ARCHIVES ON A SHOESTRING III

Making Enclosures: A Hands-on Workshop

Brentwood Public Library
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Sponsored by: LILRC Committee for the Preservation of Local History
Workshop Agenda

I. Introduction to Preservation Enclosures:
   - Item Considerations
   - Environmental Considerations
   - Recommended Tools & Equipment
   - Enclosure Supplies and Materials
   - Types of Enclosures

II. Preparing the Item
   - Cleaning the items
   - Item Stability
   - Item Dimensions

III. Demonstrations
   - Pre-creased boxes
   - Phase Box with Bristol
   - Four Fold Box with Board

IV. Support & Essentials
   - Supplies and Suppliers
   - Online Tutorials
   - Further Reading

V. Q&A/Open Discussion
   - Free Demo Time
Preservation Principles: Specific Principles

- Appraisal is both necessary and desirable.
- Keep the original.
- Keep multiple copies of objects.
- Do the minimum necessary to stabilize and preserve the object.
- Preservation actions should not exceed the abilities of the personnel who apply them.
- Preservation actions should aim at the highest quality possible.
- Preservation actions should not harm the object.
- Preservation actions should be documented.
- Preservation actions should adhere to ethical considerations.

The modern manuscript collection contains the following:

- Paper records or documents
- Photographs
- Newspapers & Journals
- Audio materials, i.e. audio cassettes
- Video materials, i.e. VHS videotapes
- Artifacts, i.e. framed awards or proclamations
- Digital materials, i.e. 3.5 floppy disks
Enclosures & Environmental Conditions

The preservation environment encompasses multiple levels, ranging from the facility to the folder level.

Proper control of temperature, relative humidity and Dew point are all factors in creating a stable preservation environment.

Enclosures assist in the preservation of the item and protect against common threats such as:

- Moisture (RH)
- Airborne Pollutants
- Heat (Temp)
- Light Damage (UV)
- Insects
- Vermin
- Mold & Mildew

Helpful Online Tool: Dew Point Calculator
## Types of Environmental Damage

### Chemical Change/Natural Aging
-- Chemical change in organic materials arises in response to heat energy (temperature) and available moisture (relative humidity).

### Biological Decay/Mold Risk
-- Biological decay is caused by living organisms, most notably mold and mildew (fungi) and insects.

### Mechanical Damage/Dimensional Change
-- Mechanical or structural damage is a form of decay that effects hygroscopic organic materials (those that absorb moisture).

### Metal Corrosion
-- Metal corrosion is a form of chemical change driven primarily by moisture. Corrosion begins when RH levels are 55% or greater.
Basic Storage of Archival Documents

• Store upright; oversized items store flat
• Container should be slightly larger than the document
• Acid/Lignin Free
• 8.5 PH
• Calcium Carbonate Buffering
• 60 pt. board
• Pull string/handle
• Acrylic Coated, as needed
• Polypropylene AV materials.
Minimum Tool Set for Box Construction

Tools Needed
Metal ruler
Metal Triangle
Bone folder
Scissors
X-acto blade or scalpel with replacement blades
Small brush
Large glue brush
Eraser
Pencil
Large cutting mat

Other Equipment
Teflon folder
Fasteners
String
Larger Equipment

**Manual Board Creaser:**
A creasing machine is best to use- it can create a deep fold in most types of board, at straight right angles. This is necessary equipment for any boards thicker than Bristol.

