

# ELECTRAGLIDE III

By Jim Zare

Electraglide III is an attractive sport sailplane powered by the Graupner Speed 600 2.8 to 1 gear drive.



## Background:

This is the third version of the Electraglide electric-powered sailplane family. The first version, Electraglide 62, appeared in the August 1975 issue of RCM. The Electraglide II was featured in the June 1985 issue of RCM and was kitted by Midway Models for several years (recently re-released by Aveox.)

The original Electraglide 62 was retired years ago but the first Electraglide II is still flying after almost 14 years of usage. It originally used Leisure and Astro Flight 05's for power. During the past few years, it has been powered by Graupner Speed 500 direct drive motors. I experimented with a Graupner Speed 400 (7.2 volt) gear drive with the 4:1 reduction and a

Graupner 12" x 10" folding propeller. This provided a gradual climb and a majestic glide. I also tried a Speed 500 2.8:1 gear drive on the same model and it was way

overpowered.

In early 1996, I decided to enlarge the original model to a wingspan of 85" with 660 sq. in. of area in order to use either the Graupner Speed 500 or Speed 600 2.8:1 gear motors and maintain a reasonable wing loading. The result is an attractive sport sailplane designed for those balmy summer days with their cumulus clouds and endless thermals.

## Design Features:

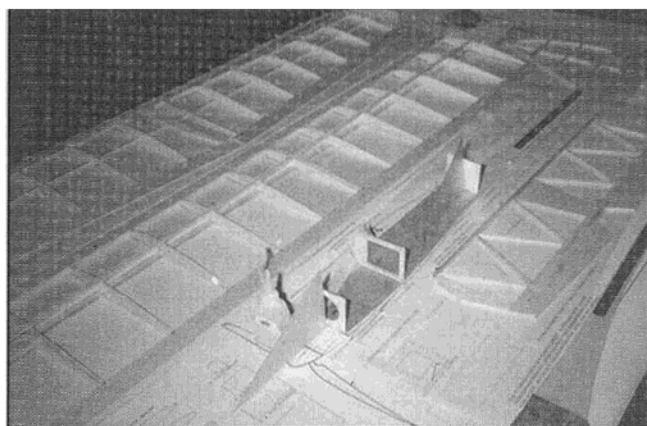
The Electraglide III is an enlarged and improved version of the Electraglide II. The basic design intent was to use exactly the same dimensional materials for each surface, spars' trailing edges, etc. The hope was to replicate or improve the same wing loading as the previous model.

Some of the features carried

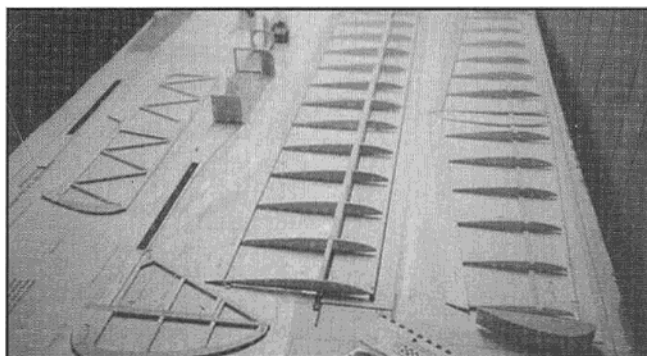


Jim Zare holds his original Electraglide II built in 1984 with the second prototype of Electraglide III.

