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**ENTERPRISES**



THE TWEEDY BIRD

The New .19 - .30 Version of Joe Bridi's Contest Winning Dirty Birdy

For the sport flier, this clean design offers a plane that moves out well in the air, but yet is docile and predictable and resists tip stalls as all of the Bridi family of planes. Well suited as a first low winged ship for the novice or as a fun ship for the experienced flier, the Tweedy Bird has a 48 3/4" wing span, 400<sup>2</sup> in. wing area, 3½ lbs. flying weight, a symmetrical airfoil, and requires aileron, throttle, rudder, and elevator controls.

The construction sequence that follows begins with the tail section. Then the wing panels are built and joined. Finally, the fuselage is constructed, the plane is finished, and the radio equipment is installed. Any kind of adhesive may be used throughout such as Hot Stuff, Zap, spoxxy, or an aliphatic resin such as Bridi's Super Stik. We have used Hot Stuff to build the wings because the quick set-up time means that no pins have to be used to hold the ribs in place. However, we also went back over each joint with a coat of aliphatic resin to insure a reliable bond.

## THE TAIL SECTION

The stab and fin pieces should be glued together on a flat surface to make sure they will be straight. To glue the stab or fin pieces together, lay them on your workbench properly aligned and pressed firmly together. Put a piece of masking tape down the length of the joint. Turn the taped-together pieces over, open the joint like a hinge, and apply the glue. After the glue has had time to penetrate into the wood, add glue as necessary. Close the glue joint and wipe off any excess glue. Pin the pieces down on your wax paper covered workbench with the masking tape side up. Let the part dry.

- \_\_\_ 1. Locate the 3/16 sheet balsa FRONT and REAR STABILIZER pieces and glue them together.
- \_\_\_ 2. Add the STAB TIP pieces.
- \_\_\_ 3. While the stab is drying, glue the ELEVATOR HALVES to the HARDWOOD DOWEL TORQUE ROD. To make sure that the elevator halves are properly aligned and spaced, assemble them in place at the trailing edge of the stab. Take care that you don't glue the elevator pieces to the stab by putting a piece of waxed paper between the stab and elevator halves.
- \_\_\_ 4. Locate the FRONT and REAR FIN pieces and glue them together. Note that when the front and rear fin pieces are properly aligned, the rear fin piece will extend below the front piece. This additional length on the rear piece is necessary to fit into the slot provided in the fuse top block.
- \_\_\_ 5. Add the FIN TOP piece.
- \_\_\_ 6. Use a sanding block to sand the stab, elevator, fin, and rudder pieces as necessary. Sand the trailing edge of both the elevator and the rudder to a rounded edge as shown on the plans elevator side view.
- \_\_\_ 7. Sand or cut the half-round notch in the front of the rudder for the elevator torque rod clearance as shown on the plans.

The stab, elevator, fin, and rudder are now ready for installation onto the fuselage.

## THE WING PANELS

Build one wing panel at a time over the plans. A word of caution. The RIGHT WING PANEL is built top side up. The LEFT WING PANEL is built bottom side up. Otherwise you'll end up with two right wing panels!

- \_\_\_ 1. The first job is to drill the holes for the wing dowels through bulkhead #2 using the diagram of bulkhead #2 on the plans as a guide.

