

Building the Telemaster 40

Telemaster 40 is a smaller version of the famous Senior Telemaster. It is just as stable and easy to fly as the Senior Telemaster. On our first flights of the prototype Telemaster 40, we throttled it down while up at a safe altitude, put in some rudder trim then put the transmitter on the ground. It just flew around in big circles up there, waiting for our next command. While it's stable and capable of slow flight to make it the best R/C trainer, it's also capable of flying many maneuvers such as a loop, wing over, inverted flight, rolls, and more. But most important for beginners and for people who have small flying fields, it lands about as slowly as a model airplane can – even without the flaps. Although not a necessity, optional flaps are shown on the plan and are easy to add. With the flaps down in a slight headwind it should be possible to land the Telemaster 40 at just about zero ground speed. Now that's landing slowly! Telemaster 40 has conventional landing gear, it's a "tail dragger". It should give you no problems with ground looping (circling on the ground during take off attempts). The conventional landing gear arrangement is better for flying from grass fields than if it had a nose gear.

While this great flying plane has been flown with only rudder, elevator, and throttle controls, we recommend that you add the ailerons even if you want to get started without use of the ailerons. Connect the aileron linkage to the servos, just don't use them as you fly. We think the airplane flies best with a .25 to .46 size engine. Some flyers use larger engines such as .61 size. If you plan to use a larger engine you should strengthen the stabilizer with shear webs similar to those used on the wing. The Telemaster 40 can also be electric powered using the AXI 2826/12 brushless motor. Both glow and electric power are shown on the plan.

Before you start building the kit it's best to glance ahead through the entire building notes first. By doing so you'll see how it should go and be able to anticipate what's coming next. Refer to the plans as you read and identify each of the pieces you'll be using as you build the kit.

In building our Telemaster 40 we used several different kinds of adhesives. Titebond, an aliphatic resin, was used for most glue joints that could be easily pinned or clamped in place while the adhesive set up. We used this adhesive to prepare the fuselage sides, build the wings, stabilizer, fin, and elevator. Cyanoacrylate (CA) glue can also be used. They are very fast setting but you must be careful to make tight fitting joints before applying the glue. For most other glue jobs such as installing the fuselage bulkheads and servo rails, gluing the fin into the stabilizer, gluing the stabilizer to the fuselage, and joining the wing panels, we used 5 minute epoxy. A big advantage of this adhesive is that it sets up quickly in addition to providing a strong glue joint. Be sure to hold the parts in proper alignment when using 5 minute epoxy because you will not have a second chance to align parts after it sets.

For sanding everything except small hard to get at places, we used a 3 or 4 inch wide by about 12 inch long flat piece of plywood or balsa with sandpaper or garnet paper contact cemented to it. We glue coarse sandpaper to one side and fine paper on the other side of our sanding board.

The Telemaster 40 will build much faster than you think after you look at these building notes. We tried to cover everything for first time builders. NOTE; paper plans can expand and shrink. When the plans disagree with the size of the factory cut parts use the parts not the plans as the correct size and fit reference. (This does not refer to long stick wood such as that used for cap strips, spars, fuselage framing, etc. which must be cut to fit.)

The Wing

Because the wing has a flat bottom airfoil, the wing panels are built flat on the plans over a building board that's soft enough for you to stick pins into. Cover the plans with wax paper to prevent parts from sticking to the plans. The surface of your building board must be perfectly flat if the wing is to turn out true.

If you have a large enough building board both wing panels may be built at the same time. When the panels are completed they will be glued together at the proper dihedral angle.

The wing may be built with optional flaps. If you plan to add flaps you will need two plywood servo mounting plates similar to those provided for the aileron servos. As with the ailerons, each flap is actuated by it's own servo. You will need a servo lead extension for each servo and a "Y" harness to connect the leads to the receiver mounted in the fuselage.

1. Prepare the wing ribs and shear webbing. Remove the wing ribs from their die-cut sheets. Stack up 8 ribs for each wing. Hold the ribs together with a pin and drill a hole through them to allow the aileron and flap servo wires to pass through. Be sure the hole is large enough to accommodate the wire connectors (about 3/8 diameter).

Cut the shear web pieces that will later be fitted between the ribs and against the spars from 3/32 x 3 x 36 balsa sheet. The grain of all the shear web pieces must be vertical so cut pieces 1-1/4 long *across* the grain of the balsa sheet. These pieces can be trimmed to fit between the ribs when they are installed.

2. Pin the bottom 3/32 x 7/8 trailing edge sheet in place on the plan then glue the 1/4 x 5/16 trailing edge in place. The back edge of the trailing edge should align with the back edge of the sheet.

3. Pin the 3/8 x 3/4 leading edge in place on the plan then add the 3/32 x 3 bottom leading edge sheet. Use a wing rib to properly locate the leading edge when pinning it down on the plan. Glue the bottom sheet to the leading edge and pin it down to the plan. Mark the locations of the 4 inboard ribs on the leading and trailing edge sheet.

sheet stock. Trim these pieces to fit between the leading and trailing edge sheeting under the first four ribs starting with the center rib. Glue and pin the sheets in place.

The bottom cap strips are cut to fit between the leading and trailing edge sheet from 3/32 x 1/4 stock. Glue and pin the bottom cap strips in place as shown on the plan.

5. Add the 3/8 x 1/2 bottom spar. Use a rib to properly locate the bottom spar. Glue and pin it in place on the bottom leading edge sheet.

6. Install the ribs, top spar, and shear webs. Cut the root rib angle template from the plan and glue it to a piece of scrap balsa or cardboard. Install the root rib (center rib) first. Use the angle template to set it at the proper dihedral angle. When properly installed the top edge of this rib should tilt slightly towards the wing tip. Add the remaining ribs. These ribs should all be vertical to the building board.

Glue the 3/8 x 1/2 top spar in place.

Trim the shear web pieces to fit between the ribs then glue them in place.

7. Sand the top edge of the wing trailing edge to the contour of the top of the ribs. Use a sanding board or block to do the job. A strip of masking tape applied to the ribs along the edge of the trailing edge will help prevent marring of the ribs as you sand.