**Large Cutter or Guillotine:**
Machines that can cut large pieces of material quickly are very helpful when making enclosures. Cutting by hand is possible, but more difficult.
Types of Enclosures

Clamshell
Double-tray
Hinge Box (single tray)
Folio (portfolio)
Slipcase

Phase Box
- Heavy Paper/Bristol
- Corrugated Board
- Barrier Board
- Cloth Covered Book Board
Types of Boards

**Bristol**

**Pros:**
- Easiest to fold with basic toolset
- Affordable
- Space saving - very thin

**Cons:**
- Does not protect against environmental concerns or acidity
- Not recommended for large items
- Flexible material = less protection

**Corrugated Board**

**Pros:**
- Sturdier than Bristol
- Can be cut and folded without large machines/equipment

**Cons:**
- Not treated to protect against environmental concerns or acidity
- Can bend or puncture more easily than harder boards
- Not ideal for heavy or large items

**Barrier Board**

**Pros:**
- Sturdier than Bristol and corrugated boards
- Is treated to stop transfer of acidity
- Great for items with acidic paper

**Cons:**
- Not ideal for items with protein based materials (unless wrapped)
- Need larger equipment for cutting and folding
Types of Fasteners

- Rivets, Grommets, & Washers
- Velcro (Hook & Loop)
- Tucked Flaps
- Wood, Bone, or Horn Clasps
- Cotton Tying Tape
**Bristol Phase Box**

**What to Box**
Small, thin, and/or light volumes. Recommended for items with hard covers.

**What You Need**
- Heavyweight, acid-free paper, like Bristol board
- Large cutting mat
- Long metal ruler, yardstick, or T-square
- Sharp cutting blade (X-acto, scalpel, or box cutter)
- Teflon or bone folder
- Fasteners (Velcro, string, etc.)
- Optional: Large paper cutter
- Optional: Corner rounder

**Time to Complete:** 10-20 minutes

**Difficulty:** ★ ★
Corrugated Board Phase Box

What to Box
Items of small to average size, light to average weight. Ex: Fragile books, thick folded maps, stacks of documents, etc.

What You Need
• Corrugated archival board
• Large cutting mat
• Long metal ruler, yardstick, or T-square
• Sharp cutting blade (X-acto, scalpel, or box cutter)
• Teflon folder
• Fasteners (Velcro, string, etc.)
• Optional: Large board cutter
• Optional: Corner rounder

Time to Complete: 20-30 minutes

Difficulty: ★★★
Barrier Board Phase Box

What to Box
Items of small to average size, light to average weight.
Ex: Fragile books, thick folded maps, stacks of documents, etc.

What You Need
• Barrier archival board
• Large board cutter
• Teflon or bone folder
• Manual Board Creaser
• Fasteners (Velcro, string, etc.)
• Recommended: Corner rounder

Time to Complete: 20-30 minutes

Difficulty: ★★★
Flap Folding Order

The flaps are folded in this order to minimize the ability for dust to penetrate the enclosure, and to enable clean spines to show on the shelf.

1. The bottom flap is folded up first.
2. The top flap is folded down.
3. The right flap is folded
4. The left flap is closed and the box can be tied.
DEMOS
1. Compare the sizing of the phase box to the book or work.

2. Unfold the phase box flaps, and place the book in the center.
3. Lift up the fore-edge flip, note the corresponding fold line to the book’s top edge.

4. Align the ruler’s edge with the appropriate fold mark.
Pre- Folded Phase Boxes 3

5. Press down on the fold mark, and score it with the edge of a bone folder.

6. Press down on the ruler with one hand, and lift the flap along the scored line.
7. Fold over the flap, and flatten down the scored fold with the bone folder, working from the center out.

8. Repeat Steps 3 – 7 on the corresponding, opposite flap.
Pre-Folded Phase Boxes 5

9. Score the corresponding fold on the bottom flap, and fold it over.

10. Score the corresponding, opposite flap and fold it over the bottom flap.
Pre- Folded Phase Boxes 6

11. Fold over the inner side flap.

12. Fold over the outside side flap.
13. Select Velcro dots, and place each side together.

14. Affix the two piece dot to the center fore-edge of the outer fold.
Pre- Folded Phase Boxes 8

15. Fold over the phase box cover, and press down over the Velcro dot.

16. Open the phase box, and ensure each side of the Velcro dot is secure.
17. Repeat the process as needed for each book to be enclosed.
BRISTOL PHASE BOX