- 2. Draw a center line down all of the wing ribs so the line runs from the leading edge to the trailing edge.
- 3. Draw a center line down the length of the inside of the leading edge pieces for both wing panels.
- 4. With the plans covered with a piece of plastic kitchen wrap, pin the bottom  $1/4 \times 3/8$ " SPAR down in place over the plans. The  $3/8$ " side should be down. This bottom spar should overlap the inboard side of rib #1 by  $1/4$ ".
- 5. Pin and glue RIBS #2 - 10 in place on the bottom spar. Remember, since the top side of the wing panel is up, the cut-outs for the landing gear blocks in ribs #3 and #4 should be down. Also, make sure that the ribs are installed at  $90^\circ$  to the building board.
- 6. Using some scrap balsa, block up each of the wing ribs as necessary so the rib center lines are all parallel to your building board.
- 7. Glue the  $1/4 \times 7/16$ " balsa TRAILING EDGE stock to each of the wing ribs. Each wing rib should be centered from top to bottom on the trailing edge and at  $90^\circ$  to it.
- 8. Glue the  $3/8 \times 3/4$ " balsa LEADING EDGE stock to each of the wing ribs. The leading edge should be centered on the wing ribs. Align the center line you drew on the back of the leading edge and the center line on each rib.
- 9. Add RIB #1, but glue it only to the leading and trailing edge. Do not glue it to the bottom spar at this time.
- 10. Add the  $1/4 \times 3/8$ " TOP SPAR so the inboard end is flush with rib #1. Glue it to all of the wing ribs.
- 11. Next, the precut  $1/16$ " balsa LEADING EDGE SHEETING is to be glued in place. This sheeting has been cut oversize so it can be moved to the right or left to get an accurate fit. When properly installed it should butt up to the back of the leading edge and overlap half the width of the spar. The top side of the leading edge sheeting may be moistened with a damp sponge and pinned in place. Make sure that the sheeting glues to each of the ribs.
- 12. Add the top REAR  $1/16$  balsa CENTER SECTION SHEETING and RIB CAP STRIPS for ribs #5 - 10. The cap strips butt glue to the trailing edge.
- 13. When the glue has dried, the RIGHT WING PANEL may be removed from the building board. Remove the plans from your building board and pin the wing panel back down upside down with the ribs blocked up as before.

- \_\_\_ 14. Add the 1/16" balsa top LEADING EDGE SHEETING, working in the same way as you installed the top leading edge sheeting. However, the bottom leading edge sheeting should extend about 1/4" beyond the inboard side of rib #1. Do not glue the bottom leading edge sheeting to rib #1 at this time. It will be glued to rib #1 later after that rib has been properly aligned to mate with the other wing panel.
- \_\_\_ 15. Glue the notched HARDWOOD LANDING GEAR BLOCK in place to ribs #3 and #4. This block should be installed so it will be flush with the balsa center section sheeting to be installed later. See the plans. The notched side should be oriented toward the bottom side of the wing.
- \_\_\_ 16. Glue the 1/16" ply LANDING GEAR PLATES to the side of ribs #3 and #4 as shown on the plans.
- \_\_\_ 17. Add the hardwood LANDING GEAR BLOCK GUSSET at each ply plate as shown on the plans. The hole in the inboard gusset should be next to the ply plate. Clamp the blocks in place while the glue dries. Use your electric drill to extend the hole in the inboard gusset through the landing gear block.
- \_\_\_ 18. Cut off the leading edge, leading edge sheeting, spar, and trailing edge flush with rib #10. Glue the balsa TIP BLOCK in place and sand it to shape as shown on the plans.

At this point the RIGHT WING PANEL is complete.

Follow the same building sequence for the left wing panel but with the following exceptions. (1) Since the bottom of the left wing panel will be up when you build it, the cut-out for the landing gear blocks in ribs #3 and #4 should be "up". As a result, the landing gear block, landing gear plates, and gussets are installed before the wing is removed from the building board to be turned over. (2) The top rear center section sheeting cannot be installed until after the wing panel is turned over. (3) The bottom wing spar and leading edge sheeting - which is on top this time - should extend 1/4" beyond the location of rib #1. Rib #1 should not be glued to the spar and sheeting until later.

#### JOINING THE WING PANELS

- \_\_\_ 1. First, the bottom spar and bottom leading edge sheeting will have to be cut to length. With the wing panels upside down on your work bench and the center of the wing panels together, block up the center 1/4". Cut and sand the bottom leading edge sheeting and spars as necessary so the wing panels mate squarely.
- \_\_\_ 2. With the wing panels still blocked up 1/4" at the center, adjust the angle of rib #1 on both wing panels so these ribs will mate squarely

when the wing panels are joined. Glue the ribs in place to the bottom spar and bottom leading edge sheeting. 5 minute epoxy may be used for this job.

