But I had other projects going, so I started to put the wing up on the wing rack.

Any biplane fan knows what happened next. As I started to put the wing on the rack, it momentarily was just the right height above the Schoolgirl wing to yield a biplane configuration — and that's all it took! There I was, with two readybuilt wings, perfectly matched for a classic, unequal span, sport biplane. You all know the bit — "I love biplanes, but I hate to have to build two wings." Also, in the scrap box, I had the old original sheet stab from an earlier Schoolmaster (I never throw anything away) so that all that I needed was a fuselage.

So, out with the sketch pad, and in a short time I had a simple box fuselage designed around the wing combination. It looked good, so I made a small chuck glider version, with which I checked out the stability characteristics, varying the CG, and also placing the stab first on top of the fuselage, then on the bottom. In the latter configuration the glider would fly satisfactorily with the CG ranging from 25% to 40% of the chord, so I decided once again to put the stab on the bottom, since it should make it easier to trim out for sport flying.

And that's how the Classmate was designed. That is, insofar as general layout is concerned. Next came the detail design — and as usual, I wanted to keep the detail as simple as possible. One of the areas in open cockpit biplanes where detail design can get complicated is the cabane structure, which has been called the "birdcage" by many people for that very reason. You can't get a much more simple structure than the Classmate has — two "N" struts, cut from one piece of ⅛" plywood each, and integral with the mounting base which glues to the side of the fuselage, and also integral with the wing cradle on which the wing rests. A 3/32" plywood doubler, with the grain running chordwise fore and aft, is added at the wing cradle for strength. The cabane units are sanded so the struts are streamlined, and the edge of the base is sanded to fair into the side of the fuselage.

Another simplifying feature is the one piece balsa block hatch. You could make it slightly lighter by building up a sheet and former with stringer type structure, but if you use a medium grade of balsa block, the weight saving isn't worth it. Same thing is true of the headrest.

It should be obvious to you by now that these simplifying features cost a little more, both in money and weight, so if you want to take the time to make slightly more complicated structures and save a little money and weight, go ahead. While you're at it, you could also make built up wings and save even more. In my own case, I became so intrigued with the design that I couldn't wait, and took the fastest way possible to get the model ready to fly. I will say this — if you do lighten the structure it'll make the model perform a little better with the Max. 10 — and for those of you who don't, and feel that the performance is a little sluggish with the Max. 10, there's room enough up front for a Max. 15 — and you'd better be ready for it!

The Classmate is strictly a fun job. Like the full size airplanes of the era in which that type of design was popular, it's not overpowered — you have to dive it a little to get up speed for maneuvers. Then it does them almost at scale speed. You're not likely to win any contests with the Classmate, other than maybe a spot landing, or limbo, or similar type club contests, but you'll enjoy the realistic takeoffs and the scale like flying qualities. The spectators like it, too. So build one, and see for yourself.

WINGS

The upper wing of the Classmate is a standard Schoolmaster wing, with the dihedral set at 4 degrees. Some of you sharp-eyed observers will note that my Classmate has a built up wing. You know why? It is the old, original Schoolmaster prototype wing, which I subsequently used on the Shearwater, then recovered with the new SuperMonoKote as a test panel, and now it's flying again on the Classmate. You can make one if you prefer, as I said earlier — but the all balsa construction of the Schoolmaster wing is really easier. Besides — there's a good chance that a lot of you still have one available that you could use.

The lower wing is a standard Schoolgirl top wing. As a matter of fact, I designed the width of the Classmate fuselage so that the center section of the Schoolgirl wing would fit it properly. Since I had previously installed the Bonner 4RS gear in the Sophisticated Schoolgirl, the same setup would fit in the Classmate, so the fuselage was built to fit the wing — rather than the other way around.

Since the wings are conventional, and have been in use for some time, it doesn't seem necessary to go into construction detail. The plans cover the situation, so let's get on with the fuselage.

FUSELAGE

The fuselage is so simple that reference to the plans will answer almost any questions you may have. There's only one thing to be sure and do, and that's to round the corners of the fuselage "box" from the cockpit back to the tail, and from the

trailing edge of the lower wing back to the tail, except leaving the corner square where the cutout is made so the stab fairs into the lower line of the fuselage. Also, leave the corner square at the bottom of the fuselage where the landing gear attaches, and then round the corners up forward to fair into the nose block, which shapes up to fair into the line of the propeller spinner.

If you do the above, then when you attach the headrest give it a nice rounded shape, you will be amazed at the general impression of a "rounded fuselage" that results.

