

Conservation Book Repair: A Training Manual

by
Artemis BonaDea



Alaska State Library, Alaska Department of Education, 1995

CONSERVATION BOOK REPAIR:

A Training Manual

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1995

CONSERVATION BOOK REPAIR

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PREFACE

Many conservation book repair programs in Alaska owe much to the author of this work. Artemis BonaDea has spearheaded the education of Alaska library personnel in these techniques since 1988. Beginning with brief presentations and one-on-one training in the 1980s, she has presented workshops in several Alaska locations since 1990.

In 1990, the Continuing Education Committee of the Alaska Library Association (AkLA) and the Library Coordinators of the Alaska State Library identified training in book repair and conservation as a high priority. In response, AkLA applied for and received an Interlibrary Cooperation Grant to offer three conservation-style repair workshops across the state. When added to previous presentations, at least one or two sections of this publication were presented in Palmer, Homer, Sitka, Juneau, Fairbanks, and Anchorage. In varying the length of presentation and location during the workshops, we determined what worked best in training and what hand-outs proved most useful. We also discovered that, while the hands-on workshops were very helpful, the trainees inevitably had questions when they returned to their libraries to face repair problems on their own. In addition, not all portions of the state could be offered these workshops, although we still believe that hands-on training works best for this subject. We considered a video tape as an alternative, but soon settled on a medium which would be universally accessible to all small libraries in the state: the written word with numerous illustrations.

As the workshops came to an end, this book began to take shape. Artemis had developed handouts for the presentations and in response to telephone requests. Subsequently, several individuals volunteered to follow the methods of conservation book repair found in this volume and offer suggestions in the attempt to make the language and illustrations as clear as possible. The explanations found in the publication have been field-tested in workshops as well as by individuals who have not been able to attend the workshops.

The Alaska State Library and the Alaska Library Association collaborated in producing this publication, but primary credit must go to Artemis BonaDea who has worked very hard to make this a successful publication. Artemis received training at the University of Washington, the University of Iowa, and Johns Hopkins University. Her work on this volume is artful, accessible, knowledgeable, and exacting; the same as her repairs. We are delighted to present this book to Alaska libraries and hope that it proves to be helpful. We will appreciate any comments and suggestions.

Kathryn H. Shelton, Librarian III
Alaska Historical Collections, Alaska State Library
Alaska Department of Education
Juneau, Alaska
August 1995

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This manual has been supported by many people who have given generously of their time and talents. At the Alaska State Library, special thanks go to Kay Shelton, for her on-going support, Sondra Stanway for reading several drafts and giving so much encouragement, Ellen FitzGerald for proofing and working through the repairs in various drafts, and Aja Razumny for her ever present assistance and humor.

Many professionals in the broad field of conservation/preservation have also given time and support to this project. Kate Leonard of the University of Washington deserves special mention as time and again she answered my basic questions and explained her reasoning for various repairs. Her input has made this a better volume.

In addition, Normandy Helmer of the University of Oregon; Carol Pratt, a private conservator in Eugene, Oregon; and Joyce Jenkins of the Petersburg Public Library, Petersburg, Alaska, also deserve special thanks for reading various drafts and sharing their comments.

I wish to gratefully acknowledge Jane Greenfield, the Library of the New York Botanical Garden, the American Library Association, Andrea Krupp of the Library Company, and the staff of the American Philosophical Society for permission to reprint some of the illustrations and instructions in this volume.

It has been a pleasure to work with Alex Prentiss. I can only wish every author as fine an illustrator and co-creator as she has been.

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Juneau, Alaska
August 1995

I. INTRODUCTION

Most of a public library's resources are spent on collecting, cataloging and circulating material. While much effort goes into acquiring books and paper materials, little follow-up occurs in caring for that same material.

Book and paper materials receive a great deal of use: they are pulled off the shelf roughly, stuffed into backpacks, forced onto photocopiers and dumped into book drops. In addition to ongoing patron and staff use, the books in a library collection are constantly aging; many are expensive and difficult to replace.

Caring for a library collection is a large task. Each library, regardless of size, must choose how to care for its collections. Successful book repair is an important component of a collection development and maintenance program.

In the past, maintaining a library collection was usually accomplished with plastic tape and household glue. Unfortunately, these products do not lead to successful repairs. Books return for repairs again and again or are discarded when they are damaged beyond repair. In many cases, the fault lies with the repair choices, not the book.