- \_\_\_ 3. Glue the wing panels together using 5 minute epoxy. With the wing upside down, the center section should be blocked up 1/4" for the proper dihedral. Pin the wings together and down to your building board while the adhesive sets up. Align the leading and trailing edge.
- \_\_\_ 4. Before the wing is removed from your building board, add the 1/16" balsa REAR BOTTOM CENTER SECTION SHEETING and RIB CAP STRIPS on ribs #5 - 10.
- \_\_\_ 5. Add the remainder of the top and bottom 1/16" balsa CENTER SECTION SHEETING. The bottom sheeting on each wing panel should be cut out for the hardwood landing gear blocks. Putting the bottom sheeting on first will make it possible to glue the sheeting to the landing gear blocks from the inside. Braces of some scrap balsa may be added where the sheeting glues to the hardwood blocks if desired.
- \_\_\_ 6. Prepare the pine TRAILING EDGE CENTER SECTION for each wing panel by glueing the AILERON TORQUE ROD sleeve in the notch. Put some vaselene at both ends of each sleeve to make certain epoxy won't bind the operation of the torque rod. One right and one left piece should be assembled. Since the torque rod arm will extend up to the top side of the wing when installed, a notch will have to be cut into the top front edge of each pine piece. This notch is necessary to permit the back to front movement of the arm.
- \_\_\_ 7. Notch the wing trailing edge as necessary for the movement of the torque rod arms. Then, glue the torque rod/trailing edge pieces onto the wing. Make sure that each one is aligned to the wing contour and that the torque rod arm aligns with the center of the trailing edge.
- \_\_\_ 8. Using bulkhead #2 to get the proper spacing, drill the holes for the wing dowels through the center of the wing leading edge. Be sure the holes are drilled parallel to the wing ribs - not at 90° to the leading edge.
- \_\_\_ 9. Cut the 3/8 x 1" balsa AILERONS to the proper length and tack glue them in place. Sand the trailing edge and ailerons to the wing contour by using a sanding block.
- \_\_\_ 10. Sand the leading edge to shape as shown on the plans.
- \_\_\_ 11. With bulkhead #2 held up to the wing leading edge, insert the dowels through the holes in bulkhead #2 and through the holes in the wing leading edge. Glue the 1/16" ply WING DOWEL PLATES on the back side

of the spars as shown on the plans. Do not glue the dowels in place yet.

Stop work on the wing at this point. Next the fuselage is to be assembled. The wing is to be completed after the final alignment of the wing dowels to bulkhead #2 is made.

#### BUILDING THE FUSELAGE

Since the fuselage has a flat top block, it is most easily built upside down on your building board. In looking at the plans you'll note that bulkheads #1 and #2 are used at stations 1 and 2. Balsa bracing is used at stations 3 and 4.

In order to get the wing dowels and wing properly fitted to the fuselage, bulkhead #2 is not installed in the fuselage until after the fuselage sides are glued in place and the wing saddle is checked. Then, bulkhead #2 is installed using the wing as a guide.

To make building the nose easy, an epoxy-glass cowl is supplied in the kit. The cowl may be permanently glued to the fuselage with epoxy, or it may be mounted to the fuselage by adding hardwood blocks and using screws.

#### Preparations

- 1. Draw a center line down the bottom side of the 3/16" balsa fuselage top block, from the nose to the tail.
- 2. While you're working on the bottom side of the fuselage top block also draw a line across the top block to indicate the location of the rear of the fuel tank compartment top block and the location of the cross braces at stations 3 and 4.
- 3. Draw a center line down the bottom of the fuel tank compartment top block, from top to bottom on bulkhead #1, and on the bottom section of bulkhead #2.
- 4. Working on the inside of the fuselage sides, mark the location of the cross braces at stations 3 and 4.
- 5. Next you'll draw a line down the outside of each fuselage side. These lines will be used to check the wing incidence angle later in the construction of the plane. Each line should run from about 1" in front of the wing saddle to 1" behind it, and located about 1½" down from the straight edge of the fuselage side. So you won't have any trouble

getting the line off of the balsa later, stick a piece of masking tape on the fuselage in the location of the line. Draw the lines with a fine point brush pen so you won't dent the wood. After you've used the line, just peel off the tape.

6. Mark and drill the holes in bulkhead #1 for the throttle linkage, fuel lines, and steering linkage. Make the holes for the fuel lines slightly oversize to make it easier to install them. When you install the fuel tank, silicon seal can be used to seal the holes. The hole for the steering linkage should be located just above the steering arm. In this way the metal NyRod end is bent at 90° to go into the hole in the steering arm.
7. Drill the holes in bulkhead #1 for the engine mount mounting screws. See the plans for the location of the engine mount.
8. Relieve the fuel tank compartment top block for your particular fuel tank as shown on the plans. Work carefully so you don't cut through the balsa and end up with a hole in the top of your fuselage.
9. Cut the pushrod exit holes in both fuselage sides. See the plans. Mark the appropriate sides "right" and "left".

