

An artist rendering inspired this
great 40-size sport model



AGS *Retro*

Photos by the author



Bob Noll (L) and Ken Maroni in front of the Aeroguidance Society's field sign. The Retro is a design of the airplane in the logo.

BY BOB NOLL AND KEN MARONI

THIS IS THE story of a little sky-blue model that became famous even before it learned how to fly. I am referring to the airplane on the club logo of the Aeroguidance Society, Inc.—one of the oldest RC clubs in the US.

In 2005 the Aeroguidance Society celebrated its 50th year of service to aeromodelling and to the AMA. The club received the Academy's President's Award for this accomplishment and for hosting 50 consecutive RC Aerobatics (Pattern) contests. In 2004 the Aeroguidance Society started preparing to commemorate this milestone event.

One of the activities suggested at the first planning meeting was to design, build, and fly a replica of the little blue airplane. This sounded like a great idea, and we were fortunate to have an experienced designer—Ken Maroni—in the club and as a member of the committee. He had designed several successful models, and I volunteered to build this one.

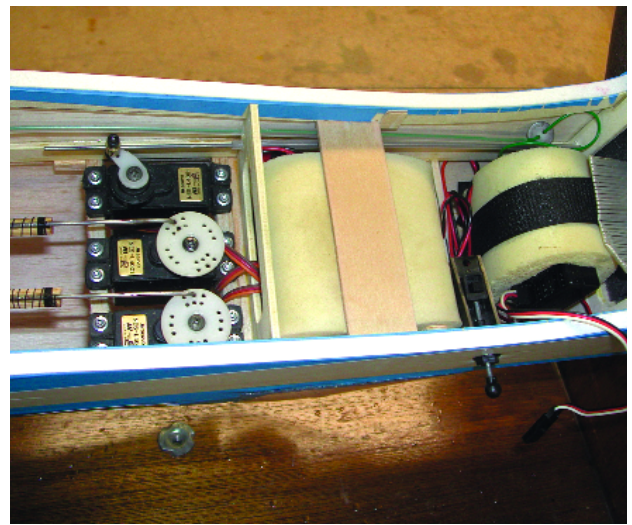
The airplane had to resemble the one on the club logo, with its high thrustline, low and rounded wing, stabilizer, and fin tips. It had to be a tail-dragger, and we wanted a model that could be flown adequately with a .40 cu. in. engine.

It was not long before Ken presented his first draft of the design at a committee meeting, and we knew we were on the way to an exciting chapter in the long history of the Aeroguidance Society. After several design review sessions between Ken and me to adjust the fuselage profile and make some minor construction changes, it was time to start building.

We had decided to design and build both a Class II (rudder, elevator, and throttle) and a Class III (aileron, elevator, rudder, and throttle) model. (The Class I and II designations come from early



A Sig Four-Star I.20 (kit RC65) canopy was trimmed to a pleasing fit. It houses a doll bust from the local craft store.



The battery is near center with the receiver in the front of the equipment compartment. The model balanced perfectly with this arrangement.



Just one 1/4-20 bolt is needed to secure the wing. The aluminum gear is good for rough fields.



A good technique for making sure the formers are properly shaped before sheeting is to mark with Magic Marker and use a sanding bar to rub down high spots.

AMA Pattern competition classes, when the class that was flown depended on the controls that were used. Class I was flown with rudder and throttle control only.) Why would we want to do this?

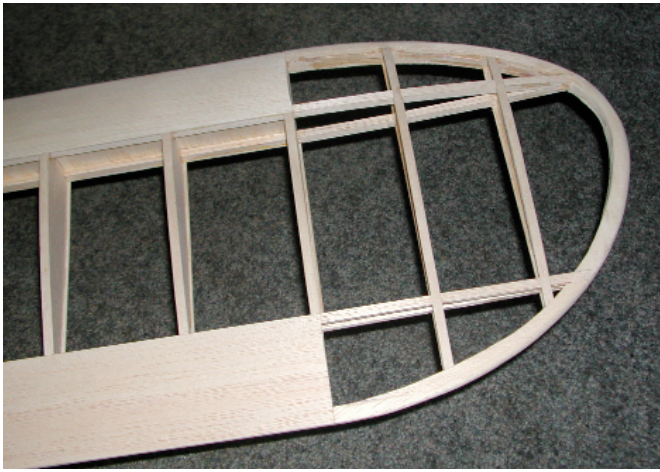
When the Aeroguidance Society was formed in 1954, few RC airplanes had ailerons. The one on the club logo didn't; it had a large dihedral angle, which was necessary if ailerons were not going to be used.

