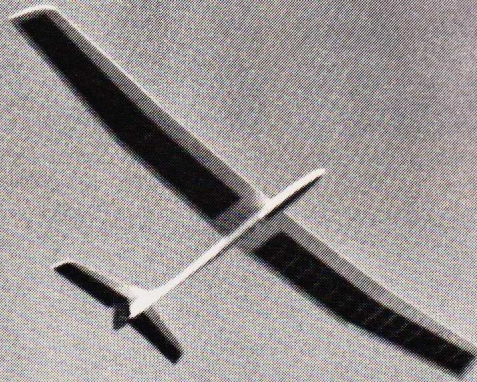


Field & Bench  
**REVIEW**



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# AIRTRONICS SAGITTA SAILPLANE

## AIRTRONICS 3-CHANNEL XL RADIO

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by MIKE LEE

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According to our reviewer, "Sagitta promises to be an international threat in sailplane FAI tasks!" The kit is superb, as is the radio.

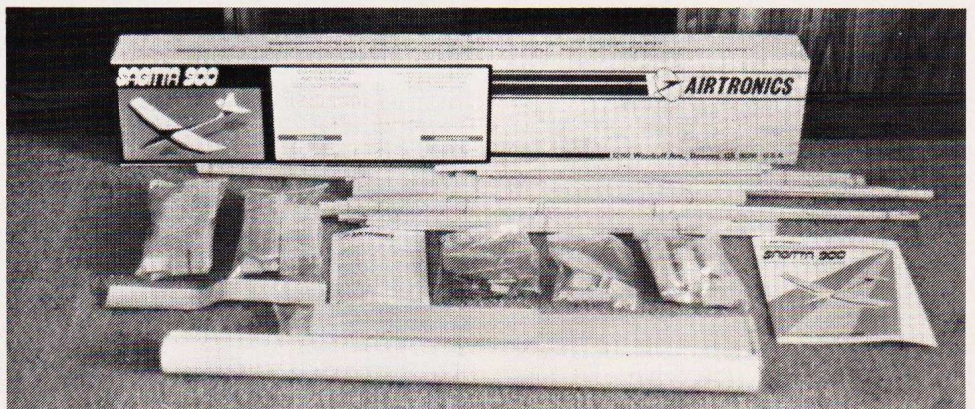
**T**HE SAGITTA from Airtronics is the first of a new breed of American sailplanes designed to take on the Europeans on their own terms...FAI sailplane.

For years, the AMA sailplane theme has been mostly task duration and precision. Meanwhile, the people in Europe and other parts of the world have been concentrating on the FAI tasks which require duration, distance and speed. These additional tasks have caused major changes in the basic design of sailplanes, and the result has been ships that excel in all phases of the required tasks and that have left the Americans far behind.

The most notable of these new sailplanes has been the Dassel from Austria. This sailplane currently holds speed records in excess of 250 mph and is also the winning ship used by the Austrian team at the World Championships. The

only problem with the Dassel is the exorbitant costs of producing the ship, which were said to be in excess of \$20,000 during the development stage alone.

Lee Renaud, recognizing the deficiency in American sailplane design, set about producing a ship for FAI competition. His previous designs, the Aquila and Aquila



In our author's opinion, "One of the finest kits ever produced anywhere. All parts are of balsa, spruce and light ply and are machine cut; fit is right on."

Grande, were competitive except in the speed task. Concentrating on cleaning up the Aquila, he came up with the Sagitta, a ship that resembles the Aquila only in basic construction.

The Sagitta looks fast just sitting on the ground. She is sleek and aerodynamically clean (after all, *sagitta* is the Latin word for "arrow"). The wing and stab tips are highly swept to cut down drag and increase speed potential. The wing sports one of the new Eppler design airfoils, which are reputed to be very efficient. Lee has modified the basic Eppler 205 airfoil for the Sagitta to make it better suited to the tasks she will encounter in FAI competition.

The fruits of his labor have not gone unnoticed. For the U.S. sailplane team competition, Sagittas bagged six places in the top 15 spots, two of which captured team spots for the pilots, Don Edberg and Dwight Holley.

The kit, as produced by Airtronics Inc., is a beauty—in this writer's opinion, one of the finest kits ever produced anywhere. All parts are balsa, spruce and light ply, and are machine cut; fit is "right on." Also supplied is a comprehensive hardware package that includes everything needed to complete the bird except for radio, covering, glue and hi-start. A detailed instruction booklet is provided to get you along during the building of the ship and it also has construction photos for reference. Plans are full-size and are very well detailed.

