WASP

Jim Zarembski with prototype Wasp. This particular ship performs spectacular aerobatics with the Astro Cobalt 05.

By Jim Zarembski

A quickly built, fast, efficient, aerobatic 05 electric model

The Wasp has been designed around the new breed of high power electric motors sold by Astro Flight, and Leisure Electronics. These systems, generically called "05's," are powered by six, seven, or eight cells of 1.2 AH capacity. The rpm's, duration, weight, etc., vary with each system. However, you can expect high power for five to nine minutes with these systems which, when coupled with a low drag high performance aircraft, can lead to spectacular aerobatic performance on par with anything electric in the world today.

When I fly, I try to take advantage of every minute at the airfield. The more flights the better. A number of electric fliers have been charging two or more battery packs prior to going to the flying site to similarly optimize flying time. The basic idea is to charge one battery while you fly on another.

This can be taken a step further. If you had, say, four to six packs pre-charged and could quickly change

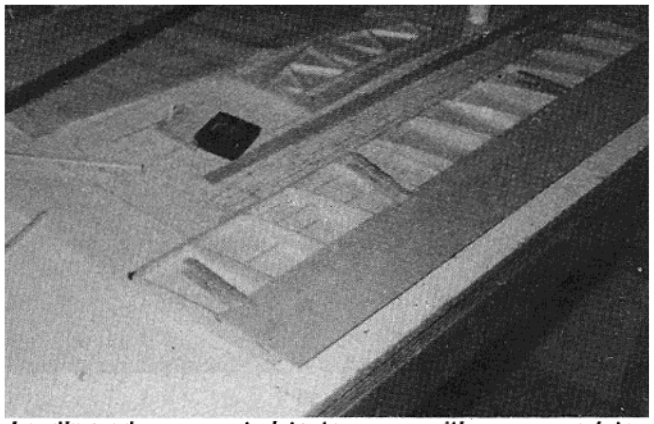
WASP

Designed By:
Jim Zarembski

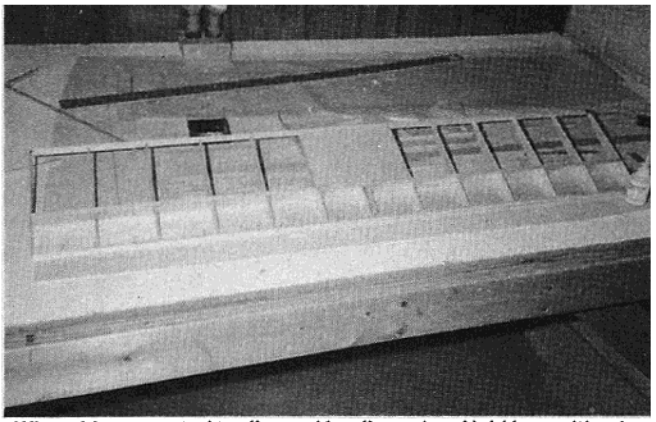
TYPE AIRCRAFT
Sport Aerobatic (elec.)
WINGSPAN
37¼ Inches
WING CHORD
8 Inches
TOTAL WING AREA
295 Sq. In.
WING LOCATION
High Wing
AIRFOIL
NACA 2410
WING PLANFORM
Constant Chord

DIHEDRAL EACH TIP
None
O.A. FUSELAGE LENGTH
30¾ Inches
RADIO COMPARTMENT SIZE
(L)8" x (W)2" x (H)1⅝"
STABILIZER SPAN
13 Inches
STABILIZER CHORD (inc. elev.)
4 Inches
STABILIZER AREA
50 Sq. In.
STAB. AIRFOIL SECTION
Flat
STABILIZER LOCATION
Top Of Fuselage
VERTICAL FIN HEIGHT
3¼ Inches

