

DN Construction

Adhesives

In the past few years, cyanoacrylate "instant" glues have become the product of choice for building most models. We use them for over 75% of our building. There are different formulas that exhibit differing set times and gap filling properties. We use both the thin "fast setting" and the gap filling "slower setting" formulas. In addition there is a aerosol accelerator that can be applied to the slow setting formula to make it set on command. These cements allow you to build with a minimum of elaborate clamps. We get by with just our hands and a few clothespins. We modify some of our clothespins to reach into tight quarters by reversing the orientation of the wood parts as can be seen in some of the photos.

Finish as you build...

Most model builders mentally separate the construction and finishing phases of a models creation. We seem to be so eager to make those little flat pieces of wood look like a boat that we skip over opportunities to make our total effort easier and better looking. For example, we usually don't do any significant sanding until the model is fairly far along. Most of the sanding that we have to do is much easier to do before the assembly is begun.

I also do some finishing as I build. I like to use lacquer sanding sealer and semi-gloss clear to finish this type of model. When it looks like I could save some time or effort by applying a coat of sealer, I do. The only caveat is if you will be cementing a part to a finished surface, sand the surface first for best adhesion. You might want to skip ahead to the section on finishing for some thoughts on that process. Some finishes require more attention to detail when you build.

Sand and identify parts

Sand all of your die cut sheets on both sides before removing any of the parts. Use the parts locator drawing to identify all of the parts. Write the part name or number on the part in a place that won't be visible on the finished model.

Mark locations on bottom and install frames

Place the bottom on top of Fig. 1 and mark the locations of the frames and end blocks. Cement Frames 1 & 2 to the bottom. Use the Mast Bridge to position Frame 4 and cement it in place. Cement Frames 3 to the bottom followed by the Mast Bridges. There should be a gap of about 1/16" between the Mast Bridges. Cement Frame 5 on its locating marks. All frames should be 90° to the plane of the bottom.

Install floor

Test fit the Floor to the bottom; one end is slightly different. The bulge in the curve should be towards the rear of the part. Apply a bead of cement to the bottom of the Floor near each end then place it on the Bottom. Don't coat the entire bottom of the Floor with glue.

Install balsa blocks

Cut two pieces 7/8" long from the 3/8" sq. balsa and cement them to the Bottom at each end. When dry, sand the sides of the balsa blocks to match the shape of the Bottom.

Cement on Sides

Cement the body Sides to the Bottom and Frames. Begin at the front and cement short sections at a time. The front edge of the Sides should line up on the front edge of the Bottom. The bottom edge of the Sides have a slight curve and the bottom should follow this curve.

Sand tops of sides and frames

Use a sanding block to sand the top of the Frames and Sides to receive the Decks. This sanding will also trim the tops of the balsa blocks level with the top of the Sides. The original Detroit News plans show triangular "knees" between Frame 4 and the Seat Back. These knees are too small to die cut reliably, but you can cut these knees from the scrap wood left from the die cut sheets. See Fig. 12.

Decks

Cement the Decks to the Sides and Frames with thick ca. The Decks are cut slightly oversize in width.

Seat back

Test fit the Seat Back to your body. Bevel the bottom edge for a nice fit against the Floor. Round over all other edges. See Fig. 2 and 6.

Drill for pivot tubes and mast step

Use the dimensions in Fig. 5 to locate the holes for the tiller and steering pivot tubes. Drill 1/8" holes for the pivot tubes and a #56 hole for the mast step. These holes should all be on the longitudinal centerline of the deck. The steering pivot hole is easy to drill off center, the drill bit tends to follow the grain of the wood. A brad point drill will lessen the tendency to wander, but I had better results drilling a small hole first and then enlarged it to 1/8".

Sand

Sand off the excess deck and side material. Round the profile of the nose and tail to look like Fig. 6. Sand the body smooth all over.

Plank

The Plank is made from two die cut pieces of mahogany veneer laminated together on a simple jig. Cement the short piece of 1/4" sq. hardwood to the middle of the 10-1/2" long piece of 3/8" x 1/2" hardwood. Cement it to the 1/2" wide face.

Coat the contacting faces of the two planks with a slow setting glue then clamp the two to the jig as seen in photo 6. I used slow setting epoxy on our models but any slow set glue should be fine. You might even be able to use thick ca. I don't like to hurry that much.

After the glue has set completely, unclamp the jig and sand smooth.

Runner brackets

We have build Ice Boats with runner brackets made from both wood and soldered brass. The brass parts look more to scale but more tools and skills are needed to make them. We have included materials for both in the kit.