8. Add the leading and trailing edge top sheet, and top cap strips. Use 3/32 x 3 sheet on the leading edge. Dampening the top surface of the sheet will help it form to the curve of the rib. Glue and pin the leading edge sheet in place on the top spar, ribs, and against the leading edge. Glue and pin the 3/32 x 7/8 trailing edge sheet in place so that the back edge of the sheet is even with the back edge of the trailing edge.

Cut the top cap strips to fit from 3/32 x 1/4 stock and glue in place.

9. Prepare the flap if used. If you plan to use flaps it must be cut from the tapered aileron stock. Use a razor back saw to cut the short center section piece from a piece of tapered aileron stock (see the plan). The remaining piece of stock will be used to make the flap.

10. Glue the center tapered aileron stock to the wing. If you are using flaps glue the short piece just cut to the wing trailing edge. If flaps are not to be used, glue the inboard section of tapered stock to the wing.

11. Glue the triangular wing tip in place. Trim any excess spar stock, sheet stock, etc., flush with the tip rib then glue the wing tip in place.

12. Tack glue the aileron and flap to the wing. Cut the aileron and flap if used to correct length as shown on the plan using a razor back saw. Tack glue the aileron and flap in position on the wing trailing edge. A tack glue is temporary, use only a few drops of glue. The aileron and flap will be removed after block sanding the wing.

13. Remove the wing panel from the building board. Carve and block sand the top of the wing tip to match the curve of the tip rib. Doing so will give the wing tip the correct top view contour shown on the plan. Block sand the leading edge to shape as shown on the plan.

14. Prepare the aileron and flap servo mounting plates. A rectangular cut-out must be made in the aileron servo mounting plate to accommodate the servo you plan to use. Position the servo centered on the mounting plate then trace around the base of the servo with a pencil. Make the cut-out using several passes with a sharp hobby knife. Trial fit the servo in the cut-out. The servo will later be secured to the plate with screws so that the top of the servo will extend beyond the bottom of the wing. If flaps are to be used, repeat this procedure for the flap servo.

15. Install the aileron and flap mounting plate. Epoxy the servo mounting plates between the correct ribs, against the shear web, and to the top side of the bottom cap strips as shown on the plan. Add the balsa strip stock to the top of the plate and against the ribs as shown on the plan. Temporarily install the servo in the mounting plate. Glue scrap pieces of 3/32 x 1/4 cap strip stock to the mounting plate around the servo. When the covering material is applied to the wing it will be removed within this 3/32 x 1/4 stock to form the servo well opening.

16. Install the aileron and flap servo lead extensions. Route these extensions through the holes in the ribs to their appropriate servo plate. Be sure to install the extensions correctly, one end has a connector to fit the servo while the other connector will plug into a "Y" harness at the receiver. Cut a hole through the bottom center sheet near the center rib for the extensions to exit into the fuselage. Temporarily tape the end of the extensions to the servo plate.

17. Add the top center sheet. As with the bottom center sheet, the top is sheeted with 3/32 x 3 sheet stock. Cut these pieces to length then trim them to fit between the leading and trailing edge sheet. Glue the center sheet in place.

18. Finish sand the wing Trim any excess spar stock, sheet stock, etc., flush with the center rib. Go over the entire wing with a sanding block. Remove any rough edges and misalignments to provide a smooth surface for the covering material.

19. Remove the aileron and flap. Cut the aileron and flap from the wing. Cut the wing tip even with the wing trailing edge then glue the cut-off piece to the aileron. Sand the tip piece to blend with the aileron.

If you've built both wing panels at the same time your ready to join them. If not, complete the second panel to this point.

20. Prepare the wing panels for joining. Block sand the mating surfaces of the wing panels so that the leading edge, trailing edge, tapered center stock, etc., are angled to match the center rib. Be careful doing this so as not to round off the ends of the panels. When the wing panels are joined there should be no voids at the joint.

21. Join the wing panels. Tie a piece of thread to the servo extension leads then push the leads into the wing center section out of the way. Apply epoxy to the mating surfaces of the wing panels. Glue the panels together with one panel flat on the work surface while raising the other panel four inches at the tip. Be sure the raised panel is flat on the work surface where it joins the opposite panel. Allow the epoxy to fully cure before proceeding.

22. Apply 4 to 6 oz. fiberglass cloth to the wing center section. The cloth is applied all around the center and about 3/4" beyond where the edge of the fuselage will be (see the plan). Adhere the cloth to the wing with cyanoacrylate glue. Apply the cloth to the bottom of the wing first then around the leading edge and over the top. Cut holes in the cloth for the threads you tied to the extension leads. The cloth should be applied like a bandage around the entire center joint of the two wing panels. As you flow CA into and through the glass cloth push the cloth against the balsa wood to make sure the cloth adheres totally to the wood. Trim the cloth around the extension lead exit holes and at the back edge of the wing.

After the CA glue has set, sand the glass cloth. **Important...**do not heavily sand the outboard edges of the glass cloth as you may cut into the balsa wing sheeting too much and weaken the wing. Wrap the balsa beyond the glass cloth with masking tape to protect the balsa while sanding.

23. Temporarily hinge the ailerons and flaps to the wing. Use a sanding block to shape the leading edge of the ailerons as shown on the plan. Since the flaps will only deflect downward, their leading edge is shaped differently than the ailerons. See the plans for correct flap leading edge shaping. Slot the ailerons/flaps and the wing trailing edge for hinges. The ailerons and flaps should each have three hinges, one near each end and one in the center. Temporarily install the ailerons and flap. Don't glue the hinges in place yet, you'll want to remove them for covering.

The Fuselage

When building the fuselage it's important for both sides to be exactly the same size. To achieve this you should build one side directly on top of the other. That's the technique we recommend here. You will assemble the fuselage sides on top of a wax paper covered plan beginning with step #4

1. Make the 3/16 thick sheet forward fuselage sides. Locate the top and bottom forward fuselage sides. Cut the forward fuselage center stringers using 3/16 x 5/8 stock. Working on a flat surface protected with wax paper, glue the fuselage top, bottom, and center stringer together to make a complete forward side. When the glue has dried trim the ends of the center stringer to match the top and bottom sides as shown on the fuselage plan side view. Make both sides this way.

