Thank you for purchasing the Dandy. The Dandy has been designed as an easy to build slowflyer that will also thermal well. Take your time and enjoy building this plane.

Specifications:
Wingspan: 47”
Wing Area: 312
Weight with 8x720 NiMH batteries: 12 ounces
Required Equipment

To build:
- Xacto with #11 blades
- Thin and Thick CA – Cyanoacrylate glue (Super Glue)
- Sanding block with 200 grit sandpaper
- Smooth, flat work table
- Wax paper to protect plans
- Needle nose pliers
- Wire cutters
- Hobby Iron for applying covering – also called a sealing iron

To fly:
- Three channel radio  (The Berg5*dsp is highly recommended, second is the GWS-R4P micro receiver. The Hitec Feather with the Laser 4 transmitter provides a low cost solution for a first time radio, however, the Feather receiver has a reputation for glitching easily. In my opinion, if you can afford it, you are much better off starting with a good radio such as the Hitec Flash 5 G with HS55 servos substituted for the HS80s that normally come with it.)
- Two micro servos: Hitec HS50s, HS55s, or GWS Pico servos recommended
- GWS EPS100-A motor with 10x8 propeller
- Motor Speed Control: GWS GS100 suggested
- Battery pack: 8 cell 370mAH or 720mAH Nickel Metal Hydride recommended.

Parts List
1 ea – 3/32” laser cut balsa sheet
6 ea – 1/16” laser cut balsa rib sheet
1 ea – 1/32” laser cut plywood sheet
1 ea – 1/16” laser cut plywood sheet
2 ea – .032” music wire pushrods
1 ea – 1/16” x 13.5” landing gear wire
1 ea – 1/16” plywood motor mount sheet
1 ea – 6” Heat shrink tubing for pushrods
1 ea – ½” heatshrink tubing for wheel retainers
1 ea – Velcro strip for mounting the battery
2 ea – 1/8” dowel wing hold downs
1 ea – 4-40 landing gear bolt and blind nut
1 ea – Battery compartment magnet and tack
1 ea – Tire Rubber
2 ea – 1/2” long aluminum tube wheel axle bearings
1 ea – Tyvek battery compartment hinge strip
1 ea – 1/16” x .75” x 4.25” plywood battery mount
1 ea – Roll of covering material
Notes and Hints

- The Dandy has been designed with weight in mind. Parts and reinforcements were chosen so as to keep the plane light. Special care must be taken when making glue joints to ensure that the Dandy can survive rough landings.
- There is very little that is critical when building the Dandy. The only thing that requires special attention is to make sure the wings are not twisted. If the wings are straight, the Dandy should fly hands-off without any trim.
- Heat shrink can be heated with a soldering iron or, if you dare, with a lighter. Pay close attention to what is near the heat shrink when you are heating it.
- You really need the sealing iron (Also called a hobby iron). You will find putting on the covering so much easier. They are reasonably inexpensive and invaluable.
- The parts are held into the sheets by retaining gaps. When you break a part loose, you should lightly sand the nubs left by the gaps down.

Dandy Assembly

Assembling the tail

1. Lay down some wax paper on a flat work area.
2. Remove the tail parts from the 1/16” balsa sheets.
3. Carefully holding the pieces together so that you don’t glue yourself to the model, flow some thin CA into the joints.
4. Sand a 45-degree bevel into the leading edge of the elevator and the rudder.
5. Sand the tail surfaces smooth and round the edges except for the bevel you sanded in previously. Leave the trailing edge of the horizontal and vertical stabilizers square, not rounded.
6. Paint the tail surfaces but try to use as little paint as possible as paint is heavy.
7. Attach the rudder and elevator to the stabilizers using tape as a hinge. Packing tape cut down to ¾” strips works quite well. Leave the slightest gap, maybe .010”, to allow free movement of the surfaces.
8. Build the wheels by assembling the parts over the aluminum axle. You will sandwich the plywood hub, balsa hub, plywood wheel, balsa wheel, plywood wheel, balsa hub, plywood hub. Slide the parts over the aluminum tube and get everything aligned. The smaller round punch-out with the axle hole is the wheel hub. Flow thin CA over the wheel to glue it taking care to not get CA in the aluminum tube. Wrap the tire rubber around your wheel to measure it and cut it 1/16” too short. Glue the ends together with CA. You now have a ring. Slip the ring over the wheel, center it then glue it to the wheel with thin CA.
Wing Assembly