HAND FOLDING A BOX
Minimum Tool Set for Box Construction

**Tools Needed**
- Metal ruler
- Metal Triangle
- Bone folder
- Scissors
- X-acto blade or scalpel with replacement blades
- Small brush
- Large glue brush
- Eraser
- Pencil
- Large cutting mat

**Other Equipment**
- Teflon folder
- Fasteners
- String
Bristol Phase Box Anatomy

Completed
Open Box

2nd fold
3rd fold
4th fold
1st fold

Box Pieces Before Gluing

4th
3rd
2nd
1st

8th 7th
6th 5th

Vertical Piece Glued Here

Completed
Open Box

2nd fold
3rd fold
4th fold
1st fold

Box Pieces Before Gluing

4th
3rd
2nd
1st

8th 7th
6th 5th

Vertical Piece Glued Here
Bristol Phase Box: Cutting the Pieces

1. Determine grain direction

2. **Vertical piece**: cut to the desired width of the box. Length is 3 times the final height of the box + 2 times the final box thickness.

3. **Horizontal Piece**: cut to the desired height of the box. Length is 3 times the final width of the box + 2 times the final box thickness.
Bristol Phase Box 1

Use an archival quality piece of heavy paper, such as Bristol board.

This type of heavy paper is ideal for boxing small, hardcover items affordably.
Bristol Phase Box 2

1. If the item is disbound or in another way misshapen, carefully arrange the pieces back into a semblance of its original shape. Be careful not to force any sections into a 'perfect' shape, simply arrange the items as well as you can.
2. Test the grain of the Bristol with a bounce test. Folds should be made with the grain of the board. This is against the grain.

3. This is with the grain. Box pieces will be cut so the creases follow the same direction.
**Bristol Phase Box 4**

4. The first folds of the complete box will be vertical, so the vertical piece is cut first.

Align the item in a squared corner of Bristol board. Use a pencil to mark the total width of the item plus an additional 1/8 to 1/2 inches.

✔✔ Double Check...
Some items may be larger at the top, bottom, or middle of the work. Be sure to use the widest measurement as your total width of the item, and add extra space on top of that measurement.
5. Measure from the edge of the board to the pencil mark. This is the width of your vertical piece.

6. Mark the same width at the top of the squared edge of the board, to ensure an even width from top to bottom.
7. Cut between the two pencil marks using a metal straight edge or ruler and a sharp blade, or with a large cutting machine.

**Pro Tip...**

A cork backed ruler will help prevent the ruler from shifting when cutting a large section by hand.
8. Check the width is consistent throughout the piece. Ensure the short ends are square, trimming a little if necessary.

9. Check that the item fits as desired. If the piece looks too wide, trim it down again.
10. Place the item on one end of the cut piece.

11. Mark where the first fold will be, leave a small space as room for error. Later, the flap ends can be trimmed if needed.
12. Use the pointed end of a bone folder to crease the board. Use a metal square/triangle or the cutting mat grid to ensure the crease is perpendicular.

13. While keeping the ruler in place, move the bone folder under the Bristol board and press upward against the ruler to create the fold.
14. Remove the ruler and fold the Bristol flat along the crease. Press the crease with the bone folder.

15. If desired, switch to a Teflon folder as well to help ensure a good crease.
16. Hold the item vertically along the fold to measure the next crease. This will ensure the depth of the box.

17. Use a pencil to mark where the next fold should be (the thickness of the book + 1/8 - 1/4 inch extra).
18. Make the same mark on the other side of the board, based on the thickness of the work on that side.

19. Remove the item and open the board. Measure the space between the first crease and the two new marks. Make the second crease according to the widest of the two marks.
Bristol Phase Box 13

20. Use the cutting mat grid to line up the second crease to ensure it will be perpendicular to the long board edge, and parallel to the first crease. Erase the pencil marks.

