

Tummelisa 52" 1/6th Scale

R/C Scale Model Instructions



CONTACT INFORMATION

Designed by M.K. Bengtson

Manufactured and Distributed by:

Bengtson Company

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www.aerodromerc.com

Tummelisa 52" 1/6 scale

Thank you for purchasing the Tummelisa 52" 1/6th Scale model for electric flight



THE MODEL

The model is designed to be easy to build and exciting to fly.

Model Specifications

	More than 215 laser cut parts
Scale:	1/6
Prop:	14x7
Channels:	R/E/A/T
Wheels:	Balsa & plywood, Neoprene foam tires
Wingspan:	52"
Airfoil Type:	Flat bottomed
Wing Area:	586sq in
Cowl:	Built up balsa and plywood
Weight:	54 oz
Power System:	AXI 2826/20
Designer:	M.K. Bengtson

BUILDING THE MODEL

Before Starting

A note about the photos: The photos were taken of a prototype and the parts supplied may look slightly different from them. However, the concepts illustrated are the same.

The Tummelisa prototypes were built by Alex Thundberg and Hannes Illipe. Alex started on his proto build but was unable to finish. The following is a compilation of techniques from his and other builds.

WINGS

Build the top wing in one piece. Note that the trailing edges are 1/32" plywood and are supplied in the kit. The leading edges are 1/4" square balsa stock. Rectangular 1/8" plywood pieces with 4-40 blind nuts are to serve as mounts that accept the IP and Cabane struts are placed in the bottom of the wing.

Insert 4-40 blind nuts in the root ribs of the lower wing. Sheet with 1/16" balsa for strength.

Use scrap 3/32" balsa and 3/32" brass tubing to make mounting point in the lower wing for the 1/16" music wire "U" shaped wing tip protectors.

Build the lower wing ailerons using the 1/32" plywood trailing edges and sand the leading edge to shape. Choose a rounded shape for center hinging or a bevelled shape for top hinging.

Attach 4-40 blind nuts in the IP strut mounts and insert into the slots in the top of the ribs as shown.

Note: The nut flange should be inside the wing.

Aileron servos are attached with short threaded rods to the ailerons. Aileron servos are fit in servo compartments located in the lower wings with the supplied 1/32" plywood servo covers. Route servo wires through holes in lower wing ribs. Use a "Y" wiring harness connector to wire the servos to a single radio connection. Alternatively, two RC channels can be used when mixed electronically. If differential aileron throws are desired, rotate each servo horn forward about 20 degrees, while maintaining the neutral position of the aileron. This should counter any adverse aileron yaw.