Note: It is very easy to make two wings of one side, i.e., two right wings. This is a bad thing.

1. Lay some wax paper over the plans to prevent the parts from sticking to the plans.
2. Remove both vertical spars from the 1/16” balsa sheets. Remove the ribs from the balsa sheets. Insert them into the vertical spars so that you have a right and left wing (See note above). The ribs are numbered 1 through 7 with 1 being the inner most rib. Don’t glue yet. Set one wing aside.

3. Position the inner top spar over the vertical spar. The letter “A” will be towards the #1 rib. Flow a bit of thin CA at each rib to hold things in place.
4. Position the inner trailing edge under the ribs. The letter “C” will be towards the #1 rib. Glue with thin CA.
5. Position the inner leading edge into the slots in the ribs. As before the letter “E” is by rib 1. Glue with thin CA.

6. Rock the wing so that the outer wing is against the building table. Ensure that rib 1 is parallel to the building table
7. Position the outer top spar over the vertical spar. The letter “B” will be towards the #4 rib. Flow a bit of thin CA at each rib to hold things in place.
8. Position the outer trailing edge under the ribs. The letter “D” will be towards the #4 rib. Glue with thin CA.
9. Position the outer leading edge into the slots in the ribs. The letter “F” is towards rib 4. Glue with thin CA.
10. Place the 3/32” turbulator strips labeled G and H into the notches near the front of the ribs. G is towards rib #1.
11. Remove the wing from the building table and glue the vertical rib with more thin CA.
12. Glue the 3/32” x 3/8” x 4 3/8” rib reinforcement strip to rib 1 as shown. The strip will lie on top of the trailing edge.

13. Align the U shaped 1/16” ply spar joiner support to the front of the vertical spar so that it is snug against the top of rib 1 and the top spar and aligned with the opening in rib 1. Glue with thin CA.

14. Place the 3/32” x .8” x 2.25” balsa rectangle over the ply you just placed and glue with thin CA.
15. Position the wingtip and glue from the spar to the trailing edge with thick CA. When dry, flex the front of the wingtip up a bit and glue with thick CA, holding it in place till the glue sets.

16. Assemble the other wing. Double check that you are not making two of the same side.
17. It would be a good idea to “harden” the balsa spar, leading and trailing edge, and turbulator at the center rib where the rubber bands will hold the wing to the fuselage. Do this by flowing a little thin CA into the wood.
**Fuselage Assembly**

1. Lay the two fuselage sides down on a piece of wax paper so that the word “INSIDE” faces up.
2. Position the forward fuselage doublers on the fuselage sides and glue with thin CA.

3. Glue the .75” x .875” x 3/32” balsa rectangle to F3. Use the guide lines that are etched onto F3. Press the blind nut into the hole in the balsa.

4. Lay the bottom fuselage on the wax paper and glue the bulkheads in place with thin CA. F5 is not placed at this time. The balsa and blind nut you glued to F3 face towards the rear of the fuselage.

5. Position the fuselage sides over the bulkheads and glue the sides to bulkheads F4 and F6.
6. Remove the battery compartment door from the bottom fuselage sheet then glue the bottom sheet to the side sheets from F4 to F6.
7. Position F5 in the side fuselage sheets and glue with thin CA.
8. Squeeze the sides together in the front and glue the sides to bulkheads F1-F3 and to the bottom fuselage sheet.