Wood

Cut six 5/8" long pieces from the 3/8" wide strip of 1/16" plywood supplied.

Glue four of these piece together at 90° as shown in Fig. 7.

Wrap a piece of masking tape around one of your runners, 1-1/2 times to serve as a spacer for the third piece of ply in each bracket.

Cement the third piece of 1/16" ply to the bracket assembly using your taped runner as a spacing gage. See Fig. 7.

Cut two 5/8" long pieces of 1/8" sq. hardwood and cement them to the bracket assemblies as shown in Fig.. 7.

Allow the brackets to cure for an hour or so then sand off all excess wood. Although instant glues set up very rapidly, they don't develop full strength for an hour or two. The edge joints that make up the brackets are easily broken if you rush the glue too much. See photo 7.

Brass

Cut a piece of 1/2" wide brass sheet 1-1/2" long. Cut a piece of 1/8" x 1/4" brass tube, 1-1/2" long. For best results use a Dremel hand grinder and an abrasive cut off disk. Safety glasses should be used.

Solder the brass tube to the brass sheet as shown on Fig. 10 and photo 9.

Use your Dremel and abrasive cut off disk, cut open the bottom of the rectangular brass tube. Work carefully and cool occasionally with water to preserve the solder joint.

Cut two 5/8" long brackets from the soldered section.

File the corners of the brass to a non-snagging radius.

The brass parts are shown in photo 10.

Steering fork

Wood

Cut two pieces of 3/8" wide 1/16" ply, 7/8" long and one piece of 1/8" sq. hardwood, 7/8" long.

Cement the ply and hardwood together to form a channel as shown in Fig. 8.

Cut a piece of 3/8" wide 1/16" ply, 1" long for the fork steering bar. Drill the three holes as shown in Fig. 8 then sand to the slightly tapered shape shown.

Drill the 3/32" hole in the back of the steering fork for the 3/32" brass tube fork pivot shaft.

Carefully cement the steering bar and brass tube to the steering fork, the steering bar should be 90° to the steering fork.

Brass

I use a Dremel hand grinder and an abrasive cut off disk to cut all of the brass parts. Safety glasses should be used.

Cut a piece of 1/8" x 1/4" brass tube 7/8" long and drill a 3/32 hole in the middle of one of the 1/8" faces.

Layout two steering bars on the .032 brass strip left from the runner chocks. The second bar will be used for the tiller shaft.

Drill the 1/8" and #56 holes before cutting out the steering bars.

Cut out the steering bars and file the edges smooth.

Solder the steering bar and the 3/32" brass tube pivot shaft to the 1/8" x 1/4" x 7/8" brass tube.

Tiller Shaft

Wood

Cut a piece of 3/8" wide 1/16" ply, 1" long for the tiller steering bar. Drill the three holes as shown in Fig. 8 then sand to the slightly tapered shape shown.

File a notch in one end of the second 3/32" brass tube then insert it in the middle hole of the steering bar.

Cut a 1/2" long piece of .041 wire and cement it to the steering bar while it is engaged in the notch in the brass tube.

Cut the brass tube to length after final assembly in the body.

Brass

Layout the length and hole position on one end of the remainder of the 1/8" x 1/4" brass tube. Drill the 3/32" hole for the pivot shaft. I don't cut this part to length until after it is all soldered together. See Fig. 9.

Cut and drill the steering bar from the 1/4" wide brass strip.

Solder the pivot tube and the steering bar to the 1/8" x 1/4" brass tube. I push the pivot tube 1/2 way into the rectangular tube and grind out the excess later with the Dremel abrasive cut-off disk.

Mast

The mast is made of a sandwich of two 24" long pieces of 1/8" x 1/4" hardwood. This sandwich allows you to make a straight mast from less than straight wood.

Cut 2 pieces of 1/8" x 1/4" hardwood 22" long. Clamp them together with 4 or 5 spring clothes pins. Sight lengthwise down this mast blank to verify straightness and adjust as needed. When your wood is straight, apply some thin ca to the seam half way between two of the clothespins and allow it to wick into the seam. After a few seconds, clamp the wood together here with another clothespin. If the clamping pressure doesn't squeeze some cement out of the seam, un-clamp and squirt on some more cement and re-clamp. Repeat this process between each of the original clothes pins. Ca doesn't set as fast with our hardwood as some other woods and you might want to squirt some accelerator on your seam. After the glue has had a few minutes to cure, pull off one of your original clothes pins and wick in some more thin ca and then re-clamp. Repeat this process for all of the original clamps.

