

Conservation Book Repair: A Training Manual

by
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Alaska State Library, Alaska Department of Education, 1995

VI. ADVANCED REPAIRS

Serious repair problems take more time and skill to accomplish than any other level of repair. Often, books that need advanced repairs were poorly repaired in the past so a library beginning a conservation book repair program may have a great many volumes in need of advanced repairs. As the repair program progresses, there will be fewer and fewer books needing this level of treatment.

A. REPAIRING THE SPINE HEAD OR TAIL

Often the head or tail area of a book cover spine wears out while the rest of the book is still in good condition. Damage at the head of the spine is often caused by improper handling and shelving techniques, especially pulling a book off the shelf incorrectly. While these problems can be easily repaired, staff and patrons should be educated on safe book handling. See page 136 for information on **SHELVING TECHNIQUES**.

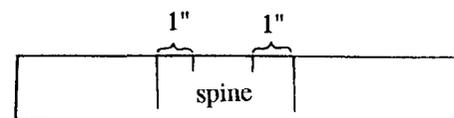
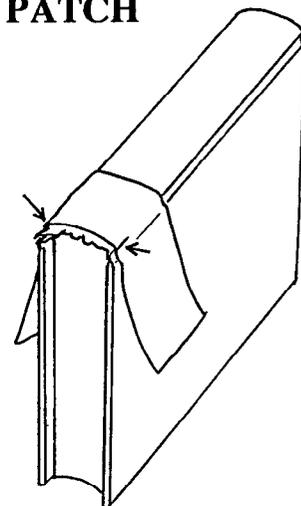
NOTE: This set of instructions can be used to repair the head or tail area of a spine. To simplify the instructions, the repair is described for the head of the book.

1. MEASURING AND CUTTING THE REPAIR PATCH

See page 37 for general information about **MEASURING BOOKS**.

Cut a strip of paper 2" wide and 6 - 10" long. Wrap the paper snugly around the book spine and mark the edges of the spine. Place the marks at the edge of the paper.

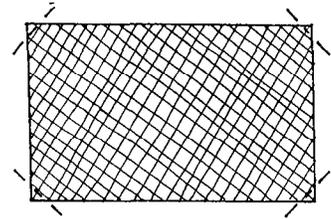
Add 1 - 2" to both sides of the book spine marks depending on the amount of damage. This measurement is the width of the book cloth patch needed to repair the torn header.



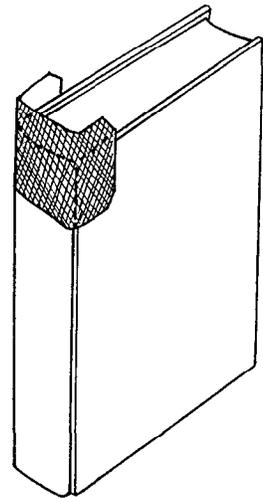
CONSERVATION BOOK REPAIR

Cut a piece of book cloth the width of the total measurement (spine plus 2 - 4") and the length of the spine damage plus 1 1/2".

The corners of the repair patch tend to curl when the patch is inserted, so trim them off diagonally. Cut only the very tip of the corner.

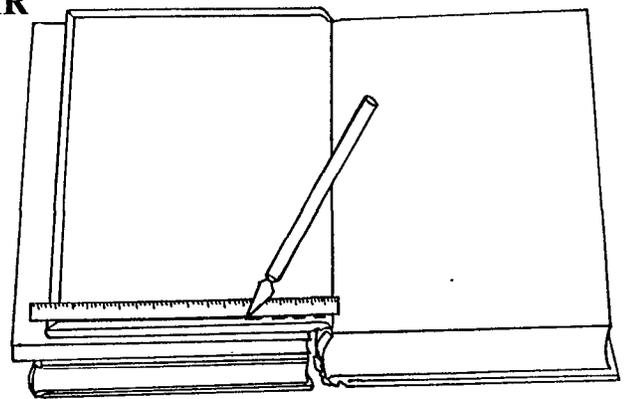


Fit the repair patch on the outside of the book and check to see that the fit is correct. The patch should extend at least 5/8" above the book board and 1/2" below the bottom of the spine damage.

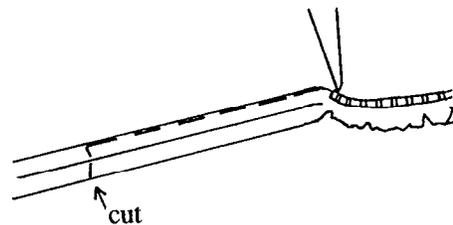


2. PREPARING THE BOOK FOR REPAIR

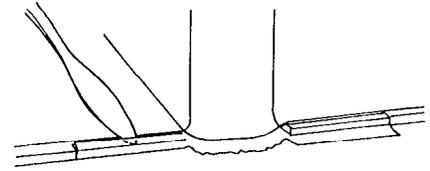
Support the book with another book or a stack of boards. Use an X-acto knife and ruler to cut through the book cloth turn-in along the edge of the endpapers at the head of the book. The cut should be 1 - 2" long.



At the outer edge of the first cut (the end away from the spine), make a 90 degree cut across the book cloth from the edge of the endpaper to the top of the book board.

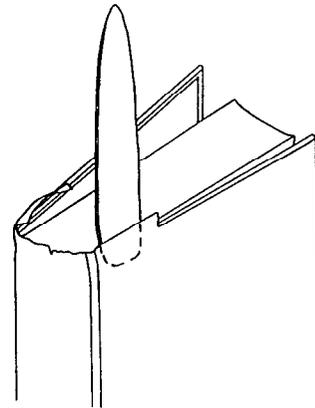


Use a knife or microspatula to lift the book cloth away from the book board. If necessary, clip through the original book cloth turn-in at the hinge to allow the cloth to lift up. **DO NOT** clip through the endpaper or the crash.



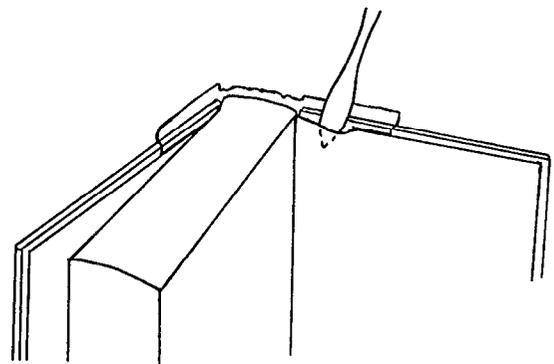
Repeat these two cuts on the opposite book board. If the original spine turn-in is completely loose, remove it.

Using a microspatula, dull knife or the rounded end of a folder, lift the book cloth loose from the cover boards. Loosen only as much book cloth as necessary to slip in the repair patch.



Work slowly and carefully as the book cloth can stretch or tear.

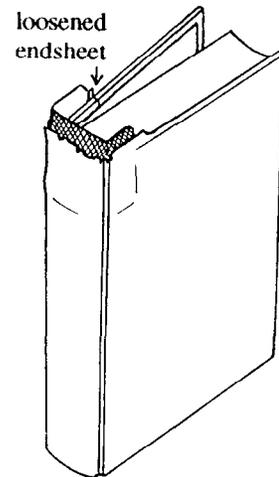
Insert a dull knife or microspatula under the original turn-in (the part of the book cloth under the endpaper that was cut but not lifted up above) and the book board. The original book cloth will help support the endpaper as it is lifted.



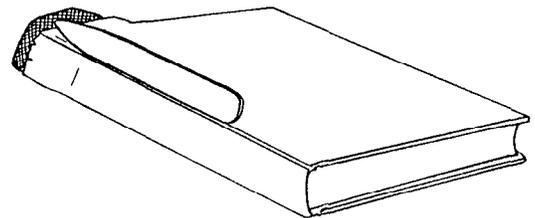
Carefully separate the endpaper away from the board with a gentle prying motion. Lift only as much of the end paper as needed to slip in the repair patch.

3. FITTING THE REPAIR PATCH TO THE BOOK

Slip the repair patch in place between the original book cloth and the book board. Make sure the patch is long enough and wide enough to cover the damaged area.

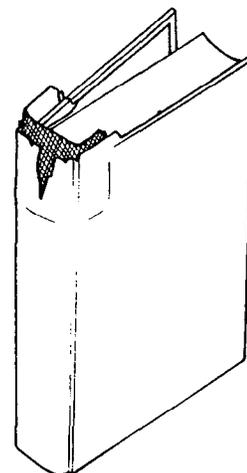


Use the long edge of a folder to work the patch into both cover joints.



Take a moment to check the position of the patch. The new book cloth patch should lie flat against the book boards and spine of the text block. There should not be any wrinkles or buckles in the patch or the book cloth spine.

The patch should extend about 5/8" above the top of the book board and should extend at least 1/2" below the bottom of the spine damage. It should also extend past both hinges toward the fore edge of the book.



If the repair patch does not fit correctly, trim it down or cut a new one.

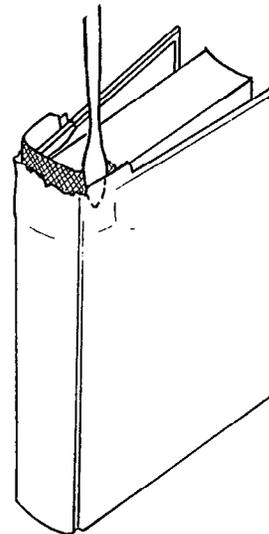
4. GLUING THE REPAIR PATCH IN PLACE

IMPORTANT: Read through the instructions for gluing the repair patch in place before beginning this procedure. It is important to understand when and where to apply the glue; if the repair is glued in the wrong order, it's possible to be "glued into a corner", needing to glue something that is already covered by another part of the repair.

In modern book case construction, the spine of the book cloth and the spine of the text block must move independently of one another in order for the book to open properly. **DO NOT** glue the repair patch to the spine of the text block (the pages of the book).

There are many older book structures that function differently from a case bound book. If a book looks or operates in an unusual way, carefully research the book structure or consult a trained book conservator before attempting a repair.

With the repair patch in place, use a knife or microspatula to feed glue between the wrong side of the original book cloth spine and the right side of the repair patch. Do not put any glue on the spine of the text block (the pages of the book) or on the cut and lifted flaps of book cloth.



Use a folder to gently press the original book cloth against the repair patch. Work on both covers and the spine. Wipe away any excess glue that is pushed out the top of the repair patch.

Use the long edge of a folder to work the patch into both cover joints. work this area well to make sure the patch is in the proper position.

CONSERVATION BOOK REPAIR

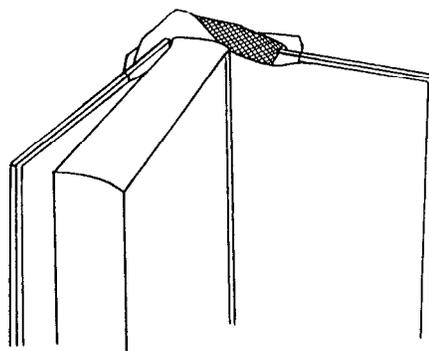
Double check the repair. Make sure the new book cloth patch lies flat against the text block and the original book cloth lies flat against the patch. There should not be any wrinkles or buckles in the patch or the book cloth spine. If it is not a good fit, readjust it or replace it before the glue dries.

Put the book in a book press or insert rods in the hinge areas and press under weight for about 10 minutes to allow the glue to set.

5. TUCKING-IN THE REPAIR PATCH TURN-IN UNDER THE END PAPER

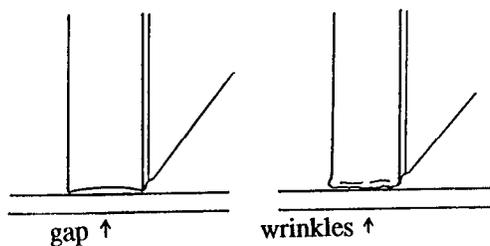
Before applying any glue to the repair patch turn-in, fold it in position to make sure the patch is placed correctly.

Starting on either edge of the repair patch, carefully begin to tuck the turn-in into the space between the end paper and the board. As one side is tucked in, the rest of the turn-in will follow.



With the entire patch tucked in place, gently crease the top edge of the patch along the boards and in the spine area with your fingers.

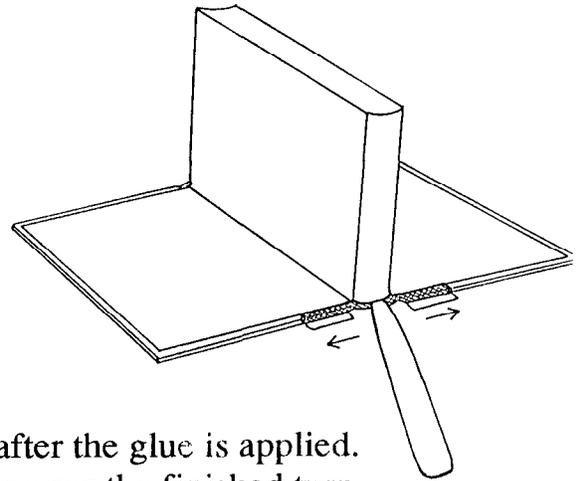
Set the book on the work table with the repaired end of the spine resting on the table. The edge of the new spine book cloth should be level with the original boards so it rests flat and even against the table.



If there is space between the table and repair patch or if the book cloth wrinkles against the table, the position of the turn-in is not correct. Readjust the turn-in and check it again.

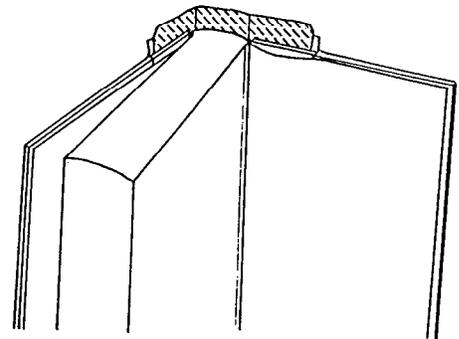
When the turn-in is positioned correctly, lay the book on the table so that the spine is flat against the table.

Use the pointed end of a folder to crease the folded repair patch along the top of the book boards and the spine turn-in.



This crease will help correctly position the turn-in after the glue is applied. Folding and creasing the turn-in before it is glued assures the finished turn-in will be in the correct position.

Unfold the turn-in and apply glue to the inside of the patch turn-in.



Working from either side of the repair patch, refold the glued repair patch turn-in under the end paper. Continue until the entire patch is tucked in place then crease the edge of the patch with your fingers.

Set the book on the work table with the repaired end of the spine resting on the table. Check that the spine edge of the new spine book cloth is level with the original boards and rests even against the table.

Remember, if there is any space visible between the table and the repair patch or if the book cloth wrinkles against the table, the position of the turn-in is not correct. Readjust the turn-in and check it again.

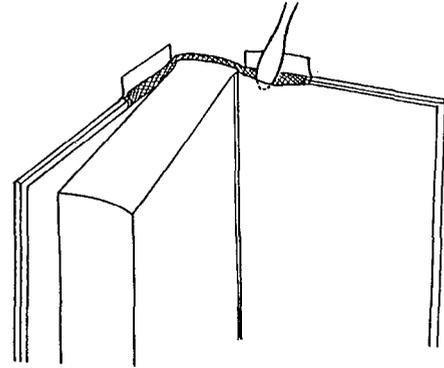
Position the book on the table so that the length of the spine is resting on the table (see illustration above). Use a pointed end of a folder to crease the folded and glued repair patch along the top of the book boards and the spine turn-in.

CONSERVATION BOOK REPAIR

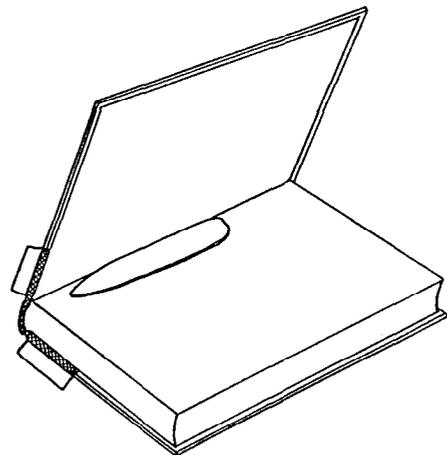
Use the long edge of a folder to work the repair patch and book cloth into the hinge joints of the book. At this point the patch will be attached to the original book cloth and the book boards.

6. GLUING DOWN THE ENDPAPERS AND TIGHTENING THE HINGES

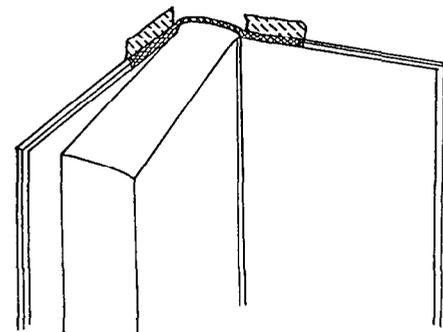
Use the rounded end of a microspatula to feed glue between the lifted endpapers and the cover boards. Feed the glue all the way down to the point where the end papers are still attached to the board and into the hinge area.



Use a folder to work the end papers into position, working from the center of the end paper toward the edge of the book board. Wipe away any excess glue that is worked out.



Apply glue to the cut flaps and press them into position. There may be a thin gap between the flap and the edge of the endpaper.



Lay a strip of wax paper in the joint areas. Put the book in a book press or insert rods in the hinges and press under weight for 10 minutes.

