

Building the Mini Telemaster

Aliphatic resin (carpenter's glue) is recommended for general construction. Epoxy glue is called for during construction when it is appropriate.

Fuselage

BUILD THE SIDE FRAMES

Build two fuselage side frames directly over the plan from 1/8 sq. and 1/8 x 1/4 stock. Cover the frame drawing with wax paper or plastic wrap to keep the frame from being glued to the drawing.

1. Start with the bottom longeron which is made from two laminated pieces of 1/8 sq. Dampen the wood to make the forward curve easier to form. Pin one piece along the inside edge of the drawing. Apply glue (aliphatic resin) to the second piece and pin it in place along the first piece to make the finished longeron.
2. Add the 1/8 x 1/4 top longeron pieces.
3. Add the 1/8 x 1/4 vertical braces except the brace located below the forward wing dowel doubler.
4. Add the 1/8 sq. diagonal braces.
5. Glue the forward and aft wing dowel doublers in place then complete the side by adding the remaining 1/8 x 1/4 vertical brace below the forward dowel doubler.
6. When the glue has dried remove the frame from the plan. Trim the excess longeron material even with the forward and aft ends of the frame.
7. Repeat procedure to build the second frame.

COMPLETE THE FUSELAGE SIDES.

1. Using medium grit sandpaper on a block, sand both sides of the frames to remove excess glue and flush the joints.
2. Make the 1/16 thick side sheeting by cutting four pieces 13 inches long from 1/16 x 3 x 36 sheet stock. Glue these pieces together to make two pieces 6 inches wide. Save the remaining piece of 1/16 sheet for later steps.
3. Cut the aft end of the side sheeting to match the drawing. Do this by placing the frame over the sheet then cut along the aft edge of the appropriate diagonal brace. Remove the frame and finish the cut.

*At this point both frames are identical. The next steps will add the sheeting to the frames making a **left and right** side frame*

4. Apply a thin layer of aliphatic resin glue to all of the frame pieces that will contact the sheeting. Pin the frame to the sheeting with the sheeting on the building surface. Be sure the angled end of the sheeting is aligned with the appropriate diagonal frame brace. Use plenty of

Glue the sheeting to the second frame. Be sure it is opposite or “mirror imaged” to the first side.

5. When the glue has dried remove the pins and trim the sheeting flush along the edge of the frames. *Do not trim the sheeting along the front edge yet since the firewall will later be fitted between the sheeting.*

6. Cut 1/16 sheet to fit within the last frame bay on both sides. Do this by placing the frame on the sheet and cutting along the inner edges of the frame pieces. Glue the sheet within the frame bay so it is flush with the *outside* of the frame.

7. Glue the 1/4 x 3/4 x 1 side wall landing gear blocks in place on the inside of the sides. The grooves are located so they will face *inside* the completed fuselage.

8. Drill the 3/16 wing dowel holes in the sides drilling through the holes in the dowel doublers.

JOINING THE SIDES

The fuselage is constant width from the firewall to the wing trailing edge. Join this section first.

1. Use the pre-cut bottom landing gear block as a gauge to cut 14 pieces 1/8 x 1/4 forward cross braces to length.

2. Pin the fuselage sides upside down over the Top View on the plan. Referencing the Side View as required, glue 14 forward cross braces in place. Check the assembly for square and adjust as required. Allow the glue to dry before proceeding.

3. Glue the 5/16 x 3/4 x 2-1/8 bottom landing gear block in place with the groove *outside* the fuselage. The block should extend 1/16” beyond the bottom longeron.

4. Using the Top View as a guide cut the aft 1/8 x 1/4 cross braces to length. Cut the top and bottom cross braces now making matching pairs.

5. With the fuselage pinned over the plan, glue the sides together at the tail directly over the centerline on the plan.

6. Add the aft cross braces. Check the assembly for square and allow the glue to dry.

7. Remove the fuselage from the plan and add the 1/8 sq. top and bottom diagonal braces.

COMPLETE THE FUSELAGE

The firewall is installed differently depending on motor used. Read the following steps before installing your firewall.

1. The plywood firewall is now glued in place against the forward frame members and between the untrimmed side sheeting. If you are using a gear driven speed 400 motor the firewall should be installed with the hole closer to the bottom of the fuselage. For rotating brushless motors, the hole is closer to the fuselage top. (See firewall details on the plan)

2. If you are using a rotating brushless motor, glue the 1/4 x 1/2 balsa spacers and plywood mount to the aft side of the firewall as shown on the firewall detail.