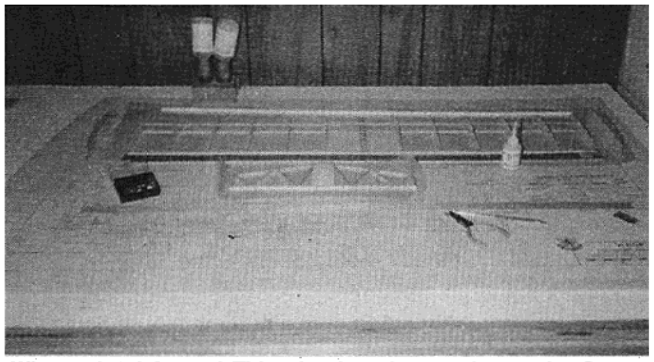
VERTICAL FIN WIDTH (inc. rud.)
3" (Avg.)
REC. MOTOR SIZE
Electric .05 System
CELLS
6-8 Cells 1.2 AH
LANDING GEAR
Skid
REC. NO. OF CHANNELS
3
CONTROL FUNCTIONS
Ail., Elev., Motor on-off.
BASIC MATERIALS USED IN CONSTRUCTION
Fuselage ..... Balsa &Ply
Wing ..... Balsa & Spruce
Empennage ..... Balsa
Wt. Ready To Fly ..... 32 Oz.
Wing Loading ..... 15.6 Oz./Sq. Ft.



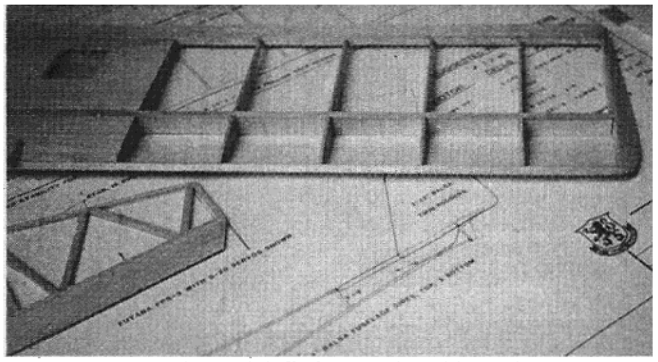
Leading edge cemented to top spar with cyanoacrylate. Clothespins used to secure during cure time.



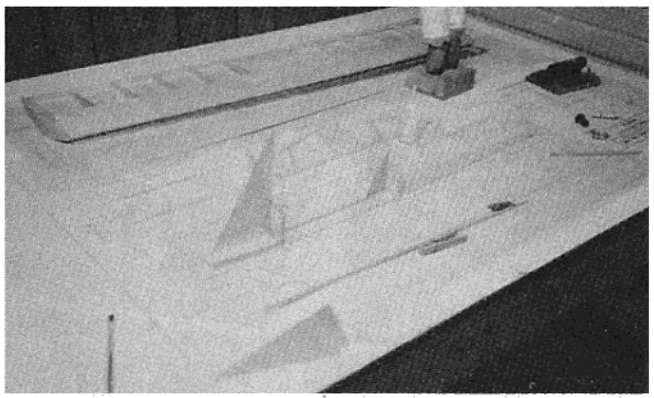
Wing skin cemented to ribs and leading edge. Held in position by pins while upside down on building surface.



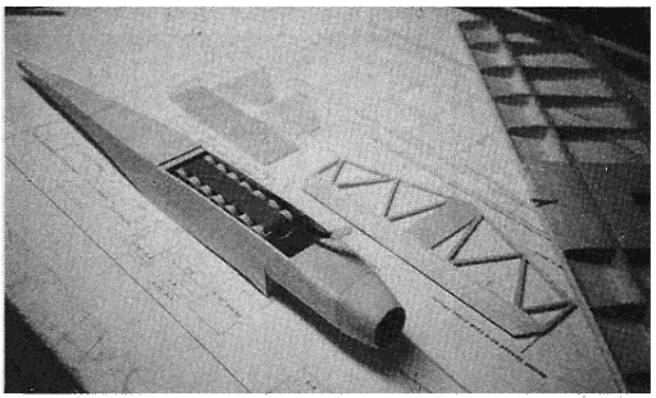
Wing and stab framed. This takes less than one hour using Super Jet.



Bottom of wing shows 3/32" shear webs with vertical grain.



Fuselage formers F-4 and F-7 epoxied in place. Make sure they are perpendicular.



Completed fuselage with battery in place.

the batteries in your model, lunch time and those short evening hours could be fully utilized for electric flying.

With the idea of a fast, efficient, aerobatic model in mind, I sat down at the drawing board trying to figure out how to design a quick change battery feature into a sport aerobatic R/C model. A lot of ideas were analyzed, but the use of a simple ventilated plywood hatch on the bottom of the fuselage proved to be the best approach. This is certainly not a new approach. I recall seeing this type of hatch on several of Mr. Mabuchi's electric models in the modeling press back in the mid-seventies.

