Instructions for Basic Drop-Spine Box
by Sandra Liddell Reese

There are three primary units to this box: two three-sided trays (one made to fit over the other) and one case that wraps around the trays.

Materials:
• #20 weight Davey board (3/32 thick) medium weight for boxes. Note: #25 is thinner, #15 is thicker.
• 2-ply mat board or chipboard
• PVA: undiluted and diluted (16 oz. to 2 T. glycerin)
• linen binding cloth (paper backed)
• paper for tray panels (all papers react differently when wet glue is applied, be prepared for curling)

Have on hand:
• right angle triangles
• bone folder
• scissors (embroidery and regular)
• mat knife with supply of sharp blades
• exacto-knife for precise cuts
• newsprint (torn to appropriate sizes)
• wet towel (preferably on hook beneath work surface)
• self-healing cutting mat
• 2 covered bricks, blocks of wood or stack of books to hold cloth-covered tray off table while gluing bottom
• plexiglass or plastic cutting mat surface resistant to glue
• (optional) bar stock or binder board spacer bar: 5/32 by 3/4 inch. Buy bar stock at Specialty Tool on Aero Camino in Goleta. Note: Use the 5/32 width as space between spine and cover. Use 3/4 to trim paper and cloth around board.

Procedure for measuring and making the first (smaller) tray

1. Measure, to the next 1/16 of an inch, the length, width and thickness of the book or object you wish to bind. Draw a picture of a three-sided tray and write the dimensions on each side. The 1/16 inch allows for the thickness of cloth glued over Davey board. These instructions refer to a vertically oriented box. The open side of the tray will be the long dimension.
   Cautionary note: Be generous, even up to an extra 1/16 inch beyond your first measurement. No sense going through the effort if the box is too small for your object.

2. Cut one piece of board to the above size making sure the grain of the board is parallel to the long dimension. Cut a second board the same width and one inch longer than your long dimension. This second piece will be used for the side rails. Unless you have a deep tray you will be able to cut all the side rails out of the second piece of board.

3. The width of the rails is determined by adding 3/16 of an inch to the first measurement you made of the thickness of the object you are enclosing. The 3/16 equals: a) the thickness of the bottom board plus b) an allowance for your work to fit slightly below the edge of the tray plus c) a two-ply panel thickness on the inside of the bottom tray. If you are altering the thickness of the panel in the bottom of the tray, you need to account for this in determining the height of your tray rail.
4. Two of the rails are the same length as the short sides of your tray. One rail is cut at least 1/2 inch longer than the long side of the tray and then trimmed to fit after the 2 side rails have been glued in place.

5. With a foam brush apply undiluted PVA to the edge of two short sides and one long side of the bottom board of the tray. Make sure to wipe off excess glue on bottom of board before placing it down on a slick, nonporous surface. Place the board in front of you so that the long dimension is facing you and the short sides are on your left and right. Put a weight down on the board to keep it flat against the table. Place each side rail up against the edge of the short sides of the board and flush to the front and back edge of tray. Put a covered brick up against each side rail to hold in place.

6. Before putting glue on the over-sized long rail, fit it up against the back of the tray so that the left side makes a flush, square corner and the right side extends beyond the edge of the tray. Use a pencil to mark the exact length of the long rail needed to cover the side rail on the bottom right corner. Pull the marked rail away from the box (it will stick slightly to the glued edge) and cut the strip to the proper length. Put a 1/8 inch strip of glue on the front surface of three sides of the rail where it attaches to the back of the tray. Place covered brick to hold rail in place. Let dry for 5-10 minutes. Then carefully pry glued tray off table surface.

**Procedure for determining size of cloth for wrapping both trays:**

1. Add together the length of the three rails on the first tray and add 2 inches to that measurement. This will determine the length of the cloth. Double the width of the rails on the first tray and add to that measurement 1 and 1/2 inches. This will determine the width of the cloth covering.

2. Cut the long measurement of your cloth parallel to the selvage, or 'finished' edge of the cloth. Even though the second tray is slightly larger than the first, you should have enough allowance of cloth so that you can cut the cloth strips the same size for both trays.

**Procedure for gluing cloth onto box:**

1. Draw a pencil line 1/2 inch wide along the long edge of the backside of the cloth.

2. Roll glue on the outside of the three rails of the tray. Place cloth face down, horizontally with the pencil line closest to you, on clean self-healing cutting mat.

3. Hold tray with open end facing right and inside of tray facing away from you. Set side of tray down along pencil line one inch in from the right side of cloth. Press this side down well on to cloth. With tension on left end of cloth, roll the three-sided tray along the pencil line. As you proceed rolling the tray, make sure air bubbles are pressed out between cloth and board on each side. Use metal bar 3/4 of an inch wide to cut off excess cloth on both ends before the next step.