21. Use the pointed end of a bone folder and straight edge to crease the board.
22. While keeping the ruler in place, move the bone folder under the Bristol board and press upward against the ruler to create the fold.

23. Remove the ruler and fold the Bristol flat along the crease. Press again with the bone folder or switch to a Teflon folder, if desired.
24. Place the item on the board so the bottom is facing the first flap that was just created.

25. Fold over the bottom flap to ensure the item is resting snug in the fold of the first flap.
26. Without moving the item, fold back the first flap and mark where the third crease will be. Ensure the crease will be square.

27. Remove the item and make the third crease using a straight edge and the pointed end of a bone folder.
28. While keeping the ruler in place, move the bone folder under the Bristol board and press upward against the ruler to create the fold.

29. Remove the ruler and fold the Bristol flat along the crease. Press again with the bone folder or switch to a Teflon folder, if desired.
30. Measure the width between the first two creases.

31. Use this measurement to mark the width from the third to fourth crease.
32. Place the item vertically against the third fold, and ensure the measurement is wide enough to for the item’s depth. If needed, adjust to the item’s thickness.

33. Use a straight edge and bone folder to make the fourth and final crease for the vertical piece of Bristol.
34. While keeping the ruler in place, move the bone folder under the Bristol board and press upward against the ruler to create the fold.

35. Remove the ruler and fold the Bristol flat along the crease. Press again with the bone folder or switch to a Teflon folder, if desired.
36. If necessary, trim the bottom flap (from the first two creases), just shy of the item’s full length. This ensures the second flap can close over it comfortably.

37. Use a sharp blade and metal straight edge to trim the bottom and top flaps.
38. Fold both flaps over the item, and flip them so the last flap is on the bottom

39. Use a pencil to mark where the flap should be trimmed.
Bristol Phase Box 23

40. Trim the final flap just inside the pencil mark, making sure the cut is square.

✔️ Finished with the Vertical Flap piece.

The horizontal piece is now cut to the height of the folded vertical piece, and similarly folded.

The instructions continue on the next slides, however the folding process is the same for the horizontal piece, except the folded vertical piece is used when measuring instead of the item itself.
41. Use the finished vertical piece to measure the height of the horizontal piece of bristol board. Ensure that the board is being cut so the creases follow grain direction.

42. Mark the top and bottom of the piece’s height from the bristol’s square edge.
43. Measure the space and mark the same measurement at the opposite end of the board to ensure an even height throughout.

44. Cut the board evenly, and check that the height remains consistent throughout. Recut or trim down if needed.
45. Align the vertical piece on the squared side of the horizontal piece. Mark with a pencil along the edge, at the top and bottom.

46. Use a straightedge and a bone folder to crease a perpendicular line along the pencil mark. Fold it up over the ruler, and press down to ensure a good folded crease, as was done for the vertical folds.
47. Hold the vertical piece upright against the flap. Mark with a pencil along the edge, at the top and bottom, to determine the thickness.

48. Use a straightedge and a bone folder to crease a perpendicular line along the pencil mark. Fold it up over the ruler, and press down to ensure a good folded crease, as was done for the vertical folds.
49. Place the folded vertical piece inside the newly created flap, ensuring a snug fit. Use a pencil to mark where the next crease should be.

50. Use a straightedge and a bone folder to crease a perpendicular line along the pencil mark. Fold it up over the ruler, and press down to ensure a good folded crease, as was done for the vertical folds.
51. Enclose the vertical piece inside the creases and turn it to an upright position.

52. Use a pencil to mark where the last fold will be. Do not use a ruler to determine the thickness matches this final fold includes the item’s thickness + the three flaps.
53. Use a straightedge and a bone folder to crease a perpendicular line along the pencil mark.

