



# MEGNA 25

It's big, it's beautiful, and it's hot! The large sport/pattern ship you've been waiting for.

By Alex Bouknight

**T**he Megna 25 is a mid-wing aerobatic type plane designed around the Super Tigre 2500. Super Tigre has long been a favorite of mine and their large 2000 series glow-type engines are excellent in terms of performance and price. The engine offers a nice power-weight ratio for an engine of this size and was a perfect base for the project. The model, although not large by today's standards, offers good visibility in the air and will just barely fit into a mini-van. Some of us do not have unlimited shop or storage

space, and have to limit the size to some reasonable compromise. My niece, Megan, might have had something to do with the name?

The two wing panels supported by a wing tube is an excellent approach to a mid-wing design and the tube/sockets can be purchased from Gator R/C Products, 3713 Pompano Dr., Pensacola, Florida 32514 (904) 476-8639. The large hatch gives easy access to the radio/tank area and makes the wing attachment very workable. The radio requirement will be a four channel/six servo

layout. I would recommend the use of coreless or larger servos on the flight surfaces, as the flight loads of this size model would be a bit too great for standard servos. I used a coreless servo for each aileron and one for each elevator-half, driven by a Y-chord. The rudder used one high output servo driving a pull/pull cable arrangement and a standard servo on the throttle.

The use of balsa/ply laminate on many of the sub-structures, was used to reduce weight while still retaining vibration



dampening qualities. There are numerous lightening holes throughout the assembly. Choose your wood very carefully. Most of the strength comes from the glue layer between the ply and balsa, and does not require heavy wood. Make the parts carefully and spread the epoxy very thin. The model will balance very nicely if you take care with the wood, especially in the tail area. Light airplanes fly better.

The finish is something that you might want to consider carefully. The model has a lot of surface area, especially fuselage side area. The choice of finish can vary the final weight considerably. A little difference in

the use of a wing jig, like the A-justo-jig, to build as accurately as possible. Due to the span of the panels, each one will have to be built separately to provide enough length on the jig for the rib guides. If you can live with a slightly higher wing loading and want to build both panels at the same time, shorten the span of each side just enough to fit both on the jig.

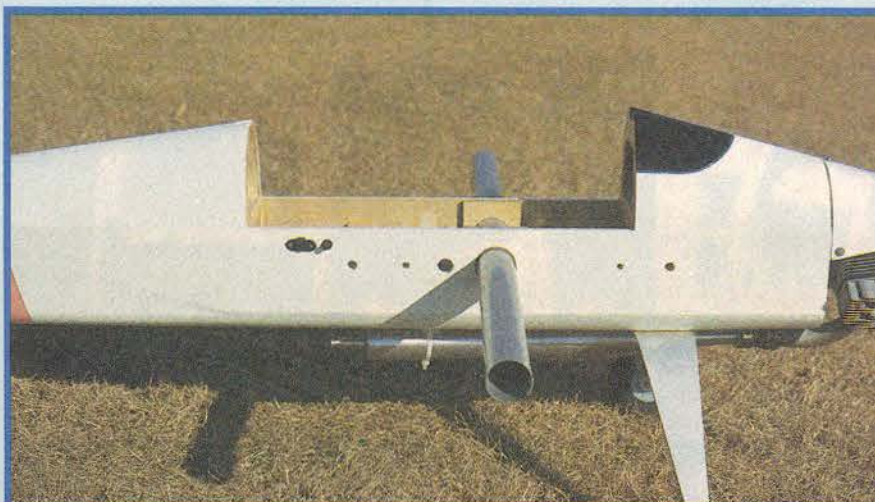
Prepare all the ribs by cutting to the correct size and shape. Notice that the inboard section which supports the wing tube uses 3/16" balsa ribs while the outboard section uses 3/32" balsa. Choose light wood for the larger ribs as most of the

strength comes from the ply doublers which support the tube sockets. Draw centerlines on both sides of each rib and drill the necessary holes for the jig rods, tube sockets, and servo leads. Slide the ribs on the jig in the correct sequence.

Notch the back side of the 1" triangle L.E. stock at the rib locations and mark a centerline for alignment with the ribs. Place on the jig and pin in place. Make the main spar assemblies by gluing the spruce doublers to each side of the 3/8" x 1/2" balsa stock in the location shown. Make a top and bottom spar for each panel, see plans. Position the **top** spar in place on the ribs. The bottom spar will be added after the panels are removed from the jig.

The rear spar and the aileron L.E. are both cut from 1/2" balsa stock and should be cut at the same time. Pin two pieces of oversize stock together and make one 8 degree taper cut for each side through a table saw. See the root rib view for detail. Notch for the ribs on the front side of the rear spar and pin in place. When everything aligns just right, glue the whole assembly with cyanoacrylate.

Edge-glue two pieces of 3" stock for the top forward portion of the sheeting. While that is drying, lightly sand the ribs to get a uniform surface with the main spar. Be careful not to alter the airfoil shape. Hold in position when dry and mark and taper cut the sheeting back edge along the centerline of the main spar. It will help to slightly wet