Open the book carefully and test the front and back hinges.

If the hinges are loose, tighten them following the directions in **TIGHTENING HINGES ON A CASE BINDING**, page 42. If they seem tight, replace the wax paper and return the book to the press or weights and dry overnight.

B. REBACKING A CASE BOUND BOOK

Books with worn cloth joints or loose, flapping spines can be repaired by replacing the original book cloth spine.

Before rebacking a book, check the condition of the original crash in the hinge area. If more than 1/4 of the crash's total height is broken, replace it before rebacking the book. That procedure is covered in **RECASING A CASE BOUND BOOK**.

Two methods of rebacking are illustrated in this section. The first method, **REBACKING WITH BOOK CLOTH ON THE OUTSIDE OF THE ORIGINAL BOOK CLOTH**, puts the new book cloth on the outside of the old book cloth with the turn-ins glued on top of the original endpapers. This method can sometimes be faster but the new spine can be difficult to position well since it is constructed off the book. From a cosmetic point of view, more of the repair shows because the book cloth is on the outside of the original book cloth. This method is also described in *Books Their Care and Repair* by Jane Greenfield. These instructions and Ms. Greenfield's drawings are reprinted with her permission.

In the second method, **REBACKING WITH THE NEW BOOK CLOTH UNDER THE ORIGINAL BOOK CLOTH AND THE TURN-INS UNDER THE END PAPERS**, the new spine is constructed on the book with the turn-ins glued under the end papers. When the original spine is replaced, the new book cloth shows in only a small portion of the joint area.

CONSERVATION BOOK REPAIR

Often different methods work for different books so practice each method, then decide which to use on a particular book.

1. PREPARING A BOOK TO BE REBACKED

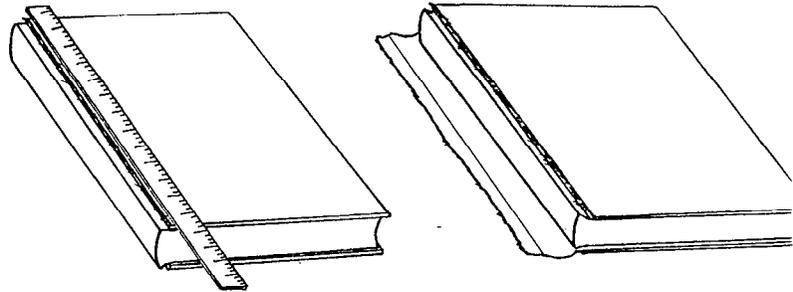
Remove the Original Book Cloth Spine

If the print or decoration on the spine is legible, save the spine to glue to the new book cloth spine. If the print or decoration is not legible, discard the spine after it is removed.

Carefully remove the original spine if it is still attached to the book.

If the cloth in the joint is broken or terribly frayed, gently pull it loose.

If the original spine is more firmly attached to the case, lay a straight edge 1/16 - 1/8" from the spine edge of the front board and use a knife to cut through the cover cloth.



Be careful not to cut through the crash or the end paper and try not to trim away any print or decoration on the cover.

Turn the book over and repeat on the other side.

Check the Original Crash

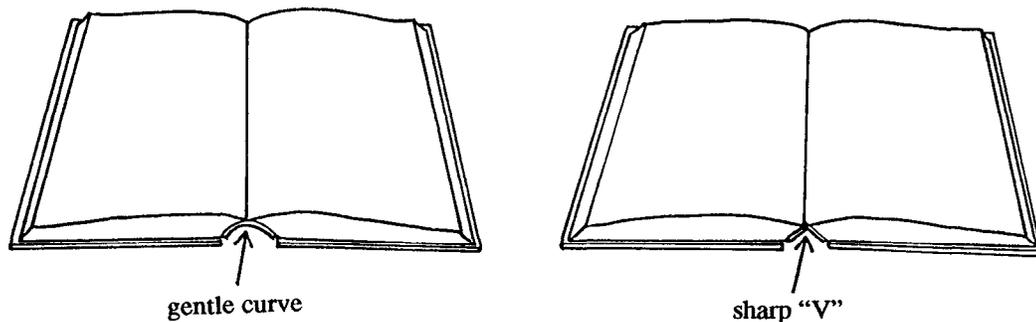
If more than 1/4 of the total height of the original crash is torn or broken, it should be replaced before the book is rebaked. That procedure is covered in RECASING A CASE BOUND BOOK, page 99.

Lining the Text Block Spine

When the book cloth spine is removed, examine the paper spine liner attached to the text block.

This paper spine liner consolidates the signatures of the text block and helps evenly distribute the stress of opening the book. Many modern book manufacturers do use enough paper liners or a good quality of paper to line the spine. In many instances, the paper spine liner is not even completely glued down.

Many libraries do not replace the paper spine liner when rebacking books. Taking the time to replace the spine liner ensures the book will function better and last longer.



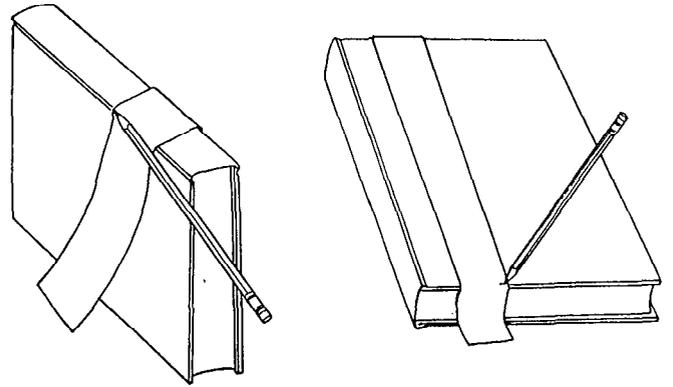
Open the text block to the center of the book and see how the spine arches. Does it form a gentle curve or a sharp "V"? When a book opens with a sharp "V", all the stress of opening the book is concentrated in one place. A gentle curve evens out the stress of opening the book.

If the original paper liner is not adhered to the spine of the text block, remove it by gently pulling it away or scraping it away with a dull knife. Be careful not to damage the crash or the sewing threads. It is not essential that all the paper be removed.

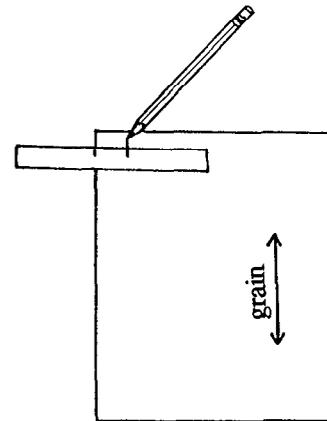
If the original paper spine liner is well adhered but not heavy enough to form a gentle curve when the book opens, add additional paper liners to create the gentle curve.

CONSERVATION BOOK REPAIR

Measure the thickness of the text block from shoulder to shoulder (measurement A) with a strip of paper. (See page 37 for information on MEASURING A BOOK.) Save this measurements until the repair is completed.

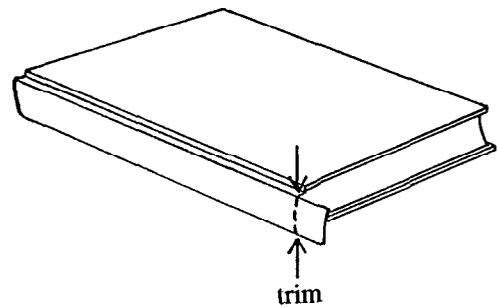


Transfer measurement A to the spine liner paper and cut a strip of spine liner paper. The cut strip should be longer than the height of the book boards. Remember the grain of the spine liner should run up and down the spine of the book.



It is best to use a medium weight paper to line the text block spine; two or three layers of thin paper is better than one thick layer. Acid-free papers such as Permalife, Mohawk Superfine or Japanese repair tissue can be used. The paper spine liner must have the grain running from the head to the tail of the book and should be the exact height and width of the text block spine.

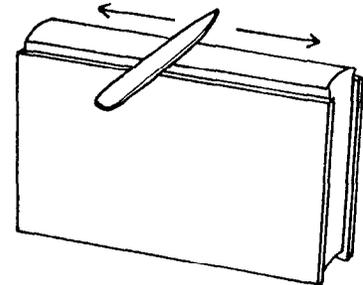
Lay the spine liner against the spine of the text block, mark the height and then trim the spine liner to the exact height of the text block.



Apply adhesive to the spine liner paper in a star burst pattern (page 34) and position on the text block spine.

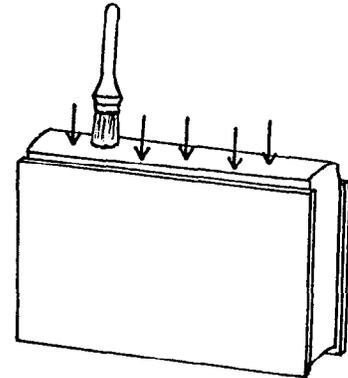
Firmly attach the paper spine liner to the text block spine using one or both of the methods below.

1. Use a folder to rub the paper spine liner to the text block spine. Make sure the paper liner is well adhered to the text block; pay special attention that the edges (sides, head and tail) are firmly attached.



OR

2. A 1" stencil brush makes a good tool to firmly attach the spine liner to the text block. Use an up and down tapping motion to work the spine liner into the text block. Pay special attention that the edges (sides, head and tail) are firmly attached.



Let the paper liner dry then open the book. If the open text block forms a "V" instead of a gentle curve, repeat the procedure. Many books need more than one layer of paper liner, especially if they are large or heavy.

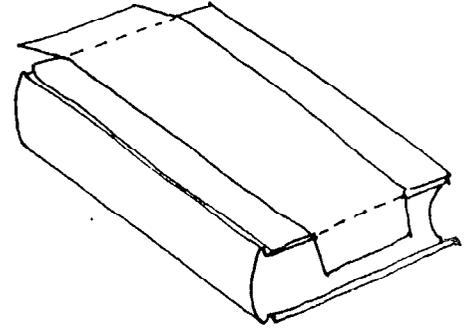
2. METHOD ONE: Rebacking With Book Cloth On The Outside Of The Original Book Cloth

Constructing the Replacement Book Cloth Spine

Make or reuse Measurement A (the thickness of the text block from shoulder to shoulder). Add 1" to each side of the spine width in measurement A. Measure the height of the text block (Measurement B) and 1 1/2" to measurement B.

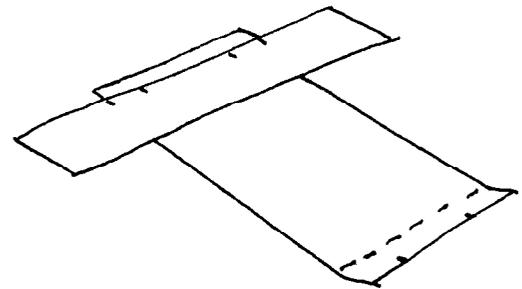
CONSERVATION BOOK REPAIR

Transfer measurement A and B to the book cloth. Be sure the grain of the book cloth runs up and down the spine of the book then cut the book cloth.

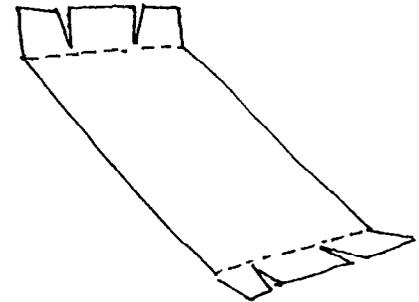


The new book cloth should be as close to the original color and texture as possible. If it is not possible to match the color, select a color that has the least amount of contrast, i.e., new black book cloth on a dark blue book.

Center the new book cloth on the front book board so the same amount hangs over the top and bottom. Crease the top and bottom of the book cloth to mark the height of the finished spine.



Center measurement A on each crease and mark.



Cut V-slits at the crease line marks that correspond to the text block spine measurements.

Illustrations on pages 84, 85, 86, 87 and the top of 88 are reprinted from *Books: Their Care & Repair* copyright 1983 by Jane Greenfield. These illustrations are included in this manual by special arrangement with the H.W. Wilson Company.

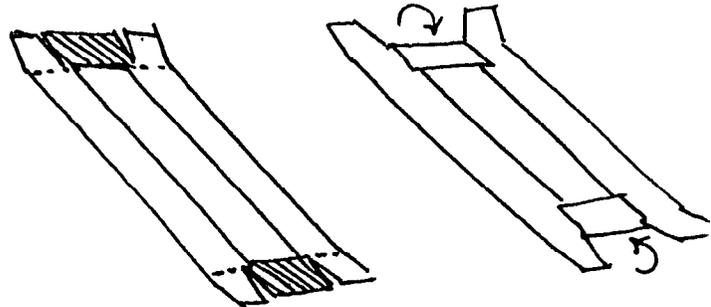
Cut a piece of acid-free paper to line and stiffen the book cloth spine. This liner is called the spine inlay. Sometimes two or more layers of acid-free bond are used for the spine liner. Mohawk Superfine or Daniel Smith Archival Paper has also been used with good results. The **BOOK BINDING SUPPLY SOURCES** lists sources for purchasing acid-free paper.

Always make sure the grain of the spine inlay runs in the same direction as the spine of the text block. If it does not, the book will not open easily.

Place the spine inlay on a sheet of waste paper. Apply glue to the wrong side in the star burst pattern.

Using the text block measurement marks and top and bottom creases, center the spine inlay on the wrong side of the new spine cloth.

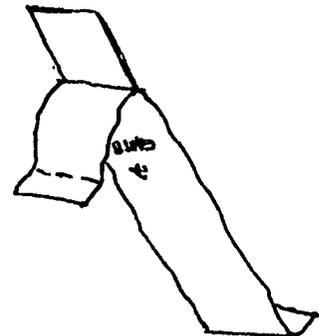
Apply glue to the center section of the spine turn-in at the top and bottom of the spine cloth; fold them over, and rub them down with a folder.



Protect the spine cloth with a piece of wax paper and place under weight to dry.

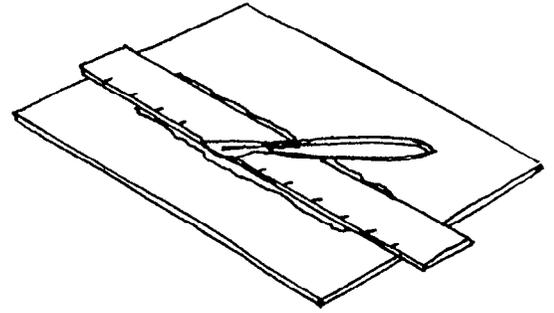
If the original spine can be reused, lift up the turn-ins and peel the paper inlay away from the book cloth spine.

If the paper is well attached to the spine, use a microspatula or dull knife to scrape it off. Dampening the inlay can release the adhesive. It is not essential to remove every bit of the paper inlay if it doesn't come off easily. The spine can be easily distorted or damaged so handle it carefully.



CONSERVATION BOOK REPAIR

Using an X-acto knife or scalpel and ruler, trim away the ragged edges of the original spine.

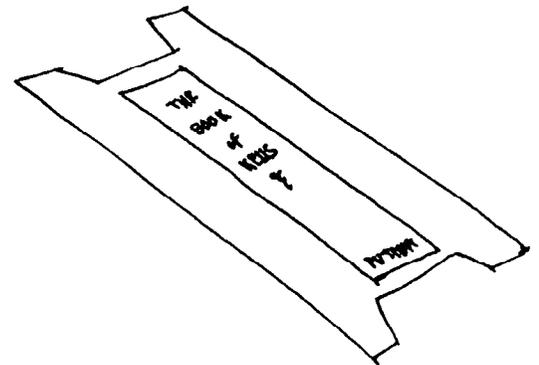


The original spine should be slightly narrower than the text block spine, so the original cloth won't interfere with the joint cloth of the replacement spine when the book opens and closes. Do not trim away any lettering or decoration. If the original spine is being re-used, save it.

If the original spine is too damaged or worn to use, there are other ways to label the spine of the book. A paper label can be hand written, typed or typeset on a computer, then glued to the new spine cloth. Another option is to write directly on the new book cloth with a permanent marker, such as those used to label quilts. Practice on a scrap of book cloth to make sure the label will be legible and attractive. If the option is an unsightly label, consider leaving the title off the spine.

Lay the original spine or new label on a piece of waste paper wrong side up. Apply glue in a star burst pattern working from the center toward the edges.

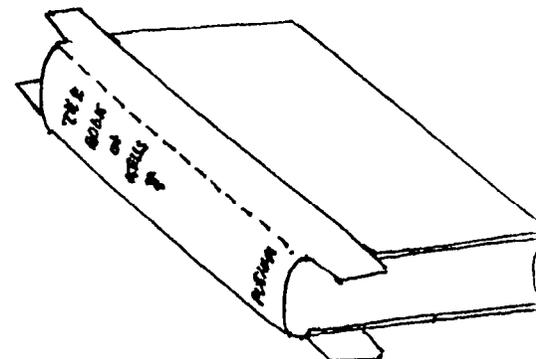
Center the original spine or new label on the right side of the replacement spine. Cover it with a piece of waste paper, and rub it down with a folder. All the edges should be well adhered.