3. For rotating brushless motors, drill the hole through the firewall to accommodate the motor wires as shown on the firewall detail.
4. Cut 1/16 sheet to fit within the bay just forward of the stabilizer location and glue in place flush with the top surface of the fuselage.
5. Add the 1/16 sheeting to the forward fuselage top and bottom as shown on the plan. This sheeting should be installed with the grain going across the fuselage (left to right).
6. Trim the sheeting flush with the firewall. Glue the cheek pieces to the fuselage.
7. At this point spend some time with a sanding block. Sand the 1/16 side and bottom sheeting to a taper at the rear to blend with the fuselage frame. The nose should be rounded as shown on the plan Top View. Give the entire fuselage a going over to remove rough spots and minor misalignments.

Stabilizer and Fin

1. Take the time to make accurate cuts and good glue joints.
2. When building the stabilizer pick firm pieces of 1/8 x 1/4 for the leading and trailing edges. These should be pinned in place first followed by the center piece and tips. Complete the assembly by adding the 1/8 x 1/4 ribs and 1/8 sq. diagonal braces.
3. The fin is built entirely from 1/8 x 1/4 stock except for the pre-shaped dorsal.

Control Surfaces

The elevator is built on the plan.

1. Pin the elevator halves to the plan.
2. Add the 1/8 x 2-1/2 dowel elevator joiner followed by the 1/8 sq. leading edges from stock.

Make the elevator clearance cut-out in the rudder as shown on the plan.

Tack glue the elevator to the stabilizer and the rudder to the fin. Block sand the assemblies to remove any uneven joints and provide a smooth surface for covering. Shape the stabilizer tips and fin top as shown on the plan. When you are finished sanding, cut the elevator and rudder loose. Sand their leading edges round to allow deflection when they are later hinged in place.

Wing

1. Pin the bottom hardwood spar to the plan with one end aligned with the tip rib allowing the excess to extend beyond the center rib location.

3. Glue and pin the tapered trailing edge in place. As with the bottom spar, align one end with the tip allowing the excess to extend beyond the center rib location.
4. Glue RS1, RS2, and RS3 in place against the second rib. Pay attention to their orientation. The angled end of these parts is towards the wing center so that the center rib will tilt outboard when installed.
5. Add the center rib tilted against RS1, RS2, and RS3.
6. The top hardwood spar and the wing tip are installed simultaneously as follows.
 - a) Cut the end of the spar at an angle as illustrated by Section A-A on the plan.
 - b) Glue the wing tip in place holding it at the approximate angle illustrated by Section A-A.
 - c) Before the glue holding the wing tip has dried, position the top spar on the ribs adjusting it's location and the wing tip angle until they match up properly. Pin everything in place while the glue dries.
7. Cut the end of the 1/4 sq. leading edge at the correct angle to fit against the wing tip as done with the top spar. Glue the leading edge in place.
8. Glue the 1/8 sq. turbulator spars to the top of the ribs located as shown on the plan. The end of these spars are cut at an angle to fit against the wing tips.
9. Cut the gussets from 1/16 scrap and glue in place against the trailing edge and ribs.
10. Repeat steps 1 – 9 for the second wing panel.

JOINING THE WING PANELS

1. Remove the panels from the work surface. Trim excess leading edge, trailing edge, and spar stock at the center rib. Leave a little material when trimming then use a sanding block to make everything flush. The important thing here is to make a straight mating surface where the panels are joined.
2. Cut a slot in the center ribs on both panels between the top and bottom spars to accommodate the dihedral brace. Make the slot slightly over wide to allow a small amount of clearance when the brace is installed.
3. Fit check the dihedral brace. Trim the brace as required to achieve a snug fit between the spars but not so tight as to spread the spars apart.
Epoxy glue should be used to join the wing panels.
4. Using epoxy, glue the dihedral brace into one wing panel. Spread epoxy onto the center rib and exposed dihedral brace then fit the second panel to the first. Align the panels and hold the center ribs together with clothes pins. Wipe off any excess epoxy then hold one panel flat on the work surface while blocking the opposite up three inches when measured at the tip. Allow the epoxy to cure before proceeding.
5. Cut the shear webbing from 1/16 x 2-1/16 x 12 stock. Note that the shear web grain is vertical (goes up and down from top to bottom spar.) *Shear webbing is essential to the strength of the finished wing and should not be omitted.*

6. Cut 1/8 sq. filler pieces to fit on the center ribs between the main and turbulator spars. Glue the filler pieces in place.
7. Block sand the leading edge to shape as shown on the plan. Go over the entire wing to even up any misalignments and prepare the wing for covering.

