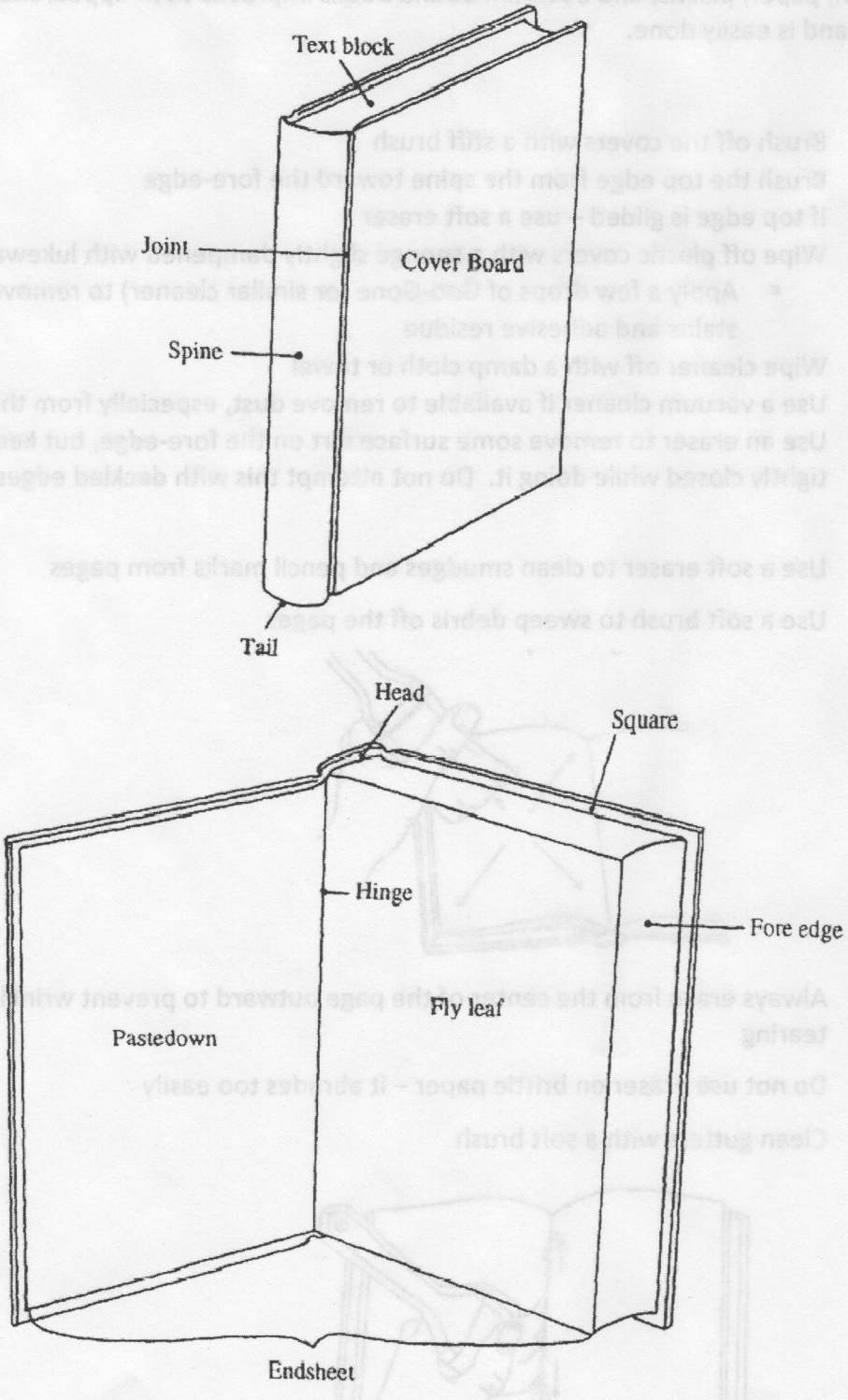
Hands-On Book Repair for Libraries

The following materials were developed by Margit J. Smith for the Infopeople Project [Infopeople.org], supported by the U.S. Institute of Museum and Library Services under the provisions of the Library Services and Technology Act, administered in California by the State Librarian, unless otherwise noted.

The Parts of a Book



Cleaning Books

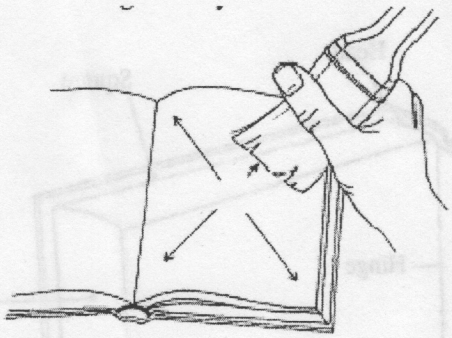
Cleaning cloth, paper, plastic, and buckram bound books improves their appearance immediately and is easily done.