2. Mark the inside of the forward fuselage sides. Hold the sides up on edge as they will be installed in the fuselage. Mark the inside of the right piece "right inside" and the left piece "left inside".

3. Draw the locations of bulkheads #1 and #2 on the inside of the sides. Using a ruler, extend the lines on the fuselage side view representing bulkheads #1 and #2. Place both sides down on the plan one on top of the other. Using the extended lines just drawn as a reference, mark the location of the bulkheads on the edges of the sides. Remove the sides from the plan and use the marks made on their edges to draw the bulkhead locations on the inside of both sides.

Assembling the fuselage sides

Important...When you begin building the right fuselage side after the left side has been completed the building sequence will be a bit different. Follow the sequence outlined or you might end up with two left sides!

4. Prepare the fuselage top and bottom side stringers. Select four pieces of 3/16 x 5/8 stock of about the same hardness. Pin two pieces together to make the top stringers. Using the template on the plan, carefully cut the aft end of the stringers to the correct shape. With the top stringers still pinned together, position them on the fuselage plan side view and cut their forward end to the correct angle to match the forward fuselage sides. Pin the remaining two pieces of stock together to make the bottom stringers. Position these stringers on the plan and cut them to match the forward fuselage sides.

5. Prepare the aft fuselage vertical braces. Cut the five vertical braces required for each side from 3/16 x 1/4 stock. Make the braces for both sides. Note: It is okay to cut these braces slightly long and trim them to length after the fuselage side is complete.

6. Pin the five vertical braces in place on the fuselage plan side view. Cover the plan with wax paper to prevent parts from sticking to the plan.

7. Pin the left forward fuselage side in place on the plan. Use some pieces of scrap 1/4 thick balsa under the side to elevate it above the plan. The side marked "left inside" should be down so the marks for the bulkheads don't show.

8. Glue the top, bottom, and center stringer in place. The previously cut top and bottom stringers are glued to the vertical braces and butt glued to the forward fuselage side. Cut the center stringer to fit from 3/16 x 1/4 stock then glue it in place on the vertical braces, between the top and bottom stringers at the tail end and butt glued to the forward fuselage side. Use some scrap 1/4 thick balsa as shims under the stringers just aft of the forward fuselage side and where the top and bottom stringers join at the tail.

9. **Remove the pins from the fuselage side but do not remove the side from the plan.** Cover the side with wax paper and replace a few pins to keep everything in place.
10. **Pin the right forward fuselage side in place directly on top of the left side.** The bulkhead location lines should face up.
11. **Add the top, bottom, and center stringers.** Pin these stringers directly on their left side counterparts while butt gluing them to the forward fuselage side and gluing them together at the tail.
12. **Glue the five previously cut 3/16 x 1/4 vertical braces in place on the stringers.**

Allow the fuselage side to dry before proceeding.

13. **Remove the fuselage sides from the plan then add the 3/16 thick triangular shaped landing gear plate brace.** The forward edge of the brace should align with the line drawn to locate bulkhead #2. The brace is properly oriented when the wood grain is vertical or perpendicular to the fuselage side grain.

14. **Add the top, bottom, and center stringer doublers.** The top and bottom stringer doublers are made from 3/16 x 5/8 stock while the center stringer doubler is made from 3/16 x 1/4 stock. All three doublers are cut to exact length using the fuselage plan side view. The top and center stringer doublers are cut to fit between bulkheads #2 and #3. The bottom stringer doubler is cut at an angle to butt against the landing gear plate brace and extends to bulkhead #3. Glue the stringer doublers in place on the inside of both fuselage sides. When the glue has dried, trim the bottom edge of the bottom doublers to match the fuselage side.

15. **Prepare bulkhead #1 (firewall).** If you are going to power the model with a glow engine, use the fuselage side view to position the engine mount on bulkhead #1. Drill required holes to attach the mount to the bulkhead then install blind nuts on the back side of the bulkhead. The view looking aft of bulkhead #1 on the plan shows locations for holes to accommodate the fuel lines and throttle pushrod. These locations are for reference only since they will change depending on the motor mount used. Drill these holes as required by your motor mount.

If electric power is planned, the cooling hole must be made in bulkhead #1. If a scroll saw is available, use it to make the cut-out in the bulkhead. An acceptable alternative is to make two 1" holes side by side using a 1" wood bore.

16. **Prepare bulkheads #2 and #3.** If the model is to be glow powered, cut the holes in bulkhead #2 to accommodate the throttle pushrod and the RX wires as shown on the view looking aft of bulkhead #2 on the plan. Make the holes to accommodate the pushrods in bulkhead #3 as shown on the view looking aft of bulkhead #3 on the plan.

For electric powered models, make the cut-out in bulkhead #2 for the motor battery. Make the cooling air cut-out and pushrod holes in bulkhead #3 as shown on the plan.

17. **Glue the 3/16 x 1/4 cross brace to the back side of bulkhead #3.** Cut the cross brace from stock and glue it along the bottom edge of the bulkhead.

18. **Epoxy the bulkheads to one fuselage side.** Pin one of the fuselage sides "in side" up on the work surface. Epoxy bulkhead #1 to the side at the location drawn. Epoxy bulkheads #2 and #3 to the side. Bulkhead #2 is positioned against the top and middle stringer doublers and the triangular landing gear plate brace. Bulkhead #3 is positioned against the aft end of the stringer doublers. Use a square to check that the bulkheads are perpendicular to the side. Allow the epoxy to fully cure before proceeding.

19. **Epoxy the second side to the bulkheads.** With the first side still pinned to the work surface, epoxy the second side to the bulkheads. Use a square along the full length of the assembly to be sure the second side is directly above the first side. When the epoxy has cured, remove the assembly from the building board.

20. **Glue the plywood landing gear plate in place.** The forward end of the landing gear plate is aligned to the forward edge of bulkhead #2. Hold the plate in place with tape while the glue sets.

21. **Prepare the aft fuselage cross braces.** Cut the cross braces to length from 3/16 x 1/4 stock using bulkhead drawings #4 – #8 as a reference. Cut both top and bottom cross braces.