54. Fold it up over the ruler, and press down to ensure a good folded crease, as was done for the vertical folds.
Bristol Phase Box 31

55. Trim off any excess material so the flaps close fully.

The Vertical and Horizontal pieces of the box are complete.

Next, the center of the vertical piece will be glued onto the center of the horizontal piece.

However, first considered how the box will remain closed. Certain fasteners, like cloth tying tapes, are attached before the box is glued.
Bristol Phase Box: Using Cotton Tying Tapes

Flat cotton tapes are woven in and out of the horizontal piece of the box before the two pieces are glued together.

The cotton strips are tied together to keep the box closed.

Strings woven through the outer-most flap.

Strings under the glued vertical piece.

Four pairs of slits, evenly spaced, equal to the thread width.
Bristol Phase Box: Using Cotton Tying Tapes

Make slits the exact width of the cotton tape.

Space the slits evenly from the top and side edges.

Pro Tip...
Using an awl to mark the beginning and end points of the slit is more precise than a pencil, and helps stop a sharp blade from over cutting.

Sample Measurements (not to scale)

- Last Folded Flap:
  - 1.5 inches
  - 1.5 inches
  - 2 inches
  - 2 inches

- Spine:
  - 1.5 inches
  - 1.5 inches

- Back of Box:
  - 1.5 inches
  - 2 inches
  - 2 inches

- Third Folded Flap:
  - 1.5 inches
  - 2 inches
  - 2 inches

½ inch (width of tape)
Bristol Phase Box: Using Cotton Tying Tapes

This is the interior of the horizontal box piece before gluing.

Exterior view when closed and glued. The box ties on the fore-edge of the box, and the spine side (without ties) will show on the shelf.
56. Use scrap paper under and around the center section of the vertical piece until only the back of the center is showing. (Cover the flaps and creases).

57. Glue just the back of the center piece, being careful not to get glue past the creases. Remove the scrap paper.
58. Line up the vertical piece and lay it on top of the center part of the horizontal piece. Close the flaps in the correct order and adjust the pieces until square.

Double Check...
That the pieces are being glued in the correct direction, and that the flaps are in the right order.
59. Use a Teflon or bone folder to press the pieces together. Be sure to clean off any extra glue that may ooze from the sides.

60. Lay the box out, open, with wax paper above and beneath it.
Bristol Phase Box 35

Once dry, remove the weights and wax paper and place the item inside. Fold the flaps in order: 1) bottom, 2) top, 3) right, 4) left.

Secure the box with the chosen fasteners (here, cotton tying tapes), and label and process before going on the shelf.
If cloth tying tapes are used, when the box is complete and glued, trim all the ties to an equal, manageable length.

Pro Tip...
Lighting coating the very ends of freshly trimmed cotton tapes will greatly reduce any fraying and extend the life of the box and fasteners.
Fasteners: Velcro

Once glued and dry, Velcro can be added in 1-3 spots of the final flap's edge to keep a box secured.
CORRUGATED BOARD

HAND CREASING PHASE BOX
Corrugated Board Phase Box 1

1. On a cutting surface, lay down a piece of phase box board, and place the book to be boxed on top.

2. Align the edges, and mark the book’s length and width.
3. Weigh down the board, and use a ruler and box cutter to cut the board to size.

4. Lay out the book on the board, and mark the top fore-edge.
5. Using the straight edge of a T-Square, press down and crease the board along the fore-edge mark.

6. Fold the book and lower half of the board over, and mark the second fore-edge.
7. Using the straight edge of a T-Square, press down and crease the board along the second fore-edge mark.
This is the ideal spacing for the first flap. There are a couple millimeters of space to allow for expansion due to environmental changes, but the item will be held snug in the box and unable to rattle around inside, potentially causing more damage.
Corrugated Board Phase Box 6

8. Fold over the bottom and middle edges, and mark the fore-edge.

9. Using the straight edge of a T-Square, press down and crease the board along the fore-edge mark.
Corrugated Board Phase Box 7

10. Mark the outside edge of the folded over board.

11. Crease and fold the top layer over board over the book and bottom board flap.
The second flap is made by making the width equal to the item inside + one board thickness. It should fit together without gaps in spacing, and not so tight it is straining to remain closed.
12. The folded flaps serve as the inner portion of the phase box; place the box on a piece of binder board.