Construction of the Sagitta poses no serious problem for any veteran builder. It may be wise for the novice builder and pilot to hold off on building and flying the Sagitta until he has some experience under his belt. This is not to say that a novice could not handle the plane, but in order to get the most from Sagitta, experience is a must.

**CONSTRUCTION.** The plans call for the wing to be accomplished first, so we'll start there. The only special requirement for construction is for the builder to have a flat building surface. The wing design is a "D" tube type structure, making it light but very strong. The instructions are detailed in the method of building and the step-by-step procedures listed will take you right



Kathy Lee proudly displays Mike's latest handiwork, the Airtronics Sagitta. Construction poses no problems for a competent builder. Finish is a combo of MonoKote and K&B.

on through the wing in no time. I began by gluing the bottom sheeting to the bottom spruce spar with Super Jet and then laying the assembly down on the plans in preparation for the ribs. The inboard sheeting is next, and when dry, the ribs are placed from the inboard side going out, spaced by the shear webs. The shear webs are massive in size and will require double gluing to get a proper joint.

With the ribs in place, the top spar, leading edge, and trailing edge assembly are glued in place. The latter is actually a balsa piece with a spruce cap placed on it to form a sharp trailing edge. It requires some careful sanding to get the proper sharpness, but the end product is worth it in terms of drag reduction and strength.

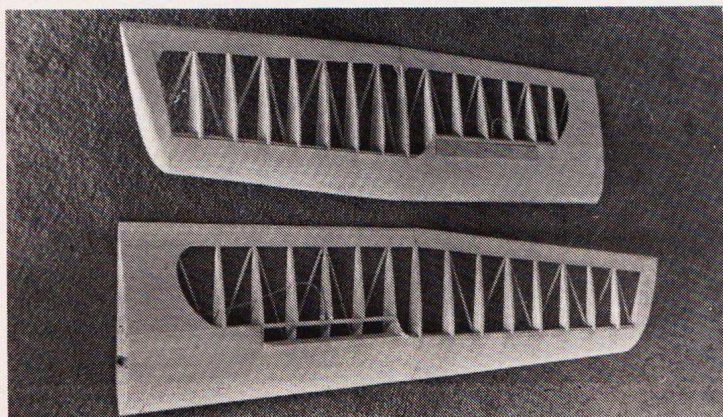
The outer wing panels are next and, again, you begin by gluing the sheeting to the spar. Using the outer rib and the inboard rib, the trailing edge is spaced and then glued in place. All the rest of the ribs are then placed, followed by the top spar, leading edge, and top sheeting.

Joining the wing panels comes right along with an "X" type balsa brace. This is quite innovative and proves to be effectively strong. The brace is also reinforced by a plywood cap epoxied over it. The wing tip, spoiler tube, and joiner tube finish the wings for now.

Fuselage construction is next. The fuselage is very strong, being made primarily of light plywood, and is rigidly reinforced with spruce longerons and 1/4" balsa triangle stock. It is a bit tricky to get the fuselage to align itself properly because of this, and one must be extra careful during this stage.

Begin construction by gluing the longerons, triangle stock and pushrod tubes in place on the side pieces. I used aliphatic glue as the adhesive and Jet glue as the third set of fingers to hold things in place.

The vertical fin subassembly is now glued to the right side fuselage piece. Here is where I deviated a bit. I figured that there might be some difficulty pulling the two fuselage sides together initially if the fin subassembly was glued to one side first, so I waited until the first two formers were placed onto the fuselage and then pulled the tail together upon the subassembly. Either way will work just as well. But, getting back to where we were, after gluing the fin subassembly to the right side, glue the tail together from just ahead of the subassembly and aft of that point. When this is done, the wing joiner tube is temporarily put in place for alignment purposes. Former F-5 is then glued down and



Wings in "bare bones" form. Sagitta uses a modified Eppler 205 to match requirements in the multi-task FAI competitions.



Radio installed in Sagitta was Airtronics XL series 3-channel; 94421 servos were also used and they are small and powerful.

trailing edges for sharp contour and protection against dings. Begin the stab by laying out the balsa leading sections and cutting out the trailing sections and frame parts. The spruce leading and trailing edges are now glued onto their respective pieces and then the stab is framed up.

There is a brass tube in the leading edge and at the midpoint of the stab for the elevator pivot point and actuator. These parts are placed into spruce carriers and then epoxied into place. The aft brass tube, the pivot tube, has two wheel collars which lock the pivot pin in place when the stab is positioned on the fuselage. Care must be taken in the assembly of the tube with the collars to insure that the locking screws inside the collar can easily cinch down on the pivot pin. This will be the only thing holding the stab halves in place on the fuselage during flight and you wouldn't want to have the stab wander away from the plane at some inopportune time.