22. **Join the fuselage sides at the tail.** Protect the fuselage plan top view with wax paper then pin one set of cross braces in place on the plan. Pin the fuselage to the plan upside down between bulkheads #2 and #3 carefully aligning the bulkheads with their location on the plan. Put a little glue on the ends of the cross braces. Working from front to back, pin the fuselage sides aft of bulkhead #3 to the plan gluing and clamping them together at the tail. Move the cross braces if required so they are against the forward side of the vertical braces.

23. **Glue the remaining cross braces in place.** Use a square along the fuselage sides to be sure they are perpendicular to the work surface as you glue the bottom (since the fuselage is pinned upside down, the bottom will be up) cross braces in place.

Cut the two cross braces that are located between the landing gear plate and bulkhead #3 to length and glue them in place.

23. **Add the three 1/4 x 3/8 bottom stringers.** The two outboard stringers are added first. These stringers run from the back of the landing gear plate to the tail. Taper cut the stringers at the tail as shown on the fuselage plan top view. The center stringer is tapered to fit between the outboard stringers at the tail and is glued centered on the cross braces and to

24. Glue the two outboard 1/4 x 3/8 top stringers in place. Remove the fuselage from the building board. The top stringers run from the forward edge of bulkhead #2 to the stabilizer cut-out at the rear of the fuselage. Trim the forward end of the stringers to match the windshield angle as shown on the fuselage plan side view.

Cut the 1/4 x 3/8 cross brace to fit between the outboard stringers and along the top of bulkhead #3. Glue the cross brace in place.

25. Add the top center 1/4 x 3/8 stringer. This stringer is taper cut to fit between the outboard stringers at the stabilizer cut out and runs to the cross brace on top of bulkhead #3.

26. Add the 3/16 balsa dowel supports. Glue these supports to the fuselage at the location shown on the fuselage plan side view.

27. Glue the 3/8 balsa lower and upper engine compartment doublers in place. First glue the lower doublers in place against bulkhead #1 and even with the bottom of the fuselage sides. Next glue the upper doublers in place on top of the lower doublers and against bulkhead #1. When the glue sets, trim the upper doubler to match the fuselage side.

28. Epoxy the 1/8 plywood hatch mounting plate in place. The plate should be even with the top of bulkhead #1 and the fuselage sides.

29 Add the 1/2 triangular stock reinforcement. Using the fuselage plan top and side views as a reference, cut the triangular pieces from stock to fit against the fuselage sides and against the back of bulkhead #1. Also cut the piece to fit on the landing gear plate and against the back side of bulkhead #2. Note the piece on the landing gear plate does not extend all the way across the fuselage, allowing room for the landing gear mounting screws and nuts. Use glue liberally when gluing the triangular bracing in place.

30. Mark the center of the hatch mounting plate and drill a 1/8" hole at the mark.

Steps 31 – 33 deal with the hatch and windshield installation on glow powered models while steps 34 – 38 are for electric power. Follow the steps that apply to the power you plan to use.

Glow powered models.

31. Glue the 1/4 balsa windshield in place on the fuselage.

32. Prepare the 1/4 balsa forward hatch. Hold the hatch in place on the fuselage with tape. Working through the bottom of the fuselage and through the previously drilled hole in the hatch mounting plate, mark the location for the hatch hold – down screw on the hatch. With the hatch still held in place with tape, trace along the fuselage sides on the bottom side of the hatch. These lines will be used to locate the hardwood hatch pins.

33. Complete the hatch. Remove the hatch from the fuselage then glue the 3/16 x 3/16 hatch pins in place on the bottom of the hatch along the lines traced in the previous step. These pins should extend beyond the back end of the hatch so they will contact the bottom of the windshield when the hatch is installed.

Electric powered models

34. Cut the windshield into two pieces. The windshield is cut into an upper and lower half. The upper half is 1-5/8" wide as shown on the electric version forward fuselage plan view.

35. Glue the upper windshield piece in place on the fuselage. Tape the bottom half in place on the fuselage to use it as a spacer to properly locate the upper piece.

36. Glue the 1/4 balsa forward hatch and the lower windshield piece together to make the hatch. Put a piece of wax paper on the fuselage where the hatch and the windshield piece will be glued to prevent the assembly from being glued to the fuselage. Apply glue to the angle cut end of the forward hatch then tape the two pieces in place on the fuselage while the glue sets.

37. Mark the bottom of the hatch assembly. Working through the bottom of the fuselage and through the previously drilled hole in the hatch mounting plate, mark the location of the hatch hold down screw on the hatch. With the hatch still held in place with tape, trace along the fuselage sides on the bottom side of the lower windshield piece. These lines will be used to locate the hardwood hatch pins.

38. Complete the hatch. Remove the hatch from the fuselage then glue the 3/16 x 3/16 hatch pins in place on the bottom side of the lower windshield piece along the lines trace in the previous step. These pins should extend beyond the end of the lower windshield piece so they will contact the back of the upper windshield piece when the hatch is installed.

Glow and electric powered models.

39. Install the #4 blind nut on the bottom side of the hatch hold plate.

40. Drill the 1/8" hole through the hatch at the marked location. Install the hatch and secure it with a #4 x 1/2 machine screw. If desired, a small piece of plywood can be glued to the hatch at the location of the screw to prevent crushing of the balsa hatch when the screw is tightened.

41. Glue the 1/4 balsa fill to the top of the fuselage forward of the hatch. Make the fill pieces from 1/4 x 3/8 scrap pieces. When the glue has set, sand the fill pieces to blend with the fuselage.

43. Add the 1/8 x 1/2 spacers and 1/8 bottom sheet to the forward fuselage bottom. Cut one 10" piece from each of the two 1/8 x 1/2 strip stock found in the wing and stabilizer stick bundle. The remaining strip will be used during stabilizer construction. Glue the 10" pieces to the bottom edges of the fuselage sides forward of the landing gear mounting plate.

Cut the 1/8 x 3 x 12 balsa sheet stock into three pieces 4" long. From one of these pieces cut a strip along the wood grain about 1/4" wide. Trim this cut-off piece to fit on the bottom of bulkhead #1 between the 1/8 x 1/2 spacers then glue in place.