4. Flip tray over onto covered wooden block or stack of books high enough to allow cloth to hang freely over edge of board and backside of tray is facing ceiling. Press down cloth along the three sides. Squeeze excess cloth together on corners and trim off dog-ears. Use bone folder to press cloth securely to bottom of tray.

**Procedure for making cuts into cloth:**
1. Lay tray on table so that the inside is facing up and the open side is toward you. Place the short side of right angle triangle flush against the front edge of the bottom of the tray, and the long side as far right as it will go into the fold of the cloth on the right side. Cut the cloth against the straight edge of the triangle. Now, place the long edge of the right angle triangle against the inside of the right hand side of the tray. Make a second cut into the cloth, parallel to your first cut. This will create about a 1/8 inch wide strip (approximately the same thickness as the Davey board). Flip the right angle over and make the same cuts on the left side. Make sure you make the outer cut first on both sides.

2. Turn the tray up on the right hand side rail with the open side facing left. Lay the long side of the right angle (not the hypotenuse) up against the front edge of the rail. Make a very straight cut from the point of the corner of the rail out to the edge of the cloth. This will release one side of the flap of cloth that covers the side rail. Gently lift this side rail section of cloth in toward the inside of the tray to get it out of the way before making your next cut. While holding this section of cloth up off the cutting surface with the back of your hand, lay the long edge of the right angle down, at an angle, so that it bisects the upper left corner of the small flap of cloth and angles down to just over 1/8 inch away from the corner of the tray. Use a mat knife to cut against the edge of the triangle. You will be left with a sail-like piece of cloth sticking out from the edge of the tray.

3. Turn tray over to the left side and repeat this process. It will feel very awkward for a right-handed person.

4. Place the long rail of the tray down on the cutting mat with the inside of the tray facing toward you and the open side facing up toward the ceiling. Place the 90 degree corner of the triangle flush against the edge of the long rail and as far right as it will go into the fold of the cloth on the right side. Put the tip of the mat knife into the cloth at the corner point and cut out to the edge. Without moving the position of the tray, place the corner of triangle all the way into the corner of the inside of the tray. Begin the next cut the thickness of the Davey board away from the edge of the rail and make a parallel cut to the first cut. Turn the tray a quarter turn to the right onto the side rail, flip the triangle over and place all the way into the inside corner of the tray. Make another parallel cut beginning at the thickness of the Davey board away from the edge. You should have two narrow strips of cloth extending from each side of the corner of the tray. Follow same procedure on other corner.

5. Cut most of the narrow strip on the short rail side of the tray off so that you have a small tab 1/8 of an inch long that covers the top corner of the tray. Don’t cut into the large flap. Do the same thing on the other side.

6. Take the second narrow strip on the long rail side and make a 45 degree cut from the point of the corner to the edge of the strip. Do the same thing on the other side.

7. Cut off four (4) 1/2 inch isosceles triangles (no bigger) from the cloth on the back corners of the tray.

Procedure for gluing down cloth

Note on PVA: The standard mixture for most gluing applications is 2 cups PVA diluted with 2 T. glycerin. Use undiluted PVA only when gluing Davey board pieces together and when attaching the finished tray to the finished cover. Glycerin may be purchased over-the-counter at most drug stores. Glycerin reduces tack and diminishes the stretching and shrinking of paper fibers.
1. Apply glue to triangle and 2 flaps (one side at a time) that were created in steps 1 and 2 under cutting procedure. **Clean fingers.** Cut off **all but 1/8 inch** of narrow middle strip with embroidery scissors. Press this little tab up to cover the lower corner of the front edge of the side rail. Turn in triangle, pressing in tightly over front edge of rail and snugly into crease between bottom edge of rail and tray. Press dog-ear of triangle down over top edge of side rail. Clip excess dog ear off flush to side rail with embroidery scissors. Turn remaining flap in over front edge of bottom of tray. Smooth corner with bone folder. Repeat on other side.

2. **Clean fingers after each glue application.**

3. Turn tray up on one short rail side, roll glue onto cloth, being careful not to get it on the backside since this is the side that will show on the inside of your tray. Use foam brush to glue area close to rail.

4. Fold side flap over edge of rail tightly, pressing bubbles out as you press cloth down into seam of the tray. Use the bone folder to press cloth snugly into corner and down over boards. You can move the tray around to get the cloth pressed down well over all surfaces. If you run the bone folder over the top edge of the rails it makes a sharp square looking edge.

5. Follow same procedure for opposite short rail side.

6. Glue the last long flap and fold down into tray making sure the outside edges don't leave a glue track on the side rails as you push it down over the long rail. Make sure you press out all air bubbles with a bone folder.