#### Assembling the Fuselage

1. Pin the 3/16" balsa FUSELAGE TOP BLOCK down on a flat building board with the center line showing.
2. Glue the 3/8" balsa FUEL TANK COMPARTMENT TOP BLOCK in place on the fuselage top block. The rear of the fuel tank compartment top block should align with the location of the rear of bulkhead #2.
3. Add the 3/8" balsa TRIANGLE STOCK STRINGERS down both sides of the top block. The flattened corner of the stringers should be up. Later the fuselage side will glue down on the flat surface. Both stringers should butt up to the back of the fuel tank compartment top block and be glued to it. Both stringers will have to be shaped as necessary at the back end of the top block.
4. Add the 3/16 x 3/8" balsa CROSS BRACES between the stringers at station 3 and 4. See the plan view of station 3.
5. Using bulkhead #1 as a spacer, cut and glue the 1/16" balsa FUSELAGE SIDE DOUBLER in place on the inside of both fuselage sides. The doubler should run from behind bulkhead #1 to the front of the cross brace at

station 3. The grain should run from top to bottom on the fuse sides. When the glue on the doublers has dried, measure and mark the location of bulkhead #2 on the inside of both fuselage sides.

6. Glue BULKHEAD #1 in place on the fuel tank compartment top block, making sure it is centered from side to side, that the correct end mates with the top block, and that it is at  $90^{\circ}$  to the top block. Do not glue bulkhead #2 in place at this time.
7. Next you'll add the  $3/8$ " balsa TRIANGLE STOCK along the sides of the fuel tank compartment top block from the front of bulkhead #1 to the front of bulkhead #2. Bulkhead #1 can be used to align the front end of the tri stock. Temporarily hold bulkhead #2 in place to align the back end of the tri stock. The side of the tri stock that is to mate with the fuse sides should be flush with the sides of bulkheads #1 and #2. When the glue has dried, relieve this tri stock as necessary for your fuel tank.
8. Glue both balsa FUSELAGE SIDES in place on top of the stringers making sure that they are at  $90^{\circ}$  to the surface of your building board. The fuse sides should also be glued to bulkhead #1 and glued together at the tail. Pins, blocks, or masking tape may be used to hold the sides in place while the glue dries. Pieces of scrap balsa pinned from side to side may be used to keep the sides parallel as necessary.
9. Add the  $3/16 \times 3/8$ " balsa SIDE BRACING pieces at the location of station 3 and 4.
10. Add the  $1/4$ " balsa TRIANGLE STOCK BRACING from side to side behind the vertical braces at station 3 as shown on the plans.
11. Add the  $3/8$ " balsa TRIANGLE STOCK along the back of bulkhead #1 at the fuse sides and fuel tank compartment top block.
12. Add the  $1/16$ " balsa FUSELAGE BOTTOM SHEETING cross grain from station 3 to the area just in front of the stab. The remainder of the sheeting will be glued in place after the stab has been installed. Remove any pins from inside the fuselage before this sheeting is installed.
13. Put the stab in place in the slot at the back of the fuselage. To check alignment of the stab before it is glued permanently in place, first measure the distance from both stab tips to the building board. Both distances should be the same. Working on one side of the stab, measure the distance from the stab leading and trailing edge to the building board. Both distances should be the same. Do the same for the other side of the stab. Sand or shim the stab slot in the fuselage sides as necessary. When the stab slot is properly aligned, put a

slow drying glue in the slot and on the stab and put the stab in place. Then, to assure the stab is centered, measure the distance from each stab tip to the fuselage side. To assure the stab is at  $90^{\circ}$  to the fuselage center line, use string to measure the distance from the forward outboard corner of the elevator cut-out in both sides of the stab to a point in the center of the front of the fuselage. Both distances should be the same. Pin the stab in place while the glue sets up.

- \_\_\_ 14. Add the remainder of the 1/16" balsa FUSELAGE BOTTOM SHEETING.
- \_\_\_ 15. To check the alignment of the wing saddle, put the fuselage upside down on a table such that the wing will be over the table. Put the wing in place on the wing saddle. Measure the distance from each wing tip to the table top. Both distances should be the same. If not, sand or shim the appropriate wing saddle as necessary.

Using the straight line you drew earlier along each fuselage side as a reference, measure the distance from the leading edge and trailing edge to that line on one side of the wing. Since the wing should have a slightly positive incidence, the distance from the leading edge to the line should be slightly less than from the trailing edge to the line. Check the other side of the wing as well. Sand or shim the wing saddle as necessary.

