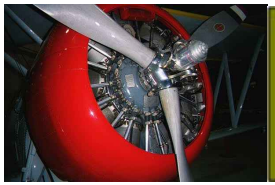
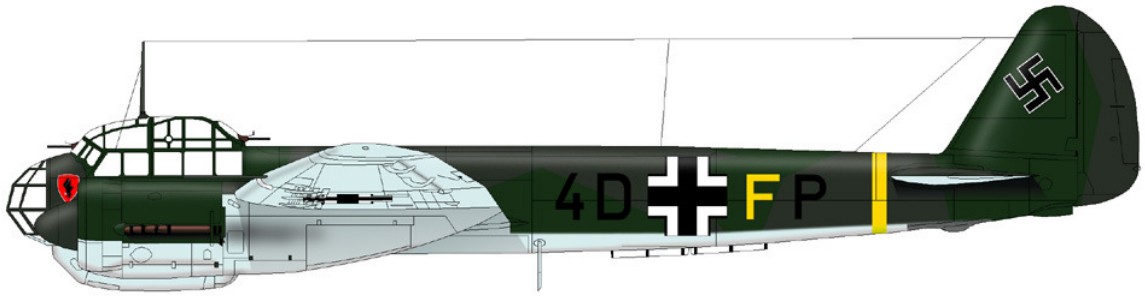


WARBIRDKITS.COM

Junkers Ju 88

Manual Version 1.2 – 13 March 2008

Specifications
Wingspan: 49.75 inches
Area: 339 square inches
Length: 36.12 inches
Power: 2x BP21 Brushless 2x Speed-400



Materials

This kit contains the following materials:

- ☐ This construction manual
- ☐ Plan sheet
- ☐ Decal sheet
- ☐ Laser-cut wood pack
- ☐ Vacuum-formed plastic canopy
- ☐ Vacuum-formed plastic nose glazing
- ☐ Vacuum-formed plastic spinners (2)

To complete this kit, you will need the following additional materials:

- ☐ 1/4” x 3/8” x 48” Balsa for wing leading edge
- ☐ 3/32” x 3” x 36” Balsa for fuselage sheeting
- ☐ 1/16” x 4” x 24” Balsa sheet for wing skin, 6 each
- ☐ 1/16” x 1/4” Balsa planks for nacelles
- ☐ 3/8” x 36” Balsa triangle stock for fuselage, 2 each
- ☐ 1/4” square Hardwood motor mounts (for Speed-400)
- ☐ 3/16” x 12” Hardwood dowel for elevator joiner
- ☐ Wing mounting bolt
- ☐ Hinges (ailerons, elevator)
- ☐ Miscellaneous servo mounting materials and pushrods
- ☐ Covering materials and paint
- ☐ Glue

NOTE: We recommend that you read this entire manual before beginning construction.

Construction

Wings

☐ Assemble the wing skins. The easy way to do this is tape them together on the “good” side. Use low-tack painter’s tape so that it releases easily later on. Then bend the joints open, apply a thread of aliphatic resin in the groove, then close the joints. Lay a sheet of wax paper on a flat surface, lay the glued skin on it, cover with another sheet of wax paper, and weight with heavy books. As you glue each skin, add it to the stack, making sure you put a sheet of wax paper between each skin. Let the glue dry overnight.

☐ Using the same procedure as in step 1, assemble two wing top skins, using the bottom skins as templates. Make the top skin about 1/4” wider (chord-wise) than the bottom skin.

☐ Block sand the good side of the wing skins. Make them nice and smooth, as this will be the outer surface of the wing, and it’s hard to sand later on.

☐ Begin with the left wing. Cover your building board with a sheet of wax paper. Remove the balsa from the aileron hatch location, and pin the bottom left skin to the building board. Keep your plan separate for reference.

☐ Cut, fit and glue the 1/4" x 3/8” leading edge to the wing skin.

☐ Remove one set of ribs W1 thru W11 from the laser-cut sheets. Leave the aileron ribs (the rear sections of ribs W7

thru W11) attached to the sheet for now. Also remove spars W12 thru W14 from the sheets.

☐ Trial-fit the wing ribs to the spars. Place the assembled ribs and spars on the skin and align with the etched lines. Glue the ribs to the bottom skin. Make sure that W1 fully engages the notches in the spars so that the correct dihedral angle is established. Then glue the three main spars to the skin and ribs. Glue braces G1 and G2 in place where rib W7 meets the leading edge.

☐ Glue spar W15 in place. Now find the rear section of rib W7 and glue it in place.

☐ Find a scrap piece of 1/8” balsa sheet to use as a spacer between W15 and W16. Carefully glue the aileron spar W16 to the bottom skin, and remove the spacer.

☐ Now glue the aileron ribs (from W7 thru W11) in place, butting to the aileron spar.

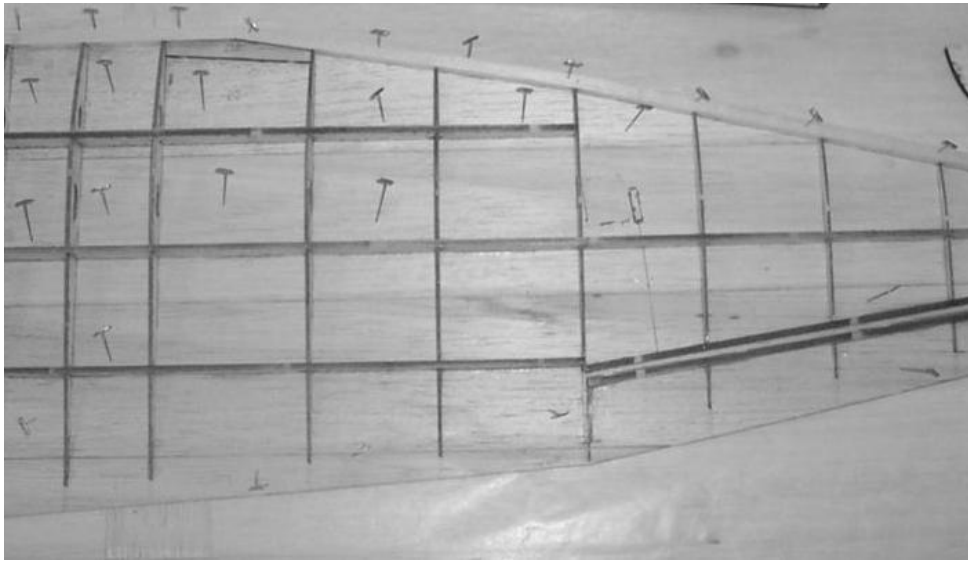
☐ Fit and glue leading edge brace W17 in place.

☐ Glue the 1/16” plywood aileron hatch base in place.

☐ Sand a taper into the trailing edge of the wing skin, so that the skin is 1/32” thick at the trailing edge.

☐ Repeat steps 3 thru 13 for the right wing.

NOTE: You may wish to apply the top skins to the wing before joining the panels. If you do, remember to pull the motor and servo wiring through!