13. Measure the width of the side board, and crease it along the mark using a T-Square.
14. Fold the flap and inner box over, and mark its fore-edge.

15. Crease the board using the T-Square.
Corrugated Board Phase Box 11

The third flap is made by making the width equal to the inner box. It should fit together without gaps in spacing, and not so tight it is straining to remain closed.
16. Match up the inner fold to the fore-edge, trim as needed.

17. Mark the fore-edge of the inner box.
18. Using the straight edge of a T-Square, press down and crease the board along the fore-edge mark. Fold the second flap over the inner flap.

19. Trim off excess board.
The final flap is made by making the width equal vertical flap enclosure width, + one board thickness. Cut all the flaps short enough that they will not interfere with the crease when the box is closed.
20. Round the corners using a corner rounder.

21. Apply PVA to the back of inner box.
22. Affix the inner box to the center section of the wrap-around outer box. Make sure the top, folded over end aligns with the top edge of the outer wrap-around box.

23. Press down firmly, and smooth out the flaps.
24. Place a piece of silicone or parchment paper on top of the inner box’s, center flap.

25. Place a board over the parchment or silicone sheet.
Corrugated Board Phase Box 18

26. Place a weight on top of the board, and allow the box to dry overnight.

27. Affix double-sided Velcro dots to the top, edge of the upper, outer flap.
Corrugated Board Phase Box 19

28. Affix double-sided Velcro dots to the bottom, edge of the upper, outer flap.

29. Fold over the outer flap.
30. Press down firmly.

31. Lay out a piece of scrap paper, and the box’s label printed side down.
32. Spread PVA over the back of the label using a brush.

33. Center and affix the label to the face of the box.
34. With the flat edge of a bone folder, smooth out the label’s edges and face.

35. Place a piece of parchment or silicone paper over the label, and place a weight on top. Allow the label to dry overnight.
Custom Enclosures: Double-tray Boxes

Top View

Side Hinge View
Custom Enclosures: Double-tray Boxes

Side Hinge [Closed] View
Custom Enclosures: Cloth Phase Box

Four Fold Phase Box Top View

Top and Bottom Flaps [Closed] View
Custom Enclosures: Cloth Phase Box

Inner Side Flap [Closed] View

Outer Side Flap [Closed] View
Custom Enclosures: Cloth Phase Box

Four Fold Phase Box [Closed & Tied] View
Archival & Preservation Materials Suppliers


Online Box and Enclosure Suppliers

**Deluxe Clamshell**

**Custom Clamshell**
- Gaylord Archival Custom Box Builder: http://www.gaylord.com/box-builder
SBU Preservation Tutorials

http://guides.library.stonybrook.edu/preservation/tutorials
Additional Tutorials


- Includes information on how to handle and preserve items by type and format.

Northeast Document Conservation Center, “Protecting Books with Custom-Fitted Boxes”
- Includes information on how to measure items for ordering custom made boxes.

- Two tutorials for making lightweight cardstock enclosures for thin, light volumes

Northeast Document Conservation Center, “Storage Enclosures for Photographic Materials”
[https://www.nedcc.org/free-resources/preservation-leaflets/5.-photographs/5.6-storage-enclosures-for-photographic-materials](https://www.nedcc.org/free-resources/preservation-leaflets/5.-photographs/5.6-storage-enclosures-for-photographic-materials)
Recommended Reading


Q&A/OPEN DISCUSSION
Arielle Hessler  
*Preservation Technician/Bookbinder*  
Frank Melville, Jr. Memorial Library Room W-2550  
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THANK YOU!