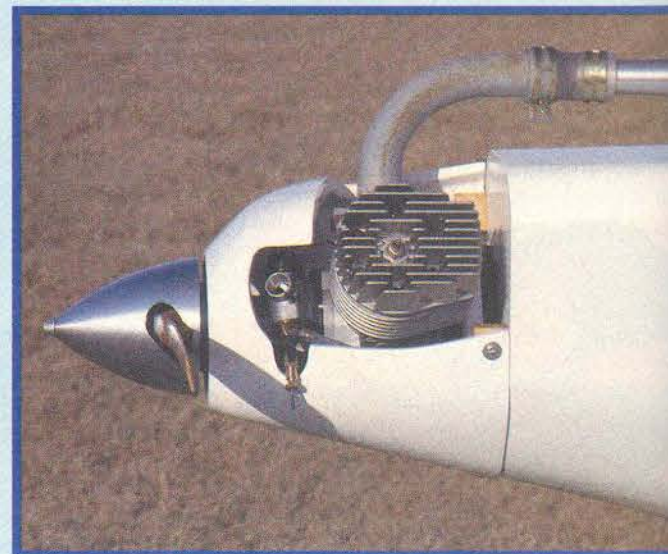
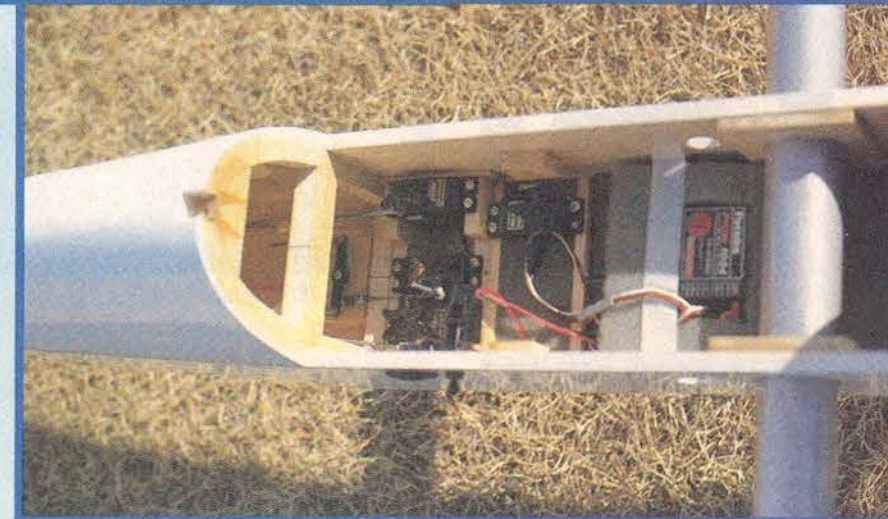


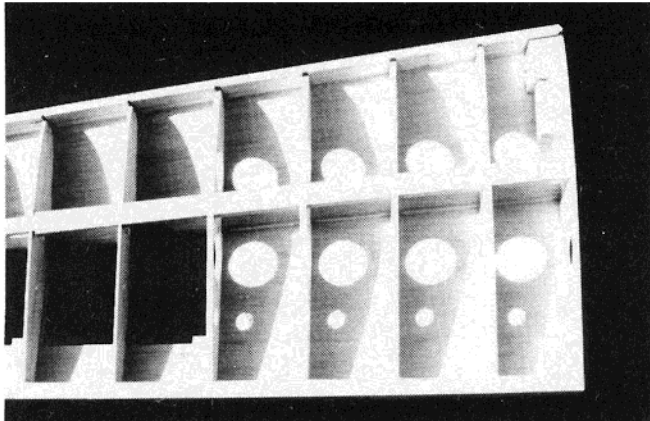
weight spread over a large area has a multiplying effect. I have seen a number of models that looked nice, but never flew as well as they would have with a lower wing loading. The obvious lightest choice is to MonoKote the whole aircraft, or at least the wing panels and tail area. I normally paint the fuselage which helps with the compound curves and gives a little more flexibility on the color scheme lay-out. It will produce the best finish, but takes more time and work to complete. In any event, build the model as light as you can, not compromising strength.

## CONSTRUCTION

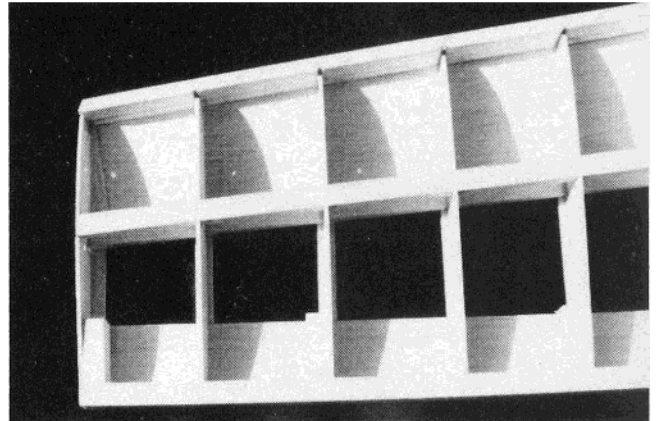
### Wing:

The wing panels would be a good place to start the construction process. I recommend

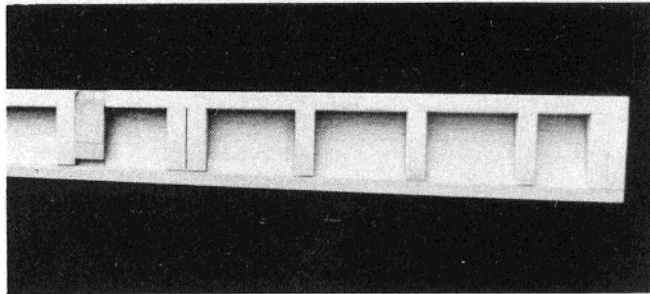




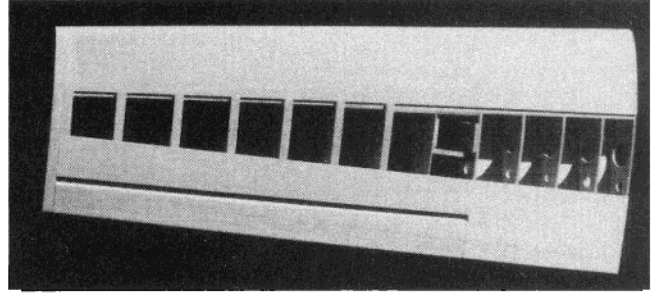
**Bottom view of right wing panel with spars, shear webs, and hinge blocks all in place.**



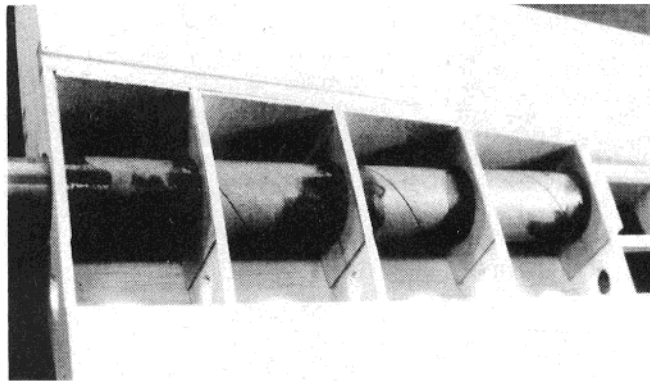
**Tip section of right panel. Note hinge blocks glued in place on rear spar.**