Cut your mast blank to 21-23/32" over all length. Refer to Fig. 3 for dimensions and lay out the placement of the jack wire spacers. Please note that Fig. 3 is not a full size drawing.

Cement the 1/16" x 1/8" spruce jack wire spacers to the back side of the mast. I line up the spacers on the glue seam between the two pieces of wood in the mast.

Drill the mast for the three eyepins (see Fig. 3).

Using a sanding block or a block plane to taper the mast to about 3/16" square at the top.

Wipe a piece of .041 wire with alcohol or lacquer thinner then scuff it all over with fine sandpaper so that it will glue well to the mast. Cut the jack wire to length. Wipe it again with your solvent and then cement it to the jack wire spacers with thick ca.

Sand the mast to a fat teardrop shape from the bottom of the jack wire to the top. From the jack wire down it should be an almost circular oval.

Sand the mast smooth and finish with your favorite materials.

Cut the eye pins to length and cement them into the holes in the mast. I nick the shanks of the eyepins with my wire cutters for a better glue bond.

Drill a #58 hole in the base of the mast about 1/2" deep. Round the bottom of the mast slightly so that it can rake aft correctly then cement a piece of .041 wire in the hole. Trim the wire so that only 1/4" extends out of the mast.

Boom

Cut a piece of 1/8" x 1/4" hardwood, 12" long. Refer to Fig. 4 and layout the placement of the jack wire spacers and holes for the eyepins. Please note that Fig. 4 is not a full size drawing.

Drill #60 holes for the eyepins then cement the 1/16" x 1/8" jack wire spacers to the boom.

Clean and sand a second piece of .041 wire for the boom jack wire.

Cement the jack wire to the jack wire spacers than sand the boom smooth all over. Please observe the same cleaning procedure used on the mast.

Cut two pieces of 1/8" x 1/4" hardwood, about 1-3/4" long. Refer to Fig. 4 for shape and carve/sand the boom cheeks to shape. See photo 14.

Cement the boom cheeks to the forward end of the boom.

Sand the boom smooth all over and finish with your favorite materials.

Cut the eye pins to length and cement them in the holes in the boom.

Tiller assembly

Cut two pieces of 1/8" sq. hardwood, 4-3/4" long. Sand smooth but leave the corners sharp.

Cement the two pieces together for 7/8" at one end. I place a piece of polyethylene bag between all but 7/8" of the two pieces then wick thin ca into the glue joint and clamp with spring clothes pins. See photo 11.

Cut a reinforcing scab from the little piece of 1/32" ply in the fitting bag and cement it to the bottom of the tiller to keep it from splitting. See photo 12. The tiller is shown upside down in the photo, the scab should be on the bottom.

Cut a 9/16" long piece of 1/8" sq. hardwood and cement between the aft ends of the tiller as seen on photo 12.

Drill a 3/32" hole for the tiller shaft and a #60 hole for the main sheet eye pin. See Fig. 5 and 6.

Tiller and steering shaft bearings

The tiller and steering shaft bearings are made from the 1/8" brass tubes in the fitting bag. You will have to cut them to length. I filed ours off flush with the wood of the body and used small washers to provide clearance for the various pivoting parts.

Attach plank

Cement or screw the plank to the body using Fig. 5 as reference. Cut two 1/8" x 1/4" hardwood chocks and cement them to the bottom ahead of and behind the plank. See photo 8. Cement the runner brackets to the plank.

Runners

Drill a #56 hole in each of the runners as shown in Fig. 11 and round off the front ends. Drill the runner brackets and steering fork so that the runners can rotate a few degrees.

Sail

Lay the mast, boom and sail on a clean table and mark the sail where the dress hooks need to be sewn. Sew the dress hooks to the luff and foot of the sail with several loops of thread each.

Use the full size drawing to layout the vinyl simulated battens on the sails. Apply the die cut vinyl to both sides of the sails and trim off the trailing end with about 1/32" extending beyond the sail.

Sew a 20" long piece of dacron string to the top of the sail.

Clip the sail to the mast and boom. Thread the string at the top through the eye pin at the top of the mast. Tie the end to another eyepin that hooks to the eye pin just above the boom.

Sew a couple loops of thread through the eye pin on the rear of the boom and the rear corner (clew) of the sail.

Final assembly

I like to finish (paint or varnish) all of the woodwork before the final assembly of the model.

