Millennium R/C's Micro SSX Mini Aerobat

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Mini's Plentiful Power Provides Positive Performance

As technology progresses, previously unimaginable models become possible. The Micro SSX from Millennium R/C epitomizes this trend. The model combines the smallest conventional radio gear, an astonishing powerful Hacker A-10 outrunner motor, and an airframe made up of laser-cut parts and a carbon-fiber fuselage tube. The resulting airplane, with 21.5-in. wingspan, has outstanding aerobatic capabilities.

Complete Kit

Aside from the electronics, the Micro SSX comes with everything needed to complete the model. The kit not only includes things like wire pushrods and pre-bent landing gear, but also comes with high-quality Du-Bro micro control horns and adjustable servo-arm attachments. The standard array of building supplies (thin and thick cyanoacrylate (CA) glues, sandpaper, building square, and so forth) is all you need to get started on this building project.

Although the Micro SSX arrives with the wings and tail surfaces built and covered, the model does require some assembly. The instructions Millennium provides are well-written and very clear, but there are a few tricks to getting the model assembled properly that are worth expounding on. For example, consider this statement: All the model's components slide onto the fuselage stick.

I'll let that statement stand alone because understanding that feature is crucial to assembling the Micro SSX. Everything slides onto and along the fuselage stick, and that means you must make every assembly as true as possible. Any brackets that end up cocked at an angle will not slide easily. If that happens, you will either have to apply excessive (possibly damaging) force to slide things into place, or you will have to sand the openings oversize, resulting in loose and weaker assemblies.

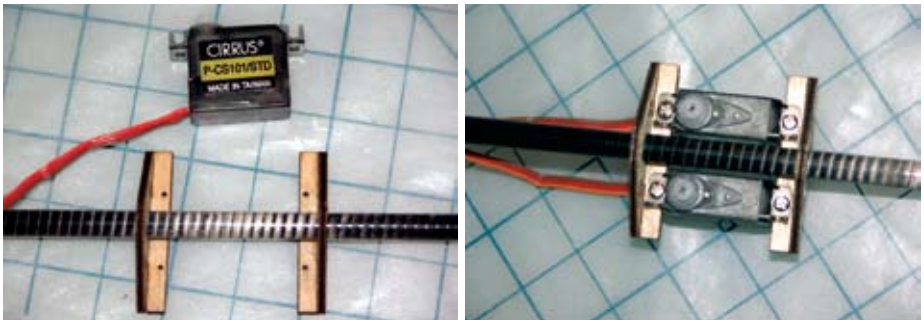
Happily, everything is laser-cut so that you start out with parts that are absolutely accurate. Like most laser-cut parts, the bits and pieces supplied with the Micro SSX have burned edges. I recommend you take the time to sand the edges lightly to remove the burned material. That will help to ensure solid bonding when it's time to glue everything together.

▲ The Micro SSX comes complete with everything you need except for electronics and glue. Laser-cut components make everything fit perfectly together.

> **"All the model's components slide onto the fuselage stick."**

Once all the parts are prepped, use a thick, slow-setting CA glue to put the various components together. I used a pair of tweezers to handle and place each laser-cut piece. Not only did that make it easy to get precise assemblies, it also let me apply glue to some of the smaller pieces without worrying about getting CA on my fingers—or, worse, gluing a part to my fingers.

Millennium's instructions state in a couple of places that you must not glue anything until the instructions specifically state to apply glue. This goes directly back to the idea that everything slides onto and along the fuselage stick. On small models like the Micro SSX, weight is critical. Even a few extra grams of weight can make a big difference in performance. The Micro SSX assemblies are designed so that you can slide everything along the fuselage to obtain the correct center of gravity (CG) without adding any additional weight. Indeed, the instructions have you dry-assembling everything (including all the electronics) and then sliding the wing and battery holder along the fuselage until the model balances perfectly. Then you can tack-glue everything in place before applying the final, permanent dots of thick CA.



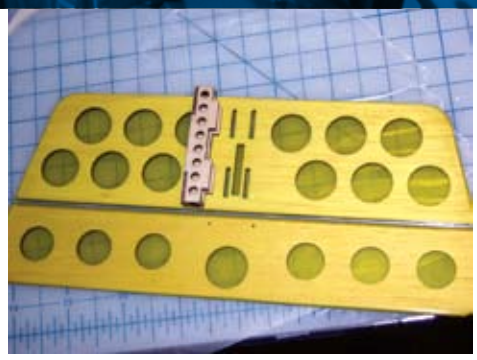
▲ The rudder and elevator servos mount to a pair of brackets that slide along the fuselage tube. Once you assemble the brackets, you slide them onto the tube and then mount the servos. The servos and mounting brackets are then slid into approximate position under the wing. The assembly does not get glued in place until you have determine exactly where they need to be to get the correct CG.