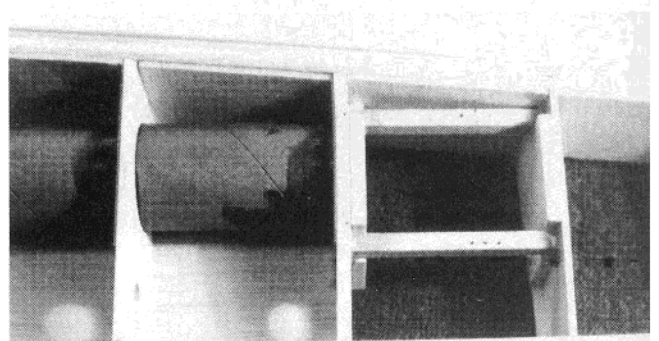
**Center section of aileron assembly with L.E. and hinge blocks added.**



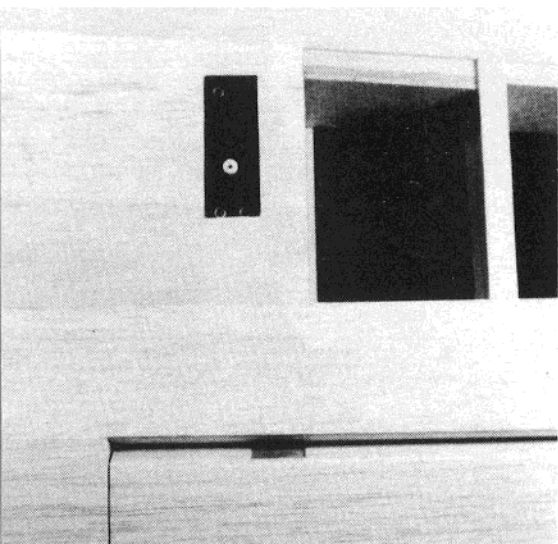
**Center section T.E. piece glued in place to rear spar.**



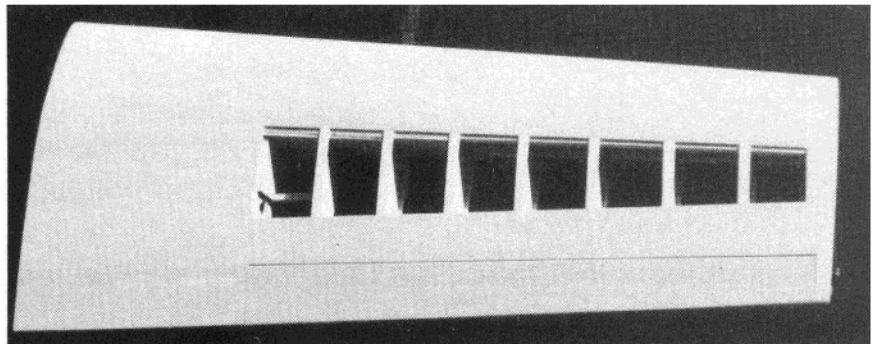
**Wing tube sockets glued in place in wing.**



**Aileron servo bay details. Spruce servo rails locked in place with 3/16" balsa half ribs.**



**Bottom of wing showing aileron servo installed in cut-out. Note horn block installed in aileron.**



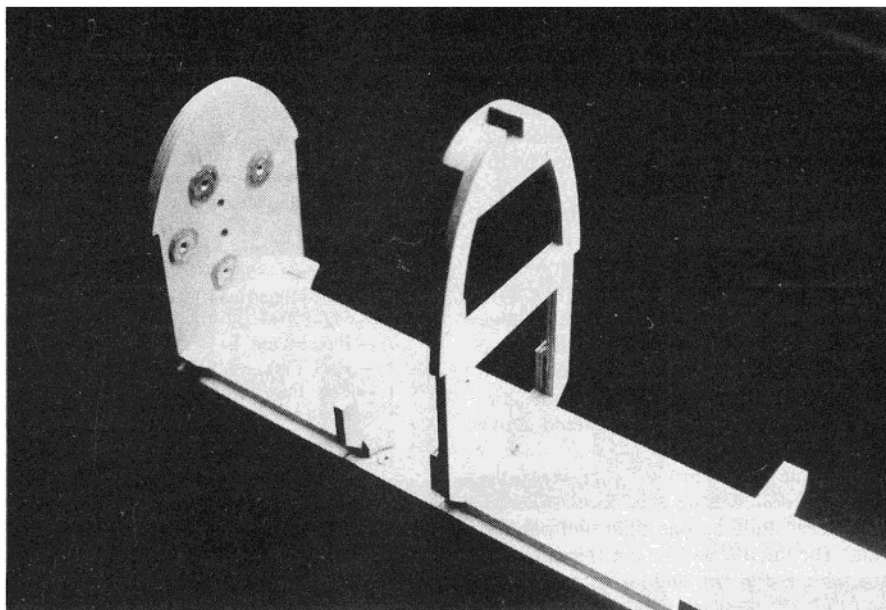
**Completed right wing panel.**

the top surface with water to allow the wood to bow with the airfoil shape. Glue with aliphatic resin; clamp in place, and let dry overnight. The panels should be strong enough to remove from the jig. Position the bottom main spar assembly to each panel in

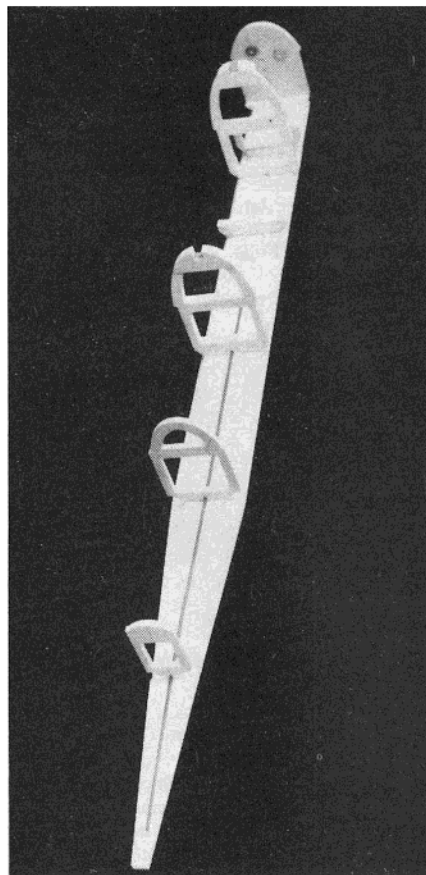
the rib notches and glue in place.