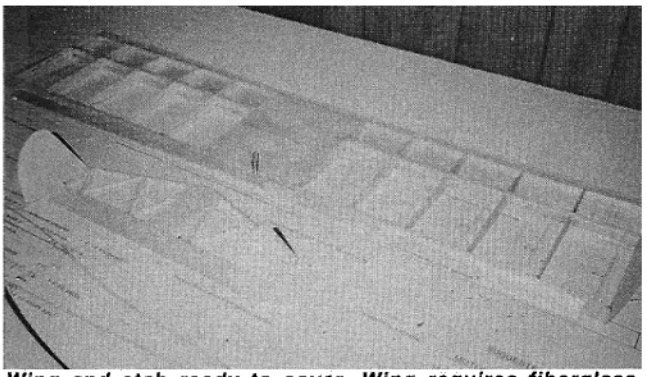
It occurred to me that I'd probably break off the fin sooner or later if I tried to turn the model upside down in the grass to change the battery pack. Just about this time, I thumbed through a general aviation periodical and saw a picture of a Short Skyvan, and I immediately began to think in terms of twin rudders.

With a pair of twin rudders, the model could be turned upside down in the grass for battery changing. Since the top of the rudders don't touch the ground, they won't get broken. They are also very striking in the air and lend a certain distinction to the Wasp.

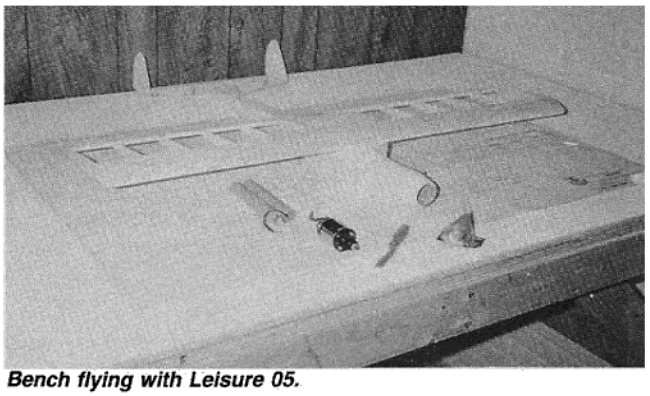
I personally feel that a high wing planform is best suited for electronic models. A model should look like an airplane. There should be a windshield, windows, etc. Of course, it also has to be as drag-free as possible and should weigh as little as possible.

The Wasp meets these design criteria, and can be quickly built with "ready to fly" aircraft weight of 8 ounces, not including the radio and electric flight system. It uses the NACA 2410 airfoil which is a 10% version of the well-known 2412. The wing loading is 15 to 16 oz. per square foot, which results in excellent gliding ability.

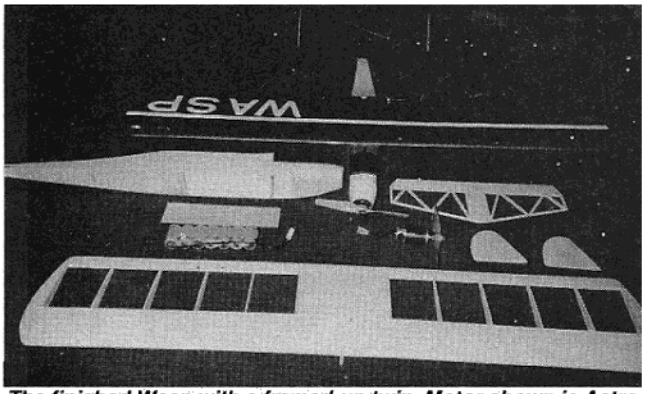
Prototypes have been flown with both Leisure's pattern and racing motors, the Astro XL 05, and Astro Flight's Samarium Cobalt Challenger 05. The number of cells was varied from six to eight Sanyos of the 1.2 AH size. As with all electrics, the compromise is duration versus speed. I personally feel that seven cells is the