Electronics

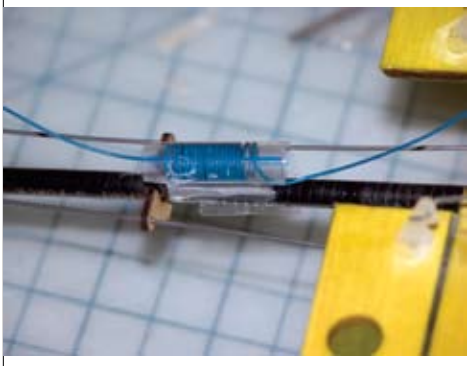
Selecting the proper radio gear for the Micro SSX is just as important as getting it assembled accurately. Overweight electronics will rob the model of performance and make it more difficult to balance correctly.

Millennium recommends using

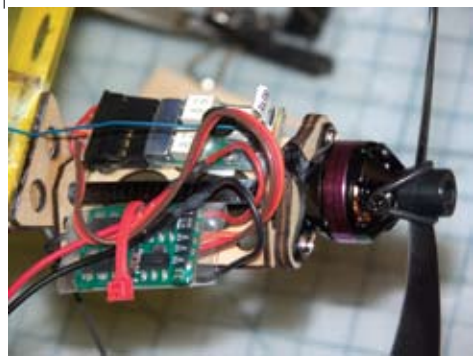
▲ Almost any of the new generation super-micro 4-gram servos will work well on the Micro SSX. We used a trio of Cirrus CS101/STD servos. These have proven capable of standing up to abuse.



▲ Take time putting the tail-mounting bracket together. Even a minor misalignment of the two end plates makes it difficult or impossible to slide the stabilizer into position on the fuselage tube.



▲ To avoid having a couple of feet of antenna wire trailing behind the model, you can shorten it by winding the wire around a bit of drinking straw and tape that to the fuselage stick. This works well and is clean.



▲ Mounted atop the battery tray, the Corona receiver is held in place with double-sided tape, while the speed controller is bound with a tiny cable tie. A Hacker A 10 outrunner provides plenty of thrust.

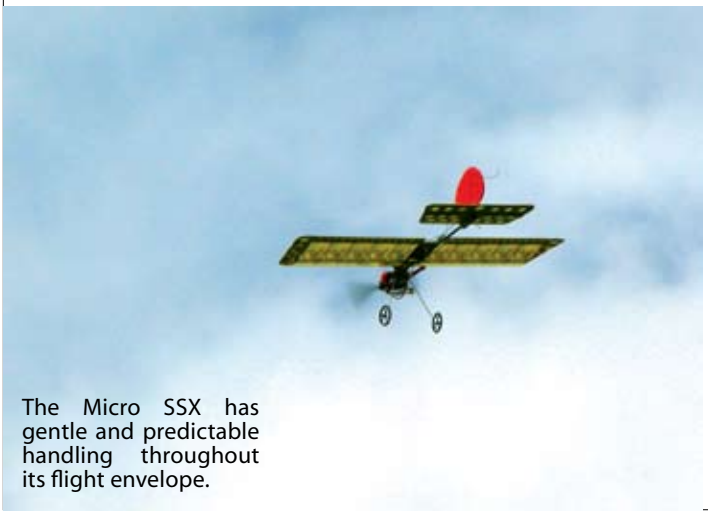
a Hacker A 10 outrunner motor. This potent little powerplant will happily spin a GWS 6x5-in. slow-flyer propeller and provide gobs of thrust. The matching X-series Hacker 5-amp controller provides smooth and positive throttle response.

You can use any of the new generation of super-micro 4-gram servos for the Micro SSX. I used a trio of Cirrus CS101/STD servos. I picked these primarily because I already have a bunch of Cirrus servos in other sizes, and all of those have proven capable of standing up to the worst kinds of abuse without flinching. However, Bluebird BMS-303 servos or the Polk PLK12005 would also work nicely.