Add the 1/2" balsa hinge support blocks to the front side of the rear spar at the hinge locations. With the rear spar and aileron L.E. pinned together, mark the taper line on each side of the centerline with a long

**Page 195 is out.**



**Blind nuts for engine mount installed prior to gluing B-1 firewall in place. Also, note blind nuts for landing gear also installed.**



**All formers glued in place on fuselage bottom.**

block to the forward side. The block will be tapped for a 10-32 bolt later in the process. Make the remaining bulkheads. Note the use of a ply/balsa/ply laminate using 1/32" ply outside of a balsa core. These will take a little time to make but will save weight and be very strong. Spread the epoxy very thin as you glue the surfaces together. Cut each to the correct size and shape and relieve material as necessary. The #4 bulkhead will have the spruce hatch bolt block inset into the bulkhead itself.

Next make the bottom sheeting assembly.

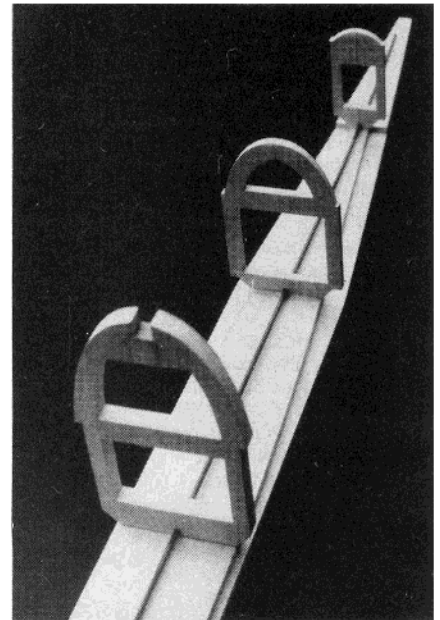
The 1/4" ply landing gear plate edge glues between the forward bottom sheeting and the aft portion, followed by the tail gear plate. Cut the gear plates to shape and draw centerlines on each. Be sure the edges are cut very square as this affects the trueness of the whole aircraft. Glue the blind-nuts to the inside of each gear plate. Lay the pieces out on a flat work surface over Saran Wrap. When everything lines up just right as viewed down the full length centerline, glue together. I installed a 1/4" ply strip aft of the #3 bulkhead on which to mount the pipe support. Leave this off if you do not plan to run a tuned pipe on the bottom surface.

Mark the location of the bulkheads 90 degrees from the centerline on the inside surface. Position each bulkhead in the appropriate position and glue to the bottom sheeting using a square for trueness. Cut out and epoxy the main gear supports and spruce triangles to the main gear plate. Make these joints very strong as this is what holds the gear on during those less than perfect landings. Add the forward tank support to the back side of the firewall. Cut to shape and add the various 1/4" balsa sheet pieces that overlay the bottom sheeting between the bulkheads, see pictures.

If you plan to run an internal antenna installation, drill for and glue a NyRod tube to the inside of the bottom sheeting now.

The bottom triangle stringers that tie the sides to the bottom assembly have two corners removed. Make one cut to match the finished side thickness and the other to 1/4", see bulkhead view. Try to cut these as accurately as possible to get a good fit at the seam joint. When you are happy with the fit glue in place on each side.

The next step will be to build the sides as a sub-assembly before joining to the bulkheads and the bottom sheeting. Study the top side view and notice that the sides use the same 1/32" ply laminate process that was used on the bulkheads. The outside piece is full length with balsa sandwiched between the two. There should be a slot at



**Author used a NyRod tube down the center of the fuselage bottom for internal antenna.**

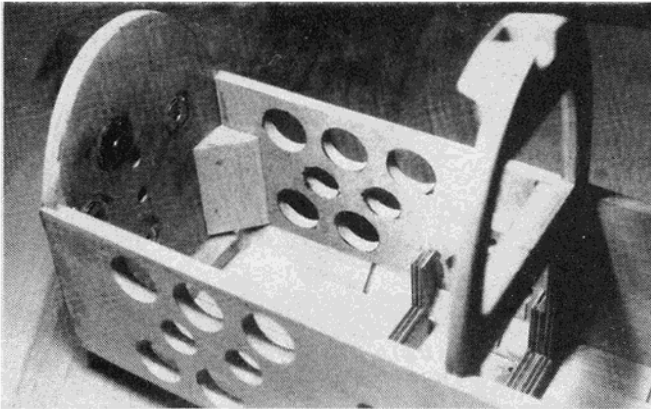
the firewall, bulkhead #2 and bulkhead #4 position on the inside of each side. Make one right and one left side. I drilled numerous lightening holes through the forward section of the side structure to save weight. Since the rearward portion has open area anyway, I planned to use Coverite to cover the fuselage and hide all the open areas.

Lay the outside ply piece, inside up, on a flat work surface. Add the balsa filler and ply doublers using epoxy spread very thin. Weight as necessary and let dry. Draw an incidence line to the outside of each side. Carefully mark the position of the wing tube, servo leads, wing bolts, and alignment dowels. Be sure they are in the same place on each side. Drill all the necessary holes to the sides. A set of Forstner bits is helpful here to drill very clean holes without tearing the edges. Add the two spruce dowel support blocks to the inside of each side.

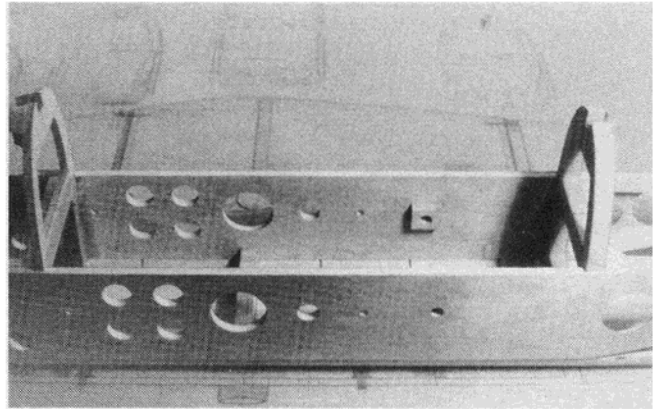
The sides can now be clamped and glued in place to the fuselage. Finish this step by adding the balsa stringers and gussets to the rear section between the #4 and the #6 bulkhead. Add the support triangles to the tank compartment and fuelproof this area. Cut out the 3/32" ply fuel tank compartment ceiling and drill the lightening holes. Fuelproof the surface and glue in place with the support triangles. Add the forward stringer between the firewall and the #2 bulkhead.