FUSELAGE CONSTRUCTION

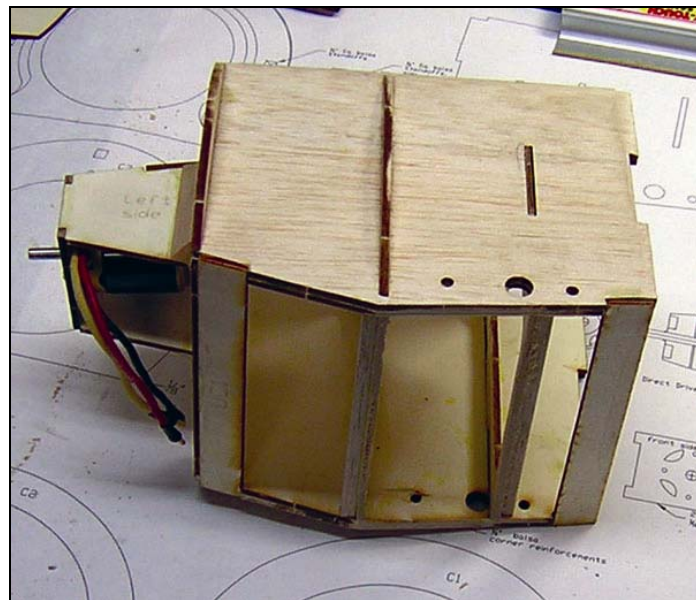
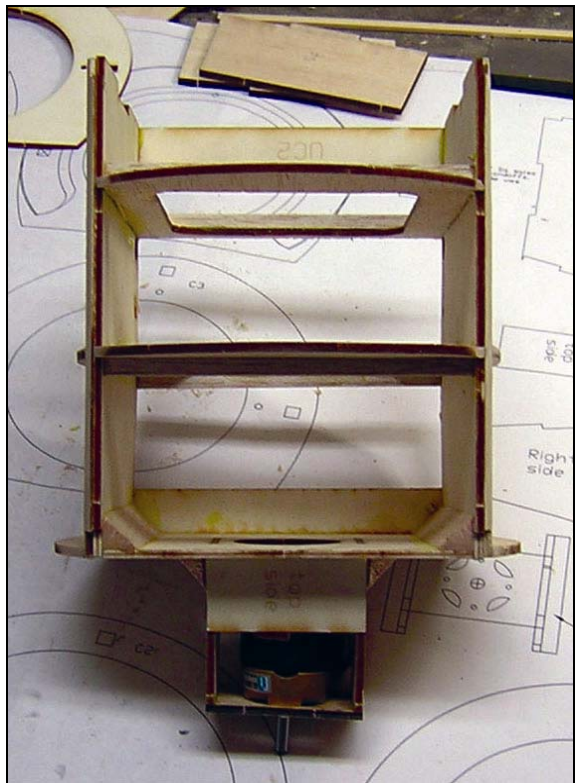
The fuselage is built as two separate box structures, the front sheet area and the rear built up section, which are then joined over the plan. This system not only keeps each stage simple, but it also helps to ensure a straight fuselage. Some modelers prefer to build each side completely on the plan and then join both halves over the top view. Both systems have their advantages and drawbacks. The following is the front/back method.

Begin by building two rear fuselage frames including the 3/16" balsa FS side piece over the plan and allow to dry. Select hard balsa or laminated balsa for the longerons. Note: The diagonal members shown on the rear of the

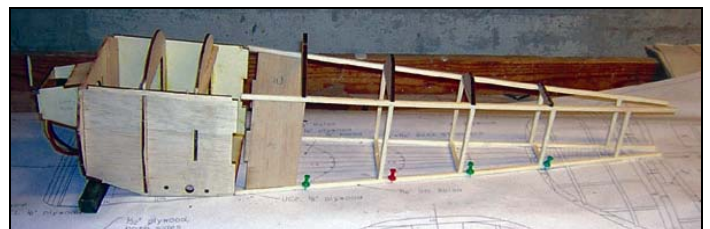
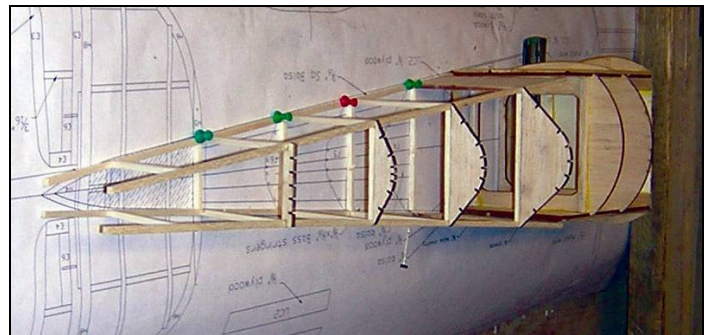
fuselage in the photos is optional and if used, choose the lightest wood so as to keep the tail weight low. Repeat with the other side. Some builders build the second side over the first to insure they match perfectly. Be sure to use wax paper or Saran Wrap between these or you'll not be able to get them apart.. Join the sides over the top view of the plan and add the cross members and tail skid mount. Check and check again to insure that the structure is square and straight or you will end up with a banana fuselage. Finally add the wedge shaped horizontal stabilizer supports, TS3. Wait until the front fuselage is joined to add the turtle deck formers and stringers.