To be authentic we decided that the little blue airplane should certainly be built without ailerons, but we recognized that most of today's modelers would prefer to have ailerons on their model. To make it simpler for me, as the builder, I would construct one fuselage with two wings. It sounded like a good plan!

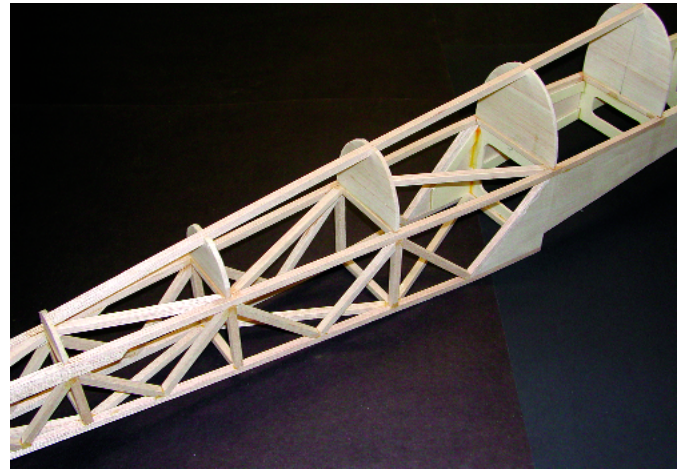
Now for the good news/bad news part of this story; first is the bad news. I built the first airplane for Class II—the one without ailerons. Ken had never designed a Class II



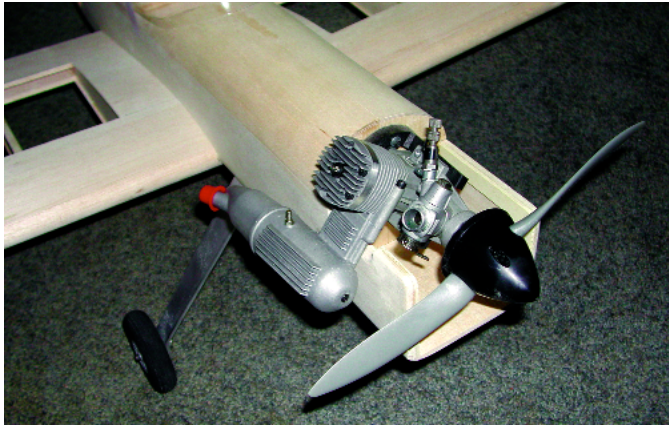
The AGS Retro takes off for a demonstration flight at the 50th Annual Aeroguidance Society Precision Aerobatics Contest.



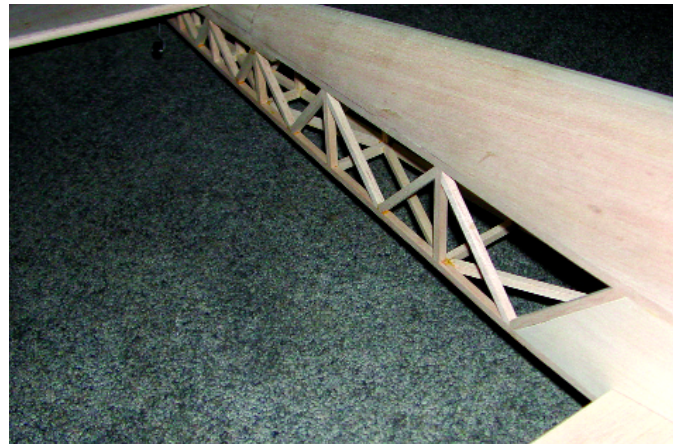
The shape of the wingtips reflects the design of the little blue airplane on the club logo. A shaped laminate technique is used.