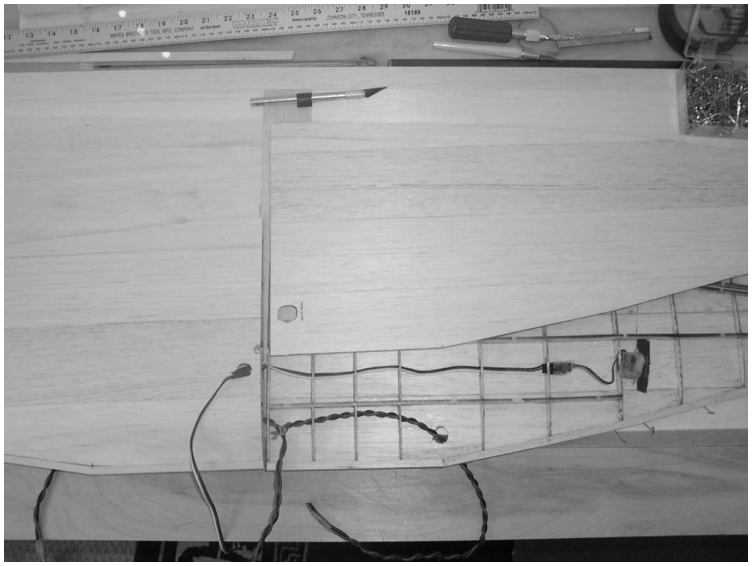
☐ Trial-fit the wing halves together. Pin down one side and block up the other side so that there is 3-1/2” total dihedral at the wingtip. Make sure that the two W1 ribs butt closely together.

☐ When satisfied with the fit, glue the wing halves together with 15-minute epoxy between the W1 ribs. Let the epoxy fully cure before moving the wing.

☐ Install the servo leads and motor wiring in the two wing halves.

☐ Cut a hole in the top left wing skin for the motor wiring to exit the wing. The hole should be about halfway between ribs W1 and W2, ahead of the forward spar W13.

☐ Cut a similar hole in the top right wing skin for the aileron servo cables.



☐ Fit and install the top wing skins. The easy way to do this is a) apply aliphatic resin to the tops of the ribs and spars; b) CA the skin to the leading edge; c) smooth the skin down onto the ribs; and d) use thick CA to join the skins at the trailing edge.

☐ Reinforce the wing panel joint with a 1-1/2" fiberglass bandage and 15-minute epoxy.

☐ Assemble the wing tip blocks, and glue them to the wing. Shape the wing tips.

☐ Shape the leading edge per the plan.

☐ Cut out the ailerons. Glue a 1/8 x 3/8 balsa strip to the leading edge of each aileron, then shape the leading edge.

☐ Cover the wing as desired.

☐ Install the ailerons using your choice of hinges.

Nacelles

☐ Tape the nacelle plans to your building board and cover with wax paper. NOTE that the nacelle plans show the nacelles from the bottom looking up! Also NOTE that the nacelle parts are lettered with an "R" or an "L" to designate their use on either the right or left nacelle.

☐ Decide now whether you will use a Speed-400 motor or an outrunner motor to power your Ju 88 model. If you decide to use a Speed-400 (or brushless inrunner) motor, you will use the 1/16" balsa firewalls N1 and two 1/4" square hardwood motor mounts.

If using an outrunner brushless motor, laminate the 1/16" ply firewalls N1 to the front of the balsa firewalls using a carpenter's wood glue (NOT CA).

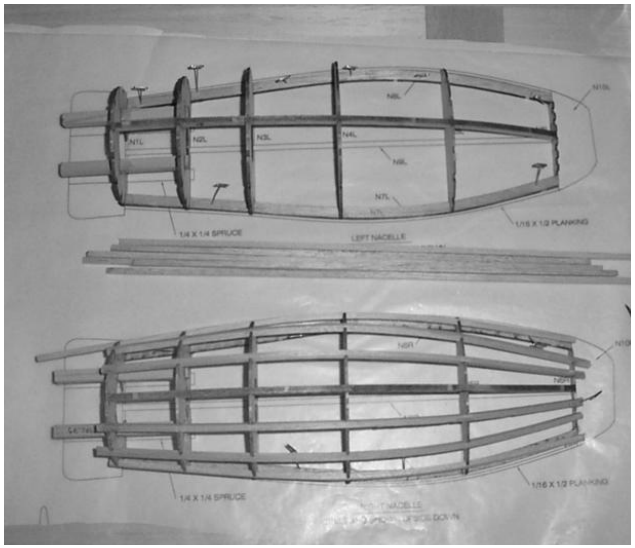
☐ If you are using a Speed-400 motor, you can use either screws or magnets to hold the cowl to the nacelle. If you are using an outrunner motor, use magnets to mount the cowl. If using magnets, glue scrap 1/16" balsa in place to cover the rear of the magnet mounting holes on firewalls N1. Then use epoxy to mount two small super-magnets in each firewall. (The magnet mounting holes are the two horizontally-opposed holes.)

☐ Pin nacelle stringers N7 and N8 over the plan. Note that these stringers are cut to fit the inside line shown on the plan.

☐ Use the 1/8" balsa N-JIG to set firewall N1 at the correct angle and glue the firewall in place.

☐ Fit and glue nacelle formers N2 thru N6 to the stringers N7 and N8. Glue stringer N9 in place.

☐ Glue 1/8” square balsa stringers in place between N1 and N6.



☐ Plank the nacelle with 1/4" x 1/16” balsa strips. Begin with the strip nearest the building board. Note that the strip must tip inward to meet the formers – see the plan for a detail sketch. This helps the plank correctly fit the shape of the nacelle.

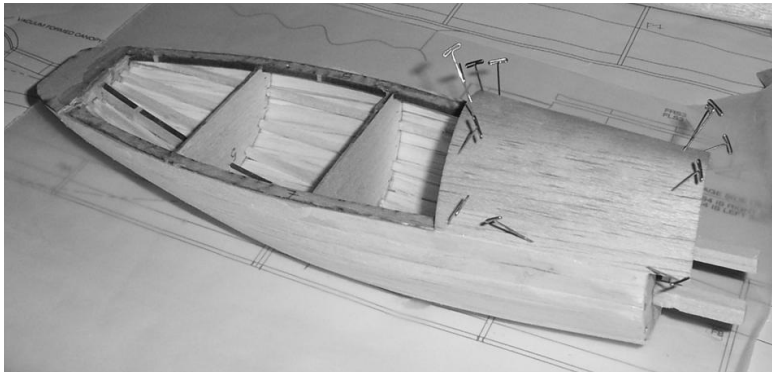
☐ Laminate three N10 pieces together and glue them to the rear of the nacelle.

☐ Glue 1/4” long 1/8” diameter dowels in the vertically-opposed holes in the firewalls N1.

☐ If using Speed-400 motors, glue the two 1/4” square hardwood motor mounts in place. Note – you can also use these motor mounts to strengthen the firewalls for brushless motors.

☐ Glue the upper portions of N1, N2 and N3 to the nacelle bottom. Add a 1/8 square balsa stringer between N1 and N3.

☐ Sheet the upper portion of the nacelle from N1 to N3 with 1/16 balsa.