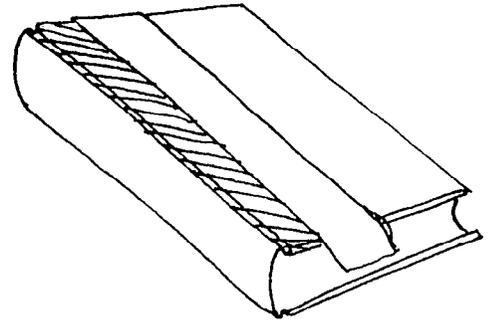
Protect the spine cloth with a piece of wax paper, and place under weight to dry.

Attaching the New Spine Cloth to the Text Block

Position the spine so the glued-down part of the turn-ins are centered on the text block spine, even with the top and bottom of the book boards. Mark the edges of the replacement spine cloth on the cover board.



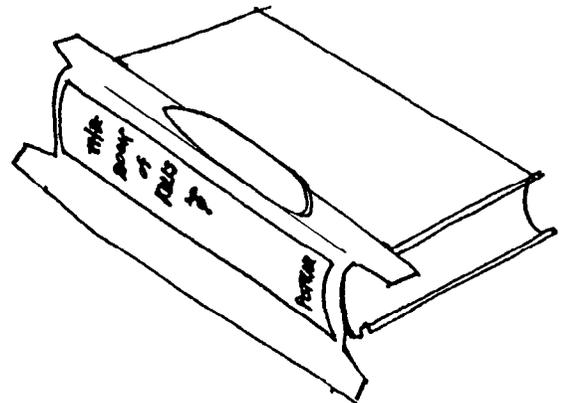
Put a strip of waste paper on the cover, lined up with the marks and glue from the waste paper toward the spine of the text block. Be careful not to get glue on the spine of the text block.



Before proceeding further, make sure the spine is right-side up on the text block.

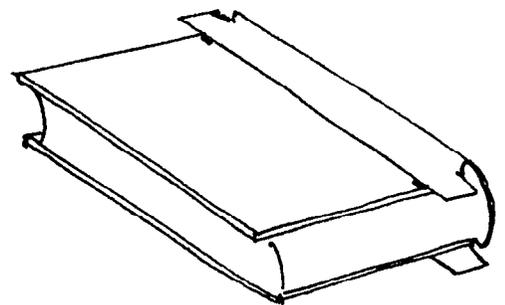
Position the replacement spine on the book. Center the head and tail; then lay the edge of the replacement spine against the line of glue on the cover.

Press the replacement spine onto the book board. Work the book cloth into the joint with a folder.

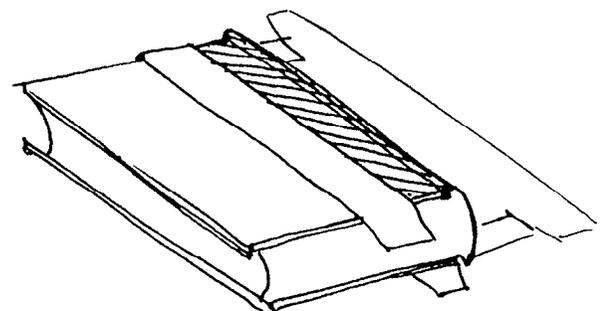


Insert rods into the joint. Dry under weight for a few minutes.

Turn the book. Wrap the replacement spine tightly around the book. Mark the position of the replacement spine on the book cover.



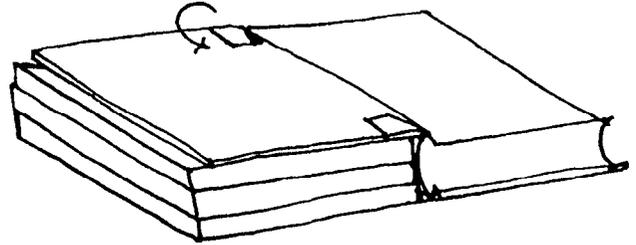
Lay a piece of waste paper along the marks. Apply glue working from the waste paper toward the joint. Be careful not to get glue on the spine of the text block.



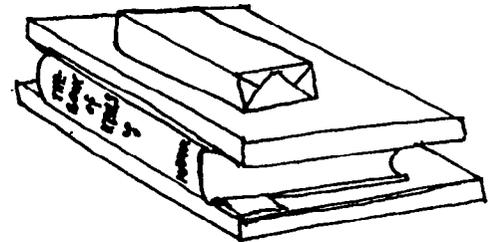
CONSERVATION BOOK REPAIR

The replacement spine should fit tight around the spine of the text block. Work the cloth into the joint with a folder.

Support the cover with book boards or other books. Apply glue to the extending tabs and fold them onto the endpapers. Rub them down with a folder.



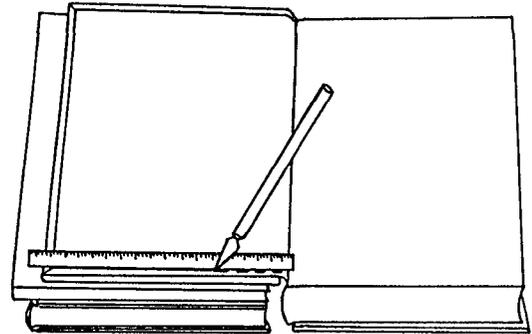
Put rods in the joints. Dry the book overnight in a press or under weight.



METHOD TWO: Rebacking With Book Cloth Under The Original Book Cloth

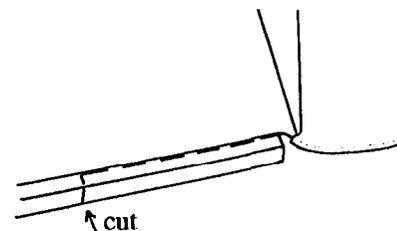
Lifting The Endpapers

Support the book with another book or a stack of boards.



Use an X-acto knife or scalpel and ruler to cut through the book cloth along the edge of the endpapers at the head and tail. The cut should be about 1 - 2" long.

At the outer edge of the first cut (away from the spine), make a second, 90-degree cut across the book cloth from the edge of the endpaper to the top of the book board.



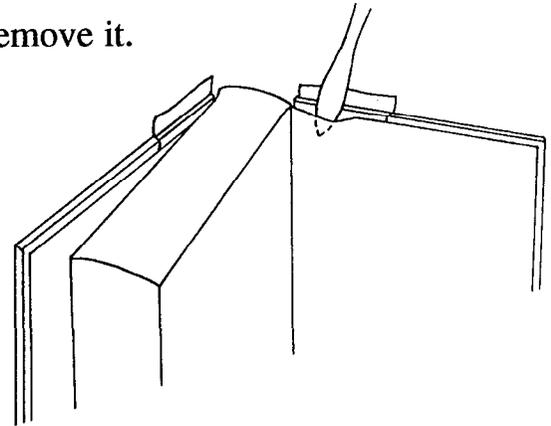
Use a knife or microspatula to lift the book cloth away from the book board.

If necessary, clip through the original book cloth turn-in at the hinge to allow the cloth to lift up. DO NOT clip through the endpaper or the crash.

Repeat this cut at the other end of the cover and on the opposite book board.

If the turn-in in the spine area is completely loose, remove it.

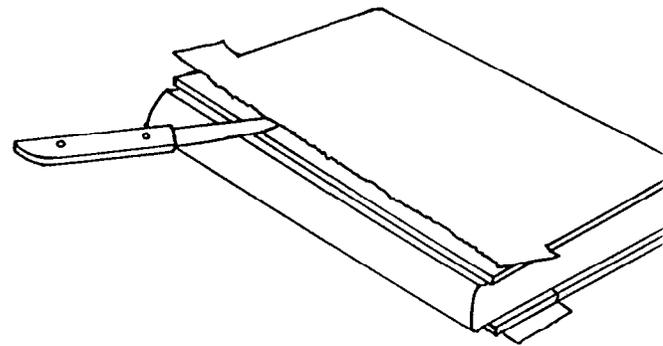
Insert a microspatula or dull knife between the original turn-in under the endpapers (the part of the book cloth cut but not lifted above and the book board. The original book cloth turn-in will support the endpaper as it is lifted.



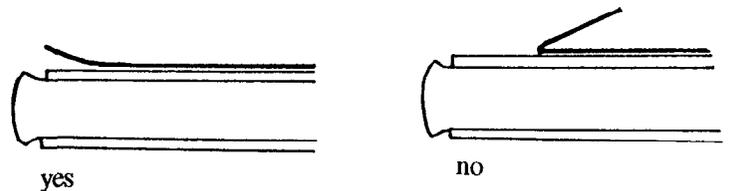
Loosen only a small amount of the endpaper as more can be separated later if needed.

Lifting and Trimming the Original Book Cloth

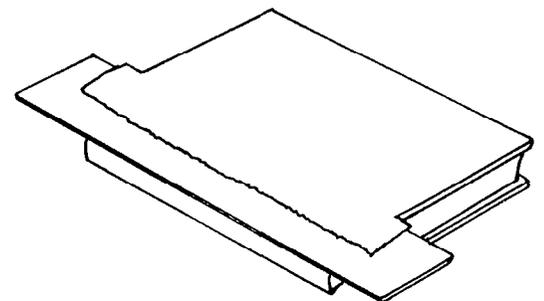
Gently lift the book cloth away from the board by sliding a folder or dull knife under the book cloth on the outer cover.



Lift the book cloth only as far as the cut at the top of the endpaper will allow, lifting a thin layer of book board with the cloth if necessary.

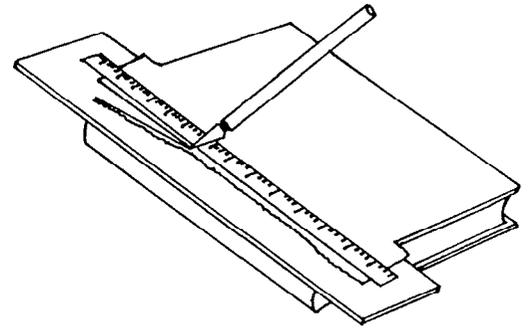


Try not to crease the book cloth as it is lifted or the crease line will show when the cloth is glued back in position.



CONSERVATION BOOK REPAIR

Insert a piece of thin cardboard between the original book cloth and the book board to use as a cutting surface.



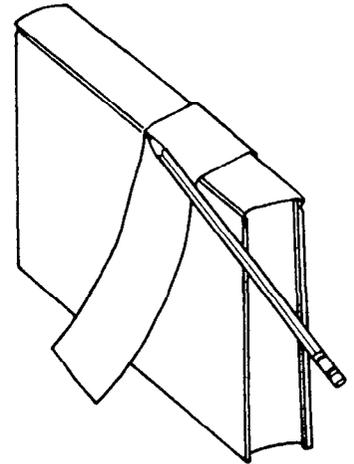
Place a straight edge along the ragged edge of the book cloth and use an X-acto knife or scalpel to trim the book cloth away from the hinge area.

Try not to trim away any print or decoration on the cover.

Turn the book over and repeat on the other side.

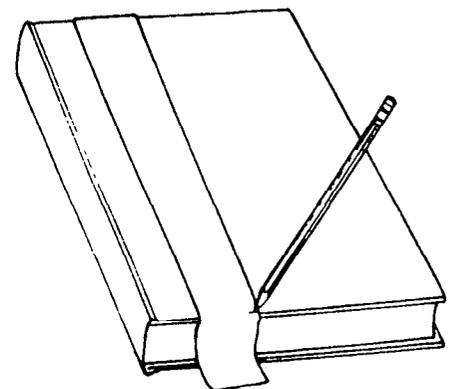
Measuring the Text Block Spine

Use a strip of paper to measure the width of the text block spine (measurement A), then add 1 - 2" to each side of the spine measurement marks.



The exact amount added to measurement A depends on how much of the original book cloth is trimmed away from the cover board. It's better to have this measurement too wide as any excess can be trimmed away later.

Use the same technique to measure the height of the book boards (measurement B) then add 1" to measurement B.



Reinforcing the Spine of the New Book Cloth

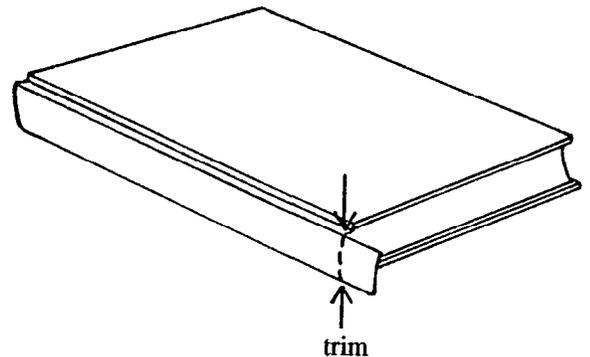
The spine area of the new spine cloth should be reinforced with an acid-free paper such as Bristol, Mohawk Superfine paper, or several layers of acid-free bond paper.

The spine inlay should be the same width as the text block spine and the height of the book boards, not the text block. It is a common mistake to cut the spine inlay the same height as the text block, which is shorter than the book boards.

Cut a spine inlay the width of the text block spine (original measurement A) and longer than the height of the book boards. It will be trimmed later. The grain of the spine liner must be parallel to the spine of the text block.

Double check the width of the spine inlay paper by laying it against the text block spine. It should fit the spine from shoulder to shoulder without curving into the joint area.

Trim the spine inlay to the correct height. Remember it should be the height of the cover boards, not the text block.



Choosing and Attaching One Side of the New Book Cloth Spine

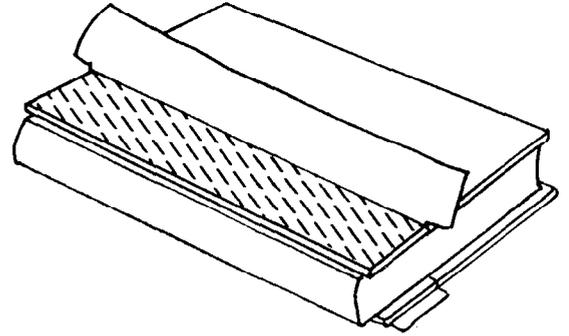
Choose a piece of book cloth that is a close color match to the original book cloth.

If a close color match isn't possible, select a color that has the least amount of contrast, i.e., black book cloth on a dark blue book would be less noticeable than light blue book cloth.

Transfer measurement A and B to the book cloth. Be sure the grain of the book cloth is parallel to the spine of the book. Cut the new spine piece.

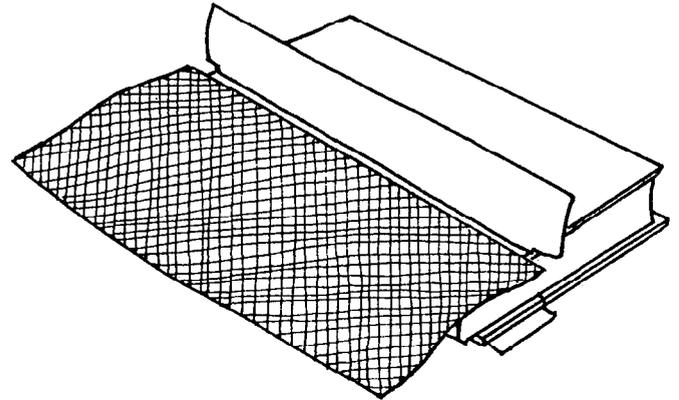
CONSERVATION BOOK REPAIR

Turn back the original book cloth on one cover (be careful not to crease it). Brush PVA glue on the exposed board. Work the glue all the way back into the area where the original book cloth and book board are still attached.



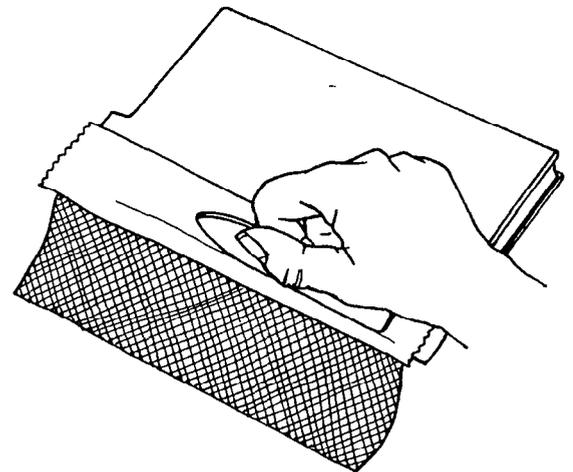
DO NOT put glue in the joint area.

Lay the new book cloth on the glued book board, with the right side up. Use a folder to press the new book cloth onto the board.



DO NOT glue down the original book cloth.

Work the cloth into the joint with the long edge of a folder. Protect the new book cloth with a piece of Hollytex or wax paper if necessary.



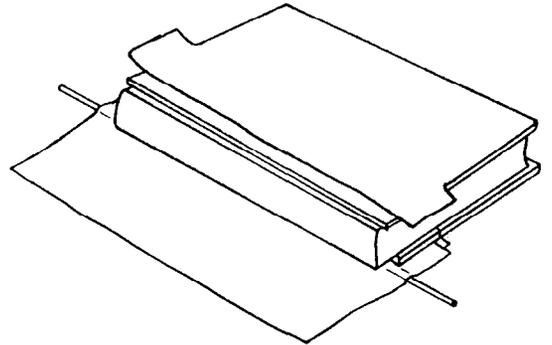
Insert rods in the joints and put under weight. Let the book dry for at least 10 minutes, so the glue will set.

Measuring the Width of the Joint

After the glue has set, use one of the following methods to mark the width of the joint. This gives the position of the spine inlay on the new spine cloth.