Use the remaining 1/8 x 3 stock to sheet the fuselage bottom forward of the landing gear plate (sheet is applied with the grain running from side to side).

When the glue has set, trim the bottom sheet flush with the fuselage sides. Using a sanding block or board, sand the bottom sheet and spacers to blend with the nose as shown on the fuselage plan side view.

44. Drill the 1/4" holes in the fuselage to accommodate the wing hold dowels. Use the fuselage plan side view as a location reference. Trial fit the dowels but don't glue them in place, this will be accomplished after the model is covered.

45. Temporarily install the landing gear. Drill four 1/8" holes through the aluminum landing gear at the locations shown on the fuselage plan top view to accommodate the mounting screws. Position the landing gear on the fuselage and mark the hole locations through the holes drilled in the landing gear. Drill 1/8" holes through the landing gear mounting plate.

Trial fit the landing gear using #4 x 1/2 machine screws and hex nuts. Note: if your model is to be electric powered, use blind nuts instead of hex nuts or epoxy the hex nuts securely to the mounting plate. since the battery box will make it impossible to gain access to the nuts after it is installed.

46. Add the 1/4 balsa stabilizer platform. Cut the 1/4 x 3 x 4-1/2 platform stock across the grain into three equal pieces. Glue these pieces in place on the fuselage. Trim the platform even with the back end of the fuselage. Allow the platform to extend beyond the fuselage sides as shown on the fuselage plan top view.

47. Make and trial fit the tail gear. Using the fuselage plan side view as a guide, bend the tail gear to it's final shape. Don't forget to install the nylon bushing before bending the wire. Slot the tail end of the fuselage to accept the tab on the bushing and check it for fit. Do not glue the tab into the slot yet, that will be done after the fuselage is covered.

Steps 48 – 52 apply to electric powered models.

48. Assemble the motor mount box extender. Glue the front plate doubler to the front plate. The doubler should be centered on the front plate so an equal amount of the front plate extends beyond all four sides of the doubler.

Mark and drill the hole in the front plate and doubler to clear the motor shaft/collar as shown on the plan detail.

Epoxy the box extender sides and top to the front plate and doubler. Note that the bottom of the assembly is left open.

49. Mount the motor on the box extender. Drill 1/8 holes through the extender front plate to accommodate the motor mount and install #4 blind nuts. Trial fit the motor to the extender box. Note that the wires exiting the motor should go down so that they can be passed through the cooling hole in bulkhead #1 during final installation.

50. Epoxy the motor mount box extender in place on Bulkhead #1. Reference the view looking aft of bulkhead #1 for proper location.

51. Build the motor battery box. The battery box is made from the 3/16 x 3 x 18 balsa stock provided. Cut an 8" long piece from the stock then cut the piece along the wood grain into two equal pieces to make the box sides. Cut another 8" long piece from the stock then cut it along the grain to make the 2-1/8" wide box bottom. The remaining scrap pieces of 3/16 balsa stock will be used to support the battery box in the fuselage.

Glue the battery box sides to the bottom.

52. Install the battery box in the fuselage. The battery box is installed through the cut-out in bulkhead #2. Use the scrap pieces of 3/16 balsa stock to make the forward and aft battery box supports as shown on the plan.

Steps 53 – 54 apply to glow engine powered models.

53. Prepare the engine compartment. Temporarily install your engine and mount. Make any required cut-outs in the fuselage to clear the muffler, needle valve, etc.

54. Prepare the fuel tank compartment. The fuel tank should be located directly behind bulkhead #1 and as high in the compartment as possible. The tank may be supported either by adding some rails inside the fuel tank compartment or by resting the tank on a bed of foam rubber. If not already done, drill holes through bulkhead #1 to accommodate the fuel feed and vent lines.

Glow and electric powered models.

55. Install the servo rails. Epoxy the 1/4 x 3/8 hardwood servo rails in place on the center stringer doubler at the location shown on the fuselage plan side view. The space between the rails will depend on the servos used.

56. Temporarily install the rudder, elevator, and for glow powered models, the throttle servos. Install the rudder and elevator pushrod outer housings. Trim the pushrod housings flush with the outside of the fuselage where they exit at the tail. Do not forget to support the housings with pieces of scrap 3/16 x 5/8 as shown of the plan.

57. Cut the holes for your radio switch in the fuselage. Locate the switch in the cabin area of the fuselage. If glow power is used locate the switch on the side opposite the engine muffler to avoid contamination from exhaust residue.

58. Seal the engine and fuel tank compartments. If the model is glow powered, these areas should be completely sealed with polyester or epoxy resin to prevent fuel soak.

59. Sand the fuselage. Remove any equipment that has been temporarily installed and block sand the entire fuselage.

The Horizontal Stabilizer

1. Cover the Stabilizer plan with wax paper. Pin down the 1/2 x 1/2 leading edge, the 1/8 x 1/2 bottom spar, and the 3/8 x 3/8 trailing edge. Start by pinning the bottom spar in position on the plan. Use a full thickness rib (there are four thinner ribs on the die sheet, these are the center section ribs) to locate the leading and trailing edges while pinning them in place on the plan.

2. Add the bottom 3/32 center section sheet. The wood grain on this sheet should run span wise. Cut two pieces 2-5/8" across the grain from a piece of 3/32 x 3 stock. Trim one piece to fit between the spar and leading edge and the other to fit between the spar and trailing edge. Glue and pin these pieces in place.

3. Glue the four center section ribs in place. These are the thin ribs on the die sheet. Use the center line drawn on the stabilizer plan as a reference to draw a center line on the center sheet. Position a fin part or a piece of 1/4" thick scrap on the center line to act as a spacer, then glue the two ribs in place on either side of the spacer. Remove the spacer before the glue sets. The idea here is to provide an accurate slot for the fin to fit in later. Glue the remaining two center section ribs in place even with the end of the center sheet.

4. Add the remaining ribs. Pull the leading and trailing edge tight against the ribs and re-pin in place as required to assure a good glue joint.

5. Glue the top 1/8 x 1/2 spar in place. The spar runs full span and is not cut at the center fin slot.

6. Add the top 3/32 center sheet. Like the bottom sheet, the top sheet wood grain runs span wise. The difference is the area between the two center ribs is not sheeted leaving a slot for the fin.