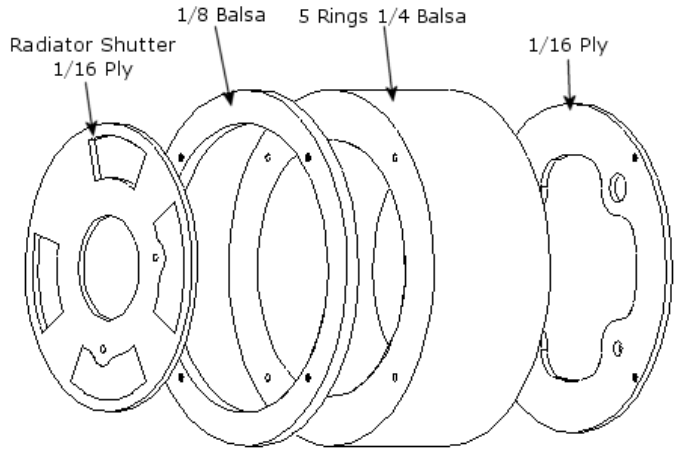
☐ Cover the nacelle as desired. We suggest using 1/2-ounce fiberglass cloth and epoxy finishing resin for extra strength, as this is the part of the model that contacts the ground upon landing.

☐ Pull the motor wires through the wing and nacelle, and out through the firewall. Glue the right-side nacelle to the wing.

☐ Cut the nacelle fairing from 1/16 balsa and glue it in place.

☐ Repeat for the left nacelle.

Cowlings



IMPORTANT:

* DO NOT CUT THE CENTERS OUT OF THE COWL RINGS UNTIL YOU HAVE FINISHED SHAPING THE COWL.

* DO NOT GLUE THE CENTERS TOGETHER.

☐ If using magnets to hold the cowl to the nacelle, install two super-magnets in 1/16" plywood cowl mount C3 as follows:

a. Glue scrap 1/16" balsa over the front side of C3 to cover the magnet holes.

b. Place a piece of wax paper over the nacelle firewall.

c. Place a magnet over each of the two magnets in the firewall.

d. Put one or two drops of epoxy in the magnet holes on the cowl mount.

e. Place the cowl mount over the magnets so that the magnets are in the magnet holes.

f. Pin, tape or weight the cowl mount in place until the epoxy sets.

g. Remove the cowl mount from the firewall.

☐ Glue the rear 1/16 ply mount C3, the five 1/4 balsa rings C2, and the 1/8 balsa ring C1 together in the order shown above. Use 1/16 wood dowels (cocktail skewer or toothpick) to hold parts in alignment. The dowels should not extend through the 1/8 balsa ring.

☐ Sand the assembled cowl to shape. You can use a long bolt and nut as a spindle to mount the assembled cowl in a drill press.

☐ Cut the centers out of the balsa and ply rings. This will be easier to do if you temporarily remove the 1/16 ply mount C3.

☐ Glue the radiator shutter (forward 1/16 ply part) inside the front 1/8 balsa ring.

☐ If you are using outrunner motors, the cowl assembly is complete. Skip forward to step 10.

☐ Cut the two 1/4" square hardwood motor mount beams to length, and slip them into their mounting holes on N1 and N2.

Fuselage

☐ Begin with the right side. Carefully align FRS1 and FRS2, and pin them to your building board – don't forget the wax paper! Glue the two parts together.

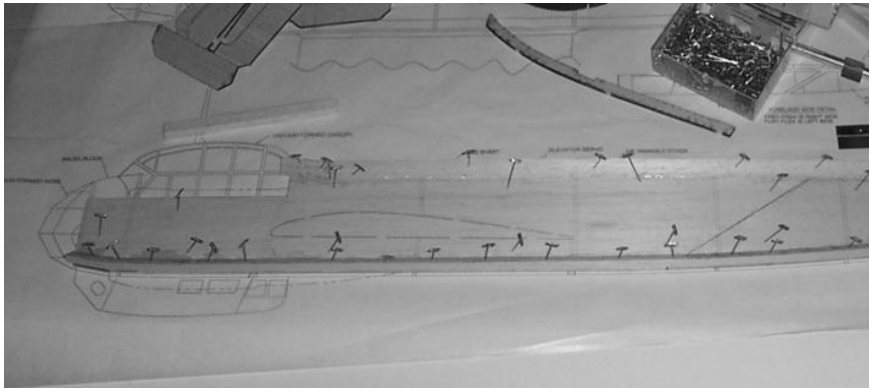
NOTE: You may want to plan your rudder and elevator control runs and cut holes for them at this time.

☐ Bevel two pieces of 3/8" triangle stock to match the plan at the aft end of the fuselage.

☐ Pin the upper triangle stock to the fuselage side. Cut and fit the short angled section just above F4. Glue the triangle stock to the fuselage.

☐ Cut and fit a short angled section of triangle stock ahead of F2 on the lower edge of the fuselage.

☐ Fit and glue the longer, beveled triangle stock to the lower edge of the fuselage. In order to bend the triangle stock to match the fuselage outline, make shallow razor-saw kerfs in the stock between F2 and F3 and between F7 and F9. The kerfs should be spaced about 1/2" apart and about half the depth of the triangle stock.



NOTE: Formers F3, F3A, F4, F5, F5A, F6 and F6a must be perpendicular to the fuselage!

☐ Trial fit former F3. Bevel the upper edge of F3 to match the wing leading edge. Glue former F3 to the fuselage.

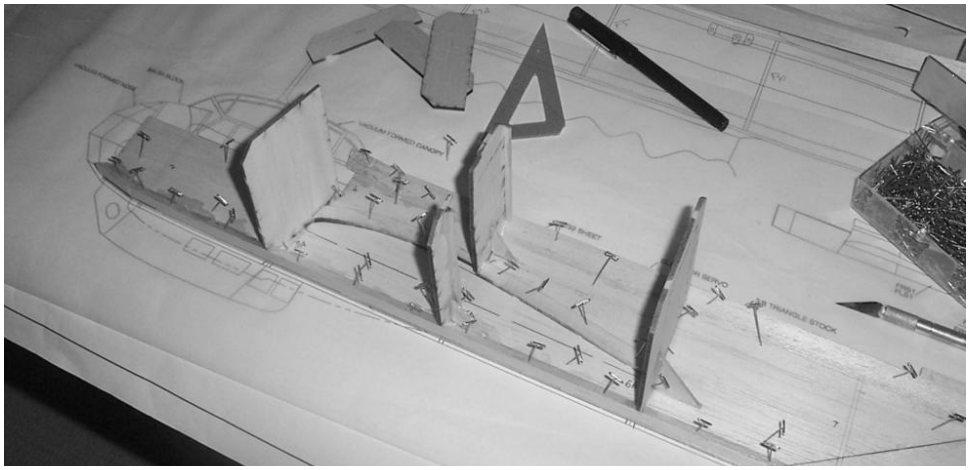
☐ Glue doublers F11 to the fuselage sides.

☐ Glue former F6 to the fuselage.

☐ Use a short piece of 1/8" square balsa or spruce to reinforce the top of former F5. Then glue former F5 to the fuselage.

☐ Glue formers F3A and F6a to the fuselage. Do not glue them to formers F3 and F6!

☐ Glue formers F4 and F5A to the fuselage.



☐ Repeat steps 1 thru 5 to assemble the left side of the fuselage.