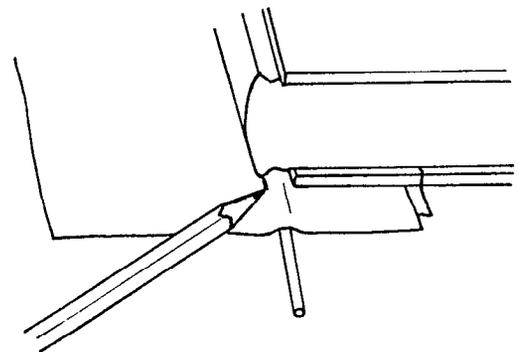
Method 1:

Lay the book on the work surface with the new spine cloth against the table, wrong side up.



Slip a rod into the joint against the table, press down gently on the joint area.

Mark the position where the shoulder of the text block spine meets the new book cloth.

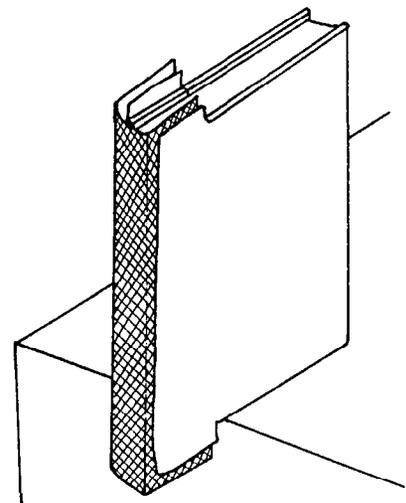


Repeat this measurement on the other end of the book.

Method 2:

The joint width can also be measured with the book upright.

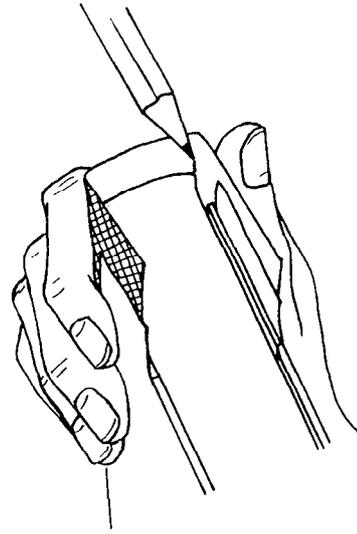
Protect the new book cloth by supporting the text block on the edge of the work table or a pile of books.



CONSERVATION BOOK REPAIR

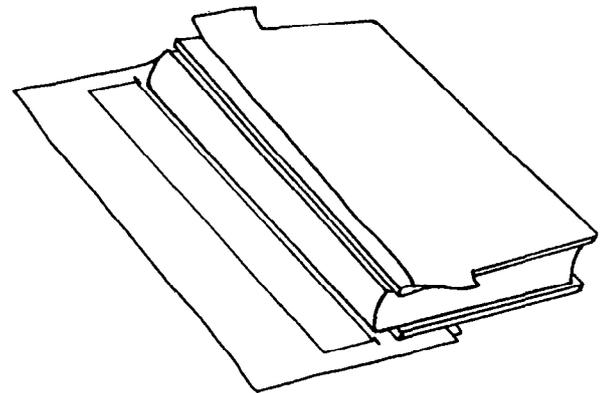
Wrap the new book cloth around the spine and press the new cloth into the joint with your fingers.

Mark the position of shoulder on the new book cloth. Repeat on the other end of the book.



Lay the paper spine inlay on a piece of waste paper and apply glue in a star burst pattern.

Use the pencil marks to position the glued spine inlay onto the wrong side of the new book cloth spine making sure the inlay is even with the top and bottom edges of the cover boards.

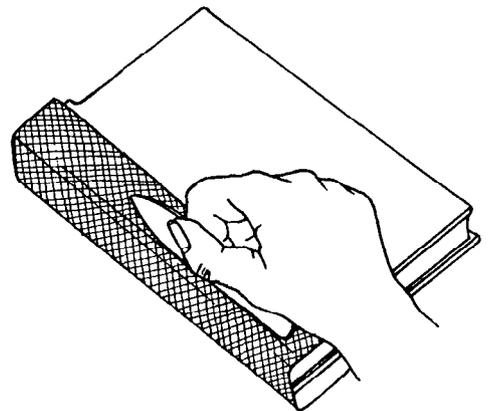


Attaching The Second Side of the New Book Cloth Spine

Cover the spine inlay with wax paper or Hollytex and blotters. Apply weight and let dry.

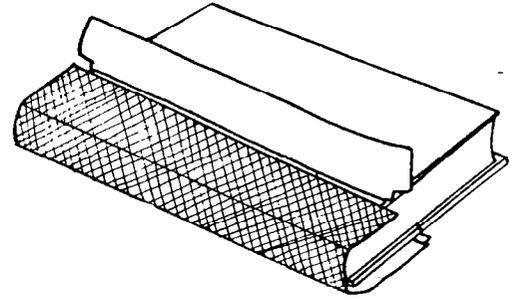
When the spine inlay is dry, gently wrap it around the text block with the new book cloth on top of the original book cloth.

Use the long edge of a folder to work the cloth into the hinge area.



Lift the original book cloth and lay the new spine cloth in place.

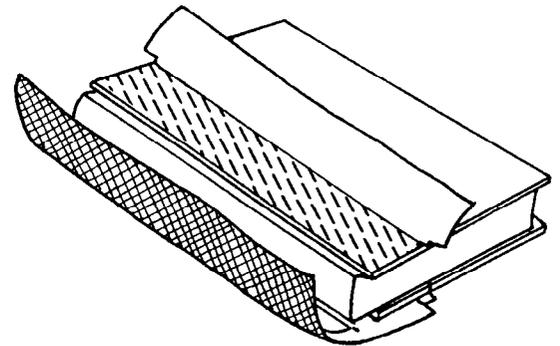
If the new spine cloth is too wide to fit, trim it down.



Lift up the new book cloth and apply PVA glue to the book board.

Work the glue all the way back into the area where the original book cloth and book board are still attached.

DO NOT put glue in the joint area or glue down the original book cloth.



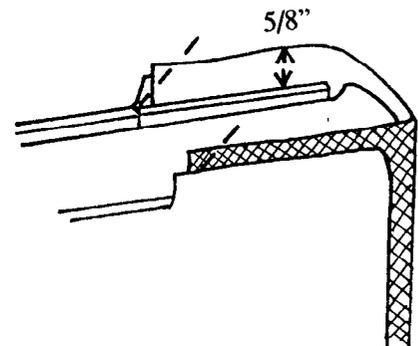
Lay the new book cloth back in place. Work the cloth into the hinge area with the long edge of a folder.

Protect the cloth with wax paper or Hollytex if necessary.

Put the book under weight to dry for at least 10 minutes so the glue will set.

If the new spine cloth extends past the top or bottom of the book more than 5/8", trim it down.

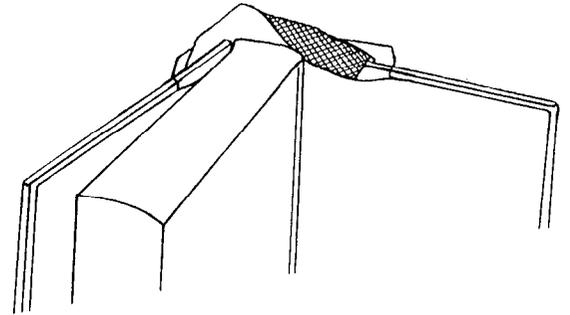
Clip the points off the corners for ease in turning-in.



CONSERVATION BOOK REPAIR

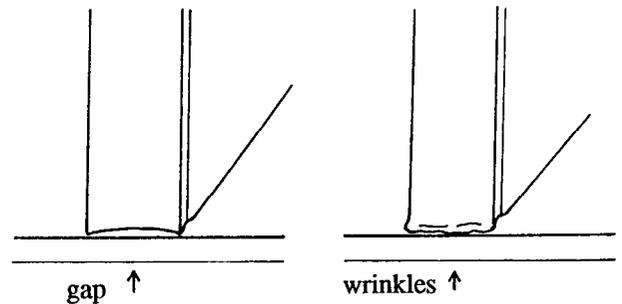
Protect the bottom extension of spine book cloth by placing the book on another stack of boards or another book.

Carefully tuck in the right side of the turn-in, then the spine area, and finally the left side of the turn-in.



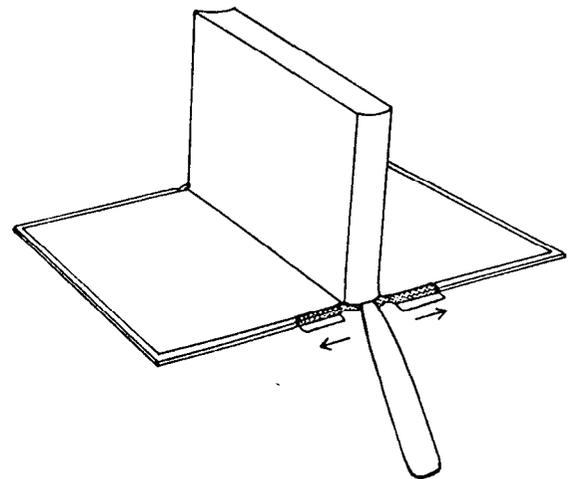
With the entire patch tucked in place, gently crease the top edge of the patch along the boards and in the spine area with your fingers.

Set the book on the work table to check the position of the turn-in area. The edge of the new spine book cloth should be level with the original boards so it rests flat and even against the table.



If there is space between the table and the new spine book cloth or if the book cloth wrinkles against the table, the turn-in is not correct. Readjust the turn in. Check it again.

When the turn-in is positioned correctly, lay the book on its spine. Use a folder to crease the turn-in in position. This crease sets the turn-in position and makes it easy to reposition it once the glue is applied.



Unfold the turn-in, brush on PVA glue, and carefully refold.

Use a folder to crease the glued turn-in into its previously creased position.

Re-check to make sure the spine area sits flat against the edge of a work table. If there is a gap or wrinkles, reposition the turn-in before the glue dries.

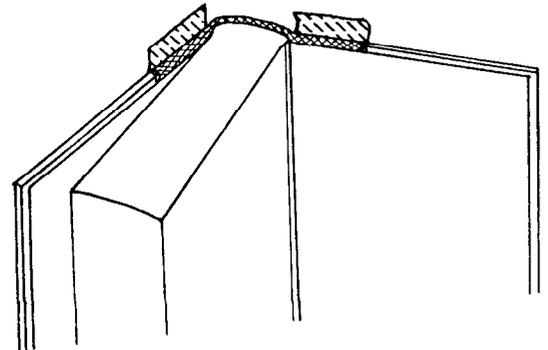
Wipe away any excess glue. Work the new book cloth into the hinge area with a folder.

Put wax paper or Hollytex inside the book hinge area to protect the end sheet from excess glue. Insert rods or knitting needles in the joint and dry under weight.

Let dry for at least ten minutes and repeat the procedure on the other end of the book.

Apply glue to the raised flaps, and lay them into position, pressing them onto the new book cloth.

There may be a slight gap between the flap and the edge of the endpaper.

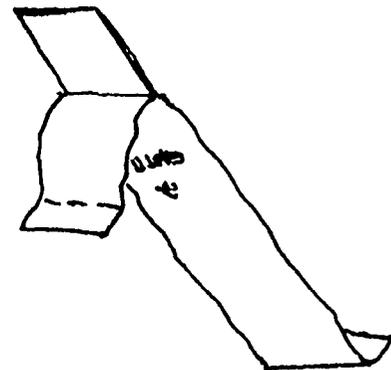


Lay a strip of wax paper in the joint areas, insert rods or knitting needles and dry overnight under weight.

Mounting the Original Spine onto the New Book Cloth Spine

Peel as much of the original paper spine inlay from the original spine cloth as possible.

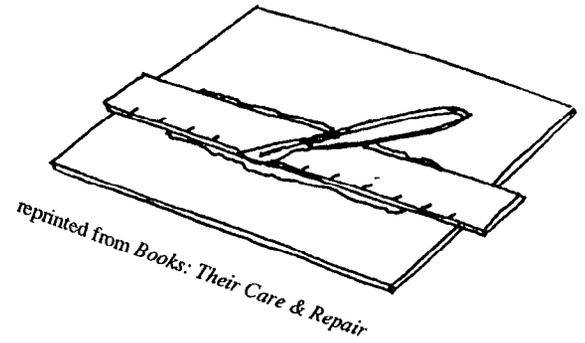
If the paper is well adhered to the cloth, don't force it off the spine cloth.



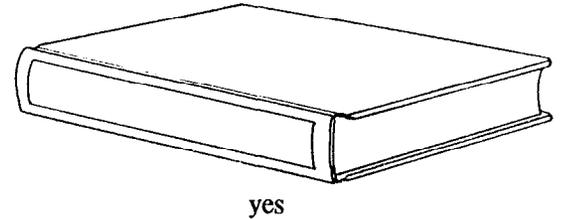
reprinted from *Books: Their Care and Repair*

CONSERVATION BOOK REPAIR

Trim the frayed edges with a straight edge and X-acto knife, taking care not to remove any of the letters or design.

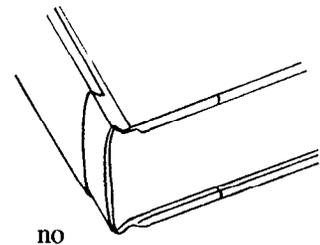


Lay the original spine against the new book cloth spine to check for a proper fit.



The original spine should not extend into the hinge area as it will add bulk that will inhibit the cover from opening freely.

Trim the original if it is too wide.



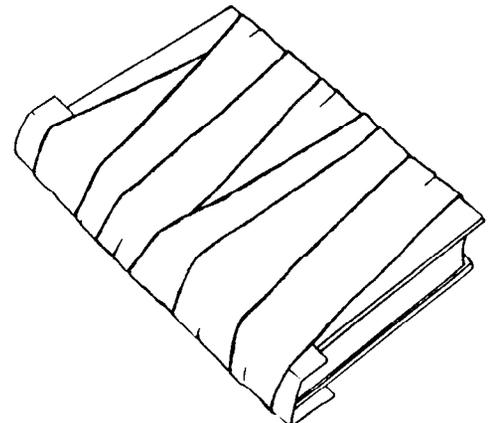
Lay the original spine wrong side up on a piece of waste paper and apply PVA glue in a star burst pattern.

Position the original spine over the new book cloth spine.

MAKE SURE THE SPINE IS RIGHT SIDE UP TO THE TEXT BLOCK.

Cover the original spine with a piece of wax paper or Hollytex and rub down with a folder.

With the wax paper or Hollytex still covering the spine, wrap the book snugly in an elastic bandage (the kind used for a sprained ankle). Pull the bandage tight as the book is wrapped. The bandage will apply even pressure over the entire curved spine.



When the spine is dry, double check that all the edges are adhered.

C. RECASING A TEXT BLOCK INTO THE COVER

The hinge is the weakest part of a case bound book. As explained in **BOOK CASE CONSTRUCTION** (page 7), the text block is constructed in one operation while the case is constructed in another operation. The spine of the text block is covered with crash, and the crash is attached to the book board. The crash is covered by the pasted down endpaper.

Over time, gravity pulls the text block away from the cover, or the crash can be damaged which allows the text block to separate from the cover. If the cover is in good condition, the text block can be recased into the original cover.

Some text blocks are so large and heavy that they will always be prone to falling out of their cases. In such a circumstance, it is be wise to recase with text block so it is flush with the bottom of the case. That way the shelf can support the entire text block.

The book case joints **must** be in excellent condition to reuse the case as is.

If the joint area is worn, repair the cover using the techniques outlined in **REBACKING A TEXT BLOCK** (page 79) as a guideline. The repair will differ slightly from the instructions if the text block is not be attached to the cover boards but the basic principles are the same.

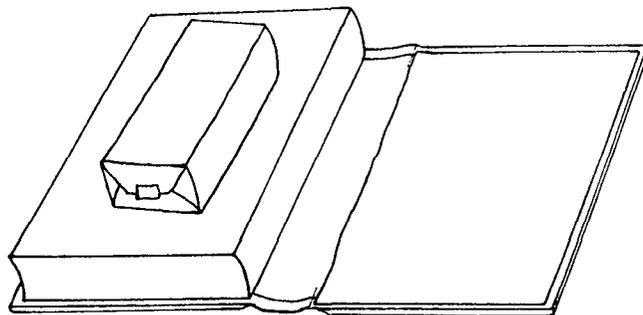
When the rebacking (spine and hinge repair) is complete, recase the text block.

Check the endpapers carefully and determine whether they can be reused or if they need to be replaced or repaired. Detailed information for removing or replacing endpapers is covered in **ENDPAPER TREATMENT** (page 112).

1. RECASING - ONE DAMAGED HINGE

Examine both hinges very carefully to be sure only one hinge needs repair. If more than 1/4 of the crash on either hinge is damaged, that hinge must be replaced. **RECASING THE TEXT BLOCK (TWO DAMAGED HINGES)** is detailed on page 102.

Cut through any crash that is still intact in the damaged hinge area so the cover falls away from the text block.