9. Squeeze the fuselage sides together at the back and, while making sure everything is aligned, glue the sides to bulkheads F7 and F8 and to the bottom fuselage sheet.
10. Place the servo tray as shown and glue with thin CA. Give it plenty of time to dry.
11. Cut two 14” lengths of 1/32” music wire. Make a Z bend in one end and thread the other end through the holes in the rear bulkheads starting with F6. This leaves the Z bends in the fuselage by the servo tray. Tape the wires to the tray so that they don’t fall out.
12. Glue the top rear fuselage sheet into place.
13. Glue the front battery mount support into bulkhead F4.

14. Glue the 1/16” x .75” x 4.25” plywood battery mount to the support you just installed and to F5 using thick CA. Attach a Velcro strip to the bottom of the battery mount. You may want to flow some thin CA under the Velcro to ensure it is firmly attached to the ply.

15. Cut the Tyvek hinge material (the white paper like material in the parts bag) so that it is almost as wide as the battery compartment door. Glue it to the door so that half of the Tyvek overhangs the door. An easy way to glue the Tyvek is to hold it down with some wax paper and flow some thin CA over it. The CA will soak through the Tyvek.
16. Position the door so that it is square in the opening and glue the Tyvek to the fuselage bottom. Note that the hinge is oriented towards the front of the airplane.

17. Once the door is dry, open it and glue the magnet to the inside of the door as shown. Flow some thin CA across the end of the door to stiffen it.
18. In the parts bag you will find a tack pushed into a ¼” x ¼” x ¾” stick of balsa. Remove the tack from the balsa and glue the balsa to F5 ¼” below the edge and on the same side as where you placed the magnet on the door.

19. Position the tack on the balsa stick so that it will line up with the magnet. Here’s the tricky part: only push the tack in a little, place a drop of thin CA on the stem of the tack, then quickly close the door and push down on the door so that it is flush with the fuselage. This will set the tack to the proper height. Give the glue a minute to dry and you’re done. If the magnet is too strong you can attach some tape to the thumbtack to weaken the pull.

20. Glue the four motor mount sides together ensuring that they are pressed together tightly and are square. Sand it lightly and test fit it to the motor. Glue the motor mount to bulkheads F1 and F2 so that it projects forward 1.25” from F1.

21. Glue the fuselage front top onto the fuselage sides.

22. Sand the front of the fuselage so that it is flat. Glue the two 3/32” nose cowls together then glue them to the front of the fuselage. The cowl with the vertical grain should be furthest from the fuselage.
23. Sand the fuselage smooth, round the corners, and shape the nose cowl.
24. Bend a tail skid as shown from some 1/32” music wire and glue to the bottom if the fuselage with thick CA. It is a good idea to reinforce the joint by laying a small section of Tyvek over the wire.

25. Insert the two 1/8” dowels into the holes in the fuselage. Center the dowels and glue with thin CA.
26. You may wish to paint the fuselage at this time. Paint is heavy so go easy.
27. Slide the horizontal stabilizer into the fuselage and glue with thin CA
28. Attach the vertical stabilizer to the notches in the fuselage and glue with thin CA. Ensure the vertical stabilizer is straight.

29. Lay the 1/32” ply gear holder on the wax paper and position the 1/16” balsa gear holder as shown. Glue with thin CA.

30. Find the halfway point in the 1/16” music wire landing gear and bend it so that it fits in the gear holder.

31. Place the gear in the holder then position the second 1/32” ply over the assembly and glue with thin CA. Allow some CA to soak up into the assembly along the legs to harden the 1/16” balsa.
32. Measure in ¾” from each end of the gear legs and bend up so that they will be parallel to the ground.
33. Slide wheels over axle and retain with 3/16” long heat shrink tubing. Heat the tubing then set with a drop of thin CA, taking care to not get any CA on the wheels.