7. Block sand the leading and trailing edge to shape. Remove the stabilizer from the plan. Put masking tape on the ribs just behind the leading edge and just forward of the trailing edge to prevent deforming the ribs, then block sand the leading and trailing edges to shape as shown on the plan.

8. Glue the triangular stabilizer tips in place. The tips are glued on in the same manner as the wing tips. When the glue has set, trim the tips even with the trailing edge. Save the cut-off pieces to be glued on the elevator later. Carve and block sand the tips to match the airfoil.

9. Notch the elevators to receive the hardwood joiner as shown on the plan.

10. Join the elevators with the 1/4 x 3/8 x 4-1/2 hardwood joiner. Pin the stabilizer on the plan then assemble the elevator parts on the plan against the trailing edge of the stabilizer.

Glue the cut-off tip pieces to the elevator assembly.

11. Taper the elevator as shown on the plan. Use a sanding block to do the job.

12. Temporarily hinge the elevator Sand the elevator leading edge as shown on the plan. Cut the required hinge slots then temporarily hinge the elevator on the stabilizer.

The fin and rudder

1. Glue the forward and aft fin pieces together. Pin the assembly to the building board while the glue sets.

2. Fit the fin to the slot in the stabilizer. Notch the bottom of the fin to fit around the stabilizer spars, leading edge, and trailing edge. When the fin is properly fitted it should contact the bottom stabilizer sheet when installed in it's slot.

3. Add the dorsal fin. Pin the stabilizer in place on the fuselage. Install the fin into it's slot in the stabilizer. Fit the dorsal fin to the fuselage and against the fin, notching it as required to clear the stabilizer leading edge. When correctly fitted, glue the dorsal fin to the fin only, do not glue it to the fuselage. Pin the dorsal fin in place while the glue sets.

4. Fit the tail gear to the rudder. Temporarily install the tail gear on the fuselage. Mark the location where the tail gear tiller arm is inserted into the rudder and drill a 3/32" hole in the rudder to accept the tiller arm. Provide clearance in the rudder for the tail gear bearing.

5. Hinge the rudder. Sand the leading edge of the rudder round. Cut the required hinge slots in the rudder and fin. Two hinges are adequate. Locate one just above the stabilizer and the other at the top of the rudder. Provide clearance for the elevator joiner in the leading edge of the rudder as shown of the plan. Block sand the sides of the fin and rudder. Round all the outer edges of the assembly. Do not taper the rudder as done with the elevator, it is best to leave it thick at the trailing edge.

Completing the Telemaster 40

1. Prepare the model to be covered. Sand the entire model using progressively finer sandpaper finishing with 400 grit.

2. Cover the model. Any of the plastic iron on coverings may be used. Follow the directions that came with the covering material. Cover all of the model's components separately. Hinging the ailerons, elevator, rudder, and flaps is done after the covering is finished. For electric powered models, remove the covering on the fuselage bottom between bulkheads #7 and #8 to provide an exit for cooling air.

3. Hinge the elevator to the stabilizer. Cut away the covering material over the hinge slots cut into the stabilizer and elevator. Epoxy or CA adhesive may be used to glue the hinges in place. If you are using hinges that have a hinge pin at the pivot, wipe some Vaseline onto the hinge pivot to prevent excess adhesive from gluing the hinge permanently in one position.

4. Epoxy the fin into it's slot in the stabilizer. Remove the covering material from the fin where it fits into the slot. Use a square to be sure the fin is perpendicular to the top of the stabilizer and allow the epoxy to cure.

5. Glue the stabilizer to the fuselage. Use a slow curing epoxy to allow yourself plenty of working time. Remove the covering material from the bottom of the stabilizer where it will mate to the fuselage and from the fuselage where the dorsal fin attaches. Before the epoxy cures, be sure the trailing edge of the stabilizer is even with the end of the fuselage. Also check to be sure the dorsal fin is centered on the top of the fuselage and that the trailing edge of the fin is directly over the tail end of the fuselage. View the model from the front and check that the stabilizer is level. When you are satisfied with the stabilizer alignment to the fuselage allow the epoxy to fully cure.

6. Epoxy the tail gear bearing tongue into the slot in the fuselage. Double check it's alignment by putting the rudder temporarily in place before the adhesive has set.

7. Hinge the rudder. Install the hinges with epoxy or CA as done when hinging the elevator. Epoxy the tail gear tiller arm in the hole in the rudder.

8. Install the control horns on the elevator and rudder. Install the horns at the locations shown on the plan. Use #2 x 5/8 machine screws for the elevator horn and #2 x 1/2 machine screws for the rudder horn.

9. Install the wing hold dowels. Trim away the covering material over the holes in the fuselage and glue the dowels in place.

10. Install the landing gear. Use #4 x 1/2 machine screws and hex nuts if blind nuts have not been installed to permanently mount the landing gear. Dubro type axles should be installed on the landing gear. Install the wheels and retain with wheel collars. Also install the tail wheel using a wheel collar to retain it.

11. Install the engine or motor. If you are using glow power, permanently install your fuel tank, fuel lines, engine, and mount. For electric powered models, install the motor and speed control. Hook and pile tape (Velco) should be glued to the motor battery box and battery to hold the battery in place. Glue the tape full length in the battery box so you will be able to move the battery forward or aft to balance the model.

12. Install the rudder, elevator, and throttle (glow power) servos. Use the screws and rubber grommets that came with your servo to secure them to the servo rails.

13. Connect the rudder and elevator pushrods. Install the pushrods and connect them to the servos and control horns as per the pushrod manufacturer's instructions. Connect the receiver and battery to check the control surfaces for neutral. Adjust the linkage at the control horn or servo until the elevator and rudder are straight when the control sticks and trim levers are centered on the transmitter. Check that the controls move in the correct direction. The elevator should move up when the control stick is pulled towards the bottom of the transmitter. The rudder should move in the same direction as the stick when viewed from behind the model. Most transmitters have servo reversing to correct control movement direction if required. Follow the instructions that came with your radio.