When the stab has been fully assembled, sand the leading and trailing edges to the proper contour and shape the airfoil across the ribs. Now it's time to cut the stab in half. I used a Dremel cutting disc around the area of the brass pivot tube and actuator tube, and a razor blade for the rest.

The rudder section is last and should take about 15 minutes to make. It basically uses the same construction steps as the stab. Take your time and make sure that you don't end up with the rudder warped. After it has been assembled and sanded, mate the rudder to the vertical stab subassembly in order to get the two to match in contour and airfoil shape.

I have gotten a little ahead of myself, so let me digress a bit. The fuselage has not been wholly completed at this stage. The fin sheeting must be done at this time, after which the holes are punched through the fin for the pivot pin and access to the actuator for the stabs. After this is accomplished, the dorsal fin is placed and the whole thing is sanded to shape.

Fuselage and wing mating begins the final assembly. The main thing to watch for in this stage is the proper alignment of the wings to the fuselage. You want them to mate to the fuselage as closely as possible, preferably flush. The total idea behind

this ship is the attention to detail that will add up to a great deal of aerodynamic gain in efficiency. Small gaps and blunted edges will tend to make the ship less than efficient.

After the wings have been mated to your satisfaction, the stab and rudder placement is next; again, watch for the proper alignment. When all is done, bring out the sandpaper and start wearing out your arms. The Sagitta should have very smooth and flowing lines all around her. There is a lot of meat to be picked off the fuselage, so don't hold back on the sanding.

**FINISHING.** Being that sailplanes rarely, if ever, see aircraft fuel, it doesn't really matter how you finish this bird. I chose to slap a coat of finishing resin with a small amount of microballoons in it onto the fuselage and finished the wings in MonoKote. The fuselage was finally painted with K&B epoxy paint for scuff resistance. A Rocket City releasable tow hook was installed on the bottom side and was rigged to actuate with the spoilers.

The radio used in this project was one of the Airtronics XL series radios, which feature servo-reversing on all channels and exponential throw on the primary channels; specifically, a 3-channel XL, in 2-stick style. The throttle stick was used for spoilers and tow hook release.

The XL radio is a real beauty of a radio, and quite a deal for the price. It has all the desirable features any sport pilot could want, at a price competitive with radios that don't have these features. The set is supplied with the 94421 type servos, featuring small size coupled with plenty of punch to serve a majority of needs. They are fast and the resolution is excellent. Centering is good, and the deadband is minimal. The servos have a splined output shaft, which allows servo arm centering without going into the servo.

The receiver supplied with the system is designed to operate with the XL and is quite compact in design. The servo and battery connectors are of the integral block type. The receiver also has interchangeable crystal capability, which the transmitter has as well. Rounding out the package is a standard 500-MAH battery pack and

## F&B: SAGITTA

the nose is pulled together at the pinewood nose block.

When this is completely dry, all the forward formers are placed in the fuselage. Pay close attention to the position shown in the plans of the formers, as they have certain cuts and holes that must be as shown or else you may end up with some funny-looking plumbing. After the forward formers are dry, the rest of the aft formers are placed and everything from here is a snap.

Top sheeting, bottom sheeting, and roughing of the top hatch assembly are next. At this time you may begin completion of the hatch assembly, which is a real jewel. The finished hatch will allow total access to the entire upper fuselage, which will make it easy for the pilot to service all of his radio gear as well as stuff tons of ballast into the ship. There is a lot of meat to whittle away on the basic hatch block, and the final shape of the hatch should be as close to a matching contour of the fuselage sides as possible.

The empennage is last on the list and these parts take a minimum of time to handle. Start with the stab, which will be assembled as one piece and will later be cut in half. This makes a more uniform stab section and takes less time to do. Basically, the stab and rudder are made of solid balsa leading sections followed by Warren truss trailing sections after the high point of the section. Both also have spruce leading and

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switch harness with charging jack. By the way, the battery can be checked for state of charge by simply plugging it into the side of the transmitter, and the transmitter will read it on the RF output meter. That's something we could all live with.

The Sagitta, conveniently enough, is configured specifically for the Airtronics XL radio. All the servos and receiver gear fit exactly into their respective compartments. In fact, there is so little room to spare that you will have to trim down the servo arms to accommodate the servos' fit. This is shown in the plans and is quite simple to do. Of course, you can fit other radios into the Sagitta, but make sure that you have radio gear as small as, or smaller than, the XL.

Balance of the Sagitta is seemingly critical as described in the plans: only 1/8" lee-way in the CG location is allowed. While this is not hard to accomplish, it may be that Lee Renaud is just trying to get the pilot to fly the Sagitta the way it should be flown. Our Sagitta came out a tad lighter than what the specifications call for and so we ended up that same tad tail-heavy! It took a few ounces of lead in the forward ballast compartment to cure this and this brought our Sagitta right in at the minimum specified weight.