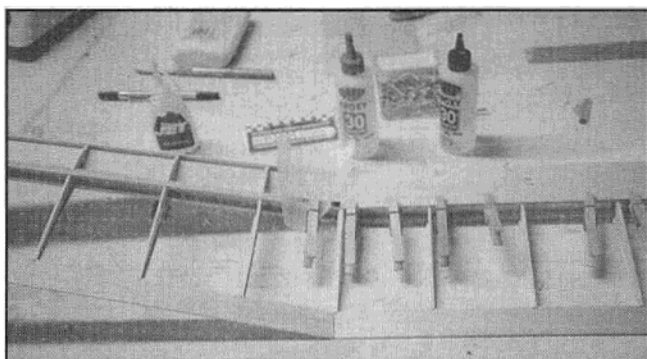




**Fuselage construction is straightforward. Use triangles to assure that the formers are perpendicular to the fuselage sides.**



**Wing ribs are all in place in this view. Note the carbon fiber reinforcement on the fuselage sides and the center wing panel.**



**Use clothespins to hold the 1/16" balsa sheeting in place while the 30-minute epoxy cures.**

over from the previous version is a one-piece, D-spar, wing with a flat center section with tip dihedral. This eliminates the plywood dihedral braces at the center of the wing and totally eliminates the weight and complication of tubes and wire required for two-piece wings. This, in itself, saves several ounces of weight.

Carbon fiber, not available in 1985, is used to reinforce the top and bottom wing spars in the center section. The resulting wing is super strong and yet quite light.

The fuselage was again designed with a tube motor mount to match the spinner that comes with the Graupner 12 x 10 folding propeller. The extra weight and complication of a hatch is eliminated in the design. The width and length of the battery/radio equipment area was carefully measured to allow for the installation of virtually any flight battery, receiver, speed control, and

servo combination in use today. Again, the carbon fiber reinforcements are designed into the rear fuselage sides. These were a weak spot in the Electraglide II (and most other balsa-sided sailplanes).

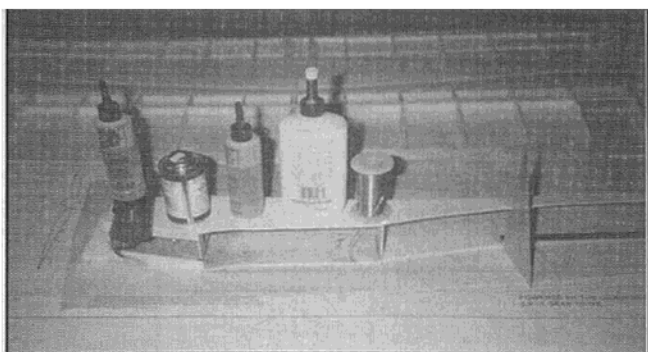
The resulting Electraglide III is easy to build and a joy to fly!

#### **CONSTRUCTION**

##### **Stabilizer/Elevator:**

Pin down the 3/16" x 1/4" balsa leading and trailing edges. Glue S-1, 3/16" balsa center in place, along with the two S-2 stabilizer tips. At this point, epoxy the 3/16" sq. spruce torque rod to the two elevator halves and temporarily spot-glue the elevator assembly to the trailing edge. I use about one drop of CA at each tip and another drop in the middle.

Add the diagonals and sand the entire stabilizer assembly to a streamlined cross section, starting with 100 grit sandpaper.



**Place light weights on the fuselage assembly and check all around with triangles to make sure that both sides are perfectly aligned.**



**Use C-clamps to hold the plywood tip dihedral braces in place while the epoxy cures.**



**Electraglide III components ready for covering.**

After a final sanding with 240 and 400 grit sandpaper, cut the elevator from the stabilizer, add the slots for your favorite brand of hinges, and you're ready for covering.

##### **Vertical Fin/Rudder:**

The vertical fin and rudder is a simple lightweight structure. Pin down the 3/16" sq. balsa center spar of the rudder and glue R-1 and R-2 in place. Glue the 3/16" sq. balsa leading edge in place and add all of the 3/16" sq. balsa horizontal members. Glue the 3/16" balsa gussets in place and the assembly is complete. As with the stabilizer, spot glue the rudder to the fin and sand completely. Add the slots for your hinges and you're ready to cover.