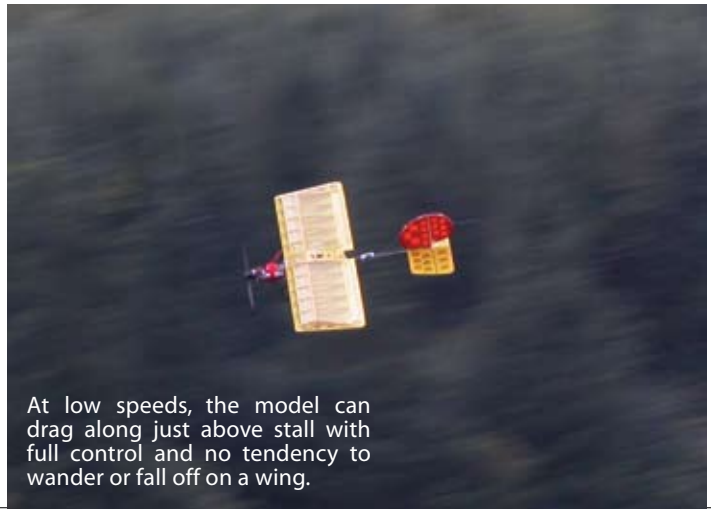
You'll want the lightest receiver you can get for this model. I chose a BP Hobbies Corona RS410 receiver. I have a fleet of these little receivers, and all of them have proven rock-solid. The antenna of the RS410 is a full 39-in. long. However, you can "shorten" it by winding the wire around a piece of soda straw, then taping the straw to the aft fuselage boom. This trick works great and doesn't diminish the receiver's range at all.

The final piece of the electronic puzzle is battery choice. The Hacker A 10 runs best on a 2-cell LiPo pack. I've flown the Micro SSX on a number of different packs by different manufacturers. For initial setup and balancing (and the first few flights), I used a couple of TrueRC 450-mAh 2-cell LiPo packs. Later on, when I wanted to experiment with moving the CG back a bit, I flew it with a slightly lighter weight ThunderPower 2-cell 480-mAh pack. I also tried an even lighter Kokam 350-mAh pack, but found that this moved the CG farther aft than I was comfortable flying.

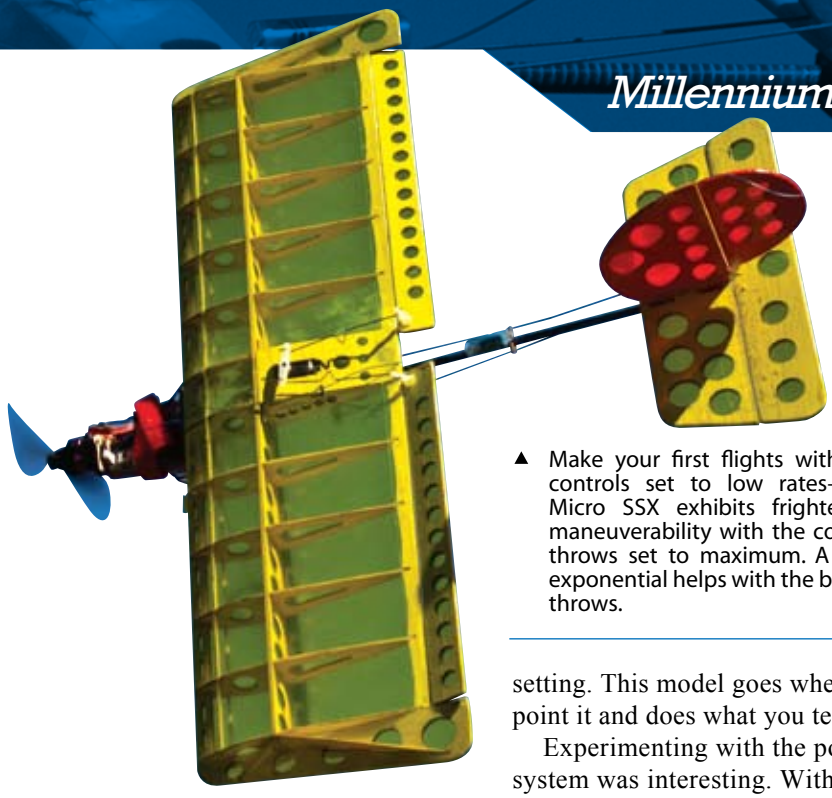
Controlling all of this was my old AirTronics Vanguard 6-channel transmitter. This radio has none of the fancy bells and whistles of the modern computer units. Its "advanced" features are limited to servo reversing and dual rates for elevator and aileron. It's stone simple, but also stone reliable. It proved to be the perfect match for the Micro SSX.



The Micro SSX has gentle and predictable handling throughout its flight envelope.