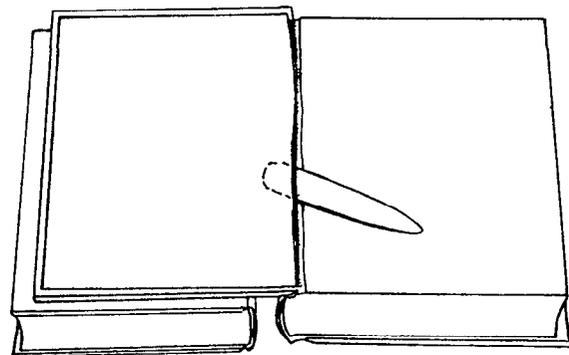
Check the original spine liners. If they are not glued down, carefully feed PVA or PVA/mixture between the spine liner and the spine of the text block. Use a folder or 1" stencil brush to work the liner in place.

If the spine liners are damaged or if they are not heavy enough, reline the spine using the directions in **Lining the Text Block Spine** (page 81) after the new crash is mounted on the spine.

Examine the endpapers. If either is missing or damaged, replace or repair it before going further. Options for **ENDPAPER TREATMENT** are discussed on page 112.

Support the loose cover with a book or stack of boards; then slide a dull knife or a folder between the pastedown and the book board.

Work carefully so as not to tear the pastedown and lift only enough of the pastedown to slip in the new crash.



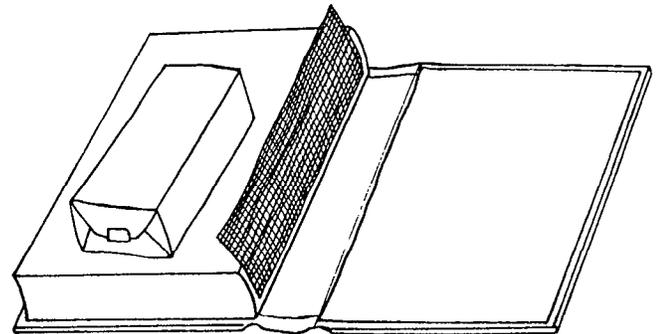
The pastedown can tear easily so try to work the folder or knife under the old crash to support the pastedown as it is lifted up.

Cut a new piece of crash 1/2" shorter than the height of the text block and the width of the text block plus about 2".

Put a weight on top of the text block then apply PVA or PVA/mixture to the spine of the text block.

Place the new crash onto the spine.

The crash should cover the entire width of the spine and extend at least 1 1/2" past the shoulder of the text block.



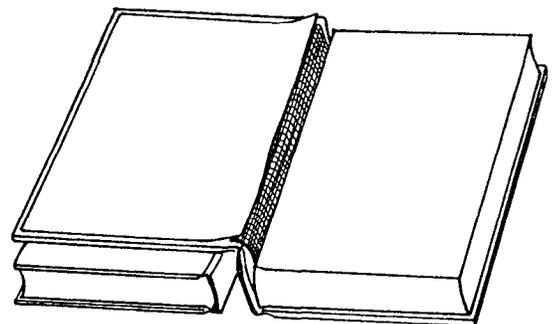
Use a folder or stencil brush to work the crash onto the spine. Let dry thoroughly.

When the crash is dry, check the spine lining paper. Use the test on page 81 to determine if more spine liners are needed.

If the spine liners are damaged or if they are not heavy enough, reline the spine using the directions in **Lining the Text Block Spine** (page 81). The number and kind of spine liners depend on the volume.

Even if the spine does not need lining, it is still a good idea to put one thin layer of paper or Japanese repair tissue over the crash to anchor it to the text block. Let it dry before proceeding.

Slide the loose edge of the crash under the lifted pastedown to check for fit. If the loose flap of the crash is too wide, trim it to fit.



Lift the crash out from under the pastedown and diagonally clip the ends of the corners. They tend to fold under as the crash is inserted under the lifted pastedown.

CONSERVATION BOOK REPAIR

Apply glue to the book board. Do not glue the lifted pastedown.

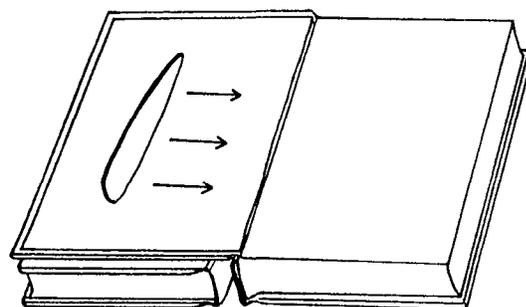
Slide the loose flap of crash back under the lifted pastedown. Work it into place, making sure there are no lumps or folds in the crash.

Place a piece of wax paper or Hollytex in the hinge area and close the cover. Use the long edge of a folder to work the joint into place.

Open the book and support the cover on another book or a stack of boards.

Lift the pastedown and apply glue between the pastedown and the crash/board.

Use the flat edge of a folder to press the pastedown into position, working from the fore edge toward the hinge area. Wipe away any excess glue.



Put a piece of wax paper or Hollytex in the hinge area and close the cover.

Use the long edge of a folder to work the joint into place.

Insert rods in both joints, and dry under pressure.

Open the cover. Inspect the repair. Use the techniques in **REPAIRING TORN ENDPAPERS AND TIGHTENING CASE HINGES** (page 44) to finish or camouflage the repair.

2. RECASING THE TEXT BLOCK (TWO DAMAGED HINGES)

When both hinges are damaged or broken, the crash must be replaced before the text block reattached to the case.

Cut or tear through any of the crash that is still attached in the hinge area.

If the endpapers need to be replaced or repaired, follow the instructions in **ENDPAPER TREATMENT** on page 112.

Clean the spine. Remove the old crash and any paper liners that come off easily. If the book is sewn, take care not to damage the sewing threads.

Remember, it is not essential to remove all the spine lining paper but do remove the paper that comes off easily.

Check the sewing threads. If any are broken and need repair, see page 117.

Check the signatures. If any are damaged and need repair, see page 108.

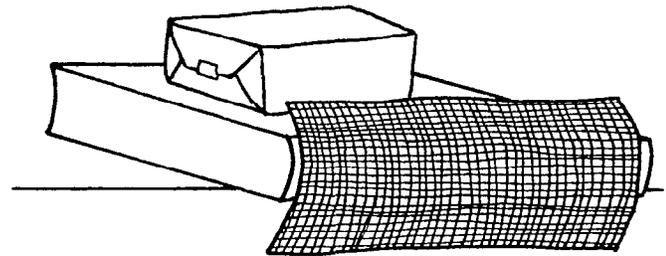
In strict conservation repair, the spine should be lined with Japanese repair tissue before a text block is recased. Since this layer is applied with wheat paste, it is reversible in water and acts as a liner for the other layers of spine materials. The spines of books that are considered valuable or that will be in the collection for a long, long time should be lined with Japanese repair tissue. Otherwise, proceed to attaching the crash.

Japanese Tissue Lining: Cut a piece of Japanese repair tissue the height and width of the text block spine, with the grain running parallel to the spine of the text block. Apply paste to the tissue in a starburst pattern and attach it to the text block spine. Use a folder or 1" stencil brush to tap the tissue onto the spine. Let dry thoroughly before proceeding.

Cut a NEW piece of crash 1/2" shorter than the height of the text block and about 4" wider than the spine of the text block.

Lay the text block on the edge of the work table and add weight. The entire spine should be accessible.

Apply PVA or PVA/paste mixture (page ___) to the spine area. Center the crash on the glued spine, and work it down with a folder or a 1" stencil brush. Let the crash dry on the text block spine.



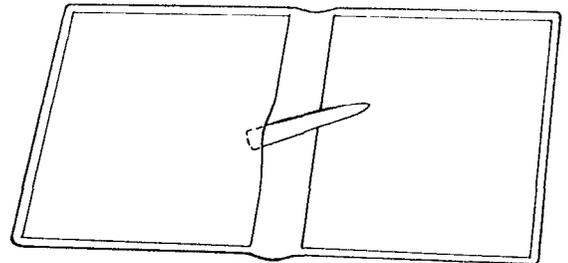
Line the spine. The number and type of spine liners depends on the size of the book. See **Lining the Text Block Spine** (page 81).

CONSERVATION BOOK REPAIR

When the pastedown is still attached to the board, use **Method 1** for recasing the book.

If the original pastedown has been lifted off the cover boards or if the endsheets have been replaced, use **Method 2** below to attach the text block into the case.

If the original pastedown is being reused, gently slide a dull knife or a folder under the spine edge of each pastedown to carefully lift the pastedown away from the board. Work the knife or folder under the original crash to support the paper.



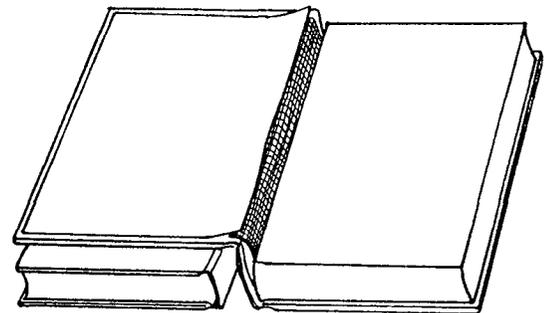
Lift only enough pastedown to slip in the new crash. Place the text block into the case.

METHOD 1: Pastedown Still Attached To The Board

Before casing-in the text block, make sure the spine is right side up to the text block.

Slide the loose edge of the crash under the lifted pastedown.

Trim the crash if it does not fit and trim the corners diagonally.



When the loose edge of crash fits well, remove it. Apply glue to the book board, working glue all the way down into the area where the pastedown and the book board are connected. Do not glue the lifted pastedown.

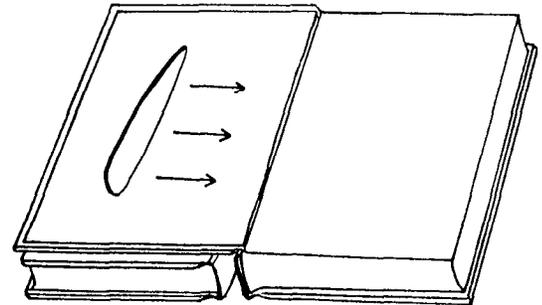
Slide the loose edge of the crash back under the lifted pastedown. Work it onto the glued board. Make sure there are no lumps in the crash.

Put a piece of wax paper or Hollytex in the hinge area and close the book. Use the long edge of a folder to work the book cloth joint in place.

Open the book and support the cover on another book or a stack of boards.

Lift the loosened pastedown, and apply glue between the pastedown and the crash.

Use the flat edge of a folder to work the pastedown into position and to move any excess glue towards the hinge. Wipe away any excess glue.



Replace the wax paper or Hollytex in the hinge area and close the book. Rework the joint into position with the long edge of a folder.

Turn the book over, and repeat for the other hinge. When the second hinge is repaired, insert rods in both joints and dry under pressure.

After the repair is dry, open the case and inspect the repair. Use the techniques in **TIGHTENING OR REPAIRING CASE HINGES** (page 44) to finish or camouflage the repairs if needed.

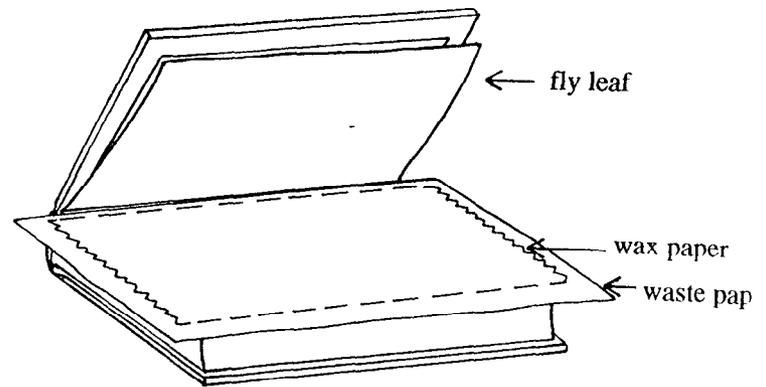
METHOD 2: Original Pastedown Lifted Off Board or Endpaper Replaced

Double check to see that the text block is correctly positioned in the case. The text block and cover need to be right side up to one another. The text block should be positioned correctly at the edge of the case.

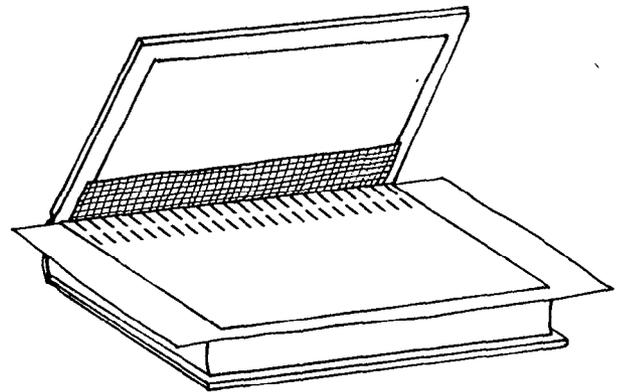
CONSERVATION BOOK REPAIR

Slip a large piece of wax paper into the fold of the endpaper to act as a moisture barrier. The wax paper should be larger than the endpaper.

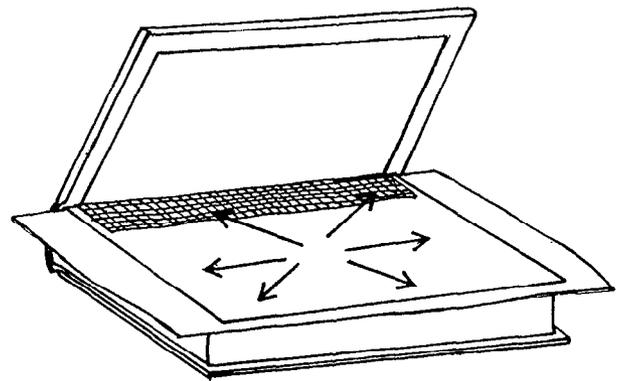
Cover the wax paper with a sheet of waste paper. The waste sheet should also be larger than the endpaper.



Use a large brush to apply glue to the endpaper under the loose edge of crash. Lay the crash onto the endpaper and work it in place with a folder. Be especially careful to work the crash into the text block shoulder.



Apply glue to the rest of the endpaper in a starburst pattern (page 34).



As the glue moistens the endpaper it may begin to curl. Reverse the curl by gently bending the paper in the opposite direction of the curl until it relaxes. The glue will not begin to dry for several minutes so there is time to work with the endpaper.

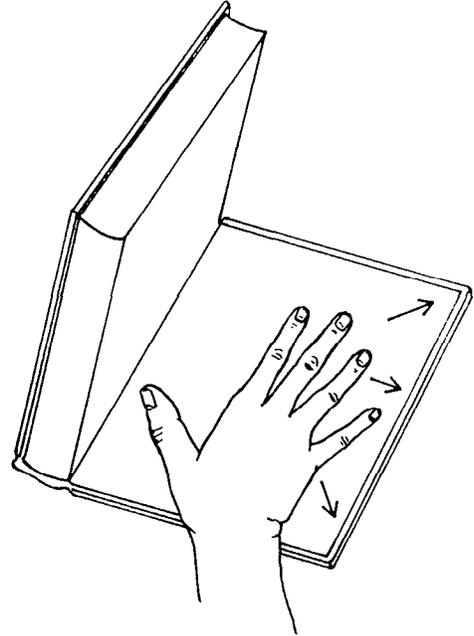
Remove the waste paper, keeping the wax paper in place.

When the endpaper is glued and flat, carefully lower the cover. Press down on the cover or rub lightly with a folder.

Open the cover slightly and check the pastedown. *Do not fully open the cover unless absolutely necessary.*

If the pastedown is in the wrong position, quickly lift it up and reposition it, then lay the cover back down.

If there are wrinkles or air bubbles in the pastedown, support the cover on the work table and use the side of your palm to smooth out the wrinkles. Work from the center to the edges of the pastedown in a starburst pattern.



Work the case cloth into the joint with the long end of a folder, insert rods and press the book under weight.

Let the endpaper dry for at least one half hour; then repeat for the opposite cover. Dry the repaired book overnight.

The book must dry under weight or the boards will warp and the endpapers will wrinkle.

D. REPAIRING AND REATTACHING DAMAGED OR SEPARATED LEAVES, FOLIOS OR SIGNATURES

Leaves (one single 2 sided sheet or page), folios (a single folded sheet comprised of 2 leaves) and signatures (gatherings of usually 4 folios) can all separate from the text block. Each can be repaired in several ways. Read through each of the options below and select the one that will work best for a specific book.

1. REPAIRING SIGNATURES

All paper tears should be mended before reattaching a signature to the text block. Various techniques for repairing damaged paper are discussed in **PAPER TEARS, CUTS AND LOSSES** (page 51).

- Examine the sewing holes on the fold of each folio. If the sewing holes are enlarged or the paper between the holes is damaged, the fold should be repaired before the folio is reattach to the text block.
- If the damage is limited to one or two sewing holes or to only part of the fold, repairing that portion of the fold is sufficient.
- It is not always necessary to repair each folio of a signature. The center and outside folios often sustain the most damage. Repairing only those two folios is faster and decreases the thickness of repair tissue in the repaired signature.
- When most or all of the folios in a signature are badly damaged, each folio should be repaired.
- Repair the folds of the folios in the folded position. Paper repaired flat then folded tends to have a very sharp crease while the original signature folds tend to be rounded. Repairing the folios in the folded position helps retain the proper shape and placement of the fold.