The hatch, forward of the cockpit, is carved out of a solid block of medium soft balsa, with the cutout to fit the tank gouged just deep enough so the tank is pressed down softly into the cradle of the bulkhead about 3" back of the firewall.

You will note that the firewall is installed with a slight downthrust and right thrust, although the latter is almost unnoticeable. It is always true that due to slight differences in individual construction, two airplanes built to the same set of plans seem to require slightly different amounts of downthrust and right thrust — and this is where the Tatone radial mount adapter comes in very handy. You can make very small adjustments in the thrust line by using washers as needed at the three mounting points. Only your first flight test will tell you whether your first setting is right. The setting shown on the plans is the one that worked out best for my version.

The cabane structure is, as I said, purposely made in the simplest possible way, yet it is strong enough to take any air load, and if you should have a bad landing and cartwheel, the cabane structure will survive unless you've strapped the upper wing on so tight with the rubber bands that there's no flexibility. Incidentally, that's a mistake that a lot of modelers make — they mount the wing with rubber bands in the belief that the wing can shift without breaking the fuselage — but they stick on so many bands that they nearly crush the wing mount! You should never use any more than are necessary to hold the wing firmly in place through the air maneuvers. Otherwise, you might as well glue it on.

TAIL SURFACES

Sheet balsa tail surfaces, cut from medium grade 1/8" stock, are the simplest structures possible. If you plan to use galloping ghost, the stab should be extended back about 1/2" and the elevator width reduced accordingly, so there won't be an oscillating motion when you apply slow pulse for up elevator action. Also, add about a quarter of an inch to the trailing edge of the rudder to get a more effective rudder action.

The fin is butt-glued to the top of the fuselage, and with the shaped 3/16" braces at the bottom it gives a good strong mounting.

INTERPLANE STRUTS

The interplane "N" struts are optional, and only for appearance. Cut from 1/16" plywood, they add to the realistic look of the model, and are easily mounted and removed through the use of a simple mounting device — a little strip of the regular "wet" MonoKote at the end of each

All sheet construction, O.S. Max .10 or .15, super MonoKote finish, a small digital system, and some weekend flying fun characterize Ken's Classmate.

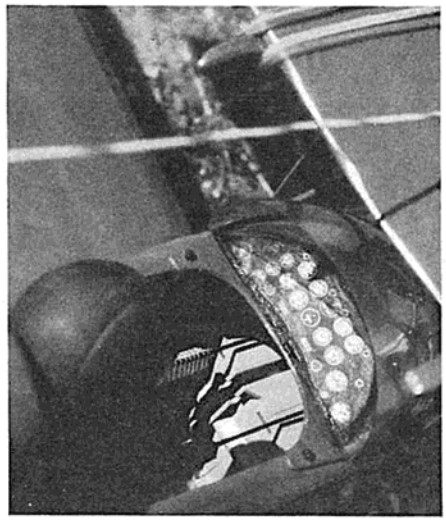
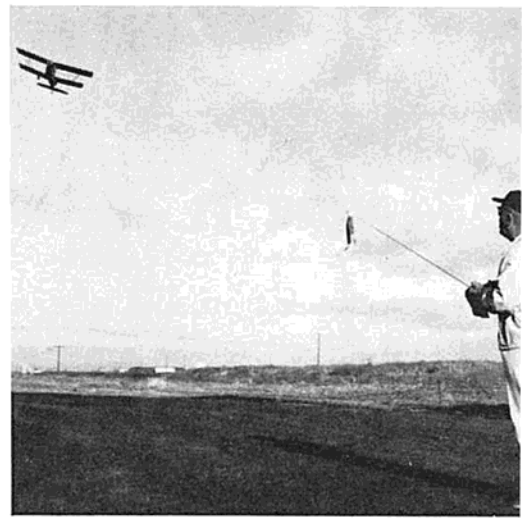


Photo shows hatch retaining screws and instrument panel.



Ken prepares to land the Classmate. Note flying garb — cap and tennies. . . .

Low angle shot of Classmate at local airport shows the Classmate in a strifing pose as vintage bipe. Note contrast to modern Cessna's in background.

strut which holds it in place against the wing surface.

LANDING GEAR

You can make your own, or go the easy route, like I did and use the Hallco unit for 2-3 pound models. DuBro wheels give a good shock absorbing action.

COVERING

What with all the materials that are available to you, this is one area where a wide choice exists. I used the new Super-MonoKote; I had been testing it on the wing panels for some time, so it followed naturally that I would use it on the fuselage and tail surfaces. As usual, I augmented the SuperMonoKote with Hobby-Poxy up around the engine well and on the firewall, and also painted the cabane struts and interplane struts with HobbyPoxy. My Classmate is red, trimmed in yellow and black, and red SuperMonoKote matches red HobbyPoxy perfectly. The trim job was done using regular MonoKote strips pressed onto the Super MonoKote red finish. It's the quickest way I know of to cover and trim a model.