Build the front half and decking

Lay the front sides on the plan and glue them together. The alignment notches insure that they mate properly. On the inside surfaces glue the 1/8" plywood doublers. Use a heavy weight and a slow setting glue like epoxy. If water based glue is used, warping may occur so allow the glue to dry under the weight. Join the sides with the F1,F2 and F3 formers and 1/8" ply undercarriage mount cross member.



Epoxy in the cabane mounts built from brass tubing encased in bass or spruce strip stock as shown on the plan. Add the decking and top formers, and carefully trim to size and fit 1/16" sheeting. The side cheeks can be added after the front and back of the fuselage are joined.



TAIL SURFACES

Lay out and glue parts of the tail surfaces on the plans.

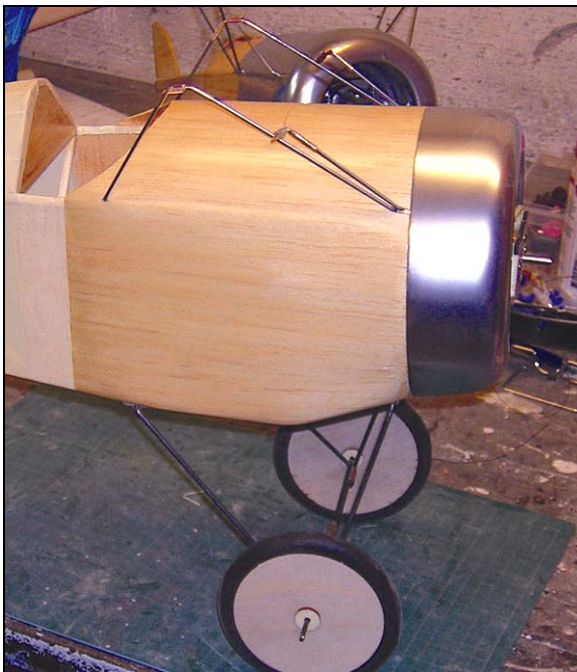
Sand the tail parts, rounding off all edges. Don't add the horns or hinge the surfaces until after covering is complete.



Cabane Struts

The cabane struts are fashioned using 3/32" music wire and #10 ring terminals. Cut to length as shown on the plan and either solder or epoxy the ring terminals in place.

NOTE: roughen the ends of the music wire with emery cloth in both methods. Epoxy makes an excellent bond that will not fail and does not suffer from the common cold solder joint problem. Testing has shown that the epoxy bond method (even with 5 minute epoxy)is stronger than the ring metal. Fair with cardstock using the patterns on the plan.



IP Struts

The IP struts are fashioned using 3/32" music wire and #10 ring terminals. Cut to length as shown on the plan and either solder or epoxy the ring terminals in place. Fair with 3/32" balsa and 1/32" ply parts and sand to shape.

LANDING GEAR

The landing gear are fashioned from 1/8" music wire bent into roughly rectangular shape shown on the plan. The front LG legs are epoxied into the bass or spruce channel built against the firewall. The rear legs are attached with landing gear saddle clamps to the 1/8" plywood LG mount in the fuselage. A shock absorbing mechanism has been designed to let the model have a little give when landing. Attach the 1/8" music wire axle to the topside of the 1/8" music wire cross member with Kevlar thread and epoxy in place in the center. Add short pieces of 1/8" brass tubing as bearings/spacers for the wheels. Use strong rubber bands on the ends near the wheels to act as shock absorbers but make each side exactly as the opposite site. Otherwise, the shock resistance is unequal and your model will cant to one side on landing. Attach the 1/8" plywood fairings with Kevlar thread and Epoxy. Adding Kevlar cross rigging will dramatically strengthen the landing gear.

COVERING

Any lightweight covering material can be used. Polyspan with dope or Minwax Polycrylic makes a good choice, Litespan is also popular.

Decal outlines for this model are available on www.aerodromerc.com/decals in Adobe Acrobat pdf format for printing out on decal paper.