Final Details

1. Glue a piece of scrap trailing edge to the fuselage on top of the windshield as shown on the plan. *Check the wing for fit, it should rest on the fuselage without interference from the trailing edge piece.* Trim or crack the trailing edge piece as required to fit the wing.
2. Bend the landing gear from the 3/32 wire provided using the landing gear pattern on the plan. The wire is pre-cut to the correct length.
3. Drill 3/32 dia. holes in the bottom landing gear block to fit the landing gear as shown on the plan. Trial fit the landing gear. Final installation will be accomplished after the fuselage is covered.
4. Install the rudder and elevator pushrod sheaths. Reference the plan for correct pushrod exit locations.
5. Cut servo mounting rails from the stock provided and glue in place in the fuselage as shown on the plan. (Spacing between servo rails is adjusted to suit the servos you plan to use.)
6. Trial fit the wing hold dowels. These will be permanently installed after the fuselage is covered.
7. Bend the tail skid from wire provided. Epoxy the skid between the fuselage sides at the tail. If you are using a tail wheel, bend the gear and trial fit it to the rudder. The tail gear will be permanently added after the model is covered.

The model is ready for covering. Separate components are most easily covered before final assembly of the model. Look at all of the assemblies carefully. Be sure all of the glue joints are sound and even. Block sand any misalignments, don't count on the covering to hide imperfections. In fact, the shiny finish will make many problems look worse. Time spent now with a sanding block is well worth it.

The prototype was covered with red and white Orecover. Which ever type you use, follow the instructions that came with the material.

Final Assembly

1. Remove the covering from the wing hold dowel holes in the fuselage. Permanently install the dowels.
2. If you are using a tail wheel, permanently epoxy the gear to the rudder.

The tail sections must be glued to the fuselage carefully to insure accurate alignment and best flight performance.

3. Place the stabilizer upside down over the plan top view. Place the fuselage upside down on the plan and stabilizer. With both components accurately positioned, trace the fuselage location on the stabilizer using a fine tipped marker.
4. Remove the covering material from the bottom of the stabilizer *between* the traced lines leaving the lines on the stabilizer.
5. Place the stabilizer on the drawing again, this time right side up. Using a straight edge, mark the stabilizer where the fin will be located. Remove the covering from the stabilizer where the fin will attach.
6. With the stabilizer accurately located on the plan, epoxy the fin in place. The fin should be held vertical to the stabilizer with pins as required while the epoxy cures.
7. Cut the 1/4 triangular fin bracing to length from stock. Sand the ends to a taper as shown on the plan then cover the braces to match the model. Remove the covering material from the fin and stabilizer where the braces will fit and epoxy the braces in place.
8. Hold the stabilizer in place on the fuselage and mark where the dorsal contacts the fuselage. Remove the covering from the fuselage where the dorsal will attach.
9. Epoxy the stabilizer and dorsal to the fuselage. Use the lines drawn earlier to exactly position the stabilizer. With the fuselage resting on the work surface the fin should be vertical and the stabilizer horizontal to the table. Allow the epoxy to fully cure.
10. Hinge the rudder to the fin and elevator to the stabilizer following the instructions that came with the hinges you are using.
11. Install the landing gear using the nylon retaining straps and screws provided. Cut the 1/32 ply covers from stock provided and epoxy to the side wall landing gear blocks inside the fuselage.
12. Install the nylon control horns on the rudder and elevator. Install your servos and connect the pushrods.
13. Install your motor, speed controller, receiver, wheels, etc.
14. The motor batteries should be installed in the fuselage in such a way that they can be moved forward or aft to balance the model. We used hook and pile tape (Velcro) glued to the fuselage floor and battery. Install your battery and adjust it's position until the model balances as shown on the plan. Once balanced, mark the battery location so the battery may be removed and reinstalled without changing the balance of the model.

Check operation of the controls and the Mini Telemaster is ready for flight.

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