Outside

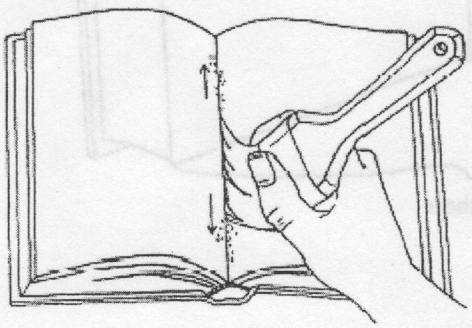
- Brush off the covers with a stiff brush
- Brush the top edge from the spine toward the fore-edge
- If top edge is gilded – use a soft eraser
- Wipe off plastic covers with a sponge slightly dampened with lukewarm water
    - Apply a few drops of Goo-Gone (or similar cleaner) to remove persistent stains and adhesive residue
- Wipe cleaner off with a damp cloth or towel
- Use a vacuum cleaner if available to remove dust, especially from the top edge
- Use an eraser to remove some surface dirt on the fore-edge, but keep book tightly closed while doing it. Do not attempt this with deckled edges.

Inside

- Use a soft eraser to clean smudges and pencil marks from pages
- Use a soft brush to sweep debris off the pages



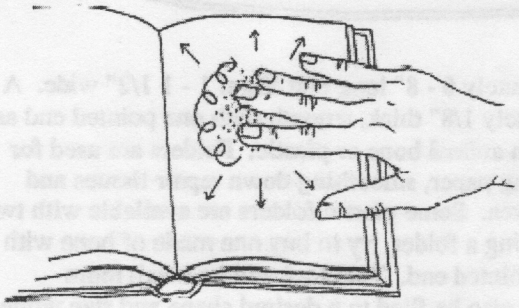
- Always erase from the center of the page outward to prevent wrinkling and tearing
- Do not use eraser on brittle paper – it abrades too easily
- Clean gutters with a soft brush



Cleaning Books (2)

For delicate papers use the following method:

1. Grate some art gum eraser on a regular household grater
2. Spread the particles on the page to be cleaned
3. Move the grated eraser around with your fingertips



4. Remove all particles carefully when they get dark from accumulated dirt
5. A dry-cleaning powder which comes in a pad, or a container, can be used the same way instead of grated art gum

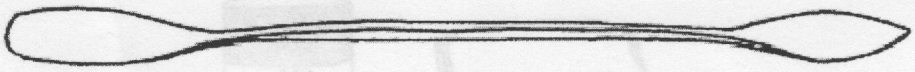
Tools

Some tools we will use, in addition to scissors, mat knife, ruler etc., are:

Bonefolder:

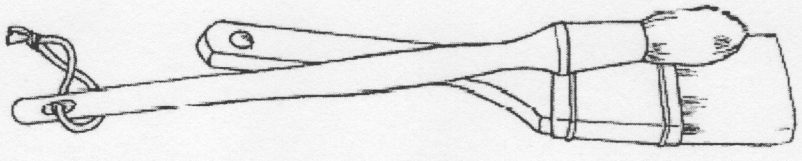
A **folder** is a tool approximately 6 - 8" long and about 1 - 1 1/2" wide. A typical folder is approximately 1/8" thick, smooth with one pointed end and one rounded end made from animal bone or plastic. Folders are used for many things such as creasing paper, smoothing down repair tissues and working cloth into a joint area. Some plastic folders are available with two round ends. When purchasing a folder, try to buy one made of bone with one rounded end and one pointed end. That tool will be much more versatile. Bone folders can also be filed to a desired shape and size while plastic folders cannot.

Microspatula:



A **microspatula** is a metal tool, approximately 6 - 8" long with one rounded end and one pointed end. Use a microspatula to pick up pasted strips of Japanese repair tissue, lift book cloth or endpapers away from the book board, or apply glue or paste in a very tight area. Microspatulas are manufactured very thin and many book binders file or sand them even thinner.

Brushes:



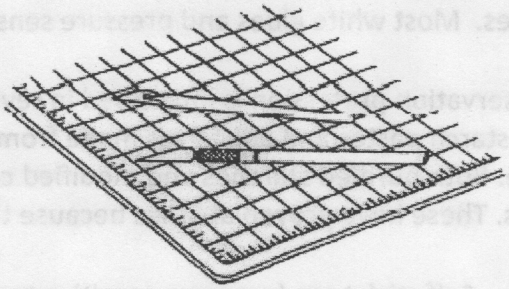
A good assortment of **brushes** makes repairing books much easier.

The size of the surface to be pasted or glued determines the size of the brush used, so keep a variety (thin, medium, thick) on hand. Round or flat bristle brushes be used.