WHEELS

Gluing the ply sides on the 1/4" and 1/8" laminated balsa core makes the basis for the wheels. Use the brass hub for alignment. Epoxy the hubs in place and add a sufficient amount of epoxy around the base of the hub to reinforce the connection of the hub to the ply. Plywood reinforcing hubs are provided that are to slip over the brass tubing as shown. Next, CA glue the neoprene cording together to form a "tire". Use thin CA sparingly as the CA bonds very aggressively to the rubber. Press the CA wetted ends together for an instant bond. The best way to align the ends is to glue them while they are in place on the wheel. Then attach the tires to the wheels and

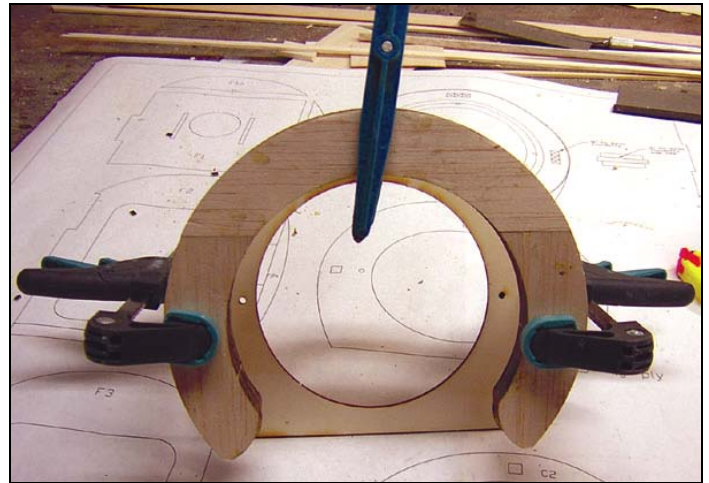
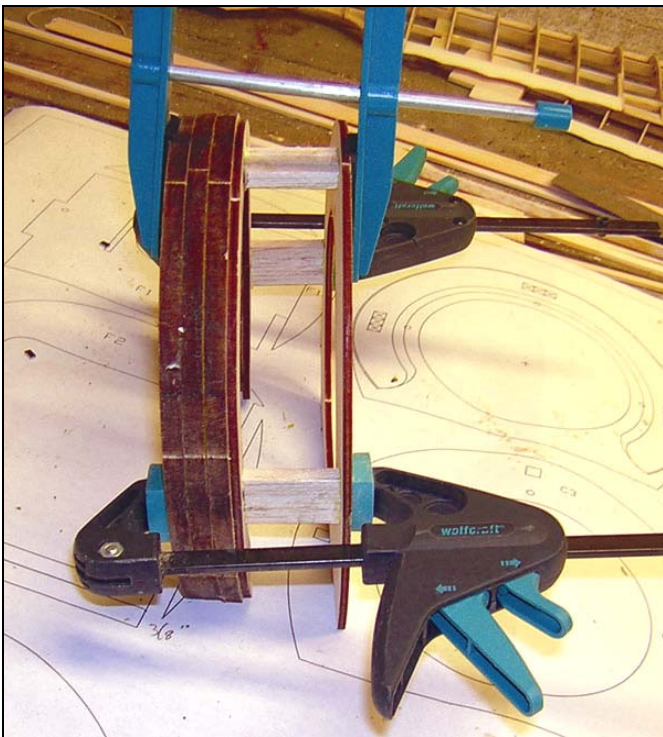
CA in place. A thin bead of CA around the rim makes for a secure tire.

Paper cones are cut out. Use a ball point pen to score each line on the back to make an impression of "spokes" It is helpful to do this operation on a paper tablet so that the pen makes a good crease. Fold the paper along the crease lines to exaggerate the raised lines. One of the sections forming a wedge is cut out. Make cuts to the center of the circle along a pair of the spokes. Close the paper cutout to form a cone and tape the joint inside the cone.

The inside cones may now be attached to the wheels. The outside cones may be attached at this point if wheel collars are to be used. Alternatively, after installing the wheels on the landing gear, a washer may be soldered to hold the wheel in place and then the cone is attached. This method makes a very nice scale appearance.

COWLING

The cowling is of built up construction using 1/8" plywood C3 and C2 parts with 1/4" balsa spacers, covered by 1/3" plywood. Construct front cowl by gluing 3 C1's together. Use make a cardboard template from the plan as a guide for sanding the balsa into shape.