Study the hatch drawing and construct in a like manner. Notice the balsa blocks in the forward section to handle the compound curve at the canopy area. Cut the blocks oversize and shape after the sheeting has been added. Remember that the block will be flush with the sheeting surface. Get a strong and accurate fit at the tab position and drill and tap for the 10-32 hatch bolts with the hatch in place.

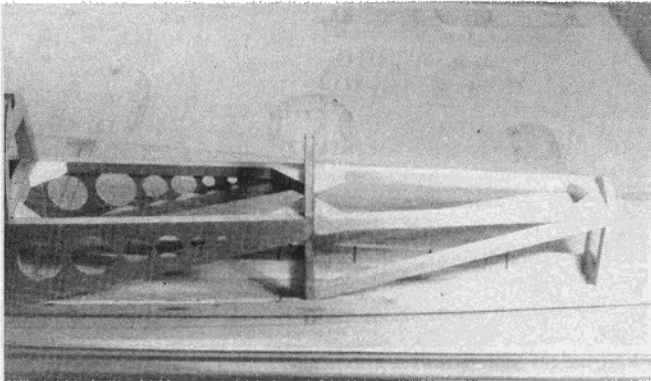
The entire top area of the fuselage may be



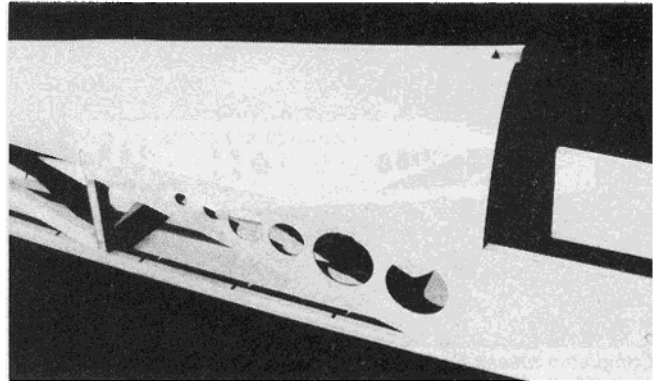
*Fuel tank compartment. Note extensive use of lightening holes in fuselage sides.*



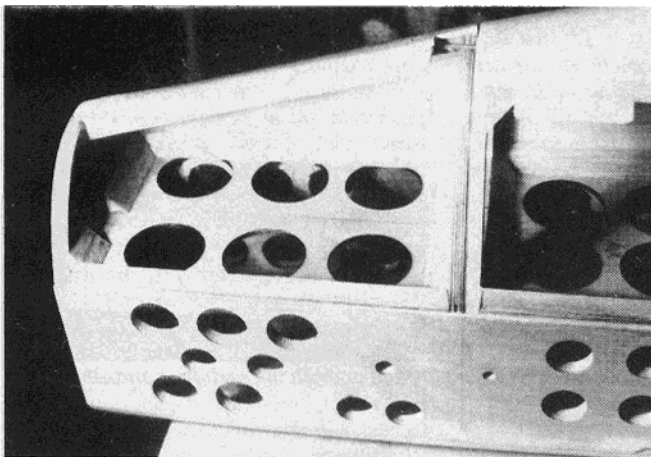
*Radio compartment. All wing alignment and attachment holes drilled prior to installation of sides on fuselage.*



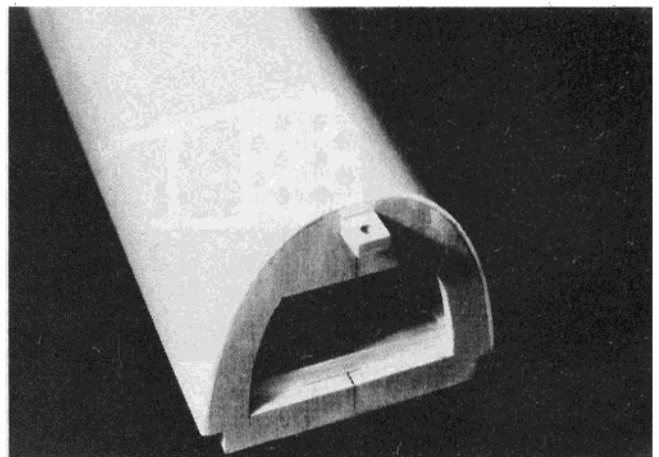
*Rear section of fuselage is made up using stringers and gussets.*



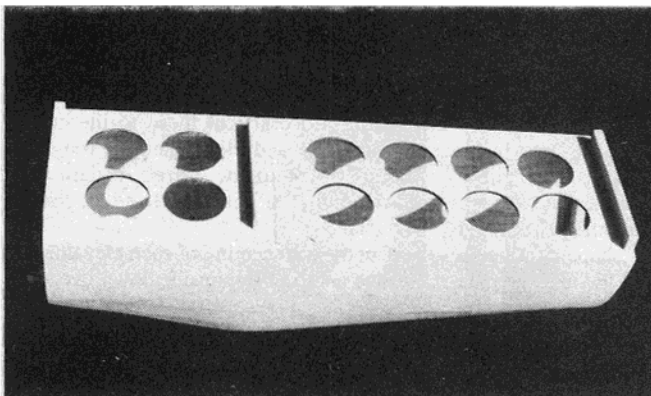
*3/32" balsa sheeting used on turtledeck.*