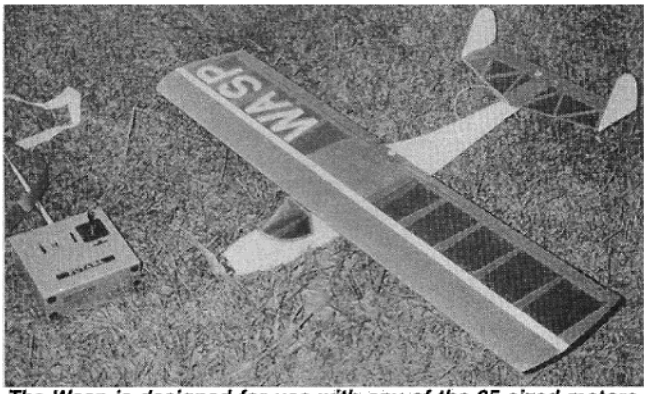
Wing and stab ready to cover. Wing requires fiberglass reinforcement around wing hold-down dowel and nylon hold-down bolt area.



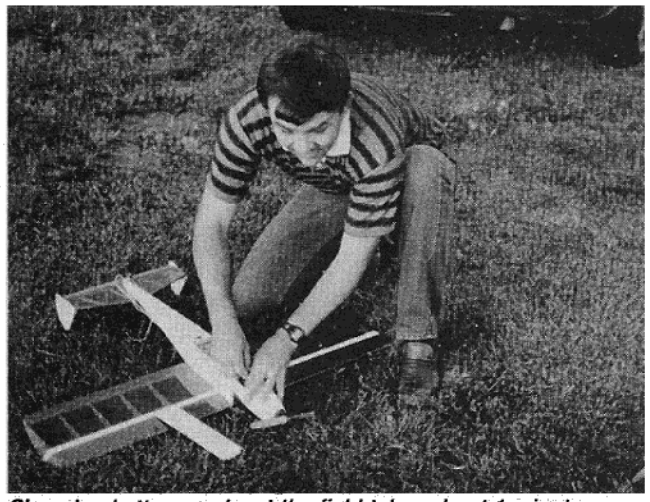
Bench flying with Leisure 05.



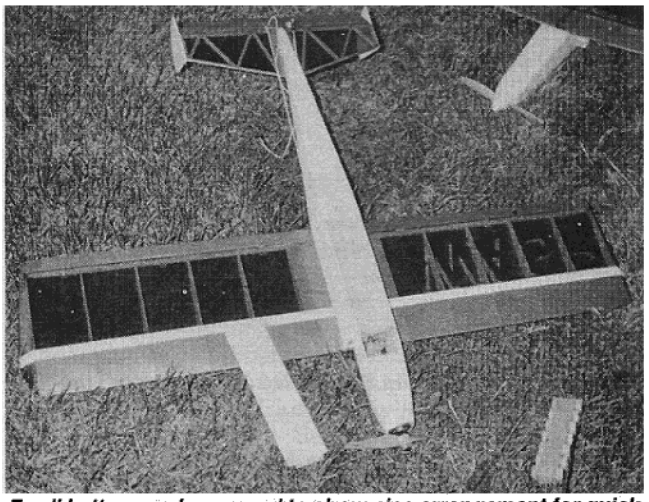
The finished Wasp with a framed-up twin. Motor shown is Astro Cobalt 05 with 7 cell pack.



The Wasp is designed for use with any of the 05 sized motors available today using 6, 7, or 8 cells of 1.2 AH capacity for long pleasing sport flying.



Changing battery packs at the field takes about 1 minute.



7 cell battery pack removed to show nice arrangement for quick removal for charging.

best compromise for either the Cobalt 05 with a 7/6 prop or the Leisure 05 with a 6/4 prop.

What can you expect in the air? With the Astro Cobalt Challenger 05, the Wasp jumps away from your hand after you toss it into the wind. It'll climb at 40 degrees and can fly out of sight in a few minutes if you continue to climb. However, if you keep the Wasp trimmed neutrally on the elevator, she'll go where you point her. Snap rolls or long smooth rolls are easily mastered. The Wasp flies inverted just as well as it does right side up. It'll do inside loops of 100 ft. diameter or more with ease. Outside loops are also possible if you build up the airspeed. It'll fly for five or six minutes before the power noticeably drops.