**FLYING.** The first thing I wanted to do was to give the bird a few test hops in the manner of hand-launch. Using my standard method of running like crazy and waiting for the bird to lift away proved one thing: the Sagitta is going to glide kind of fast. The next run confirmed my thoughts, as the Sagitta took off across the schoolyard upon release, yet the glide ratio was astounding. At a release level of only 6 feet, the Sagitta traveled at least 150 feet! Hmmm. Let's heave the devil out of it. This time she managed to do one and a half complete circles around me. Bring out the hi-start.

With the rubber stretched moderately, we hooked up the ship and gave her the old heave-ho. The Sagitta accelerated slowly and we almost thought the hi-start wouldn't handle it. As she climbed through to about 30 degrees, she finally started to make good headway in the climb, but not what I would call satisfacto-

ry. We opted to let this launch be forgotten and prepared for the next launch.

The rubber was pulled to the max and we decided to play javelin thrower with this launch. Sagitta responded by producing an excellent launch, and again she picked up the pace as she climbed through the 30-degree mark. The climb was clean and the release was uneventful. Once off the line, it was time to see what she could find in the air. It wasn't long before the Sagitta hit lift, but we couldn't recognize it! We were so used to seeing our ships hit lift and climb with the nose either slightly down or level. Sagitta points her nose upward and climbs as though she has an engine up front! This little habit took us a couple of flights to get used to, but once we did, no sweat. The climbing velocity is excellent when in any lift, and this day had only marginal lift. (In Arizona you usually only have to look for your next door neighbor's house to come floating by as a signal that the lift is normal.)

The next few flights produced some excellent results. The lift later in the day had reached to the hat-sucker stage and we were experiencing half-hour flights as the norm. The spoilers were used generously all day in order to keep Sagitta from going OOS, which nearly happened several times. The spoiler action is quite predictable and effectively controls the glide ratio. Even with the spoilers fully extended, pitch control was quite easy and well within the handling range of any pilot. The most outstanding thing that we came to like on the Sagitta was her ability to cover tremendous pieces of sky within a short time span and with minimum loss of altitude. With the boomer thermals here in the desert, there were also some boomer downdrafts with associated shear winds. Sagitta was able to run away from the sink easily and ignored the shear winds.

Sagitta is quite fast when speed is needed, and speed runs done on our crude speed course showed the ship to be exceeding 50 mph with no ballast. Now, take into consideration that all we had was a measured distance with stopwatches, so the accuracy is slim. But, it did prove the Sagitta to be the fastest thing minus a motor in town!

Slow-speed handling is just as nice to have, and Sagitta does handle well just floating along. She doesn't float as slowly as, say, a Legionair or Oly II, but she isn't going fast enough to miss a thermal on the run. She travels only a hair faster than what most of us would be expecting. Rudder and stabilator control remain very positive right up to stall. Landing the Sagitta is also a rather new experience, as the bird almost refuses to come down. Sagitta has a really good lift/drag ratio and this makes her sail right on past you and the spot. Add a tad of spoiler to her and she settles right in.

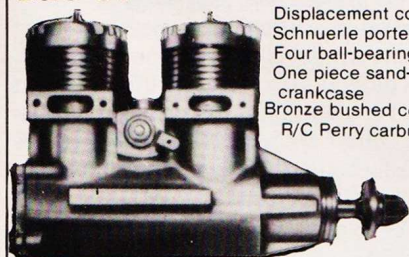
The Airtronics XL radio was absolutely flawless in operation during the flights. We used the exponential throw mode while flying the Sagitta, and after a bit of comparison to the linear mode, we found the exponential mode superior in the Sagitta. The XL servos proved to be responsive and fast, with undetectable lag or dead-band. The XL was a perfect match.

In summary, the Sagitta promises to be an international threat in FAI tasks for sailplanes. She has the speed and thermaling ability to challenge the competition, given a good pilot. As far as AMA task work is concerned, Sagitta should prove to be the plane to beat. Her ability to thermal well and the advantage of being able to run fast from one piece of dead sky to another piece of thermaling sky should be all that you will need to win. Her ease of handling will allow her to be competitive in the hands of many different styles of pilots, and she has the tough construction to withstand even the harshest of pilots. Sagitta, in this writer's opinion, will set the standard for the future sailplanes to meet, and the performance for them to beat.

For more information on the products covered in this review, contact Airtronics, 12160 Woodruff Ave., Downey, CA 90241, (213) 862-6583, and please mention that you read about them in Model Airplane News. ■



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