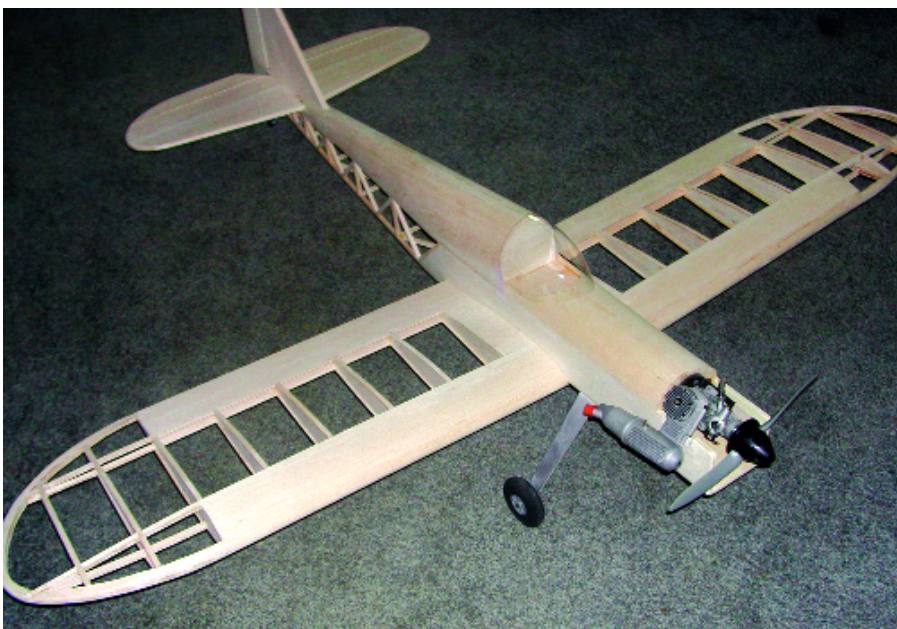
The fuselage is built with $\frac{1}{4}$ -inch square trusses to keep its weight low and a sheeted turtledeck to make the structure rigid.



The Thunder Tiger .46 proved to be more than ample power for this model. The engine is tilted so the high thrustline can be maintained.

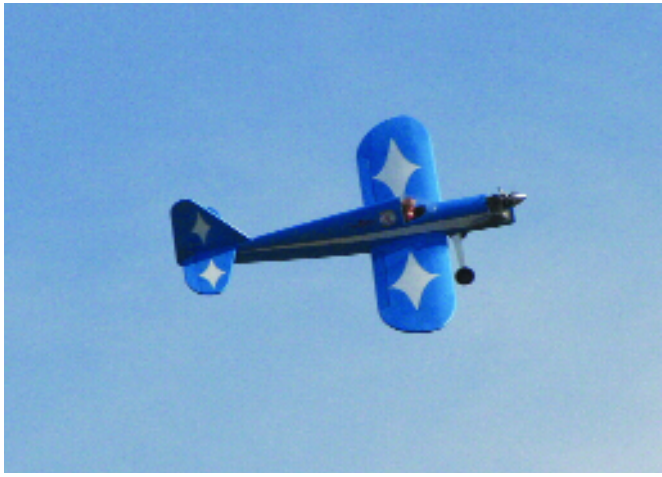


The top of the fuselage is sheeted with $\frac{3}{32}$ balsa. Make sure to sand the formers so that the sheeting fits flush.

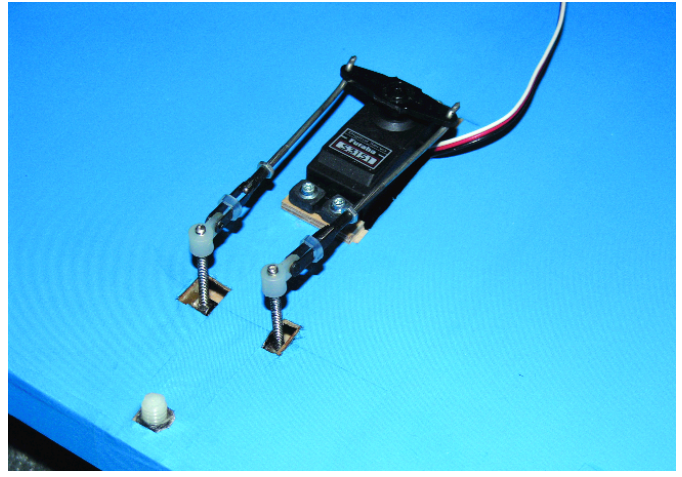


Above: The tail-feather parts are built up with $\frac{1}{4}$ square balsa sticks that are sheeted with a $\frac{1}{16}$ balsa skin.

Left: The Retro is made using conventional wood construction throughout. This sport model has good precision potential.



The Retro has a distinguished appearance in the air—just like the little blue airplane on the Aeroguidance Society logo.