##### **Fuselage:**

Begin by cutting out the fuselage sides and marking the locations of the fuselage formers. Laminate the 1/64" plywood doublers to each fuselage side using epoxy. At

the same time, add a .007" x 1/2" x 6" carbon fiber reinforcement to each fuselage side between the marked locations of former F-6 and F-7, using the same batch of epoxy. While the epoxy is curing, fabricate former F-3 as shown on the plan. Next, epoxy formers F-2, F-3, and F-5 to the right fuselage side, laid flat on the table top. Use triangles to make sure each of these formers is 90° to the fuselage side. When cured, pin the left fuselage side on the building board with the inside surface up. Place a bead of epoxy on all three formers and carefully position them over the left side, using the locations you drew as a guide.

Place light weights on the fuselage assembly and check all around with triangles to make sure that both sides are perfectly aligned.

When complete, glue the rear fuselage sides together and cement formers F-6 and F-7 in place.

Use a bead of thick cyanoacrylate to attach the 3/32" fuselage bottom in place, cross grained. Add your control rods and the 1/8" x 1/4" balsa wing saddle reinforcement. Epoxy the 3/32" plywood wing hold-down plate, F-4, in place, and add the rear fuselage sheeting.

For many years, I cut balsa nose blocks out in one piece. This was accomplished by drilling a hole, inserting a saw blade, and cutting out the motor cylinder with a scroll saw. I then made a plywood tube and inserted it into the balsa block. It didn't always work. Often, the tube would be cocked or

the balsa block would split. I now make the nose blocks in two pieces and glue the tube between them, with the motor covered with wax paper inside the tube. This is a fool-proof method.

Begin by cutting out the top and bottom nose block halves as depicted on the plan. Wrap wax paper around the motor and then roll the 1/64" plywood around the motor to form a motor tube. You can use either cyanoacrylate or aliphatic glue to laminate the tube. When dry, epoxy the tube to the top and bottom nose block halves. Remove the motor and epoxy the nose block to the front of the fuselage.

Add the 3/32" balsa fuselage top at the front and sand the fuselage to final shape. I use a Perma Grit 60 grit steel sanding tool to form the fuselage front, as well as for the leading edges of the wing, etc. This is followed by the progressive application of 100, 220, and 400 grit sanding blocks to prepare for covering.

This is also a good time to fabricate and sand the cooling air intakes and exits as shown on the drawing.

#### Wing:

The wing is a straightforward conventional design. Start with the center section panel. First, pin down the trailing edge using a 48" straightedge to assure that it is lined up properly. Next, use your straightedge to trim the inside edge of the 1/16" balsa sheeting. (Balsa edges aren't always straight.) Pin the 1/16" sheeting in place and glue in the 1/16" x 1/4" rib caps and the

## ELECTRAGLIDE III

Designed by:

Jim Zare

### TYPE AIRCRAFT

Electric Powered Sport Sailplane

### WINGSPAN

85 inches

### WING CHORD

8.5" Center — 6" Wingtips

### TOTAL WING AREA

660 Sq. In.

### WING LOCATION

High Wing

### AIRFOIL

Eppler 205 Modified

### WING PLANFORM

Constant Chord Center Panel  
with Tapered Wingtip Panels

### DIHEDRAL, EACH TIP

4-3/4 inches

### OVERALL FUSELAGE LENGTH

38-3/4 inches

### RADIO COMPARTMENT SIZE

(L) 8-7/8" x (W) 2" x (H) 2-1/4"