ENGINE COWL

The engine cowl is cut from a sheet of thin aluminum, tailored to fit around the engine. After cutting it to fit, SuperMono-Kote can be ironed right on to the metal to give it matching color to the fuselage.

EQUIPMENT INSTALLATION

By the time this article appears in print there will be several new, small, and relatively lightweight proportional units available, such as the Kraft, MicroAvionics, PCS, Orbit, Logictrol, and Cannon, to name a few. However, they were not available during the flight test period, and the Bonner 4RS, which led the way in the lightweight trend, was doing great, and that's what I used. The plans show a very simple installation — one which is quickly removable for interchangeability with other models.

Although I have never flown my Classmate with galloping ghost, I am fully confident that if you want to install it, you will get good performance. Just be sure you make the changes to the elevator and rudder as I mentioned earlier.

I would not recommend the Classmate for rudder only flying. It would work all right, since the model is basically a sport biplane that will fly free flight, but the landing gear is located in such a position that without elevator flare the model would nose over too frequently on landings. The reason for putting the landing gear where it is is to improve the tracking on takeoff and reduce the danger of ground looping. If you do want to try rudder only control, move the landing gear forward about three quarters of an inch.

TRICKY LITTLE DETAILS

Every modeler figures out some unique little features to accomplish some purpose he has in mind. Here's a couple I used.

Hinges for the rudder and elevator are made from SuperMonoKote. Cut out pieces about one inch long and ½" wide. Then cut each piece in half so you have two half inch squares. Turn one piece over; then, with the adhesive sides facing each other, overlap the two pieces about ⅛", and seal the overlapped area with your hot iron. Next, iron one half on top of the elevator, run the ⅛" overlapped seal through the hinge line, and iron the other half to the bottom of the stab. The piece immediately adjacent is ironed to the bottom of the elevator, run through the hinge line and ironed to the top of the stab. This makes the hinge.

In actual practice, you iron all the pieces to the elevator first, then hold the elevator in place behind the stab with a couple of clamps at the tips, after getting the hinge pieces so they go through the hinge line correctly, and then iron the pieces to the stab. When you remove the clamps, you have the elevator properly lined up with the stab, all hinged and ready to operate.

Here's another little trick. To mount the headrest, instead of glueing it, I first covered the top of the fuselage with SuperMonoKote, then the headrest, except for the bottom surface. Then I placed the headrest in position on the fuselage and attached it with ½" strips of SuperMono-Kote which I ironed in place along the edges.

Hatch fasteners are always a problem. To hold my hatch in place, I cut the engine cowl so that it had a slight overhang from the back of the firewall, and the hatch slides in underneath the back edge of the cowl. Then cut a piece of 1/32" plywood to fit the rear end of the hatch, with the extended part cut to a curve to simulate the forward edge of the cockpit, and extending about ½" back from the rear end of the hatch at the sides. A couple of small wood screws hold the hatch in place.

Whenever you have a noseblock under the engine, fuel exhaust collects. To keep it at a minimum, install a drain tube, then you can wipe the fuel exhaust off the bottom.

Antennas are supposed to be kept away from servos. Run a piece of nylon tubing through the hatch, then insert the antenna and run it up through the tubing and over the top wing.

ADJUSTING AND FLYING

The Classmate is very tolerant of CG location. Naturally, the further back it gets, the more sensitive the model is to elevator control. The location I've shown on the plans makes the model fly very well — although I haven't been able to spin it because it is so stable. With the CG further forward the glide gets faster and steeper.

Takeoffs are quite easy, since the landing gear is well back. On landings a little elevator flare is needed, and hold up elevator after the model has slowed down to taxi speed.

With the control systems we have these days, adjusting is pretty easy, because with both proportional servos and galloping ghost you have the trim feature. This allows you to feed in elevator or rudder adjustments in flight, then when you land you can make the adjustments and return the transmitter controls back to the neutral settings.

You'll enjoy building and flying the Classmate, and you'll also enjoy having it sitting on the shelf at home. It's both a good flyer and a good conversation piece. It's one of those models that makes you think "One of these days I'm gonna build a full size job just like that, get myself a helmet and goggles, and do some old time flying!" Of course you won't — but it's fun to think about.

So build yourself a Classmate, and do some flying and some daydreaming.

Just don't do them both at the same time!