14. Install the throttle cable (glow power). The throttle cable should be adjusted so the throttle is completely closed when the throttle stick and trim lever are both fully down. The throttle should be fully open when the control stick and trim lever are full up. If necessary, throttle throw can be lessened by moving the cable connector at the servo output arm to a hole closer to the servo or increased by moving it to a hole further out.

15. Hinge the ailerons and flaps (if used) to the wing. Follow the same procedure used for the elevator.

16. Install the aileron and flap servos. Connect the servos to the extensions installed in the wing then fasten them to the mounting plates using the screws and grommets supplied with your servos.

17. Install the control horns. Use #2 x 5/8 machine screws to mount the control horns on the ailerons at the locations shown on the plan. Install the horns on the flaps in the same manner (horns and mounting hardware for the flaps are not included in the kit).

18. Install the aileron and flap pushrods. Make the pushrods from 1/16" diameter wire with one end threaded. A clevis is installed on the threaded end and connected to the control horn. A "Z" bend made in the wire is used to connect the other end to the servo output wheel. Connect the pushrods to the inboard side of both the servo wheels. Doing this will cause one aileron to go up while the other goes down. The flap control rods are made and installed the same way as the aileron control rods except the rods are connect to the inboard side of the output wheel on one servo and the outboard side on the other, causing both flaps to move in the same direction.

Connect a "Y" harness to your receiver for the ailerons and one for the flaps. Plug in the servo lead extensions exiting the

the transmitter are centered, adjust the clevises as required. Check the ailerons for correct movement. When standing behind the wing, the right aileron should go up when the stick is moved to the right.

When checking the flaps, be sure the bottom of both flaps are aligned to the bottom of the wing when the flap lever is up. Adjust the flap clevises as required.

19. Install the receiver and receiver battery in the fuselage. For glow powered models the receiver battery should be wrapped with foam rubber and installed under the fuel tank. Wrap the receiver with foam and install it under the servos. Be sure to leave the "Y" connector for the ailerons and flaps accessible.

Install the receiver switch in the fuselage.

Final Checks

Check the wing, stab, fin, rudder, and elevator for warps. To remove any warps you find, twist the warped area a bit beyond straight while you heat the plastic film covering on both sides of the warped surface. Hold it until the covering material cools. Check your work.

Align the wing by resting the fuselage on the floor and placing the wing onto the wing saddle. Hold the wing in place with a few rubber bands. Measure the distance from each wing tip at the spar to the side of the fuselage. The distances for each wing panel should be the same. When you have the wing centered, make a mark on the wing and fuselage at the wing leading and trailing edge. Using these marks you'll be able to center the wing each time you install it. View the wing from the front checking to see if it is in line with the stabilizer. If one side of the wing is high, the low side of the wing saddle may be shimmed with some scrap balsa strips.

When you prepare to fly the plane, 14 elastic bands should be used on the wing. The last two bands should be installed cross fashion to opposite sides of the fuselage. This will hold the other bands on the dowels.

Apply foam wing seating tape to the wing saddle. This will prevent oil residue from seeping into the servo compartment.

Check how the model rolls on the ground. With the rudder control stick on the transmitter centered, let the model roll down a small incline. If it veers to one side or the other after several tries, bend the tail wheel strut until the airplane rolls straight.

Check the model for proper balance (CG). The CG is the balance point required for the plane to fly properly. Assemble the model as though you were going to fly it, this includes the motor battery on electric powered models. Hold the plane up at the wing root at the location of the CG shown on the plan. The fuselage should be level – not in either a climbing or diving position. Adjust battery location or add weight to the nose or tail of the model if required to achieve proper balance. Stick – on lead weights are available for this purpose. **Do not fly the model unless it balances correctly.**

Double check to be sure all screws holding the servos, engine and mount, landing gear, etc. are tight. It is important that you occasionally check the engine mount screws out at the field. The plywood firewall will compress slightly due to the pressure of the screws and loosen the screws. Tighten them.

First flights

Be sure that your receiver and transmitter batteries are charged the night before your first flights as recommended by the radio manufacturer. You should also perform a range check of you R/C system. See the instruction booklet that came with your R/C system for range check procedure.

If this is your first R/C model, it is best to get help from an experienced R/C pilot who will recheck your model and radio installation, help you get your engine operating properly, and get the model "trimmed" for flight. A properly trimmed model will fly straight and level with no climbing, diving, or turning tendencies with the control sticks centered. Your helper will also inform you about field safety procedures to help assure your flying is both successful and accident free.

If you do not have a flight instructor please read the following

Understand how an airplane flies. As the wing moves through the air it causes lift. Too slow, no lift and it falls out of the air or "stalls". It needs flying speed either from a motor and propeller, or by descending and gliding. The airplane is flying whether it's upside down, in a turn, inverted, or doing acrobatics. There is always lift from the wing even though the lift might not be straight up as it is in level flight. The airplane makes right or left turns by tilting in the direction of the turn so that some of the wing's lift is angled partly to the left or right. To turn an airplane you tilt the wings in the direction you want to turn with the aileron or with the rudder. To make the airplane go up you give an up command to the elevator. The elevator inclines up and the air that's hitting it from the front blows the tail down and the nose up. When the airplane goes up it slows down. If it goes too slow the lift stops and the airplane falls (stalls).

An airplane turns differently than a car or boat. When you tilt the airplane's wing in the direction that you want to turn you must hold the tilt and not let it increase. At the control stick you must, for example, input right rudder or aileron so that the wing tilts to the right and then you must stop the tilting so the airplane does not roll over on it's back. You stop the tilting of the wings by returning the rudder or aileron to neutral when the amount of tilt of the wings is what you want. To return the airplane to straight flight you must give opposite aileron or rudder input until the wings are level.

Pick an airplane that can fly by itself without you controlling it. Don't pick a low wing, aerobatic airplane. The best choice is a glider that uses an electric motor for power. Gliders can glide straight ahead all by themselves (if they do not have a warped wing) without you doing any controlling from the radio transmitter. If you are learning to fly without an instructor,

these glider type airplanes will fly themselves while you are trying to figure out how to make them go some other direction. You need this stability while you learn how to fly. The second best choice is a powered airplane that has the wing on the top of the fuselage and which is advertised to be a good training airplane.

Make sure the following things are correct before each flight.