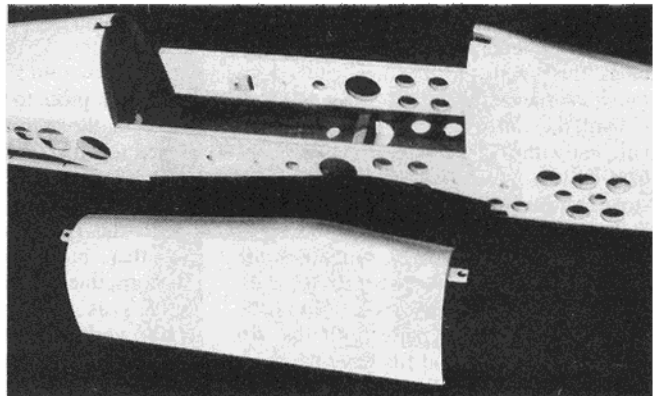
*Fuel tank compartment top sheeted with 3/32" balsa. Note triangle stock support.*



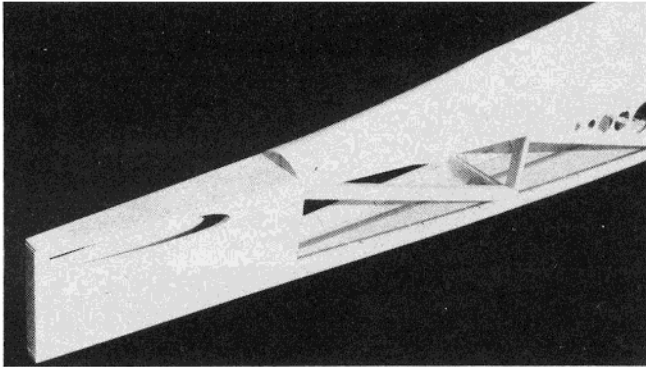
*Radio compartment hatch is held in place with plywood tabs/bolts.*



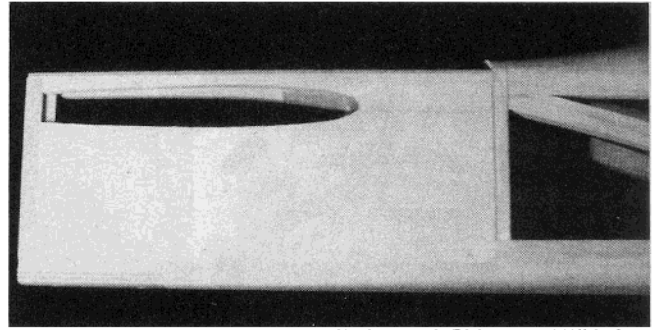
*Hatch bottom drilled to lighten. Balsa supports stiffen assembly.*



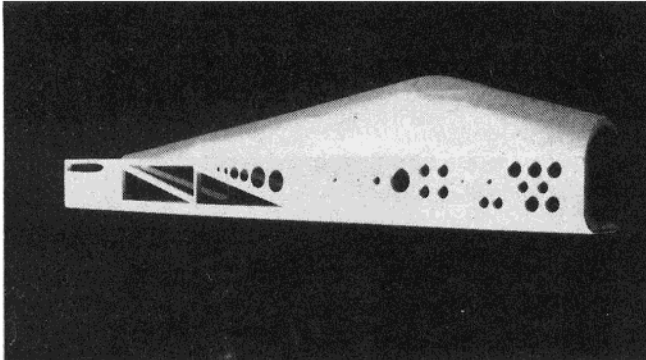
*Fuselage with completed hatch.*



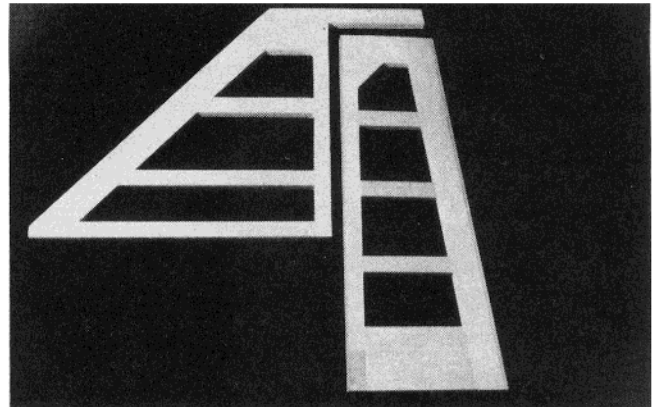
*Tail section with tailpost and sheet sides in place for stabilizer support.*



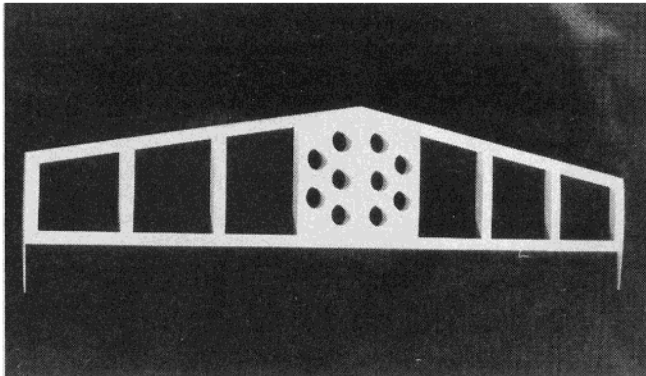
*Fin support plate (on top) is 3/32" plywood. Sides are 1/4" balsa sheet, with 1/4" plywood insert used for tailwheel mount.*



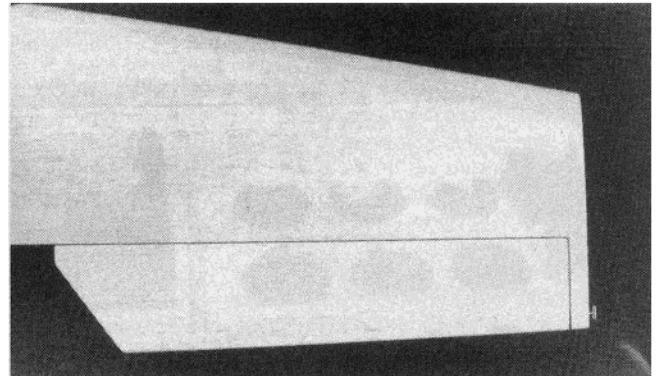
*Completed fuselage ready for covering and nose cowling.*



*Vertical fin and rudder are built-up from 1/2" balsa sticks with 1/16" balsa sheeting. Note spruce insert in rudder for control horn mount.*



*Stabilizer is framed up with 1/2" balsa.*



*1/16" balsa sheeting is used on both the stabilizer and elevators.*

sheeted using 3/32" balsa. It will help to wet each piece on the outside surface as it is being wrapped around the formers to warp the wood to the correct shape. Clamp or pin in place and let dry. Block sand the canopy block flush with the sheeting with a nice round contour.