☐ Pull the fuselage together at the rear. Glue in formers F7, F8 and F9.

☐ Using 3/32 balsa, plank the fuselage top and bottom from F3 to the tail. The grain of the planking should be perpendicular to the fuselage center line.

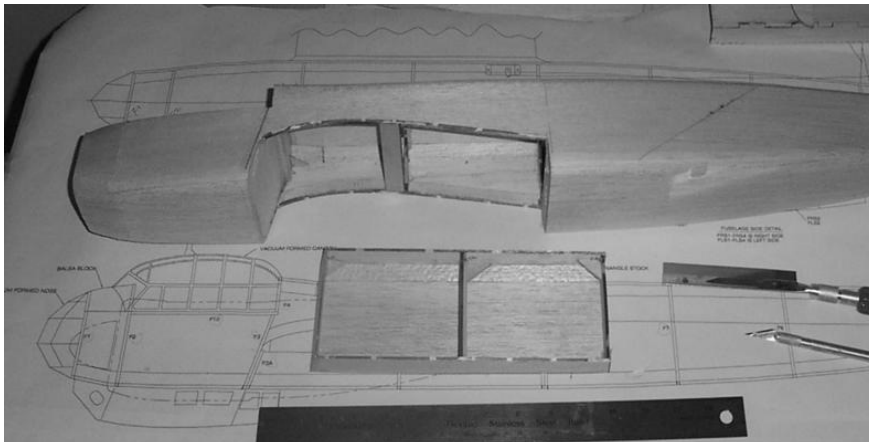
☐ Glue the two F10 pieces together.

☐ Using F10 to maintain the shape of the fuselage, glue formers F1 and F2 in place. Glue F10 in place. Using 3/32 balsa cross-grain, plank the bottom of the fuselage from F3 forward to F1.

☐ Cut and fit a balsa block to carry the upper shape of the fuselage forward from F2.

☐ If you choose to make the nose window removable, fit the plastic nose window molding to F1A. You can use dowels and magnets to hold the nose window assembly in place.

☐ Cut out the lower fuselage at wing saddle. Cut between F3 and F3A, and between F6 and F6A.



20. Fit the wing in place, and drill for the mounting bolt.

☐ Glue the lower fuselage cutout to the wing. Cut out a hole for access to the mounting bolt.

☐ Install the wing mounting bolt.

☐ Assemble the battery tray.

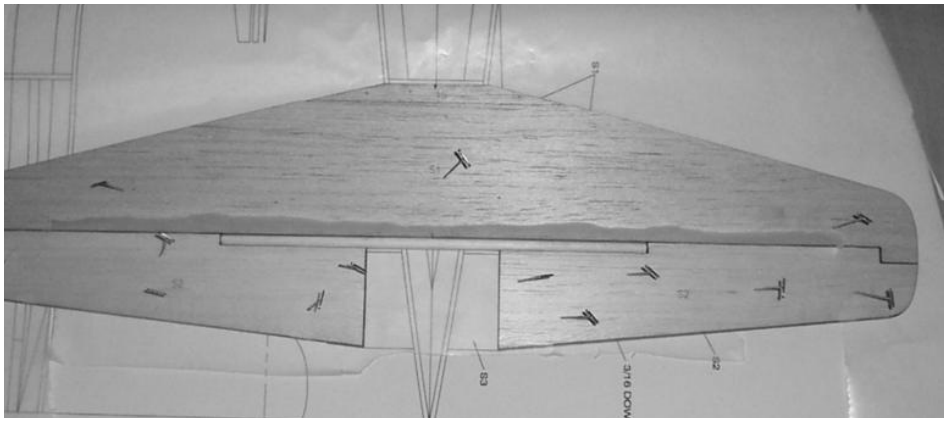
☐ Glue a ¼" wide strip of 1/16" balsa to each side of the cockpit opening between F2 and F3. This provides additional gluing area for the vacuum-formed plastic canopy.

Tail Surfaces

☐ Glue the fin parts together. Glue the rudder to the fin, or hinge it to the fin if you desire rudder control.

☐ Glue a 3/16 hardwood dowel between the elevator halves.

☐ Hinge the elevator halves to the horizontal stabilizer.



☐ Cover the fin, rudder, horizontal stabilizer and elevators as desired.

☐ Glue the horizontal stabilizer into the slot in the fuselage.

☐ Glue a piece of scrap 3/16 balsa filler into the fuselage slot behind the horizontal stabilizer.

☐ Glue the fin and rudder to the fuselage.

Finishing Your Model

☐ Cover the fuselage with 1/2-ounce glass cloth and finishing resin for maximum strength. Other iron-on coverings may also work.

☐ Cover the wing and tail surfaces with your choice of iron-on coverings.

☐ Paint and decorate the model as desired – see the *Paint and Markings Guide* on our Website for more information.

☐ Seal the entire model with a light coat of Krylon clear spray.

☐ Glue the canopy and nose glazing in place.

Decals

CAUTION: You must seal the decals before immersing them in water!

The decals included in this kit are printed with Epson DuraBrite™ inks on premium inkjet water-slide decal paper available. Follow the steps below to achieve a great looking set of markings on your model.

☐ Seal the decals with several thin coats of Krylon Crystal Clear™ spray varnish. Make sure you thoroughly cover the ink; this will prevent smears and stains during everyday handling.

☐ Make sure the surface where the decal is to be applied is smooth and glossy. Matte surfaces will permit tiny air bubbles to be trapped between the surface and the decal, thus spoiling the decal.

☐ Cut out and trim all the markings that you plan to apply in this session.

☐ Dip the decal in a bowl of water for about 30 to 40 seconds. Using your fingers, gently try to slide the decal off the backing paper. As soon as the decal slides, slide it off the backing paper and onto the model in the desired position. Use a soft absorbent cloth to gently blot excess water from the decal. Allow the decal to dry.

TIP – You can practice with bits of decal cut from the copyright notice.

☐ Spray a coat of Krylon Crystal Clear varnish over the decal.

Flying Setup

☐ Keep the model as light as possible for best performance.

☐ Your Ju 88 model should balance at 2.5” to 2.75” behind the leading edge at the center chord.