That's the real advantage of the 1.2 AH cells. The power stays there until the end of the flight when the rpm's finally diminish quickly. With some of the older systems using .55 AH cells, power continually dropped off after only a couple of minutes. With the Wasp, you can do the same aerobatics the last minute of the flight as you did when you launched.

Once the power is off, the Wasp has a surprisingly flat glide. It doesn't have a tendency to stall, so you can pull back on the elevator to slow her down for a smooth landing.

This ship is relatively clean. It penetrates very well. In fact, I'll fly it in winds up to 25 mph. The first flights with the Challenger 05 were made in California in May of 1982 in high winds. The Wasp handled these winds with ease.

CONSTRUCTION

The Wasp is built quite traditionally. Balsa, plywood, and spruce are used as the basic raw materials. To this, add MonoKote, Super Jet, 5-Minute epoxy and a few hours of time and you'll have a Wasp.

Wing:

Let's begin with the wing. Pin down the trailing edge over the plan. Next, locate the 3/32" x 1/4" bottom spruce spar over the plan and cement the 1/16" balsa sheet at the center section. Note that the prototypes had no dihedral.

Cut out four W-2 ribs and ten W-1 ribs and cement them in position with Super Jet. Add the 3/16" x 1/4" balsa leading edge and the top spruce spar. Before removing the wing from the building board, cement the shear webs in place.

Remove the wing from the table and run a bead of Super Jet on the top spar only. Cement the 1/16" forward wing sheeting to the top spar and let it fully cure before the next step.

Hold the wing perpendicular to the table with the leading edge up and put a big bead of Super Jet at the leading edge of every wing rib. The Super Jet will flow downward toward the top spar. Next, run a bead of Super Jet across the entire leading edge. Finally, place the wing upside down over the building surface and slowly roll it into a position where the top sheeting is touching all ribs with straight pins holding the leading edge down over the top sheet.

Add the rest of the center sheeting, wing tips, aileron linkage, and reinforce the wing hold-down hole with fiberglass and you're ready for sanding. The wing mounting dowel is added in conjunction with the completion of the fuselage.

The stabilizer and fins are straightforward. Be sure you do **not** sand too much off the ends of the stab since this surface is required to support the twin fins

Fuselage:

The fuselage is built so that the motor can be inserted from the inside. Much of this design's uniqueness revolves around the quick change battery hatch. However, if you do not desire to add this feature, the hatch cover and F-5 can be omitted with a weight savings of about an ounce.

However, to add the quick change feature, first cement two 1/8" square balsa sticks on each fuselage side between F-4 and F-7. Add the 1/4" sq. balsa stock to the front bottom of the fuselage sides. Cement F-4 and F-7 to one fuselage side, making sure they are perpendicular. Cement this to the other fuselage side and then cement F-2, F-8, F-9, and the rear fuselage sides together. When this dries, add the bottom sheeting, former F-3, and the front cowl top of 3/32" balsa.

Now install your favorite brand of elevator control rod and sheet the top rear of the fuselage. Epoxy F-5 and F-6 in place and drill and tap a hole for the wing hold-down bolt. At this point drill a hole in the wing for the hold-down dowel and use ample amount of epoxy to secure it while positioning it on the fuselage while inserted into the hole in F-4.

A piece of 1/64" ply, 1½" x 9½", is rolled around the motor to form a tube. This is cemented into the nose block F-1. The hole shown on the plan is for the largest diameter 05 motor, the Leisure 05.

You can reduce the diameter of the nose block hole to the size of the smaller diameter Astro XL05 and Challenger 05, or you can use spruce shims to hold these motors in an oversize tube.

The nose should be sanded to a round cross section. Sand right down to the plywood motor tube. The entire model should be finished with 100 grit, followed by 220 and 400, before covering. MonoKote was used on the prototypes.

Radio:

The motor is installed from the rear through the battery hatch. Next install the radio components.

Since you can charge the batteries out of the aircraft, no special charge circuit is required in the switch harness. A Radio Shack micro switch with a lever arm activator can be servo taped to the side of a servo. A large washer should be Super Jetted to the lever arm at the end so that there is a good contact area between the servo arm and the switch.

Once the radio is installed, check the balance and make any adjustments required to achieve the proper Center of Gravity. Range test your radio with the motor on and if all is well, give your Wasp a firm toss into the wind and you'll discover electric aerobatic flying at its best. □

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