Start the tail assembly by making the tail-post with a piece of 1" triangle scrap. Cut the two sides to size from 1/4" balsa stock and **carefully** mark the position of the stab. Cut-out. It should be 0 degrees incidence. Glue the triangle supports to the inside of each side and cut-out for the stab. The forward edge of the sides will have to be tapered where they mate with the #6 bulkhead to get a good fit. Glue the sides and tail-post in place. Be sure the centerline of the tail-post is 90 degrees from the tail-gear plate. Add the filler block at the stabilizer. Position and relieve the material

for the stabilizer. Cut out. Cut the 3/32" ply fin support plate to shape and mark a centerline. Glue to the top of the sides.

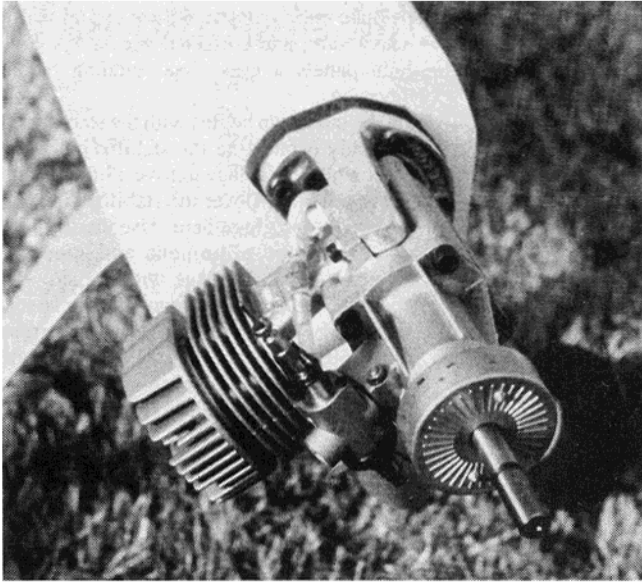
#### **Fin/Rudder:**

Begin the fin/rudder by cutting out the framework from 1/2" balsa stock. Glue the pine T.E. piece to the centerline of the rear edge of the framework after it has been glued together. Add the spruce horn block which is inset under the finished sheeting. Mark and drill for your hinges and test fit. With the fin/rudder temporarily hinged together, block sand to shape. To get a uniform thickness at the T.E., use the pine pieces as a guide when you sand the framework taper. Sheet both fin and rudder with 1/16" balsa sheet. Note the 1/16" ply plates at the horn position. Round the L.E. of the fin to a nice airfoil shape and round the L.E. of the rudder for freedom of movement.

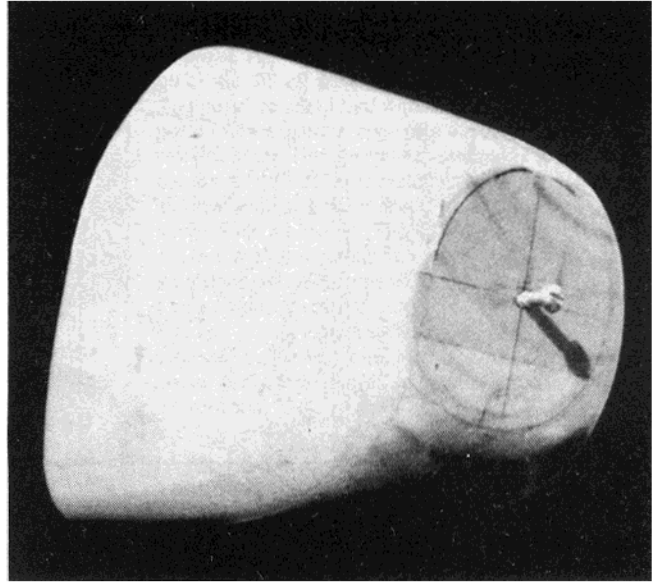
#### **Stabilizer:**

The stab is constructed in a like manner with 1/2" balsa framework, sanded to the correct shape. Be sure to cut lightening holes in the center block to reduce the weight. I used 1/32" ply templates at the center section and the tips as a guide in the sanding process. Cut these to the correct airfoil shape and block sand the rough cut blocks down to the correct pattern size. Sheet with 1/16" balsa and add the tips cut oversize.

Cut the top sheeting of each elevator-half to size and position upside down over your work surface. Add the L.E. and ribs from 1/2" stock. Make the 1/2" thick horn plates by gluing two pieces of 1/4" ply together and taper sanding to shape. Make one right and one left. Add the horn plates and pine T.E. to the framework and sand the taper to the T.E., see stabilizer side view. Sheet the



*S.T. 2500 on J'TEC mount supplies the power.*



*Male plug for fiberglass cowling.*

bottom surface and install your hinges. Relieve the L.E. of the elevators for surface control movement and test fit with the stabilizer. Finish by sanding the tip blocks flush with the sheeting, and rounding the L.E. triangle stock to shape.

Study the #3 bulkhead detail view. Notice that the 1/8" paper phenolic socket mounts in each wing panel only, not through the fuselage. The 1/2" aluminum tube runs through the fuselage and inside the sockets in the panels. Position your fuselage right side up on your workbench. Cut out and drill the two 1/4" ply support blocks that mount inside the fuselage for the 1/2" tube. These glue to the inside of each side at the tube position and give more bearing surface for the tube. Try to drill these holes so the aluminum tube will just barely fit to avoid any unwanted wing movement during flight. A Forstner bit is nice for this.

Slide the tube in position through the fuselage with the support blocks in place. **Before** you glue the support blocks, check to see if the tube is an equal height above the workbench on each side and 90 degrees from the centerline of the fuselage. With the tube centered, measure from the center of

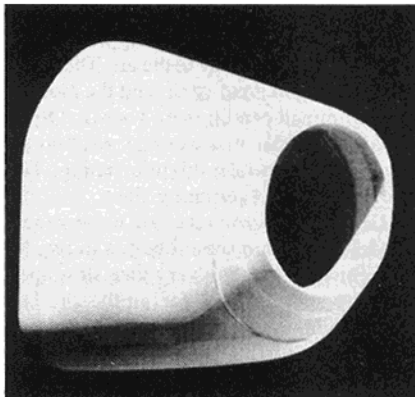
the tail-post to each end of the tube. These measurements should be the same. When you are happy with the alignment, glue the support blocks to the inside of each side. If minor adjustments need to be made, enlarge the holes in the **fuselage sides** and move the interior blocks to the correct position. **Do not** glue the tube itself to the fuselage, just use it as an alignment tool for the support blocks.