The model must balance where the designer intended it to balance. Don't be afraid to add lead weights to either the nose or the tail to make the airplane balance where it is supposed to. If you think that the required weight to achieve the correct balance point is too much, your wrong. **Use what ever weight is required to make the airplane balance where it's supposed to.**

The wing must not be warped, and it helps your flying if the wing should have something called "washout". Fasten the wing to the airplane. Put the airplane on a table and walk off to the rear of it. Look back at the airplane from an eye position where you can see just a bit of the bottom of the entire wing. If you see more bottom wing surface on, let's say, the left wing, then your airplane will tend to turn left even when you have the aileron or rudder control in neutral. Remove the warp before you try to fly the airplane.

"Washout": This is an intentional and desirable warp of the wing at each wing tip. Usually this warp is done to the outer 20% of the wing toward each wing tip. From the rear of the airplane you should see a little more of the bottom of the wing near both wing tips. Why is this "washout" good? It helps the outer parts of the wing continue flying straight ahead during the beginning of a stall. This means that your airplane will stall straight ahead instead of rolling over on it's back or side which may be impossible to recover from.

If you hand launch your airplane throw it hard and throw it straight ahead, not up.

If you take off from a ground roll, let the airplane build up so much speed on the ground before you signal "up" elevator that you know the airplane has enough speed to fly.

Don't try any turns until the airplane is very high. Climb straight ahead.

Practice very gentle turns high in the air before you try to land.

Don't try to land in a specific spot, avoid turns when the airplane is low. Just let the model glide into the ground straight ahead.

If you have built the model with flaps they should not be used until you have the plane "trimmed out" and can land well without them. To check the operation of the flaps, get the plane up high then throttle down to about 1/4 power. Fly straight and level, add some down flaps. Expect the plane to point it's nose up a bit as the flaps are added. Some down elevator trim may be added to maintain straight and level flight with the flaps deflected. When the flaps are added, if the plane tends to bank noticeably to the right or left, this is an indication that one flap is dropping further than the other. For example, if the right flap drops more than the left, the plane will bank to the left. If this happens, check that the linkages on both flaps are identical.

When landing with the flaps down you'll want to keep the engine running a bit above your normal engine idle speed that you'd use without flaps. This is to compensate for the added drag. If the engine doesn't run a bit faster, you may find that you'll land short of the runway.

Telemaster 40 Kit Contents

Hardware and hardwood parts bag

- 4 – Standard control horns
- 5 – #4 x 1/2 machine screws
- 2 – #2 x 1/2 machine screws
- 6 – #2 x 5/8 machine screws
- 4 – #4 hex nuts
- 1 – #4 blind nut
- 1 – Tail wheel wire and bushing
- 1 – Bulkhead #1 (Firewall) 1/4 x 3-1/2 x 3-15/16 ply.
- 1 – Landing gear plate 1/4 x 2-3/4 x 3-7/8 ply.
- 1 – Hatch mounting plate 1/8 x 1/2 x 3-1/2 ply.
- 2 – Aileron servo plate 1/8 x 3 x 2-1/2 lite ply.
- 1 – Elevator joiner 1/4 x 3/8 x 4-1/2 hardwood
- 2 – Wing hold dowels 1/4 x 5-3/8
- 2 – Hatch pins 3/16 x 3/16 x 1-1/4 hardwood
- 2 – 1/4 x 3/8 x 3-1/2 hardwood servo rails

Parts for electric power versions

- 1 – Box extender front plate 1/8 x 2 x 2 ply.
- 1 – Box extender front plate doubler 1/8 x 1-3/4 x 1-3/4
- 2 – Box extender sides 1/8 x 1-3/8 x 1-7/8 ply.
- 1 – Box extender top 1/8 x 1-3/8 x 2 ply.

Balsa parts bag

- 1 – Bulkhead #2 3/16 x 3-1/2 x 6-3/16
- 1 – Bulkhead #3 1/8 x 3-1/2 x 4-15/16
- 1 – Stabilizer platform stock 1/4 x 3 x 4
- 1 – Windshield 1/4 x 3-3/16 x 3-7/8
- 1 – Forward hatch 1/4 x 3-7/8 x 4-1/2
- 2 – Upper engine compartment doubler 3/8 x 1-7/16 x 3-3/4
- 2 – Lower engine compartment doubler
- 2 – Landing gear plate brace
- 2 – Wing dowel supports
- 1 – Dorsal fin

Balsa parts bundle

- 2 – Lower fuselage sides
- 2 – Upper fuselage sides
- 1 – Rudder
- 1 – Forward fin piece
- 1 – Aft fin piece
- 2 – Elevators
- 1 – 1/8 x 3 x 12 forward fuselage bottom sheet

Die cut parts bundle

- 7 – Wing rib sheets 3/32 x 3 x 18
- 1 – Stabilizer rib sheet 3/32 x 3 x 18

Fuselage stick bundle

- 7 – 3/16 x 5/8 x 36 framing stock
- 5 – 3/16 x 1/4 x 36 framing stock
- 6 – 1/4 x 3/8 x 42 framing stock
- 1 – 1/2 x 12 triangular stock

Wing and stabilizer stick bundle

- 1 – 1/2 x 1/2 x 25 stabilizer leading edge
- 1 – 3/8 x 3/8 x 25 stabilizer trailing edge
- 2 – 1/8 x 1/2 x 36 stabilizer spars and fuselage bottom spacer
- 6 – 3/32 x 1/4 x 36 wing cap strips
- 4 – 3/8 x 1/2 x 36 wing main spars
- 2 – 3/8 x 3/4 x 36 wing leading edge
- 2 – 1/4 x 5/16 x 36 wing trailing edge

Sheet balsa

- 8 – 3/32 x 3 x 36 wing sheeting and shear webbing
- 4 – 3/32 x 7/8 x 36 wing trailing edge sheeting
- 1 – 3/16 x 3 x 18 sheeting for battery box (electric)

Miscellaneous

- 2 – 3/4 x 8-5/8 triangular stab tips
- 2 – 1-1/2 x 11-7/8 triangular wing tips
- 1 – Aluminum main landing gear
- 4 – 7/16 x 2 x 18 tapered aileron/flap stock

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