Tools (2)

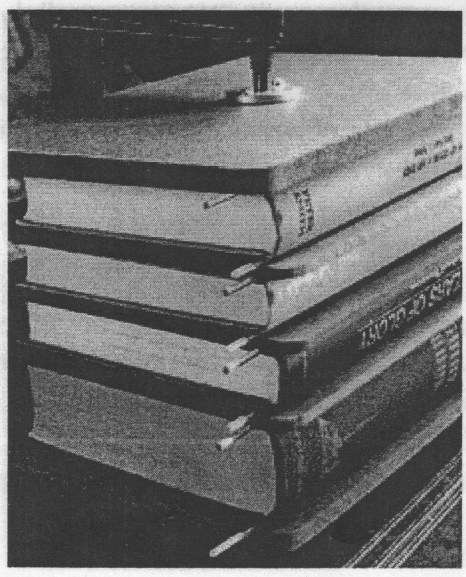
Cutting mat and scalpels

A self-healing cutting mat and sharp X-acto knife, scalpel or breakaway utility knife such as Olfa Silver makes precise cutting easy and fast. It is important to always work with a sharp blade when cutting or trimming repair materials. Attempting to cut with a dull blade will usually result in a torn edge that needs even more repair.



Instead of scalpels we can also use mat knives (utility knives)

Plexiglass pressing rods



Knitting needles can be substituted for the plexiglass rods

Adhesives

(Materials on Adhesives developed by Gillian Boal for Infopeople.)

When choosing an adhesive, you are looking for good adhesion properties and good ageing properties. Most white glues and pressure sensitive tapes do not have good ageing properties.

The conservation profession is interested in reversibility. Conservation quality adhesives include purified starch pastes and adhesives made from chemically modified cellulose such as methyl cellulose. Both purified starches and modified cellulose are used as thickening agents in food products. These have proven abilities because they have been in use for many years.

- Self stick tape (pressure sensitive tape) is made with a solvent to keep the adhesive "tacky." This evaporates over time, and eventually the adhesive dries up and the carrier falls off, especially rubber-based adhesives (e.g., masking tape and "scotchtape"). The adhesive can ooze and with time stick to the adjoining page.
- Double-stick tape is sometimes used in a Mylar encapsulation. It can ooze and the encapsulated paper will stick to it.
- Over time mono-polymers in PVA can crosslink, and the dried PVA loses its flexibility. Conservation PVA is a co-polymer glue which stays flexible longer.
- Household white and yellow glues and rubber cement should not be used on valuable or heirloom documents or photographs. These glues are not easily reversible. Dried PVA is not reversible in water.

Adhesive Recipes

Starch

1 part wheat starch to 3 parts water. Cook on stove top in double boiler.
1 part wheat starch to 4 parts water. Cook in microwave; stir every 30 seconds for a total of 2-5 mins, until it forms a translucent gel.
Cool and store it in the refrigerator or in water.
This adhesive lasts for up to a week in the refrigerator. Strain and dilute to use.

Methyl Cellulose

1 part methyl cellulose to 8 parts water (this can be 6 parts water if you want it thicker).
Mix and leave overnight to gel.
This adhesive lasts for up to six months at room temperature.

PVA/Methyl Cellulose Mix

Mix 60% PVA with 40% methyl cellulose (prepared as above).
PVA has a manufacturer's shelf life of one year. The mix should last six months.

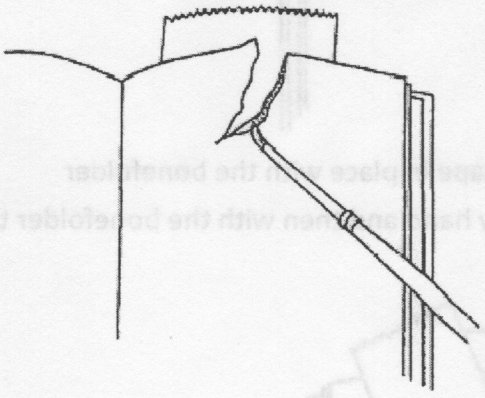
All these adhesives can be diluted with water to the required consistency depending on their application.