A single aileron servo connected to torque rods provides linkage to the ailerons. There's plenty of control authority.

aircraft since all his models had ailerons, which is what most designers use today.

However, we knew that the little blue airplane on the logo didn't have ailerons. And the way you overcome the lack of ailerons is to increase the wing dihedral. That seemed easy enough.

We learned by experience that there was not enough dihedral in the wing, which led to a *hairy* first flight. To this day I am not sure how I managed to keep the airplane from crashing; it didn't fly with its wings level from after the first turn until I managed to straighten it out for a damage-free landing. My many years of flying must have caused me to reach instinctively without having time to think about the situation I was in.

Several club members witnessed that first flight, and we spent roughly 10 minutes reflecting on what had happened. The

dihedral was not enough to allow the rudder to do its job of turning the model.

In fact, as I applied left rudder for that first turn the darned airplane decided it wanted to fly on its left side. Go figure that one out!

Now for the good news. I immediately went home and cut ailerons into the wing, which took only a day, and went back to the field for the test flight of the then-Class III model. The next flight was great, with only a few minor trim changes.

After that I was confident with the design and performed most of the maneuvers in my repertoire. Loops and Rolls were good, but I was more impressed with the little blue airplane's ability to do clean Stall Turns, Point Rolls, and Snap Rolls. I was happy, especially after that first flight a few days earlier.

The model made its public debut at the

50th Annual Aeroguidance Society Precision Aerobatics Contest, which took place just a few weeks after those test flights. The AGS Retro, as it is now known, has become a part of the club's rich history. I never did build another wing without ailerons. I am an easy learner.

This model is something different for the "they all look alike" crowd. Give it a try. Following is Ken's account of some of the AGS Retro's design parameters.

The CG location is between the 30% and 33% point of the wing chord. I started at 25%-30% for initial flight. The tail moment is 31.84 inches based on one-quarter chord of each flight surface (wing and stabilizer). The wing area is 671 square inches and the stabilizer is 157.8 square inches.

The wing airfoil is basically an NACA 2415 with a fellow modeler's alterations.



Single pushrods are used for the rudder and the elevator. Fuel tubing keeps the clevises closed, and a longer piece acts as a shock-absorbing steering linkage for the tail wheel.

AGS *Retro*

Type: RC sport monoplane
Builder skill level: Basic
Pilot skill level: Intermediate
Wingspan: 62.25 inches
Wing area: 671.3 square inches
Length: 56 inches
Weight: 4-6 pounds
Wing loading (average): 17.6 ounces/square foot
Engine: .40-.46 two-stroke
Radio: Three to four channels with three or four standard servos
Construction: Balsa/plywood
Covering/finish: Builder's choice; MonoKote was used

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The modification is flat on the bottom of the airfoil from the 20% point to make it possible to build on a flat surface without a wing fixture. This airfoil has been used for many models.

The fuselage was designed with a laminated main fuselage body and truss assembly for the empennage. The fuselage lamination consists of light plywood as a skeleton and a medium-grade balsa as the laminate. This gives the fuselage body strength and light weight. The truss empennage section is integrated into the main body of the fuselage to aid in strength and distribution of moment forces.

The fuselage formers, landing-gear mount plate, fuel-tank floor, and firewall are notched to interlock with the fuselage sides and associated formers. The engine firewall has 2° of offset and is integrated as part of the fuselage side construction.

The wing is of standard D-tube construction with shear webs, planking on the TE, and rib capstrips. The wing halves are assembled using a dihedral brace that ties the upper and lower spars together. The brace also gives the wing its required dihedral angle. The LE is formed by two pieces of stick balsa glued together and shaped to the LE radius. This technique makes for an extremely strong assembly.

The tail feathers are of stick construction and are sheeted with balsa.

The engine is mounted at a 45° angle to create a clean, sleek appearance, with the muffler tucked in close to the fuselage side.

Many of the accessories, such as the canopy, landing gear, and tail wheel, are common parts you can purchase through Internet distributors or hobby shops. The servos and flight-surface control components, including the linkages, are sized to suit a standard 40-size model.

The AGS Retro's construction is simple and straightforward. No special building techniques are required, which makes this project enjoyable for all levels of pilots/builders. **MA**

*Bob Noll
BOBRC@aol.com*

*Ken Maroni
ossieux@frontiernet.net*

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