At low speeds, the model can drag along just above stall with full control and no tendency to wander or fall off on a wing.



▲ Make your first flights with the controls set to low rates—the Micro SSX exhibits frightening maneuverability with the control throws set to maximum. A little exponential helps with the bigger throws.

In The Sky

It took three evenings of spare-time building to get the Micro SSX together. The process could go much faster, but this model had to be sandwiched between a half dozen other projects. Using faster-setting CA glues, you could realistically expect to put a Micro SSX together in an evening or two.

After completing the usual pre-flight checkout items, the Micro SSX was ready to fly on a sunny Saturday morning. I set the model down on the edge of the pavement of the unused road from which I fly my models. I had all sorts of expectations about what the Micro SSX would do. None of them were borne out.

For example, I expected the model to pull to the left when the throttle was advanced for takeoff. Instead, the Micro SSX shot forward like a scalded cat, lifting off the pavement after about 18 inches of forward travel and well before the throttle hit the stop.

I expected that the model would need some trimming after it became airborne. Instead, the Micro SSX turned out to be perfectly trimmed. Indeed, the design setup was such that I did not need to touch the trim or hold any control inputs no matter what the power setting. This model goes where you point it and does what you tell it to.

Experimenting with the power system was interesting. With the TrueRC 450-mAh packs, the Micro SSX would hover at a bit more than half throttle. Control response from all surfaces was more than adequate, making hovering easy even for a ham-fisted klutz like me. Applying full throttle from a hover had the model rocketing straight up.

With the TrueRC packs, the Micro SSX could easily perform any aerobatic maneuver except knife-edge flight. The stick fuselage just doesn't have any side area to do true knife-edge flying. However, the model is both nimble and precise flying through loops, rolls, snap-rolls, spins, and any possible combination of maneuvers you'd like to try.

With the lighter ThunderPower pack, hovering performance was slightly better. Snap maneuvers became noticeably faster as the model became much more sensitive to both elevator and rudder inputs. My attempts at flat spins ended up degenerating into conventional spins, but that clearly had more to do with lack of pilot ability than lack of model capability.

I only flew the Micro SSX once with the Kokam pack. With the CG that far aft, the model became extremely pitch sensitive. Without exponential in the elevator setup, the airplane was very difficult to control with any sort of precision. I wound up spending most of the flight chasing the pitch excursions I got the airplane into, trying desperately to damp them out.

CUTTING THE HAZE

Cyanoacrylate (CA) glues have made building much easier and faster than it ever has been before. These glues produce near-instant bonds that are rock solid.

However, they also out-gas as they cure, producing a fine white haze on adjacent surfaces. Criminal investigators use this property of CA glues to make fingerprints visible, as the gases condense slightly more readily on the residual oils your finger leave behind. That's great for them, but a pain for us as it leaves our models with unsightly white haze patches around the joints.

You can easily wipe away the haze with a little acetone. Just dip a cotton swap into some acetone and swab the haze gently. Swap ends of the swab and use the dry tip to wipe up the residual acetone and CA haze.

Home Depot and similar hardware outlets sell acetone, but only in quantities that will last several lifetimes. I have a quart can purchased during Clinton's first term and it's still almost full. With that in mind, you might want to split a can with as many friends as you can find. A little bit goes a long way toward solving many of your CA problems!

■ Out-gassing CA fumes can leave a white haze on nearby surfaces. After gluing the tail into position, the vertical fin had a solid band of haze along its base. A few swipes with a cotton swab dipped in acetone cleans it up nicely.

Although the model was ultimately landed successfully, it wasn't much fun for me to fly it in such an unstable configuration. However, 3D aficionados will no doubt love the model's handling and performance with the CG at the aft limit.

You can fly this model indoors at a larger venue, but it takes judicious use of the throttle to keep it from zipping into the walls. At full throttle, the Micro SSX is a little yellow bullet that eats up sky quickly. In the confines of your average high school gym, the model would be difficult to keep away from the walls and ceiling. However, it will fly and perform quite nicely at half throttle or less. At low power settings, the speed is much more manageable for indoor flying. Just keep in mind that an impetuous push of the throttle will have the airplane accelerating almost instantly. Indeed, it would be very wise to fly the Micro SSX outdoors for many flights before taking it inside anything smaller than a stadium. QF

▲ At the aft CG limits, pitch control becomes quite sensitive and even small deflections produce big excursions.

▲ Despite its size, the Micro SSX flies and handles like a much larger model. It even handles fairly strong winds with aplomb.

References

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