The cowl should now be sealed, sanded and primed until no wood grain is left showing. Baby (Talcum) powder in clear dope makes an excellent balsa sealer. Talcum powder mixed in white glue makes excellent filler for gaps or gouges. Sand down after it dries.

Fitting Tail Surfaces

Attach the rudder to the vertical stabilizer using 1/8" strips of CA hinges. Similarly, attach the elevator to the horizontal stabilizer. Glue the horizontal stab/elevator assembly onto the fuselage. Then glue the vertical stabilizer and rudder assembly into the slot in the horizontal stabilizer. Since the Tummelisa has a very short nose, pull pull tail surface controls are recommended.

Fitting the Rigging Wires

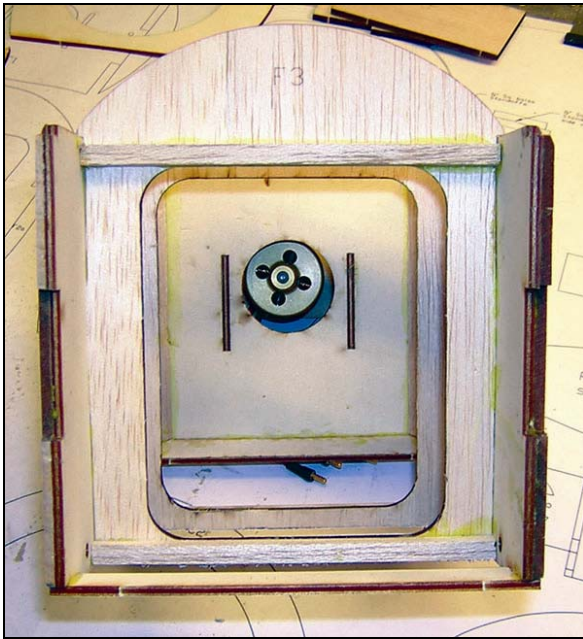
Use strong thread or Kevlar® fishing line or elastic beading cording to simulate rigging wires. Use small screws, fishing hook eyes, straight pinheads or small eyelets to attach the lines. These "wires" can add a degree of strength to your model.

Battery hatch

Fashion a battery hatch from 1/32" plywood

Motor Mount

Fashion the motor mount from the balsa and ply pieces as shown on the plans. The assembly insures the correct right and down thrust when holding the AXI 2826 motor.



- Don't expect the elevator to make the model climb.
- Think of the elevator as a device to change the attitude of the model.
- The wing and airspeed ultimately make the model climb.
- Often down elevator applied at stalling can avoid a major crash.

The most important details for proper flight operations:

- Correct CG location.
- Straight non-warped wings.

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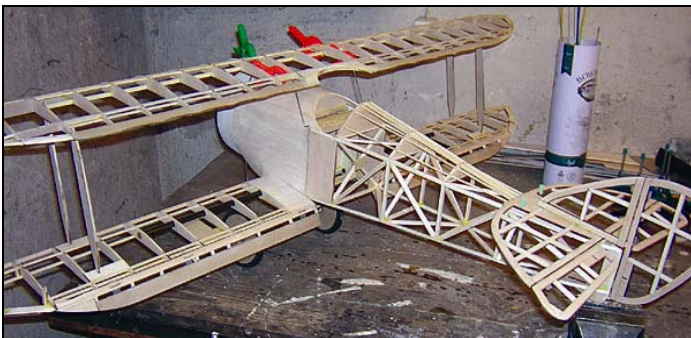
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Web Site: www.aerodromerc.com

Balancing The Model

Balance the model at the point shown. Choosing a larger battery is preferred to adding lead.

Here is Alex Thundberg's "in the bones" photo of the Tummelisa.



FLYING

- The model should ROG on grass, pavement or hard surfaces.
- Let the model gain altitude slowly off the runway.
- Applying too much up elevator at slow speeds risks a stall.
- Make your turns gently as tight turns risk tip stalling in any model.