- \_\_\_ 16. At this point you're ready to install BULKHEAD #2. Apply some slow drying glue to the appropriate areas inside the fuselage and to the sides and ends of bulkhead #2. Slide the bulkhead in place in the fuselage. Immediately put the wing in place in the wing saddle with the wing dowels in the holes in bulkhead #2. Adjust the bulkhead as necessary so the wing rests properly in the wing saddle. If you plan to use foam wing seating tape on the wing saddle, a couple of shims 1/2 the thickness of your seating tape should be used on each wing saddle as spacers for the wing when bulkhead #2 is installed. Clamp the fuse sides to the bulkhead while the glue dries.
- \_\_\_ 17. Once the bulkhead is glued in place, double check the wing incidence. If all is OK, remove the wing from the fuse and glue the wing dowels in place both to the leading edge and the ply dowel plates. If minor adjustments are needed, the dowel holes in the wing leading edge may be filed out accordingly. Then glue the dowels in place. Fill any gaps between the dowels and the leading edge with epoxy and microballoons.
- \_\_\_ 18. Glue the 1/4" ply WING HOLD DOWN in place inside the fuselage. Add a piece of 1/4" balsa TRIANGLE STOCK along both sides of the wing hold down as shown on the plans.
- \_\_\_ 19. Add the 1/4" balsa TRIANGLE STOCK behind bulkhead #2. See the plans.

- \_\_\_ 20. Add the 3/8" balsa TRIANGLE STOCK that runs along the bottom sides of the fuselage in the area of the fuel tank compartment. These two pieces run from the front of bulkhead #1 to the back of bulkhead #2 and should be flush with the bottom of the fuselage sides. Later the fuel tank compartment bottom will glue to the bottom of the fuselage sides and the triangle stock.
- \_\_\_ 21. Resin the inside of the fuel tank compartment. Be careful, however, not to get any resin in areas that will mate with the fuel tank compartment bottom, the bottom of the fuse sides, the bottom of the triangle stock, the bottom of bulkhead #1, and the front of the bottom of bulkhead #2. Check the plans.
- \_\_\_ 22. While your resin is out, apply a coat to the front of bulkhead #1 to prevent fuel penetration. While it's also advisable to seal the wood inside the holes in the bulkhead, the holes may have to be redrilled to open them up to size after the resin sets up.
- \_\_\_ 23. Drill the hole for the steering linkage through the triangle stock behind bulkhead #1.
- \_\_\_ 24. Permanently install the MOTOR MOUNT using the screws and nuts supplied in the hardware package. With a washer under each of the nuts. tighten them good and tight. Some silicon seal over the nut and threads will prevent loosening due to vibration.  
  
If you want, the fuel tank can also be installed at this time. It's much easier now than later when the bottom of the fuel tank compartment has been closed. If the resined area of the fuel tank compartment top block is wiped with alcohol, double stick tape can be used to hold the fuel tank in place at the top of the fuel tank compartment until the battery pack is installed.
- \_\_\_ 25. Sand the back end of the 1/4" balsa FUEL TANK COMPARTMENT BOTTOM as necessary to fit squarely with bulkhead #2 and glue it in place. The inside of the bottom of the fuel tank compartment may be resined by working through the opening in bulkhead #2.

#### Completing the Plane

- \_\_\_ 1. Wrap the wing center section either with glass cloth and epoxy or resin or with Celastic. The center section wrapping should extend at least 2" beyond each side of the wing center. DAP vinyl spackling compound (see the section entitled "Wrapping It Up") may be used to feather the edges of the glass or Celastic.

- 2. Add the 1/16" ply WING HOLD DOWN PLATE on the bottom, center trailing edge of the wing as shown on the plans using 5 minute epoxy or resin as the adhesive.
- 3. Break the tack-glued ailerons loose and shape the aileron leading edge as shown on the wing side view.
- 4. To drill the hole for the 1/4-20 nylon hold down bolt, put the wing in place in the wing saddle. Measure the distance from each wing tip to a point in the center of the fuselage at the tail. When both distances are the same, tape the wing in place so it won't move. Drill a pilot hole through the center of the wing at the trailing edge as shown on the plans. The hole should also be drilled through the wing hold down.