**Procedure for making 2nd tray (which needs to fit over the first covered tray):**

1. Turn the tray you have just made over so the backside is facing up. To the dimensions of this assembled and covered tray **add: 1/16 inch to the short dimension and 1/8 inch to the long dimension.** This measurement allows for the thickness of the covering material on the second tray. **Add 3/16 inch to the height of the rails.** This extra amount accounts for a) the thickness of the board on the second tray b) the thickness of the covering material and c) the 2-ply panel on the inside of the larger tray.

2. At this point follow all procedures for making first tray.

5. Test to see if one fits easily inside the other.

**Procedure for making panels that fit into the bottom of the trays**

1. Cut **two** pieces of 2-ply mat board 1/16 inch smaller than length and width of the **inside of the small tray.**

2. Cut cloth or paper at least one inch bigger on all sides than the mat board you have just cut.

3. **Apply glue to mat board** and place down on paper or cloth. Press out any bubbles with bone folder. Trim all the way around using a 3/4 inch wide steel bar. Trim two isosceles triangles off, very close to the board, at top and bottom of one side of the long dimension. Opposite these, cut two square pieces out of the paper that extends beyond the mat board at the corner. This will release the flap that will wrap around the front edge of the tray when you glue the panel in place. Turn panel over so the covered side is down and roll glue along all the edges **except the one which will wrap over the edge of the tray.** Pull edges tightly over the
mat board and smooth down with bone folder. If you have cut the triangles properly the paper will cover the corner on the front side but it will not quite come together on the back side. This is OK because you have less bulk and it won't show. Make a second, identical panel.

3. Roll PVA with glycerin over back of one of the panels and carefully place in the bottom of the small tray. Press down well. Fold flap over open edge of tray and glue down on backside of tray.

4. Use the same procedure for gluing the second panel into the larger tray. Please note: There will be more room around the edge of the panel because the second tray is larger than the first. This "moat" will allow the rails of the small tray to fit in between the edge of the larger tray and the panel.

Procedure for making wrap-around case

1. Cut two pieces of Davey board that measure 1/4" longer and 1/8" wider than the outside measurement of the cloth-covered large tray. Cut one piece of Davey board for the spine that is exactly the same length as the two cover boards you have just cut and 1/16 inch wider than the height of the rails on the large tray.

2. Lay the 3 pieces of Davey board out in front of you on the table. The back cover will be on the right, the spine in the middle and the front cover on the left, with about 1/4 inch in between each board. Roughly calculate the amount of cloth needed to cover all three pieces plus 1 and 1/2 inches extending from each side for turn-ins.

3. Cut cloth with the height dimension parallel to the selvage edge.

4. Roll PVA with glycerin on one of the cover boards and place it down on cloth approximately one inch in from right hand side and down from top. Place a metal bar across the top of this board and another metal bar measuring 5/32 of an inch thick up against the left side of board. Roll glue on to spine board. Turn over and lay spine board into right angle formed by two metal bars. Lift the 5/32 bar and put it on the other side of the spine board. Roll glue onto other cover board, turn over and place in right angle formed by two metal bars. After the second cover board is in place lift and clean the metal bars. Trim the top and bottom flaps of cloth off to 3/4 of an inch. Trim isosceles triangles off all four corners at least 1/8 away from corner of board. Use foam brush to apply glue to top turn-in. Bring the top flap over edge of all 3 boards and glue down to back side. Push cloth into separation between boards. Do the same for the bottom flap. Nick-in the dog-ears on all four corners. Apply more glue with foam brush and turn in both side flaps. Press corners with bone folder so they are flat, crisp right angles.

5. Cut a piece of cloth for the inner spine that is the same height as the long dimension of the small tray and 2 inches wider than the spine. Roll glue on to back of cloth, turn over and place equidistant between top and bottom of spine. Lightly attach by running your fingers over cloth down the center of the spine. Before cloth has a chance to stick to inside of cover boards work it down very squarely into the groove between the spine and the cover boards. Then, press the excess cloth down onto the inside of the cover boards.

Procedure for gluing trays to case

1. Make two pressing blocks of binder board to fit snugly into each tray. The height of the pressing block should rise 1/16" or so above the height of the side rails. This is optional and primarily useful if you are making several boxes that are all the same size.
2. Glue the small tray down first. Roll undiluted PVA onto the back side of the small tray and also onto the inside cover making sure you don't put glue out beyond where the tray will rest. Place the open edge of the tray flush to the right side edge of the hinge, and equidistant from the top and bottom of the cover. **Make sure you don't place the tray over the hinge area or the box will not close properly.** Remember there will be a much larger reveal on the side with the small tray because the big tray has to fit over it. Put into the nipping press for 10 minutes, careful not to crush the sides of your tray. If you don't have a nipping press, try to apply pressure to edges of tray, without crushing them, as well as to the center. You should apply the pressure longer (1/2 hour) if you do not have a nipping press.

3. Glue the large tray in place using same procedure.

4. Close finished box and let cure for a day out of bright sunlight and heat.