### STABILIZER SPAN

20-3/8 inches

### STABILIZER CHORD (inc. elev.)

5-7/8 inches

### STABILIZER AREA

119 Sq. In. (Approx.)

### STAB AIRFOIL SECTION

Flat Bottom

### STABILIZER LOCATION

Top of Fuselage

### VERTICAL FIN HEIGHT

8-3/4 inches

### VERTICAL FIN WIDTH (inc. rud.)

7-3/8 inches

### REC. MOTOR/PROPELLER

Graupner Speed 600 w/2.8:1 Gear Drive  
and 12 x 10 Folding Propeller

### FLIGHT BATTERY

7-Cell Sanyo N-1250 SCR  
or 7-Cell Sanyo RC-2000

### SPEED CONTROL

Jeti JES 30 Proportional Control w/Brake

### LANDING GEAR

None

### REC. NO. OF CHANNELS

3

### CONTROL FUNCTIONS

Rud., Elev., Motor Control  
with Brake to stop Propeller

### C.G. (from L.E.)

2-5/8 inches

### ELEVATOR THROWS

1/2" Up — 1/2" Down

### RUDDER THROWS

1-1/4" Right — 1-1/4" Left

### SIDETHRUST

0°

### DOWNTHRUST/UPTHRUST

7-1/2" to 8"

### BASIC MATERIALS USED IN CONSTRUCTION

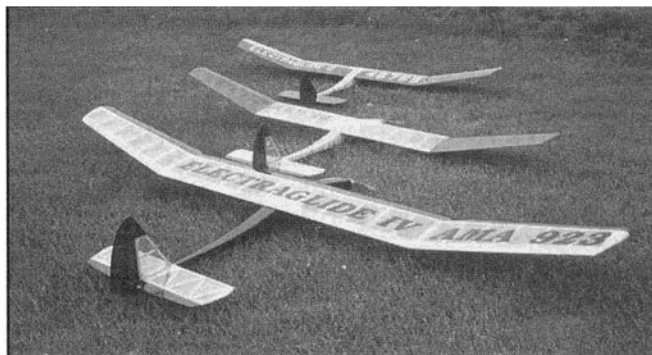
Fuselage ..... Balsa, Ply, Carbon Fiber  
Wing ..... Balsa, Ply, Carbon Fiber  
Empennage .... Balsa, Hardwood Dowel  
Wt. Ready To Fly ..... 45.0 to 49.2 Oz.  
(2 Lbs. 13 Oz. to 3 Lbs. 1.2 Oz.)  
Wing Loading ... 9.8 to 10.7 Oz./Sq. Ft.

1/16" sheeting at the center section. Only apply a few pins on the bottom sheeting and keep them near the spar location. We will want to roll the bottom section upward and the pins will get in the way.

This model calls for a .007" x 1/4"



*This is a very easy-to-build and docile-to-fly model.*



*Don Belote's Electraglide IV, Electraglide III and Electraglide II lined up on the flight line.*

carbon fiber spar reinforcement at the top and bottom spars in the center section only. I mixed 30-minute epoxy and used a disposable brush to paint one side of the carbon fiber strip. I placed this directly on the 1/16" balsa bottom sheeting. I immediately painted epoxy on the 3/32" x 1/4" spruce lower spar and placed it over the carbon fiber to create a sandwich. I placed weights across the entire length of the spar and waited for the epoxy to set up.

Next, trial-fit the W-1 ribs at the middle and each tip of the center section. Carefully mark the location of the 3/16" x 1/4" balsa leading edge and use epoxy or white glue to assemble the leading edge to the bottom sheeting while they are both flat on the plan. **Make sure that you use a straightedge.** Next, glue all of the W-1 wing ribs in place.

**Only apply CA on each rib from the front of the spar to the rear of the rib.**

Cut the W-1 rib at each end of the center section and epoxy the 3/32" plywood dihedral braces in place, then add the top spar and all of the 3/32" balsa shear webs. Remove the center section from the building board and individually glue each rib forward of the spar in place by gently rolling the 3/32" balsa bottom sheeting upward to fit the curvature of the bottom front of each rib while applying CA.

Build each tip panel in a similar manner and join each to the center panel, making sure that you have 4-3/4" dihedral under each tip. This will take some trial-and-error matching of the bottom sheeting.