Remove the wing, then drill a clearance hole through the wing. Drill and tap the hole through the 1/4" ply hold down for the 1/4-20 nylon bolt.

- 5. To install the WING FILLER BLOCK, put the wing back in place onto the fuselage. Tighten down the hold down bolt. Shape the block to fit in place on the bottom of the center of the wing as shown on the plans. Because it is difficult to fit the filler block accurately to the bottom of the wing, the block may be glued in place using a mixture of epoxy and microballoons. To prevent the possibility of gluing the block to the fuselage, a piece of plastic kitchen wrap may be used between the wing leading edge and the fuselage.
- 6. To install the FIN, put the rear portion of the bottom of the fin in place in the slot provided in the fuselage top block. The front of the fin glues to the surface of the top block. Eyeball the fin from the front of the fuselage to assure it's straight. If all is OK, remove the fin and apply glue to the fin, the slot, and the top of the fuse as necessary. Pin the fin in place. Before the glue sets up, use a piece of string to measure the distance from a point on top of the fin to the outboard front corner of each elevator cut-out in the stab.
- 7. To align the SUB FIN when it is installed, tape or pin the rudder in place onto the fin. Glue the sub fin in place on the bottom of the fuselage, making sure it is properly aligned to the rudder and is centered on the bottom of the fuse.
- 8. Temporarily put the NOSEGEAR in place - including the wheel collar that is used just above the spring. The nosegear should pass through both the lower and upper holes in the engine mount. Mark the area to be relieved in the bottom of the chin block as shown on the plans. Remove the nosegear and relieve the balsa as necessary. If you find it necessary to cut through the chin block into the fuel tank compartment to get adequate clearance, the hole should be sealed inside the fuel tank compartment with a piece of scrap balsa.

- \_\_\_ 9. Mark, drill, and tap the holes in the engine mount for your engine. If you wish, the holes may be drilled a bit oversize and nuts used on the bottom. If you take this route however, flat spots will have to be filed on the bottom of the arms to provide a flat shoulder for the nuts. In order to prevent the possibility of jamming the drill bit in the engine mount arm, drill at a slow speed. Back the drill bit out frequently to clear the hole and bit.
- \_\_\_ 10. Relieve the front of the fuselage as necessary to get a good fit for the cowl. Cut a "U" out of the COWL for your engine as shown on the plans. Cut out a slot in the bottom of the cowl for the nose gear strut and spring
- \_\_\_ 11. By putting the engine in place on the engine mount, putting the cowl in place, and putting the spinner and prop on the engine, the correct fore-aft location of the cowl may be determined to get a good fit to the spinner back plate. The cowl may be permanently glued in place using epoxy. Or, the cowl may be mounted using screws if hardwood blocks are added to the front of bulkhead #1.

If you plan to use resin on the fuselage, do not glue the cowl in place until after the resin has been applied. Be sure to sand the area of the cowl that is to mate with the fuse and wipe it clean with acetone or MEK before you apply the epoxy.

- \_\_\_ 12. Sand the fuselage to shape. Use the shape of the cowl as a reference to shape the front of the fuselage. It is recommended that fairings be added along both sides of the fin, sub fin, and along the stab-fuselage joint on the top and bottom of the stab.

The Tweedy Bird airframe is now complete. The control surfaces will be hinged and the landing gear installed after the plane is finished.

#### WRAPPING IT UP

DAP vinyl spackling compound may be used to fill any imperfections in the wood. It is available in most hardware stores in either a tube or can and sands as easy as balsa. Hobbyoxy H-50 "Stuff" also works as a filler for small dents and workbench dings. Microballoons and epoxy or resin should be used to fill larger imperfections.

With the entire airframe sanded, any type of covering material may be used. If you want the plane as light as possible, one of the plastic covering materials such as Solarfilm, MonoKote, or Flite-Kote may be used on the bare wood. The epoxy-glass cowl will have to be painted. Or, the plane may be finished by using the film on the wing and painting the fuse and tail section.

If you want to paint the bird, the wood may be prepared by using 3/4 oz. glass cloth and resin on the fuselage, tail, and sheeted wing center section. Not only does this approach offer a good finish when properly sanded, but it also increases the strength of the glassed areas tremendously - at the cost of some added weight. Resin may also be used without the glass cloth, but with less an increase in the strength of the glassed areas. Some covering material such as silk will have to be used on the wing panels.