As I mentioned at the beginning, I like finishing with lacquer based materials; mostly because they dry so quickly. As an experiment, I finished our first display model with waterbase finishes from a local crafts store. The results were quite nice. If you live in an apartment or similar situation where strong smells are objectionable to your neighbors, these finishes are a very good choice. I used Liquitex Acrylic Wood Stain, Minwax Polycrylic Clear and Elmers Fill 'N Finish Dark Wood Filler. The filler was a little lighter than the Mahogany veneer but I was able to mix some wood stain with filler and get a very good match.

I used the wood filler to fill gaps in imperfectly fitted joints and to fill the sometimes coarse grain of the planking. The filling technique was to tint some filler with the acrylic stain then spread it on the wood with an artist's palette knife. Kind of a miniature putty knife. The filler was spread on across the grain to leave as much as possible in the grain and was then allowed to dry thoroughly. Don't put on so much filler that the wood looks like it has been plastered with brown plaster. After the filler has dried sand off all the excess leaving filler in the pores only. A coat of stain and about 3 coats of clear will result in a very nice finish. The only real objection that I have to the water borne finishes is that I have a hard time cleaning the stuff out of my brushes. I have better luck cleaning out solvent based products.

My favorite finishing system is lacquer sanding sealer and semigloss clear lacquer or polyurethane. I usually stain my wood with water or alcohol based stains from Constantines or Behlens and fill the grain with multiple coats of sanding sealer. I like a little bit of the wood texture to be visible in the finished model. Polyurethane is a more durable top coat than the lacquer but it dries much more slowly.

You can also paint your model but a lot of the charm comes from the natural beauty of the wood.

Drill for eye pins

Refer to Fig. 5 & 6 for the placement of the eye pins on the body and plank. Drill #60 holes for all of the eye pins. Scuff the shank of the eye pins and cement them in place with thick ca after applying your finish.

Rigging

We are supplying braided dacron fishing line to rig your ice boat. Some of the connections to the boat are with a knot, and a couple of overhand knots are adequate. The halyard is sewn to the head of the sail with a needle and thread. The stays and the steering lines use soft copper swaging sleeves we call shroud sleeves. In order to thread the dacron string through the sleeves we stiffen one end of each string with thin ca. After the ca sets, the end is cut at a sharp angle to form kind of a "needle". This stiff section needs to be about 1/2" long

Steering Lines

Cut two pieces of string about 9" long and attach them to the steering bar of the tiller shaft with two shroud sleeves. Crimp the sleeves slightly to retain the string. See photo 13.

Install the tiller shaft in tiller tube with a washer between the steering bar and the bottom.

Put another washer on the shaft on top of the deck followed by the wooden tiller with the scab on the bottom.

Retain the tiller on the shaft with a grip ring. I opened the grip ring slightly with an ice pick to make it easier to push on. Cut off the tiller shaft about 1/16" above the grip ring. See Fig. 6 and photo 17.

Steering fork

Install the steering fork in the front bearing tube with a washer between the steering bar and the bottom. Place another washer on top of the deck and retain the shaft with a grip ring. Trim off the tube about 1/16" above the grip ring.

Attach the steering strings from the tiller shaft to the steering fork with shroud sleeves. Adjust the length of the strings so that the two steering bars are parallel. See photo 13. Cut off excess string.

Attach runners

Attach the runners to the brackets with the heavy straight pins from the fitting bag. Cut off the excess with wire cutters and cement the pins to the brackets.

Rig the mast

Trace the Angle Template from Fig. 6 on to a piece of cardboard.



Cut three 24" pieces of dacron string and make ca needles on one end of each. Attach the strings to the eye pin 15-1/2" above the base with shroud sleeves.

Install the mast in the mast step hole in the deck. It will flop around some until the stays are tightened.

Loosely attach the stays to the appropriate eye pins with shroud sleeves. Crimp the sleeves very slightly to provide a little drag on the strings. Adjust the length of the stays so that the mast is vertical when viewed from the front and raked aft to match the angle of the Angle Template when viewed from the side. See photo 16. When you are satisfied, crimp the sleeves more firmly. Trim off the excess string.

Main sheet

Tie a piece of string to the aft eye pin and thread it through the various eye pins on the rear deck, boom and the tiller. Pull the sheet up snug and cut off any excess 12" beyond the tiller eye pin.

Cement tiller to shaft.

Center the front runner so that it points straight ahead. Center the tiller then cement the tiller to the tiller shaft.

...That's all folks

Thanks...

We appreciate your confidence in our product as expressed by your purchase of this kit. We hope that you have enjoyed building the DN Iceboat and hope that we can be of service to you in the future.

Good luck and good boating.

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