At this point, drill a 3/16" diameter dowel hole in the center of the wing and

trial-fit the wing on the fuselage. You can use rubber bands to hold the unfinished wing on the fuselage while you epoxy the 3/16" dowel in place between the two center W-1 wing ribs. When cured, remove from the fuselage and sand the top of the leading edge to accept the top sheeting using the Perma Grit 60 sanding tool. When complete, use cyanoacrylate to glue the 1/16" balsa top sheeting and the wingtips in place. **Note: epoxy the .007" x 1/4" carbon fiber reinforcement to the balsa top sheeting before gluing the top sheeting in place.**

Sand the wing leading edge to the section shown and streamline the wingtips. Add either fiberglass or kevlar reinforcement at the wing bolt area. Re-fit the wing on the fuselage and drill and tap the hole for the 3/16" nylon wing hold-down bolt.

**Covering:**

The model was covered with white and transparent Super MonoKote and trimmed with 1/4" black striping tape. The simulated

**TABLE 1  
AIRFRAME COMPONENT WEIGHTS**

	Before Covering	After Covering
Wing	9.5 oz.	11.9 oz.
Fuselage	3.6 oz.	3.9 oz.
Fin and Rudder	.2 oz.	.4 oz.
Stabilizer and Elevator	.7 oz.	1.0 oz.
Total Airframe	14.0 oz.	17.5 oz.

canopy is merely a piece of black MonoKote cut to the pattern shown on the plan. I was interested in the amount of weight the covering adds to the bare airframe. Therefore, the weight of the components was recorded before and after covering.

The result was that an additional 3.4 oz. was added by covering (see Table 1).

**Motor Installation:**

The Graupner Speed 600 Motor is a superb piece of engineering. The motor is attached to a gearbox that has the same diameter as the motor itself. A pair of pinions and drivers provide a 2.8:1 gear reduction, while the motor and propeller turn in the same normal rotation. All that needs to be added to the motor is a capacitor, wiring, and connectors. I used the traditional Sermos Power Poles and slipped the motor into the motor tube.

A short piece of masking tape was applied at the front half of the gear motor to provide enough interference for a tight fit. Make sure you try this under power. You don't want to lose a motor in flight. The Graupner 12 x 10 folding propeller was mounted on the motor shaft and I was ready to install the radio.

**Radio Installation:**

I used the Hitec Micro 535 Receiver with two HS-80 servos for rudder and elevator. The JES 30 speed control with BEC and brake

was installed. This combination weighs about 3.4 ounces.

The servos were mounted in a plywood servo tray shown on the plan. The receiver and speed control were mounted with adhesive-backed Velcro tape.

#### **Battery Selection:**

The Speed 600 motor in the prototype Electraglide III has been powered by both the 7-cell Sanyo N-1250 SCR and RC 2000 flight battery. I would suggest a 6-cell N-1250 SCR NiCd flight battery if you are using the Speed 500 gear motor.

The 7-cell 1250 pack with connectors weighs 12 oz., while the 7-cell RC 2000 pack weighs 16.2 oz. If you are concerned about motor duration, use the new RC 2000 mAh NiCds. The extra weight will make the

model fly a little faster but the overall glide is about the same.

#### **Flying:**

Check out the balance and the radio with the motor off and on. Now you're ready for the first flight. Turn on the motor and watch that big 12 x 10 prop pull the model up at a brisk pace. After a few hundred feet, all you'll hear is the propeller since the Speed 600 gear drive is really a very quiet unit.

The Electraglide III will climb to thermalling height four or five times with the Graupner Speed 600 gear drive and the 1250 pack. Still, air times are in the 25-27 minute range. With the larger RC 2000 pack, the model will climb to thermalling height six to eight times with a still air duration in the 35-37 minute range.

Thermalling is a snap. This is really a very docile sailplane. However, if you push in a little down elevator, the model can pick up speed rapidly and cut across the sky from one thermal to another or back to the field for a spot landing.

One way to return to reasonable height after being caught in a boomer thermal is to do aerobatics ... the Electraglide III will loop, fly inverted, and make the smoothest rolls you've ever seen.

I hope you enjoy your Electraglide III. My good friend, Don Belote, also built a 105" Electraglide IV powered by the Speed 600 or Speed 700 gear drives. Write if you have any interest.