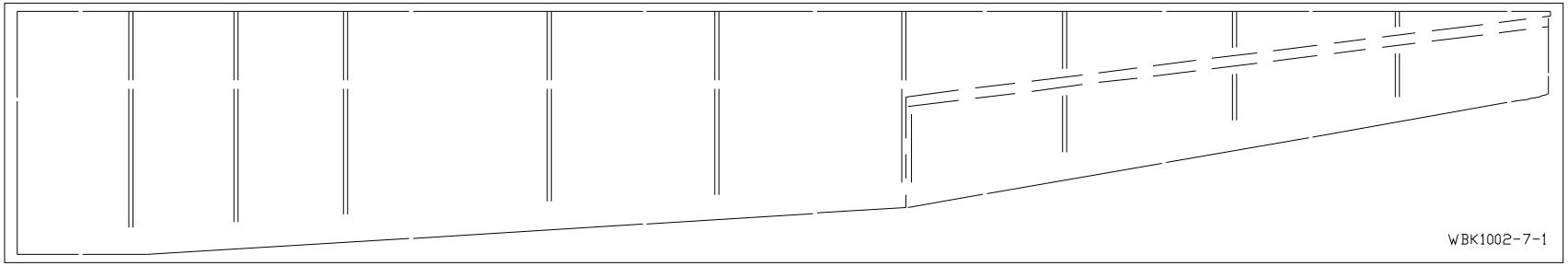
☐ Set the control throws to:

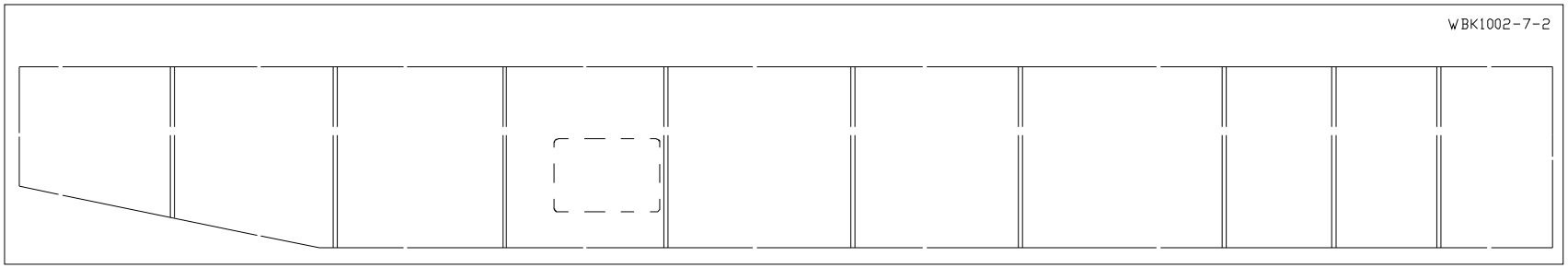
Elevator: 1/2” up – 1/2” down

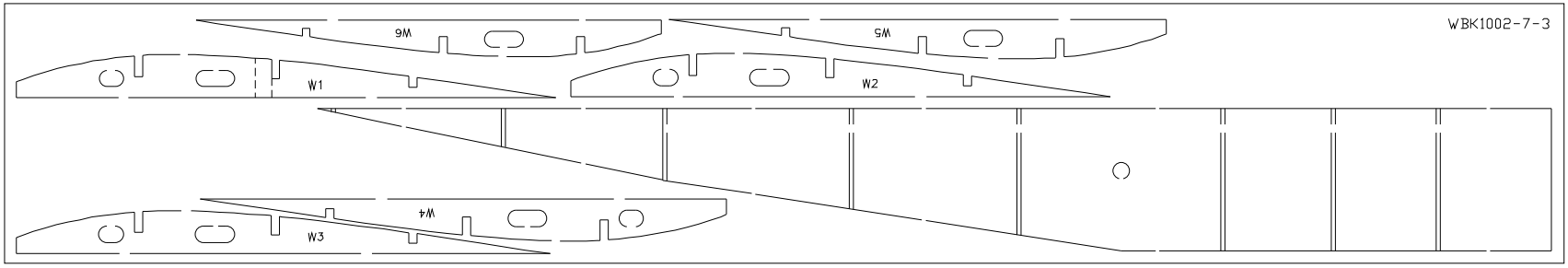
Ailerons: 3/8” up – 1/4” down

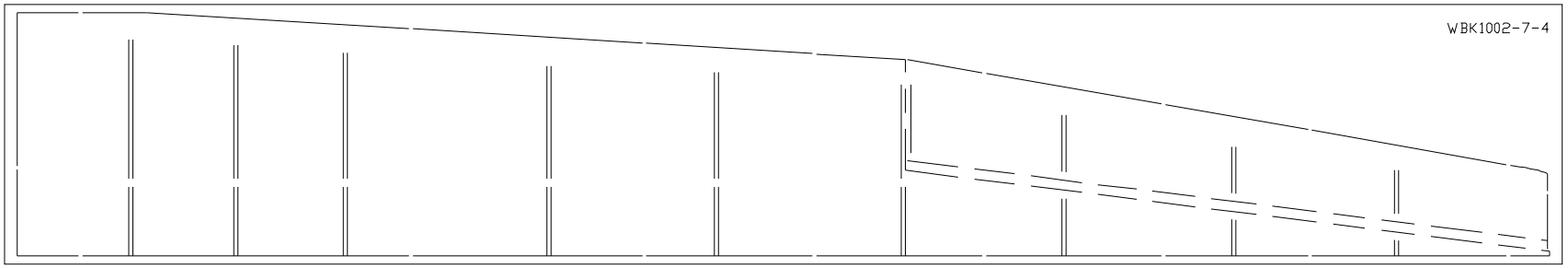
Parts Layout

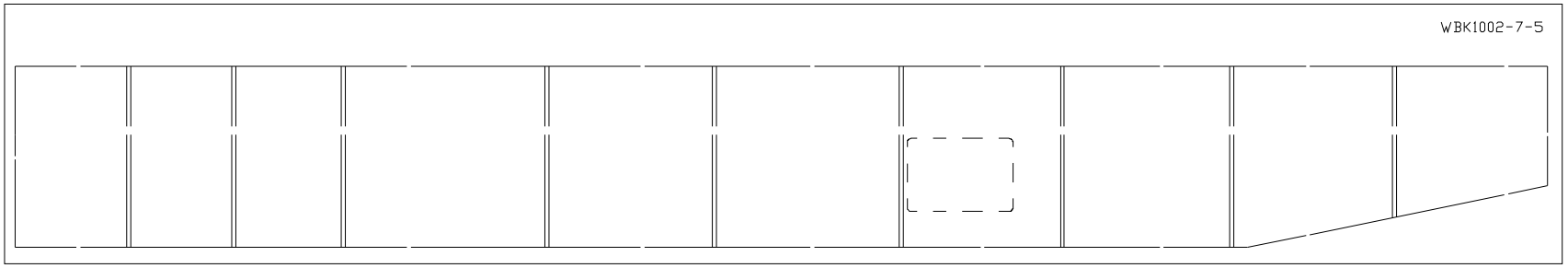
1/16” Balsa

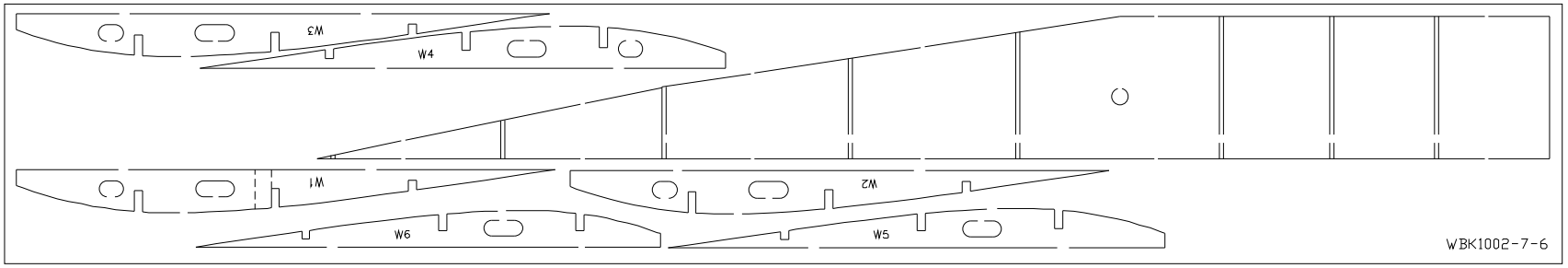


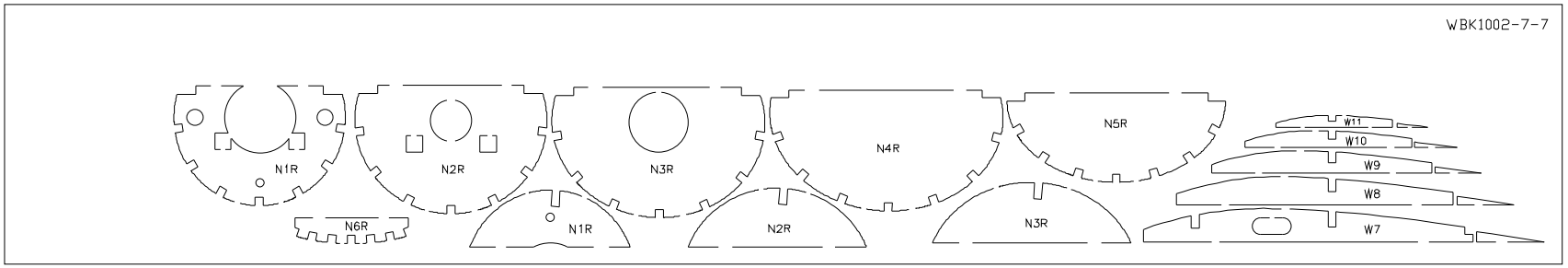