Hot Stuff or Zap instant glue may be used to install the canopy. If the canopy is to be glued in place before the fuselage is painted so a fairing can be added at the canopy-fuselage joint, the area inside the canopy should be finished first. Another way of installing the canopy is to use some scrap 1/8" balsa (not furnished) to make a sub-floor. After the top side of the sub-floor is finished, the canopy is glued to it. This sub-floor is installed up inside the canopy, just flush with the bottom of the sides. To install the canopy to the fuse, the sub floor is glued in place. The advantage of the sub-floor approach is that the gluing surface is much greater and insures a much stronger bond to the fuselage.

We recommend that K & B Superpoxy primer be used on the finish sanded fuselage before you apply the color coat, regardless of whether you're going to use a Superpoxy paint, dope, or an acrylic lacquer. This primer sands easily and offers a glass-smooth finish for the color coat. The smoother the finish before the color is applied, the better the paint job after the color is on.

With the plane painted or covered, the control surfaces are to be hinged. At least 3 hinges should be used for each aileron, each elevator half, and for the rudder. The hinges should be located as shown on the plans. Be sure to hinge the elevators first, then the rudder.

Next, the rudder and elevator CONTROL HORNS are installed. The line of clevis holes on the control horns should be in line with the hinge pivot point. See the plans. When the nosegear steering arm is installed onto the nosegear strut, it should be set up at an angle to the bulkhead to allow for forward and backward movement as right and left control is given.

To find the location for the servos inside the servo compartment for the correct center of gravity, the landing gear, engine, muffler, fuel tank, battery, and receiver should be temporarily put in place. The battery should be located at the rear of the fuel tank compartment and the receiver is located toward the front of the servo compartment. The rudder and elevator pushrods may be taped to the bottom or top of the fuselage in their approximate location. With the wing in place - and the wing servo taped in its proper location on the wing, lay the rudder, elevator, and throttle servos on top of the fuselage in their proper location. Move the servos for or aft until the plane balances at the proper location at the wing tips. Then, the servos are mounted on hardwood rails inside the fuselage at that location. If the

desired CG cannot be gained by moving the servos, the battery pack may be moved a bit forward or back into the servo compartment. Don't add weight to the plane unless you can find no way of moving the radio equipment to get the proper CG. Cut the hole in the wing for the aileron servo. Add the hardwood servo mounting rails at the front and back of the hole and install the aileron servo and linkage.

While on the subject of the CG, we should also note that within certain limits, the CG for a sport ship is a matter of personal preference. We recommend locating it at a point approximately  $5\frac{1}{2}$ " in front of the trailing edge of the wings at the wing tips for your first flights. Above all, the plane must not be tail heavy. Later on we'll comment about checking out the CG of your plane in flight.

To permanently install the fuel tank - if you didn't do so earlier - you'll need two 10' lengths of fuel tubing. Thread both pieces of fuel tubing through the holes in bulkhead #1 so the end of the tubing hangs into the servo compartment. Attach the fuel lines to the fuel tank. Then, pull the two pieces of tubing a little at a time while pushing the fuel tank into position. Cut the tubing to length for your engine.

To prevent the possibility of damaging your battery in the event of a fuel leak in the fuel tank compartment, we recommend wrapping your battery in a plastic bag. Then, wrap it lightly in foam rubber. The receiver should also be wrapped loosely in foam rubber. The receiver switch and charging plug are to be mounted on the side of the fuselage opposite the muffler and located in the area of the receiver.

The main landing gear should be permanently installed. Wheel collars should be used on both sides of the wheels.

#### FINAL CHECK OUT

Double check all screws to make certain that they are snug. Also recheck them after a few flights. With the plane standing on the ground, measure the distance from each wing tip to the ground. Bend the main gear as necessary so the wing tips are level. Eyeball the plane from the side. It should rest slightly nose-up. Adjust the length of the nosegear accordingly by moving the wheel collars on the nosegear strut accordingly. Above all, the plane should not rest in a nose-up attitude.

Give the plane a push to make sure it rolls straight. Check the operation of the control surfaces to make sure that they operate freely and in the direction they should; pulling down on the elevator stick makes the elevator go up; pushing the aileron stick to the right makes the right aileron go up and the left one goes down; and so on. With someone holding the plane, check the operation of the control surfaces with the engine running wide open to watch for the effects of vibration on the operation of the servos and the receiver. Check the operation of the engine to make sure it idles and will run wide open with the nose

of the plane pointed up in the air. And, do a distance check with the radio as recommended by the manufacturer.