34. The gear slides into the fuselage and is retained by a 4-40 bolt.

**Wing Covering**

1. Lightly sand the leading edge, the trailing edge, and the ribs.
2. We will cover a section that is adjacent to a section that has already been covered, allow the covering to overlap the other section around 1/8” to give the new covering something to adhere to.
3. Lay the wing on your workbench right side up.
4. Cut off a sheet of covering for the area you are about to cover.
5. Tack down the covering at the four corners then work along the width, tacking the edges down. Work along the leading and trailing edge pulling the wrap snug as you tack it in place.

Note: At the polydihedral breaks, the wrap will be trying to pull up and away from the ribs so be sure to do a good job adhering them.

6. Cover all the sections before shrinking the covering.
7. When the covering is all glued down, pass the iron over the covering to shrink it. Go slowly to reduce the amount of warp.
8. Once the covering is reasonably tight, check for warps and remove them by gently twisting the wing opposite the direction of the warp while heating the covering. An easy way to check for warps is to lay the wing on a flat surface and see which corners are coming up. It is a good idea to put about 3/8” washout in the wingtips. With the outer wing laying on a flat surface, The back of the wing tip should be off the table by 3/8”.
9. When the wing is straight you can apply a light misting of paint if you like. Again, take care to not apply too much paint to keep the weight down. Krylon paint will work but I recommend Testors Pactra Racing Finish. It bonds well to the covering.

**Final Assembly**

1. Glue the two control horns into the rudder and elevator. The rudder horn will be on the opposite side of the elevator horn. The elevator horn faces up.
2. Insert two servos into the servo mounts. Insert the Z bends of the pushrods into the servo control arms and mount the servo arms onto the servos so that they are centered. Use the outer holes in the servo control.
3. Cut two pieces of 1/32” music wire 2.5” long. On each one, make a 90 degree bend 1/4” from one end.
4. Slip a piece of 3/4” long heat shrink tubing over the tail end of the pushrods. Slide the long end of the L bend wire into the heat shrink and place the short end into the center hole of the horn. Flip the end of the pushrod over the horn then carefully shrink the heat shrink tubing.

5. Adjust the length of the push rods by sliding the L bend wire in or out of the pushrods until the tail control surfaces are straight back and lined up with the stabilizer. Carefully secure the wires in position with a drop of thin CA. Ensure that the locking arm is in place – opposite the L bend.

6. Install receiver and speed control. The receiver is velcroed to the top of the battery mount and the speed controller is light enough to be suspended by its wires. Wire the speed control and servos to the receiver.

7. Slide the motor onto the motor mount and push it as far back as possible. Through the access hole in the top of the fuselage, drill a tiny pilot hole through the gearbox housing and into the motor mount. Use the small 3/8” long screw to secure the motor to the mount.

8. Slide the vee shaped 1/16” ply spar joiner into one of the wings then slide the other wing into the spar joiner. Rubber band the wing to the fuselage with at least 6 of the supplied rubber bands.

9. Check your control throws. The rudder should move ~1.5” from center to each end measured from the furthest point back. The elevator should move .75” – 1” up and down from center.

**Flying**

Attach the wing to the wing mount with around 6 rubber bands. Check that none of the control surfaces are binding and that everything, including the battery, is secure.

Before you fly the Dandy, check that the control surfaces move the correct directions. Always check the directions while you are behind the airplane. I highly recommend that you check the control surfaces before EVERY takeoff.

The center of gravity (CG) should be directly under the wing spar. With the battery installed, place a finger on each side of the fuselage just behind the spar and lift the Dandy. It should balance there. If not, adjust the battery forward or backwards till the CG is correct.

Adjust your radio trim so that the rudder is straight back and the elevator is level.

For your first flight, be patient and wait for a calm day. Choose a large field where you have a smooth surface to use as a runway. Set the plane down pointing away from you. I would say to point it into the wind but it’s a calm day, right? If everything goes well, applying full power will result in a short rollout and a rapid climb with little to no need to trim the plane. Initiate turns slowly till you get used to the way the Dandy flies.