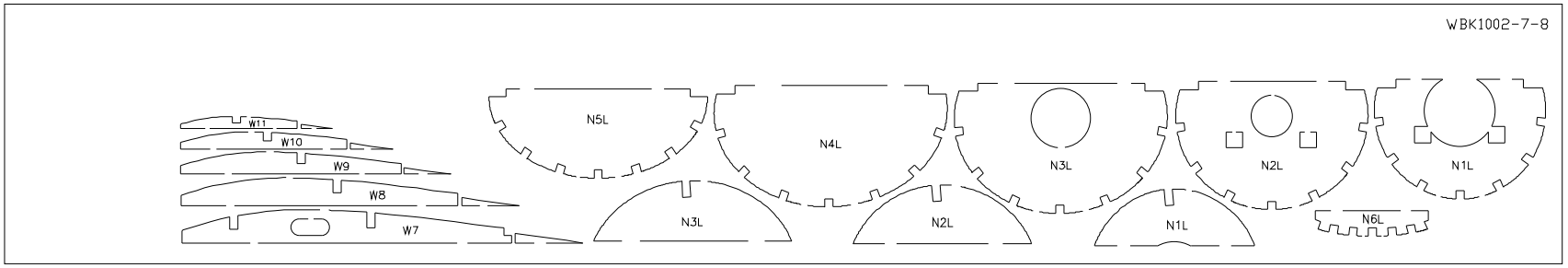




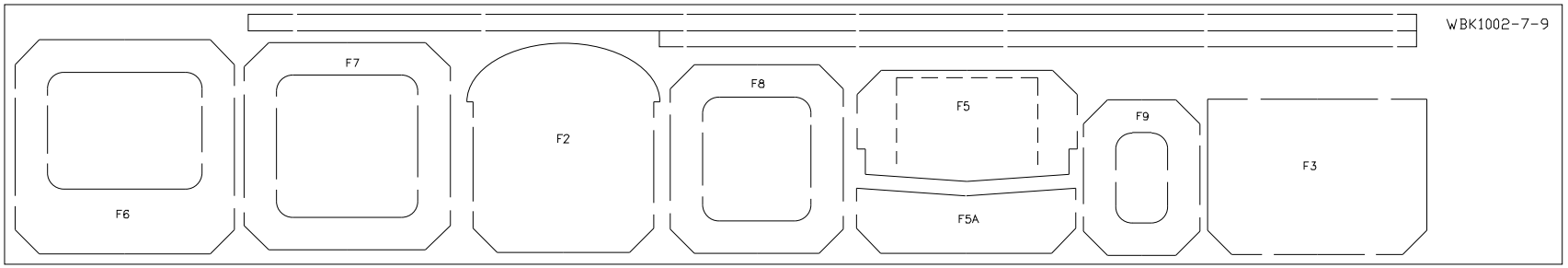


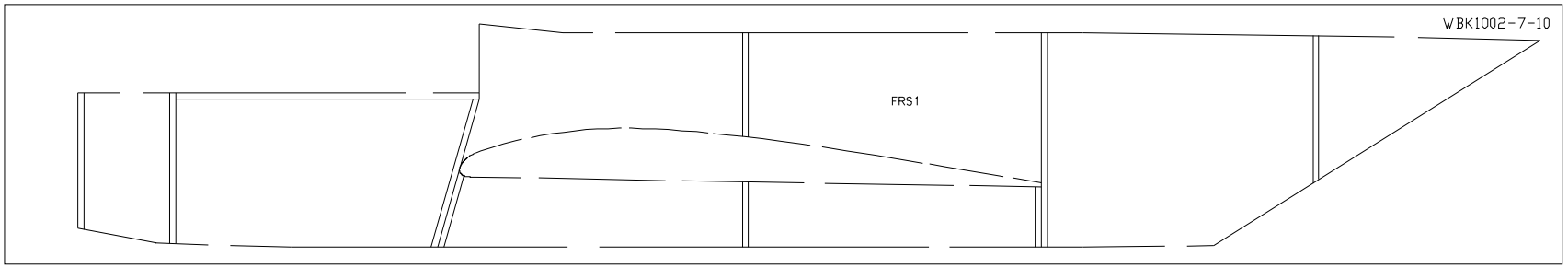


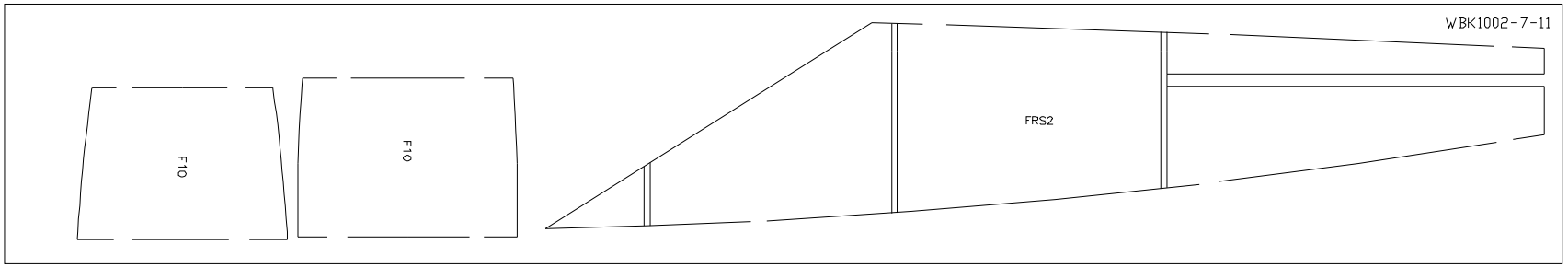


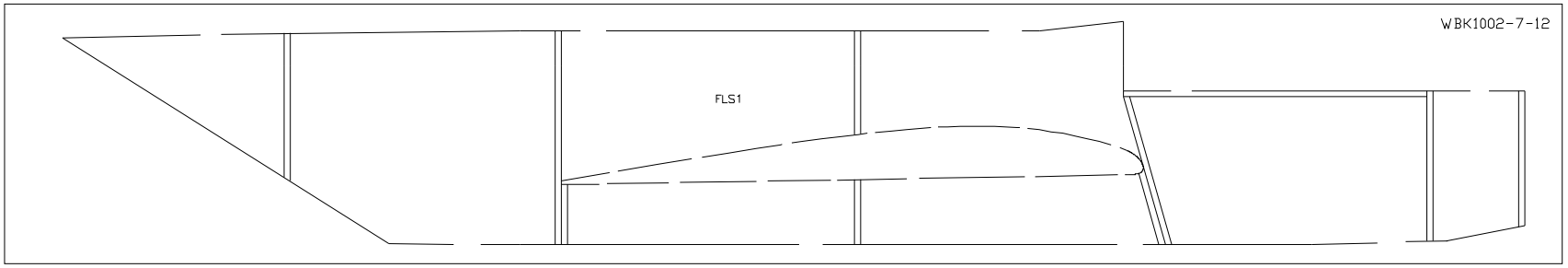


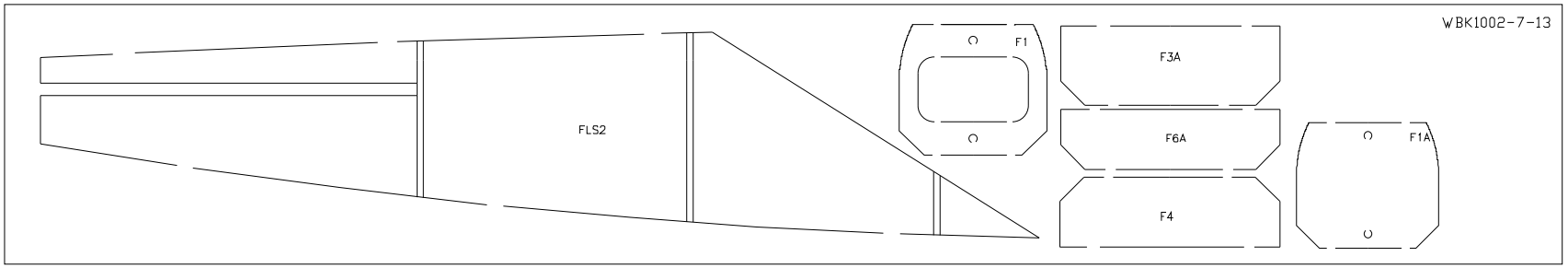
3/32" Balsa



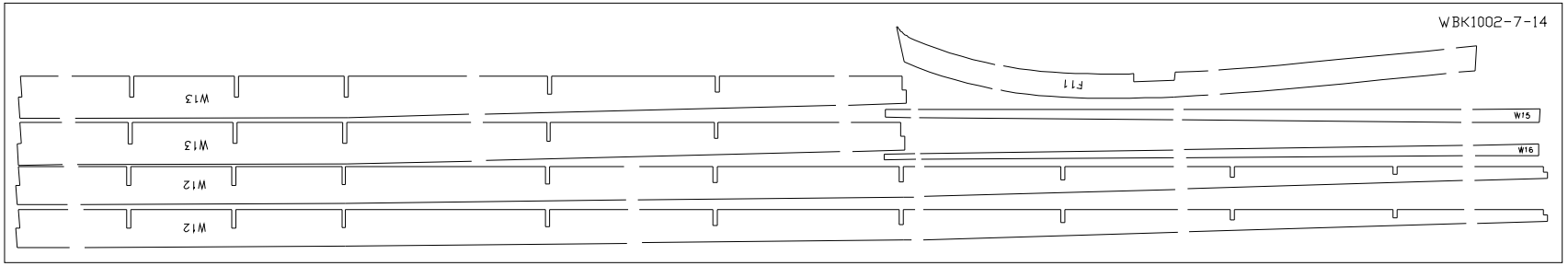