Take all of the runway for your first take off, and make a smooth climb out. Get the plane up high and make your trim adjustments.

To check the location of your CG, get the plane flying straight and level, wide open and using your aileron and elevator, put the plane into a tightly banked turn. If the nose drops noticeably during the banked turn, the plane may be nose heavy. If the tail drops, the plane may be tail heavy.

Another check to make is to put the plane into a spin. If you have difficulty getting into the spin because the plane wants to go into a spiral dive instead, the plane may be nose heavy. In addition, the CG may also be checked by watching the plane in the final approach for a landing. If more and more up elevator must be added to keep the plane in the proper glide path for the touch-down, the plane may be nose heavy. Or, if the plane keeps ballooning on you so that down elevator must be added to maintain the proper glide path, the plane may be tail heavy. Shift the battery pack as you can. As a last resort, stick-on weights may be added to the nose or tail as necessary.

Once you get the Tweedy Bird trimmed out you'll find it to be a sweet flying ship. If your engine power is .30 or so, you'll also find that you will be able to fly many of the maneuvers most pattern ships fly. Happy flying.

Bridi Hobby Enterprises

## TWEEDY BIRD

### PARTS LIST

The following parts are listed in the general order in which they are used in the construction notes.

#### TAIL SECTION

1ea 3/16 balsa front stab piece  
1ea 3/16 balsa rear stab piece  
2ea 3/16 balsa stab tips  
2ea 3/16 balsa elevator halves  
1ea 3/16 hardwood dowel, elevator torque rod 4" long  
1ea 3/16 balsa front fin piece  
1ea 3/16 balsa rear fin piece  
1ea 3/16 balsa fin top  
1ea 3/16 balsa rudder  
1ea 3/16 balsa sud dorsal

#### WING

4ea 1/4x3/8x24" balsa spar  
20ea 3/32" balsa ribs  
2ea 1/4x7/16x24" balsa trailing edge  
2ea 3/8x3/4x24" balsa leading edge  
4ea 1/16" balsa leading edge sheeting tapered  
3ea 1/16x3x12 balsa center section sheeting  
2ea Notched hardwood landing gear block 3 1/4 long  
4ea 1/16 ply landing gear plate  
2ea hardwood landing gear block gusset, outboard  
2ea hardwood drilled landing gear block gusset,  
2ea balsa wing tip block  
2ea 3" balsa trailing edge center section notched  
1ea small aileron torque rod, left  
1ea small aileron torque rod, right  
2ea 3/8x1x20 5/8 balsa aileron  
2ea 1/16 ply wing dowel plate  
2ea hardwood dowel, wing hold down 4" long  
1ea 1/16x1 1/2x3 rear wing hold down plate 1/16 ply

#### FUSELAGE

1ea 3/16 balsa fuselage top block  
1ea 3/8x3x5 1/2 balsa fuel tank compartment top block  
2ea 3/8x30" balsa triangle stock stringers  
2ea 1/8 balsa fuselage side  
3ea 1/16x3x12 balsa sheet, fuselage side doubler  
2ea 1/16x3x12 balsa fuse bottom  
1ea 1/4" ply bulkhead #1  
1ea 3/8x36 balsa triangle stock  
1ea 1/4x36 balsa triangle stock  
1ea 1/8 ply bulkhead #2  
1ea Kraft engine mount  
1ea 1/4x3/4x2 9/16 ply wing hold down 1/4 ply  
1ea 3/8x3x5 1/2 balsa fuel tank compartment bottom  
1ea balsa wing filler block 3/4x2x3

1ea 5/32 piano wire nose gear  
1ea epoxy-glass cowl  
1ea canopy  
2ea 5/32 piano wire main landing gear  
2ea 1/4x3/8x2 7/16 vertical side brace station #3  
1ea 1/4x3/8x1 5/16 bottom brace station #3  
1ea 1/4x3/8x2 5/8 top brace station #3  
2ea 1/4x3/8x2 vertical side brace station #4  
1ea 1/4x3/8x2 3/16 top brace station #4

HARDWOOD

2ea control horns & screws  
4ea engine mount, mounting screws and nuts 1/40  
4ea main gear mounting straps & screws  
1ea nose gear steering arm with collars