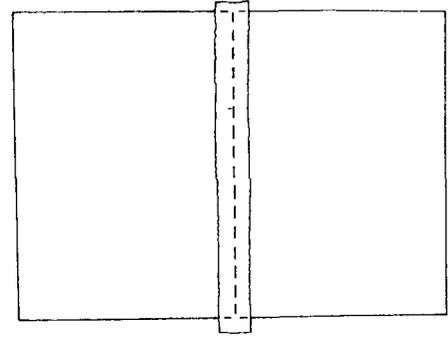
Repairing The Center Folio of a Signature

The damaged fold of a center folio should be repaired on the inside. All the other folios are repaired on the outside.

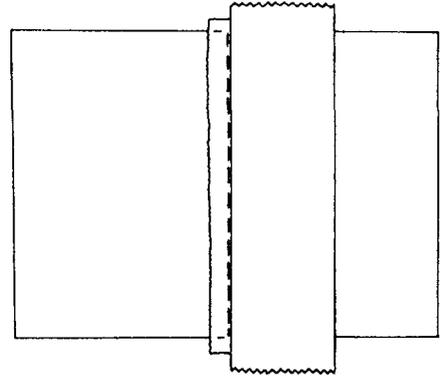
Use the technique on page 33 to tear a piece of Japanese tissue and apply paste to the Japanese tissue (page 34). The width of the Japanese tissue will vary depending on how much of the signature page is damaged.

Lay the center folio of the signature on a piece of non-stick material with center facing up.

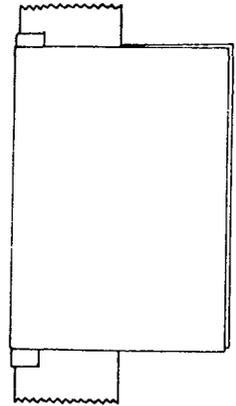
Lay the pasted repair tissue down the center of the folio.



Lay a strip of wax paper or Hollytex along the fold.



Carefully close the page.



Place the folded page between blotters. Put under weight to dry.

If the other folios in the signature do not need repair, place them in the correct position around the center folio then reattach the signature to the text block following the instructions in **3. REATTACHING PARTIALLY OR FULLY DETACHED SIGNATURES.**

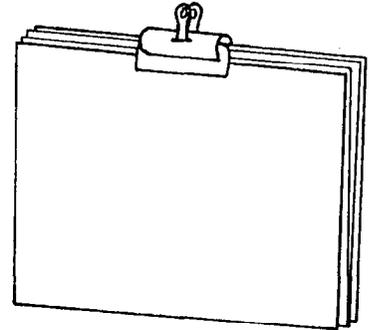
If all or some of the other folios need repair, continue with these instructions.

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Repairing Additional Or The Last Folio of a Signature

If additional folios need to be repaired, place the folio to be repaired in the correct position around the center folio page(s). Make sure all the pages are in the correct order.

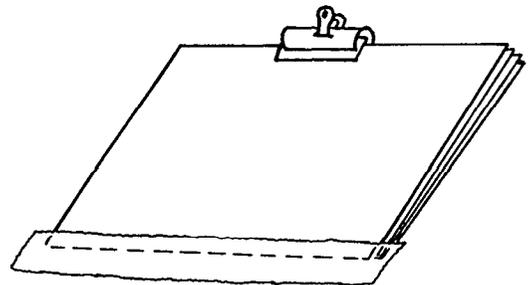
If a folio has separated into two halves, place both leaves in the correct position, and clip them together at the fore edge.



Tear a strip of Japanese repair tissue the height of the folio and as wide as necessary to cover any paper damage in the hinge area.

Apply paste to the Japanese tissue strip.

Place the tissue strip on the spine edge of the damaged folio so that one half of the pasted tissue extends past the folio fold.



Gently wrap the Japanese tissue around on the back side of the folio. Remember, only the center folio of a signature is repaired on the inside; the others are repaired on the outside of folio.



Lay the repaired signature pages between wax paper or Hollytex and let dry.

Repeat the instructions until all the signature folios are repaired.

2. REATTACHING SINGLE LEAVES

Detached single leaves can be reattached to the text block by hinging (page 61) or tipping (page 58) depending on the structure of the text block.

Since each leaf of a sewn text block is one half of a complete folio, always make sure the other half of the folio is well attached to the text block. If the second leaf is loose, both leaves must be repaired.

Two detached halves of a folio can be reattached by hinging or tipping, or as a partially detached signature below.

3. REATTACHING PARTIALLY OR FULLY DETACHED SIGNATURES

Method 1:

Find the center of the signature and cut the sewing threads to release the pages.

If any of the leaves have separated, hinge them together with Japanese tissue to restore the complete signature. Make sure the pages are in the correct order.

Tear a piece of Japanese repair tissue the height of the signature and about 3/4 - 1" wide.

Fold the Japanese repair tissue strip around the outside of the signature (there is no paste involved here). Using thin thread (page 22), sew the signature to the repair tissue with a 3- or 5- hole pamphlet stitch.

Put a piece of waste paper on top of a piece of wax paper then put both between one side of the Japanese repair tissue and the separated text page.

Apply paste to one side of the folded repair tissue.

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Position the repaired signature with its pasted repair strip into the text. Close the book and let dry.

When the first half of the repair strip is dry, repeat on the second half of the repair strip.

The reattached signature may not sit into the text block exactly as it originally did. If the signature protrudes past the edges of the text block, use the techniques on page 64 to trim the reattached signature to the correct size.

Method 2:

If the spine of the text block is accessible, such as when the text block is being recased (page 99), the repaired signature can be sewn back into the text block.

Punch sewing holes in the detached signature, one signature before it in the text block and one signature after it. Use the LINK STITCH (page 121) to sew through the center of these three signatures and through the spine lining papers.

If the resewn signature does not sit in the text block evenly, use the techniques on page 64 to trim it to size.

E. ENDPAPER TREATMENT AND REPAIR

The first pages at the front and back of the text block are called the endpapers. The main function of the endpapers is to protect the text block from dirt and damage, but endpapers can also be decorative or informative.

Most endsheets consist of two to four leaves: the pastedown which is glued to the cover board and the leaves that turn freely called the fly leaves.

Most commercially bound volumes use two page endpapers that are sewn or glued to the text block.

The way to handle endpapers depends on the condition of the endpapers and on the information they contain.

If the fly leaf and pastedown are in good condition they can be reused. In some instances, such as recasing, the two parts of the endpapers may be split. Slide the new crash under the pastedown and cover any gap between the fly leaf and the pastedown with Japanese repair tissue.

If the endpapers are torn and need repair, follow the instructions for repairing tears on page 51.

If the endpapers are replaced, clean as much of the old pastedown off the book board as possible. Remove any barcodes or book pockets. The inside of the cover boards can be lightly sanded to remove or smooth down any pastedown paper left on them.

1. CONSTRUCTING A DOUBLESREAD ENDPAPER

When the front and back endpapers show the same information or picture, the fly leaf of each endpaper can be used to construct one complete endpaper. The constructed endpaper is usually attached to the front of the text block.

Separate the fly leaf from the pastedown. If the hinge area is weak, the fly leaf can be separated by gently pulling it away from the pastedown; if the paper in the hinge is in good condition, cut it away.

Check the alignment of the two fly leaves. If there is an overlap, trim back the two parts until they meet correctly. If there is a gap in the two pages, it can be filled with Japanese repair tissue when they are hinged together. Hinge the two halves together (page 108), then use the LINK STITCH (page 121) to attach the endpaper to the text block. Sew the endpaper to at least three adjacent signatures.

2. PHOTOCOPYING THE ORIGINAL ENDPAPERS

Damaged endpapers can be photocopied and sewn to the text block. The endpapers can be copied as an entire page (pastedown and fly leaf on one page) or in two parts (pastedown and fly leaf copied separately), then hinged together (page 108). Color photocopying is an option for damaged

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endpapers printed with maps that include color keys or route lines which do not reproduce well in black and white.

The quality of a photocopy depends on the original image. Line drawings reproduce well while halftones or photographic images can be tricky. Using a lighter photocopy setting or copying through a halftone screen can improve some images.

All replacement photocopies should be made on acid-free 20 lb. bond paper. Commonly used papers include Howard Permalife, Xerox XXV Bond and University Products' Perma-Dur (white and cream). Papers designated as cream, natural or toned tend to blend in with older paper better than white paper.

Test the grain of the photocopy paper. The grain of the finished endpaper should run parallel to the spine of the book. Lay the endpaper to be copied on the copier glass. The grain of the paper and the grain of the endpaper should be parallel. Close the lid or lay paper on the glass to mask the copier glass and avoid dark borders on the copy

Copy large endpapers in two parts. Hinge the two pieces together using the technique on page 108.

When the doublesheet endpaper is dry, carefully trim it to size.

Use the LINK STITCH (page 121) to attach the photocopied endpaper to the text block. Sew the endpaper to at least three adjacent signatures.

3. LIFTING THE PASTEDOWN

If the information on the endpapers cannot be saved by constructing a new endpaper or photocopying, the pastedown can sometimes be mechanically lifted off the cover board or soaked off in water.

Use a microspatula, X-acto knife or sharp knife to carefully lift the fly leaf off the cover board. This procedure works best when the glue under the pastedown has dried and the pastedown is only loosely attached to the cover board.

Some pastedowns can be removed by soaking the endpaper and cover board in water. The cover board must be detached from the text block, *DO NOT IMMERSE THE ENTIRE BOOK IN WATER.*

Soak the cover board with its attached endpaper in warm water for no more than half an hour. The water should release the adhesive, and the pastedown will float free of the board. Before immersing in water, make a copy of the pastedown to be used in the event the adhesive is not soluble in water or the color runs.

Dry the endpaper between Hollytex and blotters. Change the blotters to hasten drying.

4. REPLACING ENDPAPERS

If either or both endpapers are damaged and do not contain special or unique information, it may be easier to replace them with new endpapers. Most text paper is not truly white so use an off-white or cream colored paper to blend in with the text block. Mohawk Superfine paper is often used to replace endpapers.

Many text blocks are not really square so it can be easier to trim the end sheet to fit the text block after it is attached to the text block.

Fold the endpaper, and lay it in place on the text block.

Mark and cut the top edge of the endpaper to fit the text block.

Using one of the methods below, attach the endpaper to the text block. Trim the bottom and fore edge to fit (page 64). Attach and trim one endpaper before attaching the second endpaper.

5. ATTACHING THE ENDPAPER

Endpapers can be attached to the text block in several ways. The two most common methods of attaching endpapers are either by sewing or by tipping them to the text block.

Sewing Endpapers To The Text Block

Use the **LINK STITCH** (page 121) to attach the endpaper to the text block. Sew the endpaper to at least three adjacent signatures.

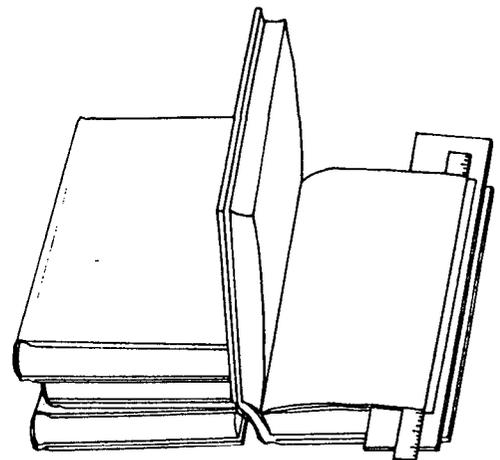
Tipping Endpapers Onto The Text Block

Using the masking technique in **Applying Glue to A Page To Be Tipped-** (page 59), apply a 1/4" line of glue to the folded edge of the endpaper. Carefully lay the endpaper in position and work the fold down with a folder. Dry under weight.

Trimming the Endpaper to Fit the Text Block

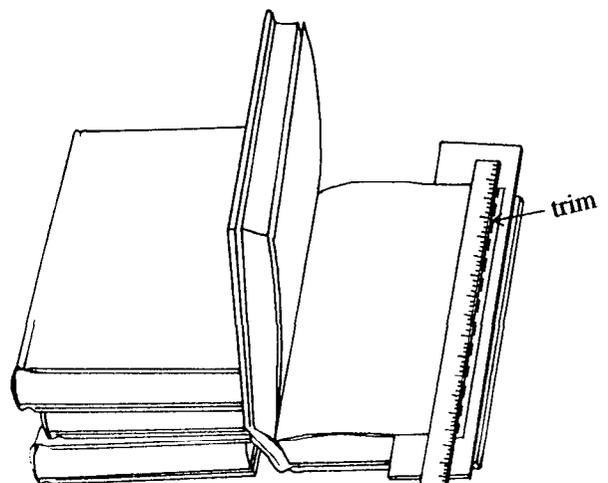
Once the endpaper is firmly attached to the text block, lay the text block endpaper down on the cutting surface.

At the bottom edge of the text block, insert a ruler between the endpaper and the adjacent text block page so the edge of the ruler just barely shows.



Hold down the text block firmly and use several light strokes of a sharp knife to cut through the endpaper.

Repeat this procedure for the fore edge.



F. RESEWING A DAMAGED TEXT BLOCK

Often the sewing thread in one or two signatures will break while the rest of the text block sewing is sound.

In this case, tipping or hinging the separated signature(s) into the book is not the best option because those methods do not give enough support to so many pages. Also, hinging-in pages adds several layers of thickness to the spine of the text block. The extra thickness can put stress on the case hinges and interfere with the pages opening easily.

Resewing an entire text block takes time and practice and should only be attempted when the book is judged to have lasting importance to a collection.

Before resewing a text block, study the sewing structure.

- Open the text block to the center of a signature and look at the sewing threads.
- Books sewn by machine usually have double threads and no sewing supports (tapes or cords). This kind of sewing is called unsupported sewing because only the sewing thread and glue hold the signatures together. Most manufactured books are constructed with unsupported machine sewing.
- Text blocks that are sewn by hand usually have single sewing threads sewn around tapes or cords for support. Some manufactured books are also sewn on tapes or cords. This type of sewing is called supported sewing. Supported sewing is always stronger than unsupported sewing because the tape or cord helps support the signatures.

The **link stitch** is used to repair a text block sewn using unsupported sewing. In unsupported sewing, the signatures are linked to one another only by the sewing threads.

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The **lap-link stitch** is used to repair a text block that is sewn on tapes or cords. This is called supported sewing because the tapes or cords provide the supporting connection between the signatures so there is no need to link the signatures to one another.

The instructions for the link stitch and the lap-link stitch are identical until step number 4. Specific link stitch instructions begin on page 121 and specific lap-link Stitch instructions begin on page 129.

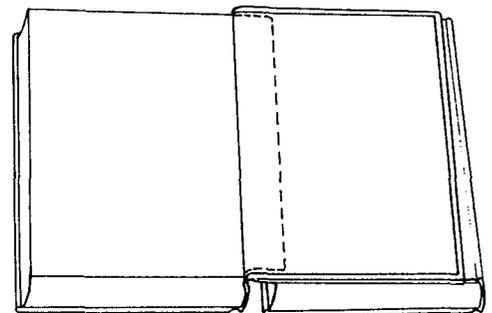
Work through the instructions at least once before attempting them in a library book. Fold pieces of paper to create signatures, punch sewing holes and number them so the directions are easy to follow. Save the practice signatures to serve as a model for future reference.

1. GAINING ACCESS TO THE TEXT BLOCK SPINE

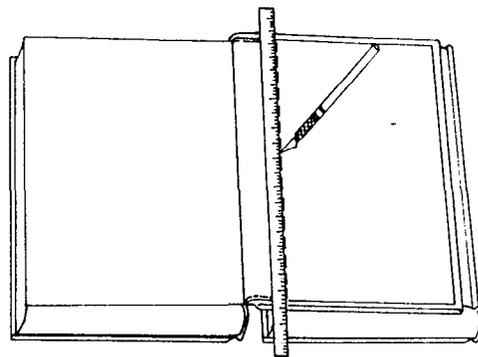
The spine of the text block must be accessible to re sew loose or separated signatures. If the endpapers are separated at one hinge, cut through it with scissors or a knife to gain access to the spine. Whenever possible, separate the back hinge so the repair will be less noticeable.

If the hinges are sound, it is possible to cut through one of the pastedowns to gain access to the text block spine. Again, makes cuts at the back cover if possible so the repaired damage will be less noticeable.

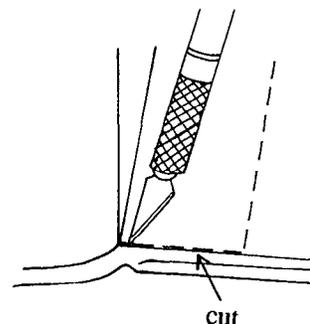
Support the cover with books or boards.
Find the edge of the crash. It is usually either visible through the endpaper or can be felt as a ridge.



Lay a ruler just past the far edge of crash (farthest from the hinge) and cut through the endpaper.



Cut along the top and bottom of the endpaper from the cut line to the hinge (the distance will vary with the thickness of the crash).



Use a microspatula, folder or dull knife to carefully lift up the crash/endpaper and free the cover board.

2. CLEANING AND RELINING THE TEXT BLOCK SPINE

Depending on the condition of the text block spine, the spine lining paper and the crash can be removed before sewing.

If only one or two signatures are separated or in need of repair, it might be easier to punch sewing holes through the spine lining materials and sew directly through them.

If several signatures are affected or if the spine lining materials are in poor condition, remove them and the original sewing threads, then re sew the volume, and reline the spine. Relineing the spine is discussed on page 81.