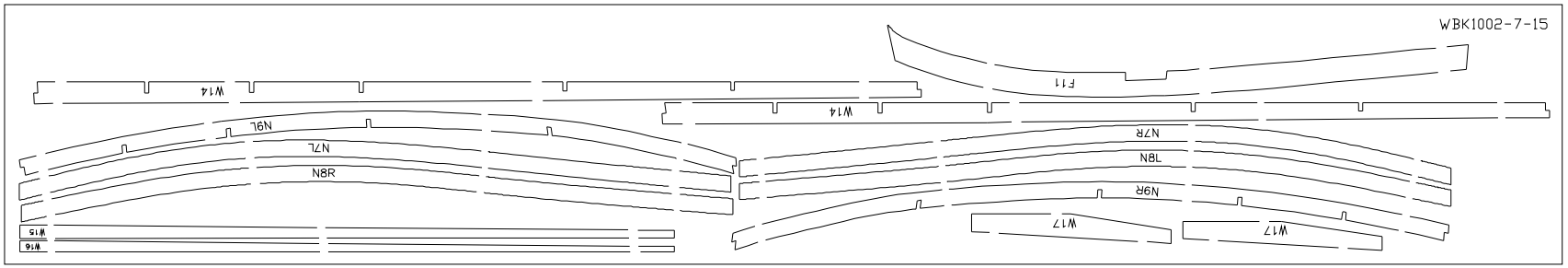


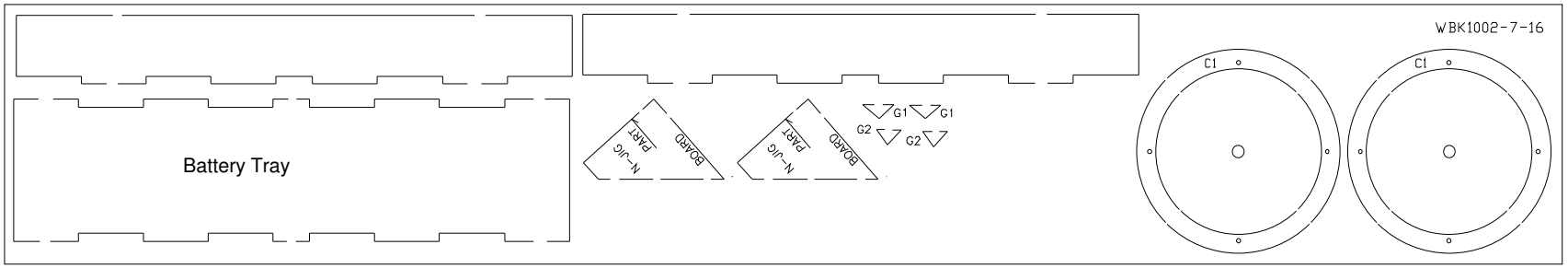




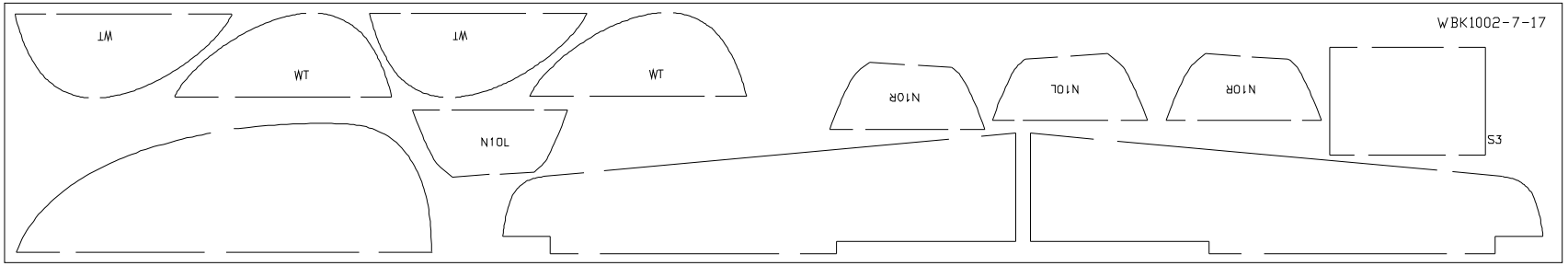
1/8” Balsa

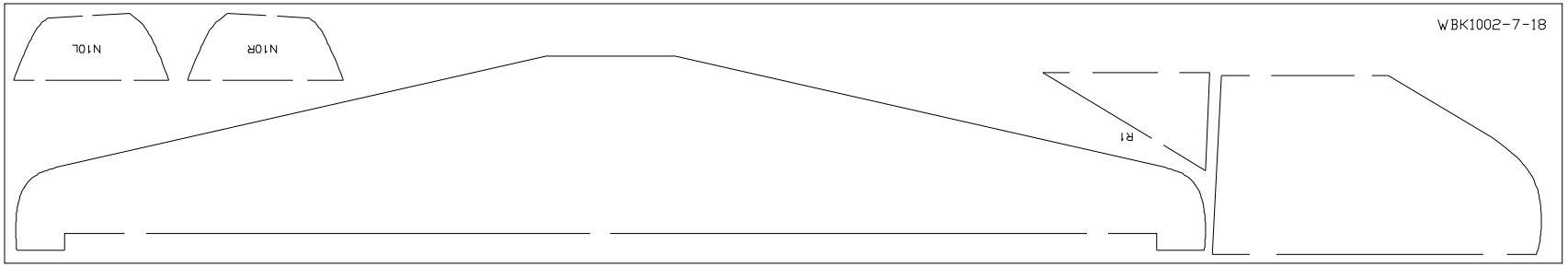




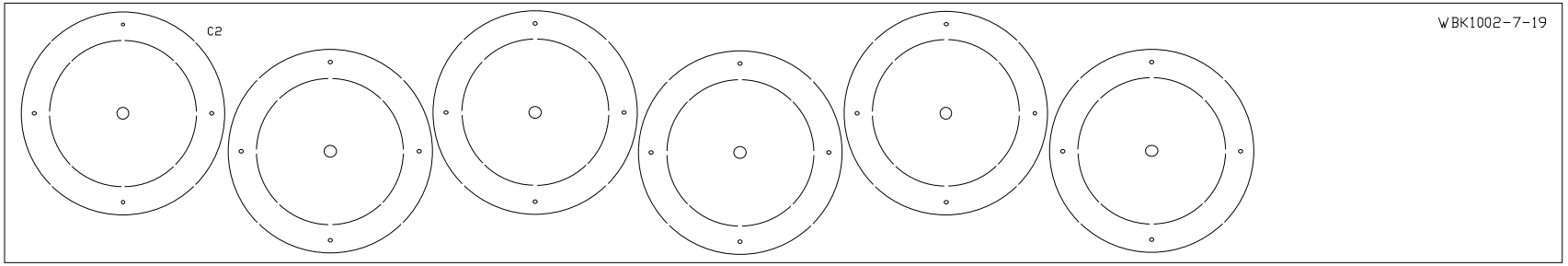


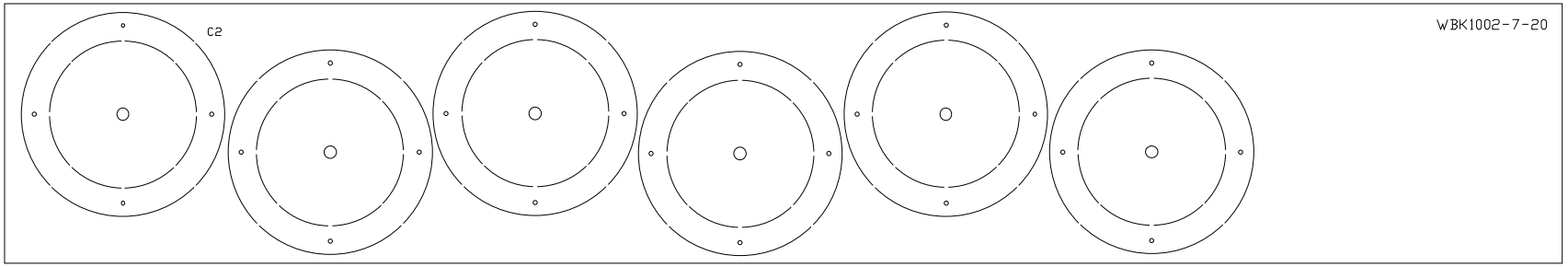
3/16" Balsa

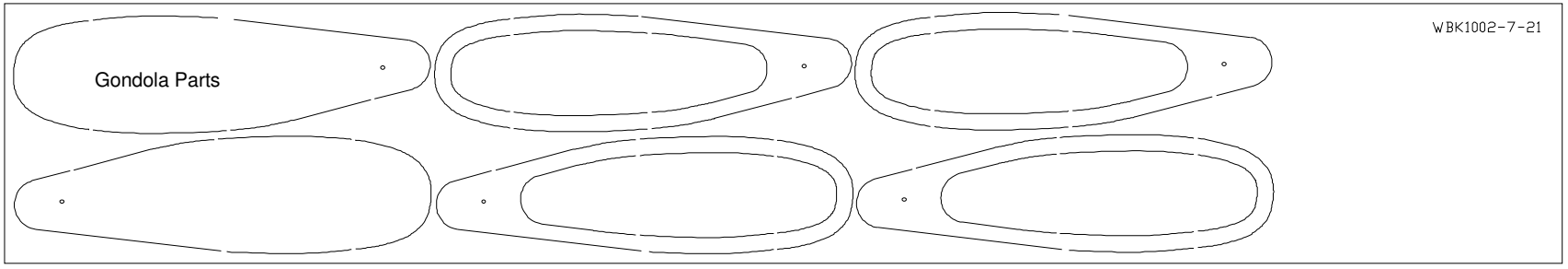




1/4” Balsa







1/16” Plywood