Mending Tears

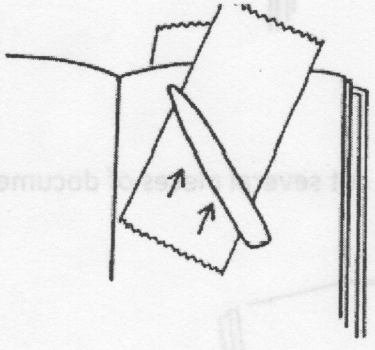
Tears can be mended in several ways:

Tears with bevels where one side of the tear overlaps the other:

1. Place a sheet of waste paper under the page to be repaired and line up the bevel
2. Brush a small amount of adhesive on one side of the bevel



3. Press both sides together gently, paying special attention to lining up the torn edges of the bevels
4. Smooth over with the bonefolder through wax paper



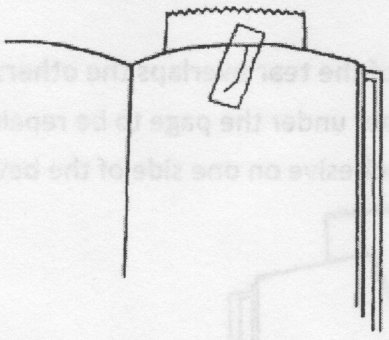
5. Place a light weight on top
6. Let dry completely

Tears without overlapping edges:

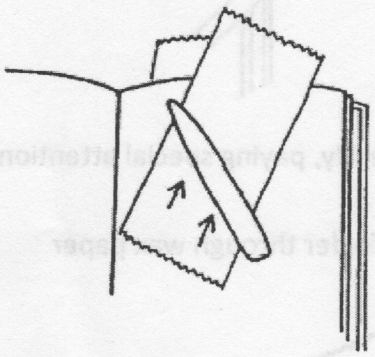
1. Place a piece of wax paper under the page to be repaired
2. Cut a piece of document repair tape slightly longer than the tear

Mending Tears (2)

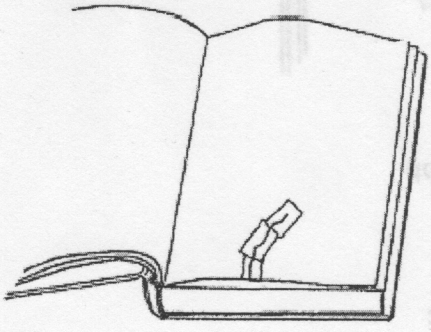
3. Place the piece of tape on the tear letting it protrude over the edge



4. Tack document repair tape in place with the bonefolder
5. Smooth down gently by hand and then with the bonefolder through the wax paper



6. Trim tape to size
7. In case of a very jagged tear, cut several pieces of document repair tape and follow the shape of the tear

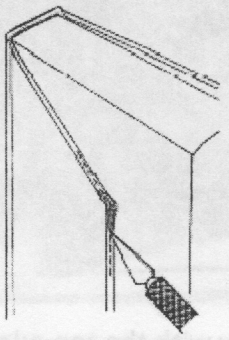


8. If necessary, repeat steps on the reverse side of the page

Repairing Corners

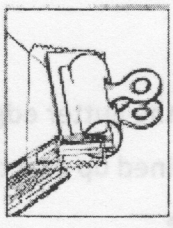
Many books in your collection, but especially children's books, often have bumped and limp corners. Here is how to repair them:

1. Separate the layers of the corner cardboard with a needle or knife



2. Apply a small amount of PVA between layers with a brush

3. Wrap corner with a piece of wax paper
4. Fold two strips of manila stock around the corner – one bent over the cover from the bottom up, or the top down; the other from the fore-edge in
5. Hold in place with a folder clip and let dry overnight

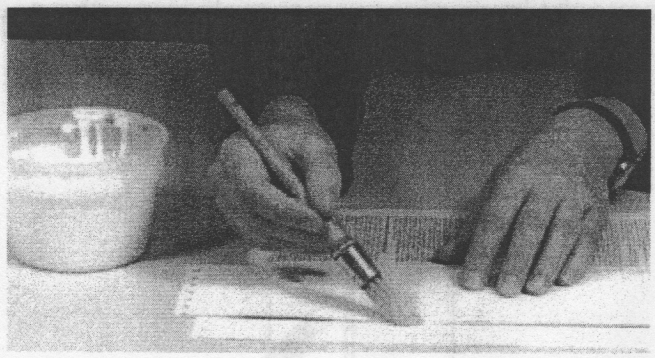


6. Tap reinforced corner slightly with a bone folder to take off any sharp edges after the repair has dried.

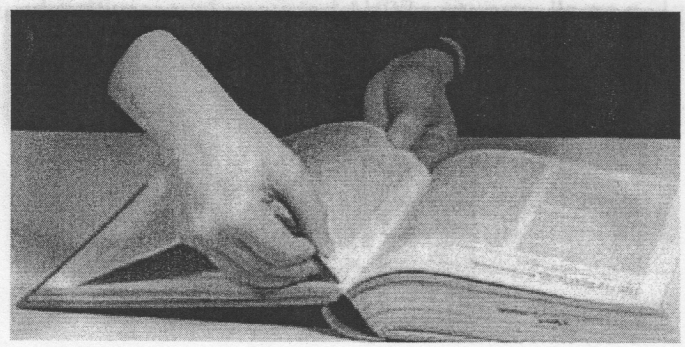
Inserting Pages

To tip in a single page:

1. Trim the page to fit if it is a replacement page
2. Apply a thin line of glue along the paper's edge where it will be inserted into the book



3. Fit it into the book and line it up carefully with the top edge



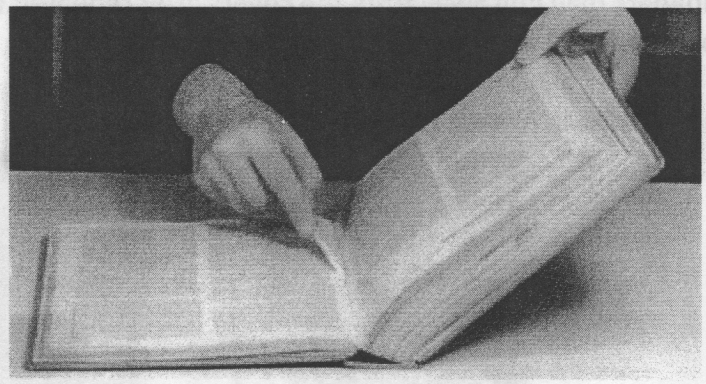
4. Place wax paper under it to protect the pages
5. Close the book
6. Place under light weight and let dry

To tip in multiple pages, but not more than three:

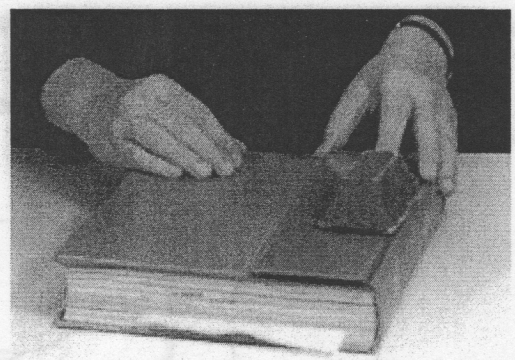
1. Trim if necessary
2. Place the pages on waster paper, staggering the gutter edges by 1/16"
3. Place a piece of waste paper on top page to lined up exactly with the edge
4. Apply glue to all page edges at the same time
5. Wrap wax paper around the packet and let try under a light weight
6. When dry, apply adhesive to the edge of the page packet
7. Insert into the book, lining it up carefully with the top edge

Inserting Pages (2)

8. Use bonefolder to mold page packet into the gutter



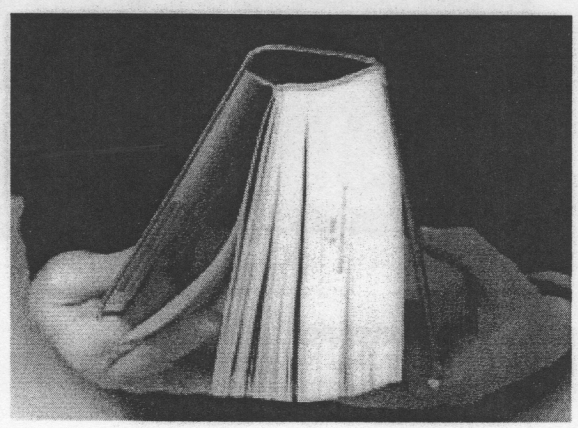
9. Protect adjoining pages with wax paper
10. Close the book
11. Place under weight and let dry



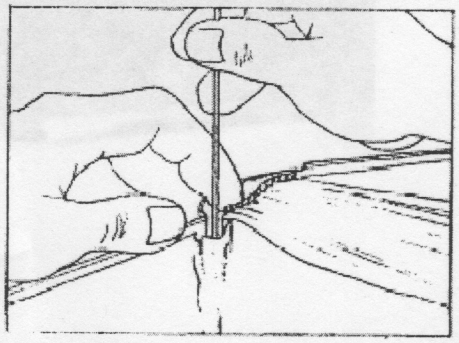
Repairing Hinges

A book's endpapers may pull away from the covers after repeated use, causing the textblock to sag and become loose.

1. Open the book to expose the affected hinge



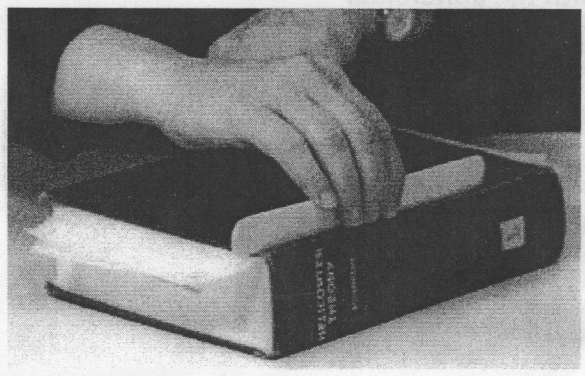
2. Apply PVA to a long knitting needle with a brush, or by dipping the needle into a bottle with PVA
3. Use the knitting needle to transfer the PVA to the inside of the hinge, applying it only to the cardboard – not the spine