Any complete repair should include cleaning the text block, resewing the text block, and relining it. Some books may not warrant this full treatment. In that case it is possible to re sew through the old spine linings.

3. PREPARING THE TEXT BLOCK

All the necessary paper repairs should be done before starting the sewing procedure.

Mark the centers of each signature to be sewn so they are easier to locate during the sewing process. Find and mark the centers of the signature before the first separated signature and after the last separated signature as well as all the separated signatures.

A punching jig (page 30) can be used to achieve consistently placed sewing holes.

Use an awl or needle to punch new sewing holes or to repunch existing holes that may be filled with glue. Use the existing sewing holes whenever possible.

If the spine of the text block is covered with spine lining paper or the original crash and glue, it can be difficult to pierce through the spine. Apply gently pressure and rotate the awl or needle-in-a-stick to punch through the paper. A needle can break if too much pressure is used.

4. SEWING THE TEXT BLOCK

Linen thread and sewing needles are discussed in **THE BASIC INFORMATION** (page 7).

Depending on the height and weight of the text block, a volume may have more or less sewing stations than the example. The instructions can be repeated as often as necessary, depending on the number of sewing stations between the kettle stitches.

When sewing the link stitch, any number of sewing stations can be used. For the lap-link stitch, there must be an even number of sewing stations.

a. The Link Stitch

1) Sewing An Anchor Thread Into An Attached Signature

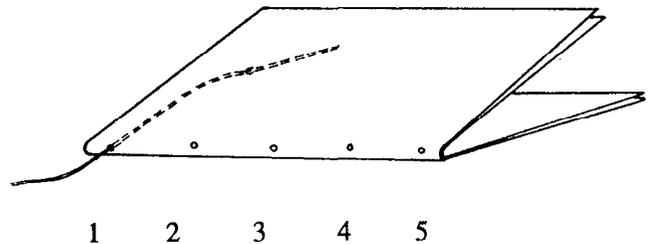
Begin sewing one signature before the first loose/unattached signature.

Start on the outside of the sound signature at station 1 which is called the kettle station. Kettle stations are the first and last sewing stations on each signature. The term "kettle" may be a corruption of a German word for "catch-up stitch" or "Kettel stitch" (the stitch that forms a little chain).

The sewing thread is pictured very short in these illustrations. In reality the thread should be as long as needed providing it is a comfortable length to sew with. See page 24 for information on adding sewing thread.

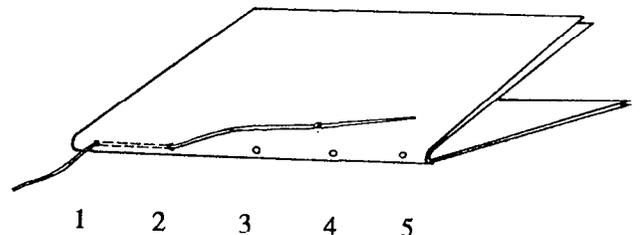
To follow these instructions, station 1 can be the kettle stitch station at either end of the signature.

Insert the needle into station number 1 and pull the thread to the inside of the signature. Leave a 2" tail of thread on the outside of the signature.



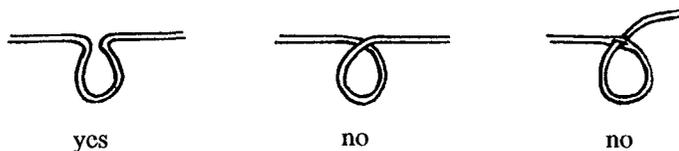
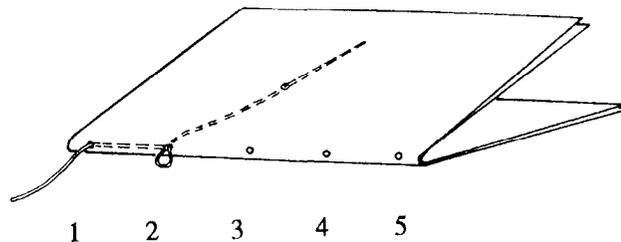
IMPORTANT: Always pull and tighten the thread in the direction of the sewing. Thread tightened in the opposite direction, against itself, can tear through the paper between the sewing stations.

On the inside of the signature, insert the needle in station number 2, and pull the thread to the outside of the signature.



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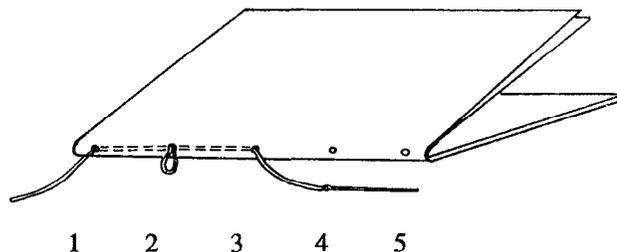
On the outside of the signature, insert the needle back into station number 2 and pull the thread to the inside of the signature, leaving a loop of thread on the outside of the sewing station 2. The loop should be about 1/2".



The two threads should not cross over one another and the needle should not pierce the thread where it reenters a sewing station.

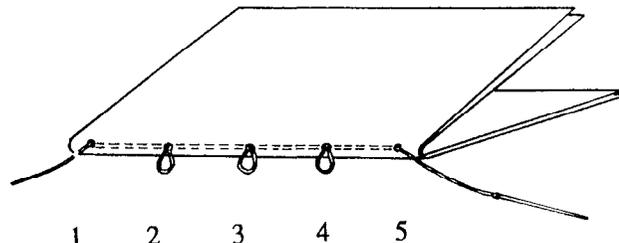
NOTE: It can be difficult to locate the sewing hole on the back of the signature fold. If this is a problem, place an unthreaded needle or awl in the sewing station on the inside of the fold so that it protrudes onto the back of the spine. Slowly pull the needle or awl out of the hole and insert the sewing needle as first needle or awl leaves the sewing hole.

On the inside of the signature, insert the needle in station number 3 and pull the thread to the outside of the signature. Do not pull so tight that the loop is pulled out of sewing station 2.



Continue sewing along the spine, forming loops as sewing station 3, 4 and 5. Remember to pull the thread in the direction of the sewing. Be careful not to pierce the sewing thread already in the sewing station.

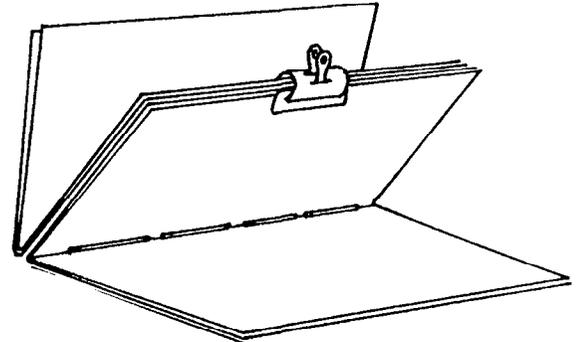
At sewing station 5, the thread will be on the outside of the signature. The first signature is now sewn. This sewing provides the anchor for the next signature to be attached to it.



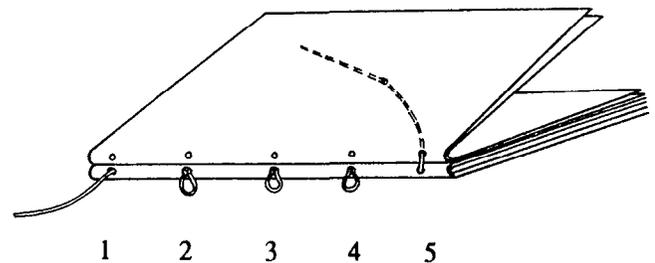
2) *Sewing The First Unattached Signature With A Link Stitch*

The next signature to be sewn is the first loose/unattached signature. Remember the illustrations show the signatures outside the book. The instructions are the same if most of the signatures are still intact in the book.

It can be helpful to clip the first and second repaired signatures together so the centers of both can be easily located in the sewing process.



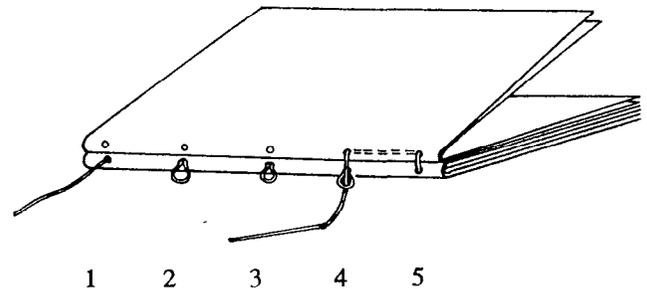
On the outside of the second signature, insert the needle into station number 5 (a kettle stitch station) and pull the thread to the inside of the signature.



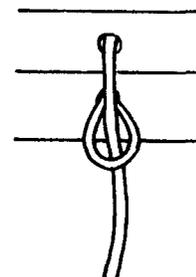
Do not pull the thread so tight that any of the loops in the first signature are lost.

The two signatures are now joined together at the kettle stitch stations.

Working on the inside of the second signature, insert the needle in sewing station 4.

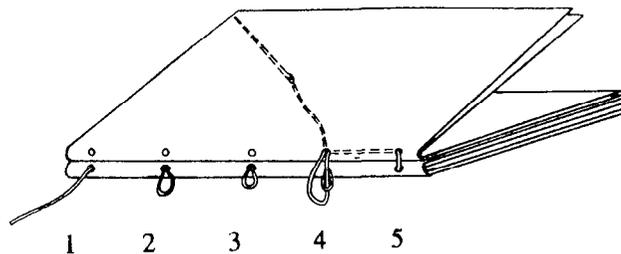


Take the thread through the loop at sewing station 4 of the first signature.

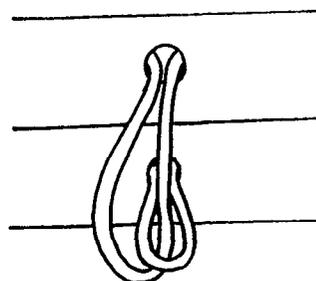


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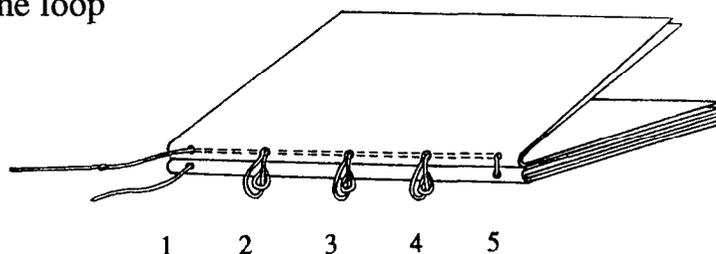
Bring the needle around the loop and back up into sewing station 4 on the second signature.



There should now be two intertwined loops.



Continue sewing in this manner to station 3, 2 and 1. Loop each thread through the loop on the first signature.



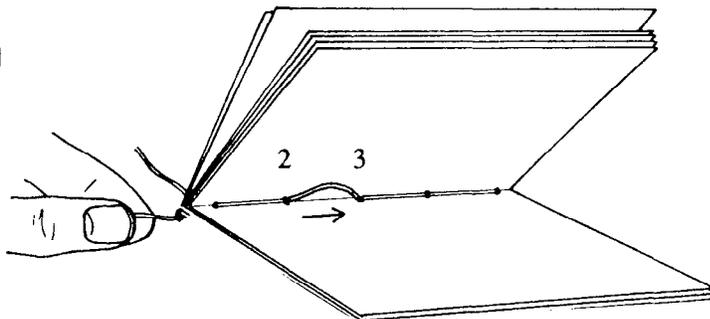
3) Tighten The Sewing Threads On The First Two Signatures

The first and second signatures are now sewn together but the sewing thread is still loose. If the needle has not pierced the sewing threads when it was re-inserted into each sewing station, it is simple to tighten the thread.

NOTE: Linen thread is very strong, but it will still break if pulled hard enough. Pulling too tight can also tear through the paper. When tightening sewing thread, pull on the thread firmly until it just slips through your fingers.

Position the book so the inside of the first sewn signature is facing out.

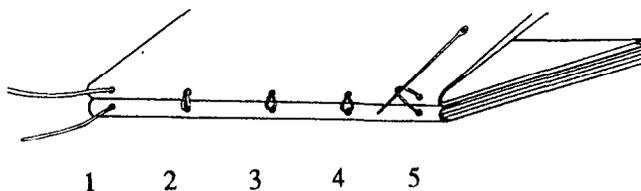
Hold the tail end of the sewing thread (sewing station 1) in one hand, and grasp the thread between sewing station 2 & 3.



Pull the sewing thread toward sewing station 3.

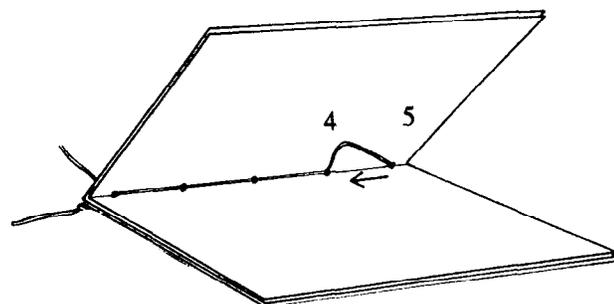
Keep hold of the tail end of the sewing thread in one hand, and use this same technique to tighten the sewing thread one sewing station at a time, working the thread toward sewing station 5.

When all the excess thread is at sewing station 5, reposition the text block so the fold of the signatures are facing out.



Still holding the tail end of the sewing thread, use the sewing needle to pull the sewing thread to the outside of the signature at sewing station 5.

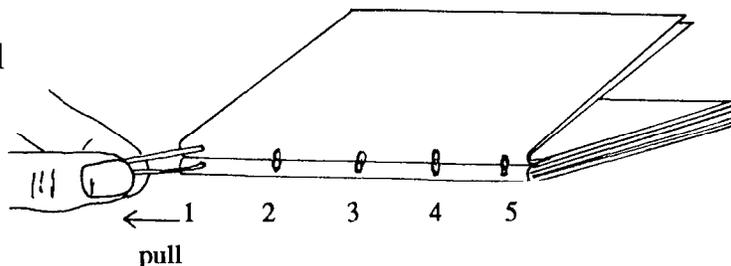
Using the same technique, tighten the sewing thread in the second signature one sewing station at a time. Work the excess thread from sewing station 5 toward sewing station 1.



When the excess thread is at sewing station 1, turn the text block so the folds of the signatures are facing out.

Carefully pull the thread through sewing station 1 toward the outside of the signature.

Grasp both threads in one hand and pull away from the edge of the signature fold to fully tighten.



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When the first and second signature threads are tight, tie the two ends of thread in a square knot (page 26).

4. Sewing The Second Unattached Signature OR Sewing An Anchor Thread Into An Attached Signature

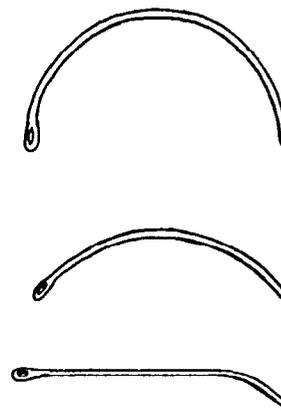
The third sewn signature will either attach another loose/unattached signature or anchor the first loose/unattached signature to the text block.

Pre-punch the sewing stations if needed and place the signature in place in the text block. It can be helpful to clip the second and third signatures together (page 123) so the centers of both can be easily located in the sewing process.

It is possible to continue sewing the link stitch with a straight needle, but it will be easier with a curved needle. The instructions for continuing the link stitch will be shown for a curved and straight needle.

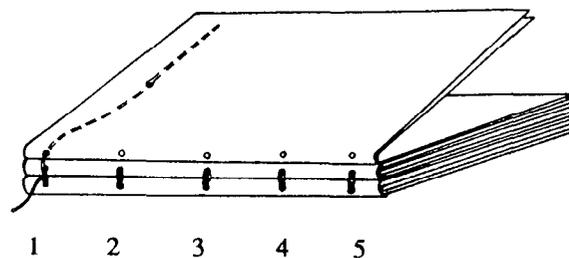
Curved needles can often be purchased in a sewing or craft store, but some people find these manufactured needles too curved. Many book binders like a more specific type of curve and bend needles to suit a particular task.

Experiment with different kinds of sewing needles and decide which works best.



This illustrations shows a variety of curved needles. Experiment with different kinds of sewing needles and decide which works best.

On the outside of the third signature, insert the needle into station number 1 (a kettle stitch station). Pull the thread tight to the inside of the signature.



Working on the inside of the signature, insert the needle in station 2. Pull the thread tight to the outside of the signature. Remember to pull the thread in the direction of the sewing (toward station number 3).

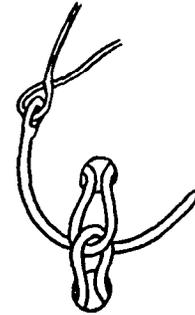
Using the technique for a curved or straight needle, pass the needle behind the loop at sewing station 2.

Curved Needle:

Link the third signature to the second signature by inserting a curved needle behind the loops at station 2.

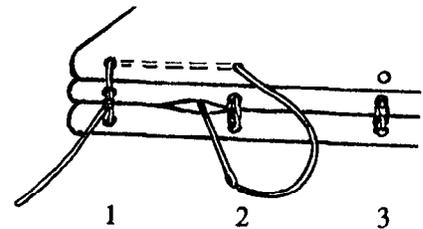
Pull the thread tight and reinsert the needle into sewing station 2. Be careful not to pierce the sewing thread already in sewing station 2.