With the 1/32" ply rib doublers temporarily in place, slide a wing panel with socket in place on the aluminum tube. Block up the tip for a 0 degree dihedral and incidence reading. When everything looks right, epoxy the ply plates and socket into the panel. Repeat for the other panel. Add the vertical-grain webbing to the back side of the main spars.

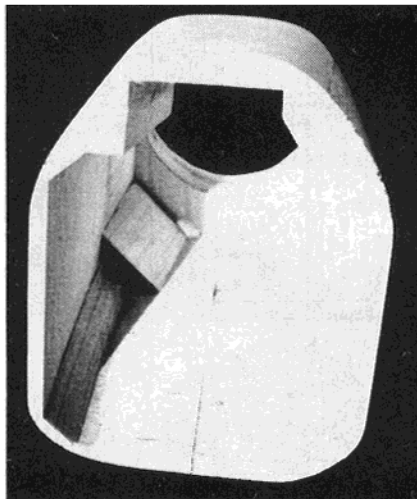
Cut out the 1/32" ply face plate that fits on the outside of the #1 rib a bit over-sized and drill all the necessary holes except the dowel holes. Protect the fuselage side with Saran Wrap and position the plate between

the panel and the fuselage on the wing tube. Glue the plate to the wing panel, **not** the fuselage side. Use the thick-type epoxy and this will take out any uneven gaps where the panel mates with the fuselage. When dry, slide the panel off the tube; finish the sheeting on the bottom surface and sand the face plate even with the sheeting. Be sure to cut out the servo opening in the servo bays. Repeat for the other panel.

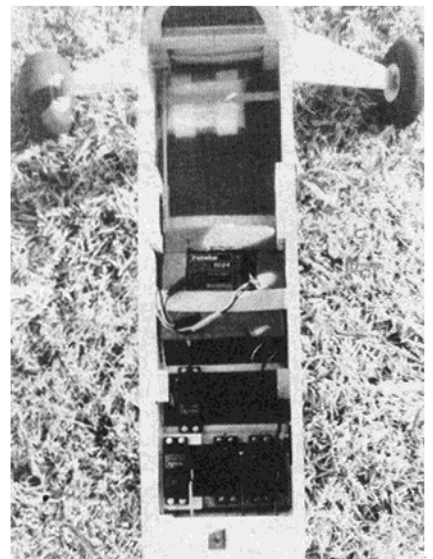
To get an accurate incidence reading on both panels, slide the panels on the tube and rotate them until they both read 0 degrees incidence. With a short pencil, mark the dowel positions on the face plate through the fuselage holes. Drill and test fit. When you are happy with the alignment, glue the dowels in place with epoxy. Mark the position of the wing bolts: two in each panel, and drill and tap for 1/4-20 bolts, test fit. It might be a good idea to check the lateral balance with the panels in place on



*Built-up cowl from balsa blocks.*



*Reinforce balsa cowl with 1/2" tri-stock in corners.*



*Plenty of room for any type of radio gear. Two servos used for elevator, one for rudder and throttle, and one servo mounted in each wing panel for ailerons (6 total).*

the tube to be sure you did not end up with a heavy side, and correct if necessary. Give both panels a good final sanding before covering.

The tail group begins with the stabilizer. I normally MonoKote the stabilizer/elevator and paint the fuselage to save a little weight in the tail area. Cover the stabilizer leaving the area to be glued bare. Use the fuselage centerline for alignment and glue the stabilizer to the fuselage with the slow-set epoxy. Check the view from the rear so it is parallel with the wing and 0 degrees incidence. Add the fin to the fin plate aligning with the centerline and 90 degrees from the stabilizer. Check the rudder for fit and movement.

Lay out your radio gear and make up your pushrods and install the servo rails. I put the pull/pull rudder control arm behind the #4 bulkhead mounted to balsa blocks on the bottom sheeting. Cut out for the pushrod exits in the fuselage and test with all the servos in place to see if everything works correctly. It will be much easier to get to and fix something now before you cover or paint the tail area.

Construct the cowling using either fiberglass cloth and resin, or build up with balsa blocks. Patterns are drawn on the plans for reference. Cut out for the engine and header clearance and plan your mounting method. The removable cowling gives easy access to the engine area for changing thrust plates, engine work, tightening bolts, etc. There is nothing more aggravating than having a beautifully shaped and seamless nose with a loose bolt that you cannot reach.

Cover and finish the model as you desire. Add all the components, engine, tank, hardware, etc. After the control surfaces are hinged and glued in place, check for proper movement direction and amount of throw. The throws listed on the plans will be a good place to start. Adjust to suit your own touch after the trim adjustments have been made. Check the C.G. and shift weight as necessary. This completes the construction of the Megna 25.

Before your first trim flight, do a radio range check and vibration test. Cycle your batteries a few times **before** you fly. Have the engine test run and working properly with a good idle. If it will not idle or gasps when you throttle up, these problems will not magically go away in the air. There is no need having to dead-stick land the model in an untrimmed condition on your first flight. Hold the model in a vertical position and check for a too lean mixture setting. Take the time to get everything right.

Given that you are an experienced modeler, the ship should be fun to fly. The airfoil used gives it a very nice slow speed stability and a smooth feel in the air. Trim for straight and level hands-off. Adjust the right thrust for the prop that you settle on using so the verticals are straight with a neutral rudder setting. The C.G. is listed on the plans as a range. The forward portion will give more stability but will require

some up trim from neutral on the elevator for level flight, which means having to hold more down when inverted. Moving the balance point aft will decrease the elevator trim needed, improving the inverted flight and rolls. Moving too far aft makes the stall turns difficult and the elevator touchy. Adjust to your own taste.

After the long and hopefully successful completion of this project, give yourself a pat on the back for a job well done. Fly safe and enjoy.



**From  
RCModeler  
Feb. 1991**