4. Insert a piece of wax paper to act as barrier between repair and textblock
5. Close the book

Repairing Hinges (2)

6. Work the cover into the joint with the bonefolder

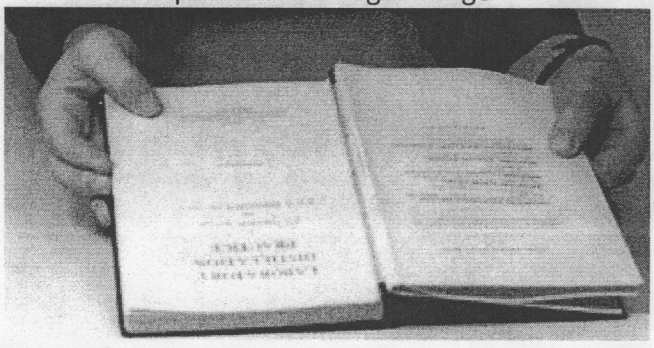


7. Place spine rods into the groove
8. Put under weight until dry

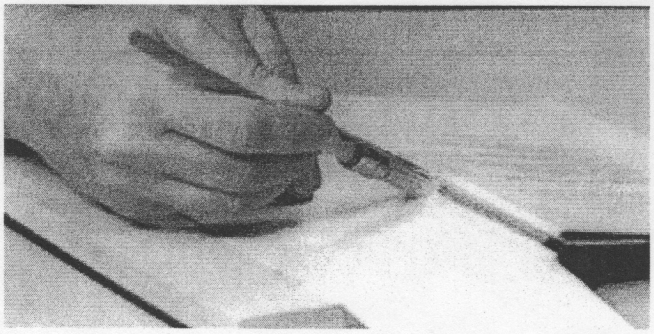
If both joints are loose, repair both before placing the book under weights and drying.

If endpapers are pulling away from the inside joint and the spine lining has become visible, use this method:

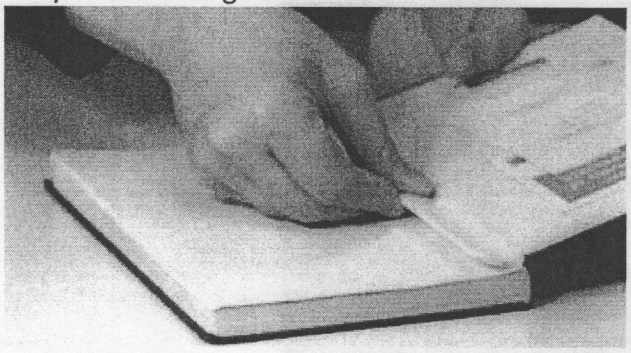
1. Open the book to expose the damaged hinge



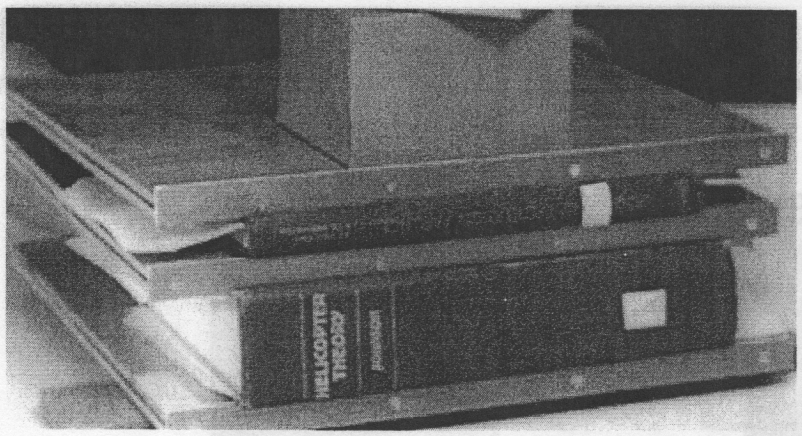
2. Place a piece of waste paper where the textblock and cover have separated



3. Apply PVA to the exposed spine lining and on the underside of the fold of the endpaper that has come away from the joint
4. Adjust the endpaper and insert a piece of wax paper as barrier
5. Press gently into the hinge with the bonefolder