Continue onto sewing station 5.

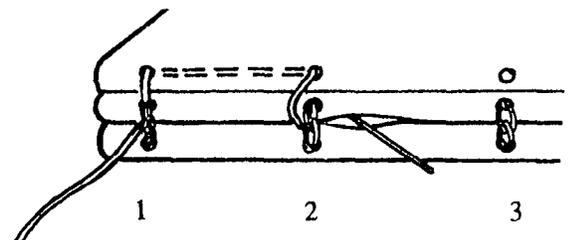


Straight Needle:

Insert the needle in between the first and second signatures. The needle should be between sewing station 1 (kettle station) & 2. Pull the thread to the inside of the text block.

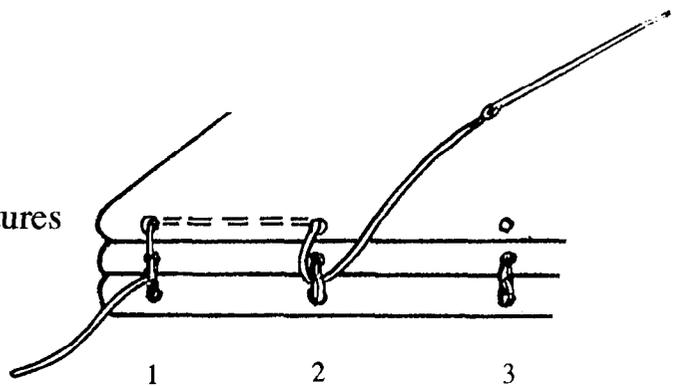


Working from the inside of the text block, insert the needle outward between the first and second signatures. The needle should be between sewing station 2 & 3.



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Pull the needle out of the signatures and tighten the thread.



Reinsert the needle into sewing station 2. Be careful not to pierce the sewing thread already in sewing station 2.

Tighten the thread by pulling in the direction of the sewing (toward sewing station 3) and continue to station 3 on the inside of the signature.

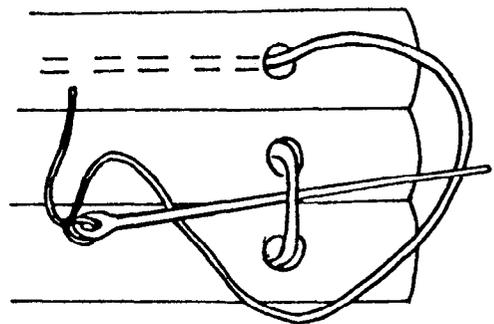
Repeat this procedure for sewing station 3 and 4 then proceed to sewing station 5.

The two signatures must be linked together at sewing station 5. Since there is no second thread to tie into a square knot, a special knot is used to hold the two signatures to one another. It is called a kettle stitch because it is used to link signatures together at the kettle stitch station.

8) Kettle Stitch

At station 5, pass the needle behind the stitch that connects the first two signatures together. Pull the thread until a small loop is formed, about 1/2" in diameter.

Pass the needle through the loop, and pull tight.



If this is the last signature to be sewn, repeat the Kettle Stitch so there is a total of two. Clip the thread leaving a 1" tail. Return to sewing station 1 on the first signature, clip that thread to a 1" tail.

If there is another signature to attach, put the needle into station 5 of that signature and repeat the sewing pattern using the instructions for **4. Sewing**

The Second Unattached Signature OR Sewing An Anchor Thread Into An Attached Signature page 126.

NOTE: Keep in mind that the sewing will be moving in the opposite direction and the sewing station numbers will be backwards to the instructions.

When the last signature is attached, tie two kettle stitches and clip the thread, leaving a 1" tail. Return to sewing station 1 on the first signature, and clip that thread to a 1" tail.

b. The Lap-link Stitch

1) Sewing An Anchor Thread Into An Attached Signature

The lap-link stitch must have an even number of sewing stations. The kettle stitches at either end of the text block stand alone. All other sewing stations are in pairs.

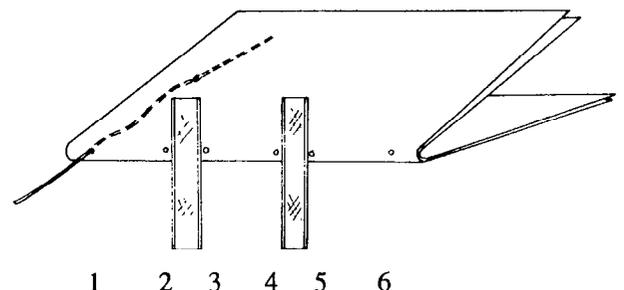
The sewing thread is pictured very short in these illustrations. In reality the thread should be as long as needed providing it is a comfortable length to sew with. See page 24 for information on adding sewing thread.

Begin sewing one signature before the first loose/unattached signature.

The first station number 1 is called the kettle station. Kettle stations are the first and last sewing stations on each signature. The term may be a corruption of a German word for "catch-up stitch" or "Kettle stitch" (the stitch that forms a little chain).

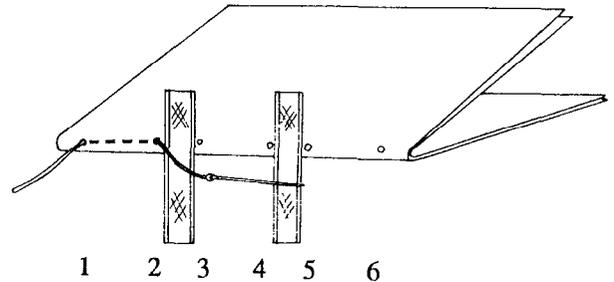
To follow these instructions, station 1 can be either kettle stitch station at the end of the signature.

Insert the needle into station number 1 and pull the thread to the inside of the signature. Leave a 2" tail of thread on the outside of the signature.



NOTE: It can be difficult to locate the sewing hole on the back of the signature fold. If this is a problem, place an unthreaded needle or awl into the sewing station on the inside of the fold so that it protrudes out the back of the spine. Slowly pull the needle or awl out of the hole and insert the sewing needle as first needle or awl leaves the sewing hole.

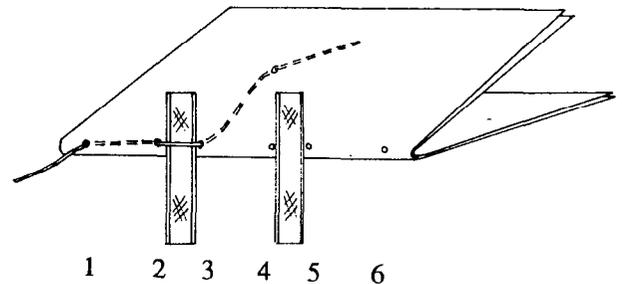
On the inside of the signature, insert the needle in station number 2 and pull the thread to the outside of the signature. Remember to pull the thread in the direction of sewing (toward station number 3).



IMPORTANT: Always pull and tighten the thread in the direction of the sewing. Thread tightened in the opposite direction can tear through the paper between the sewing stations.

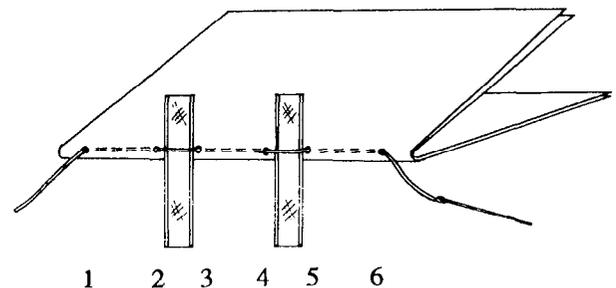
Linen thread is very strong, but it will still break if pulled hard enough. Also, pulling too tight can tear through the paper. When tightening sewing thread, pull on the thread firmly until it just slips through your fingers.

Sewing around the tape or cord, insert the needle into the outside of station number 3 and pull the thread tight to the inside of the signature. Pull the thread toward sewing station 4.



On the inside of the signature, insert the needle in station number 4 and pull the thread to the outside of the signature.

Continue sewing along the spine until the needle is on the outside of the signature at sewing station 6, a kettle stitch station.



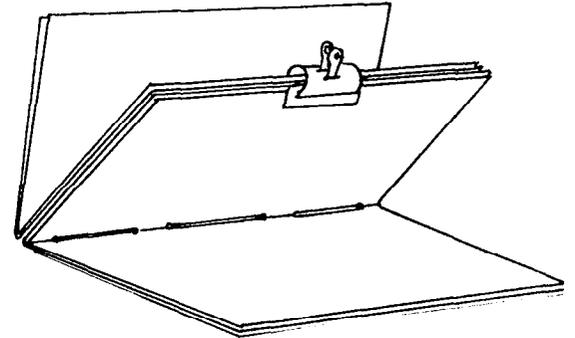
Pull the thread to the outside of the signature. Remember to pull in the direction of sewing so the paper doesn't tear.

The tapes or cords are now sewn onto the first signature.

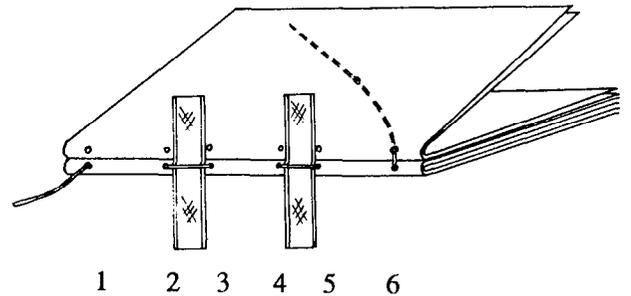
2) *Sewing The First Unattached Signature With A Lap-Link Stitch*

The next signature to be sewn is the first loose/unattached signature.

It can be helpful to clip the first and second signatures together so the centers of both can be easily located in the sewing process.

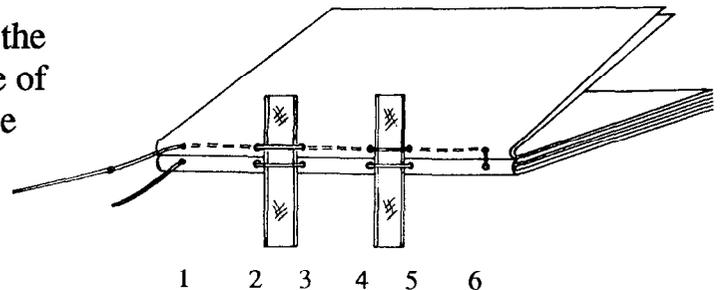


On the outside of the second signature, insert the needle into station number 6 (a kettle stitch station). Pull the thread to the inside of the signature.



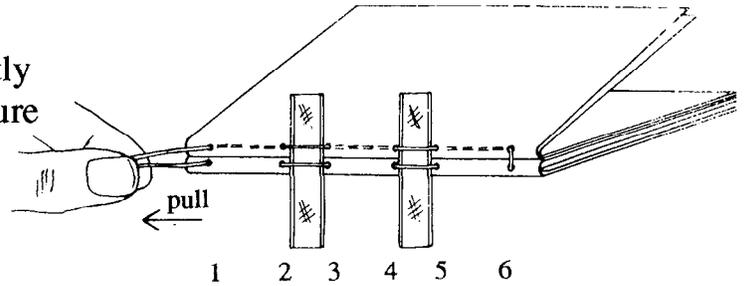
The two signatures are now joined together at the kettle stitch stations.

Proceed along the spine sewing around the tapes or cords until the needle is outside of the signature at sewing station 1, a kettle station.

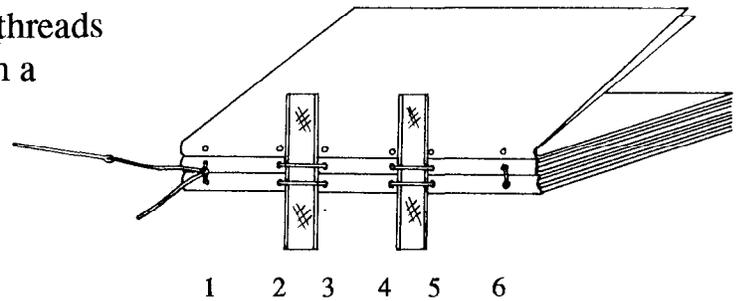


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Grasp both threads in one hand. Gently pull away from the edge of the signature fold to fully tighten the sewing.



When the first and second signature threads are tight, tie the two ends of thread in a square knot (page 26).

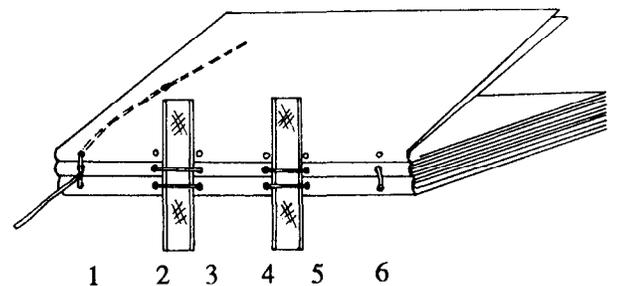


3) Sewing The Second Unattached Signature OR Sewing An Anchor Thread Into An Attached Signature

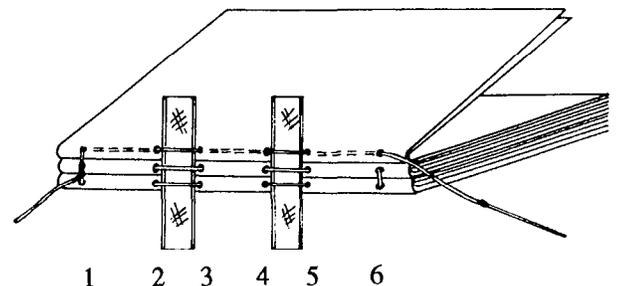
The third sewn signature will either attach another loose/unattached signature or anchor the first loose/unattached signature to the text block.

Place the signature in place in the text block. If necessary, clip the second and third signatures together (page 123).

On the outside of the third signature, insert the needle into station number 1 (a kettle stitch station). Pull the thread tight to the inside of the signature.



Proceed along the spine sewing around the tapes or cords until the needle is outside of the signature at sewing station 6, a kettle station.



Pull the thread tight, remembering to pull in the direction of sewing so the paper doesn't tear.

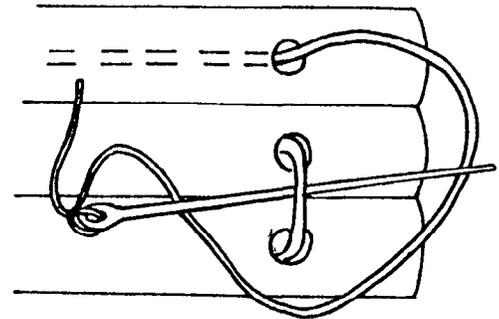
4) *Kettle Stitch*

The two signatures must be linked together at sewing station 6. Since there is no second thread to tie a square knot, a special knot is used to attach the two signatures to one another. It is called a kettle stitch because it is used to link signatures together at the kettle stitch station.

At station 6, pass the needle behind the stitch that connects the first two signatures together.

Pull the thread until a small loop is formed, about 1/2" in diameter.

Pass the needle through the loop and pull tight.



If this is the last signature to be sewn, repeat the kettle stitch so there is a total of two kettle stitches, and clip the thread leaving a 1" tail. Return to sewing station 1 on the first signature, and clip that thread to a 1" tail.

If there is another signature to attach, put the needle into station 6 of that signature. Repeat the sewing pattern using the instructions *3) Sewing The Second Unattached Signature OR Sewing An Anchor Thread Into An Attached Signature* (page 132).

NOTE: The sewing will be moving in the opposite direction and the sewing station numbers will be backwards to the instructions.

When the last signature is attached, tie two kettle stitches, and clip the thread leaving a 1" tail. Return to sewing station 1 on the first signature, and clip that thread to a 1" tail.

The text block is now repaired. If the spine needs to be lined or new crash attached, follow the instructions on page 103. Repair the case as necessary, and attach the text block to the case.

G. DESIGNING SPECIFIC BOOK REPAIRS

Often a damaged book does not easily fit into a single repair category. It might be bound in an unfamiliar style or be material that has never been bound. When designing a repair, consider all aspects of the item to be repaired, the individual characteristics of repair materials, and the strengths and weaknesses of a particular structure.

Start by looking at how a book is constructed, why it needs repair and any previous repairs. Keep these questions in mind:

- How does the book function? Does it have signatures? Is it adhesive bound? Side stapled?
- Why did the book structure fail? Is the original binding structure flawed? Has a previous repair caused damage?
- If the book has previous repairs, were inappropriate repair materials used? Were the repair materials too weak or too strong for the original material?
- If the book was damaged through use, can the damage be successfully repaired? Will it happen again even if it is repaired?
- If the original binding style was of poor construction or the paper is brittle, can the volume be successfully repaired in-house? For instance, an adhesive bound book with many pages detached from the spine usually cannot be repaired in house.
- Think about how a book functions now and how it will function when the repair is complete.

Ask other librarians or book repair technicians how they would handle the repair but keep in mind that book repair is a field that has not been taught to many librarians. Beware of any answers that involve materials that are damaging to books.

Read books about book repair and conservation. Reread instructions after practicing a specific repair several times; they will probably make more sense.