6. Set groove on outside with the bonefolder
7. Place spine rods into outside groove
8. Put under weight to dry

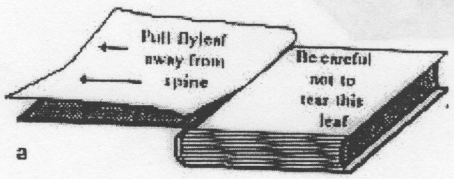


Replacing Endsheets

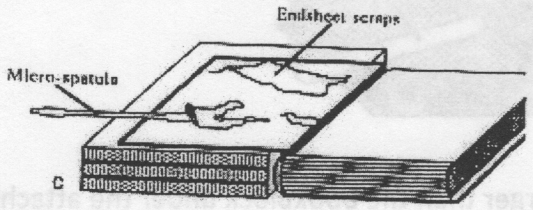
To replace a complete endsheet, both the pasted down side and the free leaf, do the following:

Preparing book and endsheet:

1. Open the book and support the open cover on boards or another book
2. Remove the free torn endsheet from the textblock by gently pulling it toward the front or back cover and discard



3. Remove as much of the pasted down endsheet as you can by lifting with the spatula

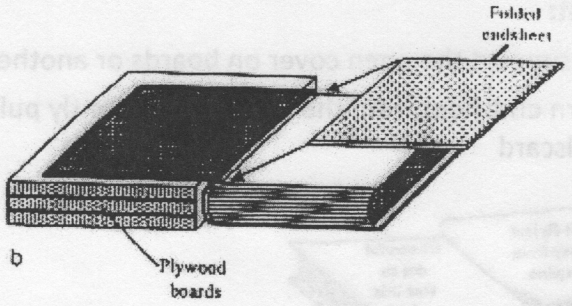


4. Use the bonefolder, or some sandpaper to smooth out any uneven areas
5. Measure endsheet size with a paper strip rather than a ruler
    - Height is exact height of bookblock
    - Width is bookblock from gutter to fore-edge **doubled,** plus ½"
6. Transfer measurements to a piece of endsheet paper making sure the grain runs parallel to the spine
7. Cut out this piece of endsheet paper
8. Fold paper in half and crease with the bonefolder
9. 1/8" from the fold run the bonefolder along the ruler **under** the paper to set up a slight lip on the fold which will fit into the gutter
10. Turn the folded endsheet over so that the "v" of the fold faces the table
11. Put the folded endsheet on a piece of waste paper
12. Put another piece of waste paper to within ¼" of the fold
13. Carefully spread a 50:50 mixture of PVA and Methylcellulose along the exposed edge of the endsheet
14. Line up the endsheet with the top edge of the book

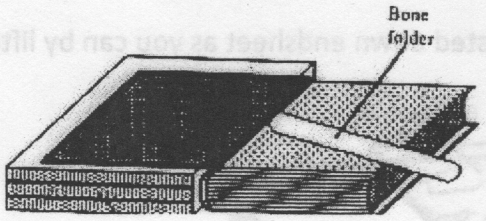
Replacing Endsheets (2)

Inserting the endsheet:

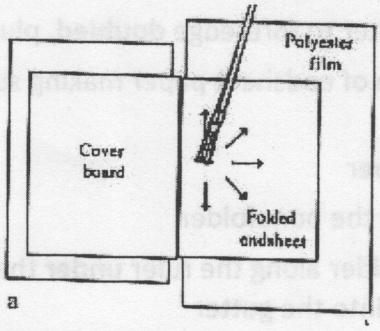
1. Place fold firmly into the gutter



2. Bone gently over wax paper



3. Place a piece of wax paper, larger than the bookblock under the attached endsheet
4. Cover with a piece of waste paper, again larger than the wax paper
5. Spread the PVA/MC mixture evenly, and in one direction only, from the center to the edges of the endsheet to be pasted onto the board



6. Remove waste paper carefully to avoid dragging adhesive into the endsheet or wax paper
7. Leave wax paper in the book, close and press with your hands
8. Check alignment of endsheets by slightly lifting cover to about 45degree angle – do not open completely as this will stretch the paper in the gutter
9. Smooth out any wrinkles with bonefolder or with your hand

10. Set outside hinge with the bonefolder to ensure adhesion of the new endsheet to inside hinge area
11. Put book in press overnight using pressing boards and spine rods

Trimming the endsheet:

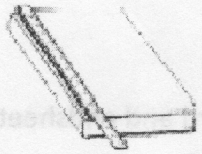
1. Wait until the book is completely dry before trimming the endsheets.
2. Trim the free endsheet to size as follows:
    a. Turn book over with endsheet towards the table
    b. Slide a piece of thin cardboard between the board and endsheet
    c. Line up a ruler's edge with the textblock's fore-edge
    d. Cut along the edge of the ruler with your knife

3. Trim the pasted down endsheet to size as follows:
    a. Line up ruler with the visible square on the board
    b. Cut along ruler with the knife
    c. Peel off the waste

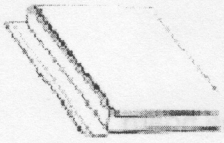
Replacing Spines

Prepare the book as follows:

1. If the spine is very loose, pull it gently away from the book
2. If the spine is still fairly strongly attached, line up the ruler 1/4" from the outside groove and cut through the cover cloth being careful not to cut into the boards. Do this on the front and back cover

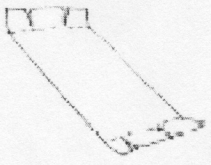


3. Pull the cloth away from the boards



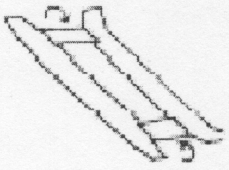
4. Measure thickness of spine from shoulder to shoulder and add 1" to each side
5. Measure height of textblock and add 1-1/2"
6. Transfer these measurements to a strip of book cloth, making sure grain runs parallel to the spine
7. Center book cloth on front board with the same overhang on top and bottom and crease the book cloth to mark height of spine

8. Crease book cloth to mark shoulder to shoulder measurement
9. Cut v-slits at the crease line marks corresponding to the text block spine measurements



Replacing Spines (2)

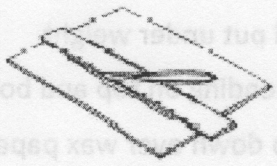
10. To line and strengthen the cloth spine cut a piece of acid-free paper to the size of the spine measuring shoulder to shoulder and exact height of boards
11. Place liner strip on waste paper and apply PVA to the strip
12. Place pasted liner strip on book cloth, centered on shoulder-to-shoulder marks and smooth down
13. Apply PVA to the book cloth between the two v-slits and fold over



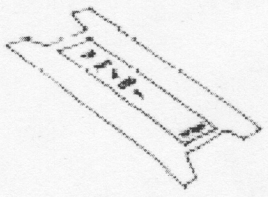
14. Place wax paper over book cloth with liner and let dry

If the original spine can be reused:

1. Remove it carefully from the backing
2. Scrape off as much adhering paper and glue as possible
3. Trim the original spine to a size slightly shorter and narrower than the replacement spine



4. Apply PVA to original spine and adhere to replacement spine

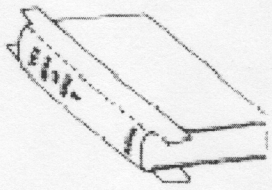


5. Cover with wax paper and gently smooth over with hand and bonefolder

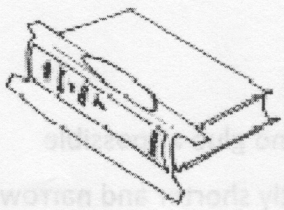
Replacing Spines (3)

Continue to replace the new spine with, or without, the original spine:

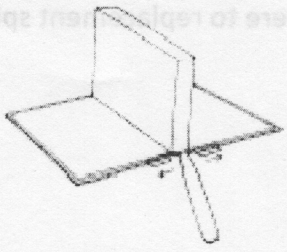
1. Apply PVA to that part of the replacement spine that will be glued to the front cover
2. Center the replacement spine on the book
3. Holding the replacement spine in place with one hand, lay the flap with the PVA over the front board and press gently



4. With the bonefolder work the book cloth into the joint



5. Repeat with the back board flap
6. Insert pressing rods in the joints and put under weight
7. When dry, apply PVA to the tabs extending on top and bottom
8. Fold them over to the inside and rub down over wax paper



9. Insert pressing rods in the joints and put under light weight

Common Book Handling and Repair Situations

This list is less for librarians and permanent staff, but it is a good reminder for student workers, volunteers, and housekeeping personnel.

Don't get books wet – if it rains carry them in a plastic bag

Don't set beverages on books – they make rings and spots

Don't use rubber bands, post-it notes, paper clips – they tear

Don't use Scotch tape to mend pages – except in extreme cases

Don't press flowers between pages – they discolor the paper

Don't mark up books – no highlighters, ballpoints, pens

Don't store books in damp rooms – monitor environment

Don't wash the covers of a book – water can soak right in

Don't expose books to extreme heat – sunlight – radiators

Don't store bulky things in books – it will break their backs

Don't pack books too tightly on shelves – mold spreads easier

Don't forget to use bookends – the taller the better

Don't make irreversible repairs – repairs may need repairs

Don't use rubber cement to make repairs – it is irreversible

Don't erase back-and-forth – erase from the middle out

Don't forget to check stored books for mold – it creeps up on you

Don't allow books to flop around on shelves – keep them upright

Don't be in a hurry when repairing books – let dry between steps

Don't do anything to colored pages or illustrations without testing – but learn about testing

Don't work on inside covers without supporting them

Don't forget to wash out brushes after use – they get stiff

Don't use inferior materials for repairs – they won't last

Don't carry too many books – use carts

Don't repair old or valuable books – they need special attention

Don't let dust accumulate on books – it invites insects, rodents

Don't neglect basic housekeeping – it pays to keep things clean