The basic concepts used in conservation book repair, such as using materials that are stable and reversible, were originally introduced to care for rare book collections. These same practices and materials can be successfully adapted to repairing non-rare books, and it is the intent of this manual to teach these techniques for use in circulating and reference collections.

A. USING THIS MANUAL

While it can be difficult to learn practical, hands-on skills from a book and tempting to jump right into a repair technique without reading the introduction, PLEASE resist the urge. The introduction to each technique explains how to choose a particular technique and why that technique works while others do not. With a solid understanding of these principles and techniques, it is possible to quickly evaluate damaged books and choose the treatment that will lead to a successful repair.

CONSERVATION BOOK REPAIR

A **GLOSSARY** on page 173 explains some of the terms used in this manual that may not be familiar.

B. CHOOSING BOOKS TO REPAIR

Choosing which books to repair is the first step in any successful book repair program. Because each library is unique, one library's guidelines for retaining or repairing books may be very different from another's. Taking the time to create guidelines that are realistic and consistent with the needs of a collection can insure the well being of library materials and the effective use of staff time.

Before choosing to repair a book, ask questions such as:

- Is this book a candidate for weeding? Is the information misleading or has it been superseded by a new edition or a better book on the subject? Is the information trivial, of no discernible literary or scientific merit or irrelevant to the needs and interests of the library's patrons?
- Has the book previously been repaired using improper or damaging techniques? Is the book worn beyond mending or rebinding? Should this book be replaced or sent to the bindery? Is it easier and cheaper to purchase a replacement copy rather than repair the old volume?

It can be a difficult decision to not repair a book. However, the urge to save every book is unrealistic because some books cannot be effectively repaired and should be replaced. Learn to choose the books that can be repaired and those that cannot so the library collection will be in better condition and staff time will be better utilized.

Choosing the proper repair for a book and carrying out that repair takes knowledge and skill. In a small library, the person who makes the repair decision will probably be the person who repairs the book. In a larger library, that process might be shared by two staff members, in which case, both people need to understand the principles of book construction and repair.

After deciding to repair a book, choose the best kind of treatment. If a volume is to be replaced or withdrawn after one more circulation or when a replacement is purchased, mending it quickly using non-conservation repair methods such as clear plastic tape, might be an option. If the book is needed for a longer period of time or is part of a permanent collection, always repair it using conservation repair techniques such as those outlined in this book.

C. DETERMINING WHY A BOOK NEEDS REPAIR

It is important to determine why a book needs repair.

- Has it been damaged through carelessness or simply through use?
- Was it manufactured in a way that caused the damage?
- Has an old repair failed or caused more damage?
- How have previous repairs hindered the mechanics (the way the book opens and closes, the way the pages turn) of the book?

Look at the kind of paper used in the book and how the book is constructed.

- Is the book constructed in signatures (folded pages that can be sewn or glued together)?
- Is the book constructed in single sheets glued or oversewn together?
- Is the paper coated and shiny?

All these factors should be considered when choosing to repair a book and deciding what techniques to use.

Examine the volume carefully and determine how it is constructed. BOOK STRUCTURE CONSTRUCTION is discussed in detail on page 7.

Determine which part of the structure failed and which repair technique is most suitable. Some books were not constructed to be repaired and will never successfully be put back together. Repair time and skills are valuable so use them on the books that are worth repairing and have lasting value. Remember, choosing not to repair a book is not a value judgment about the contents of a book. The concern is to choose the type of treatment that a book will receive.

D. PLANNING REPAIRS AND THE WORKSPACE

- Read the directions for any repair thoroughly before attempting the repair.
- Make sure the workspace is large enough to work comfortably. Clear away excess objects and have the tools and materials needed close at hand.
- Think about where the repaired books will dry. Materials that are glued or pasted must dry under weight or the paper will buckle.
- If the book has several problems, start with the simplest and work toward the most complex. In general the text block is repaired first (torn pages, damaged signatures, etc.) then the cover (rebacking, mending damaged corners, etc.). The last part of the book to be repaired is the attachment of the text block to the cover (the crash and endpapers).
- Try to group similar types of repairs together. In addition to saving time and materials, repeating the same repair several times is a good way to improve repair techniques.

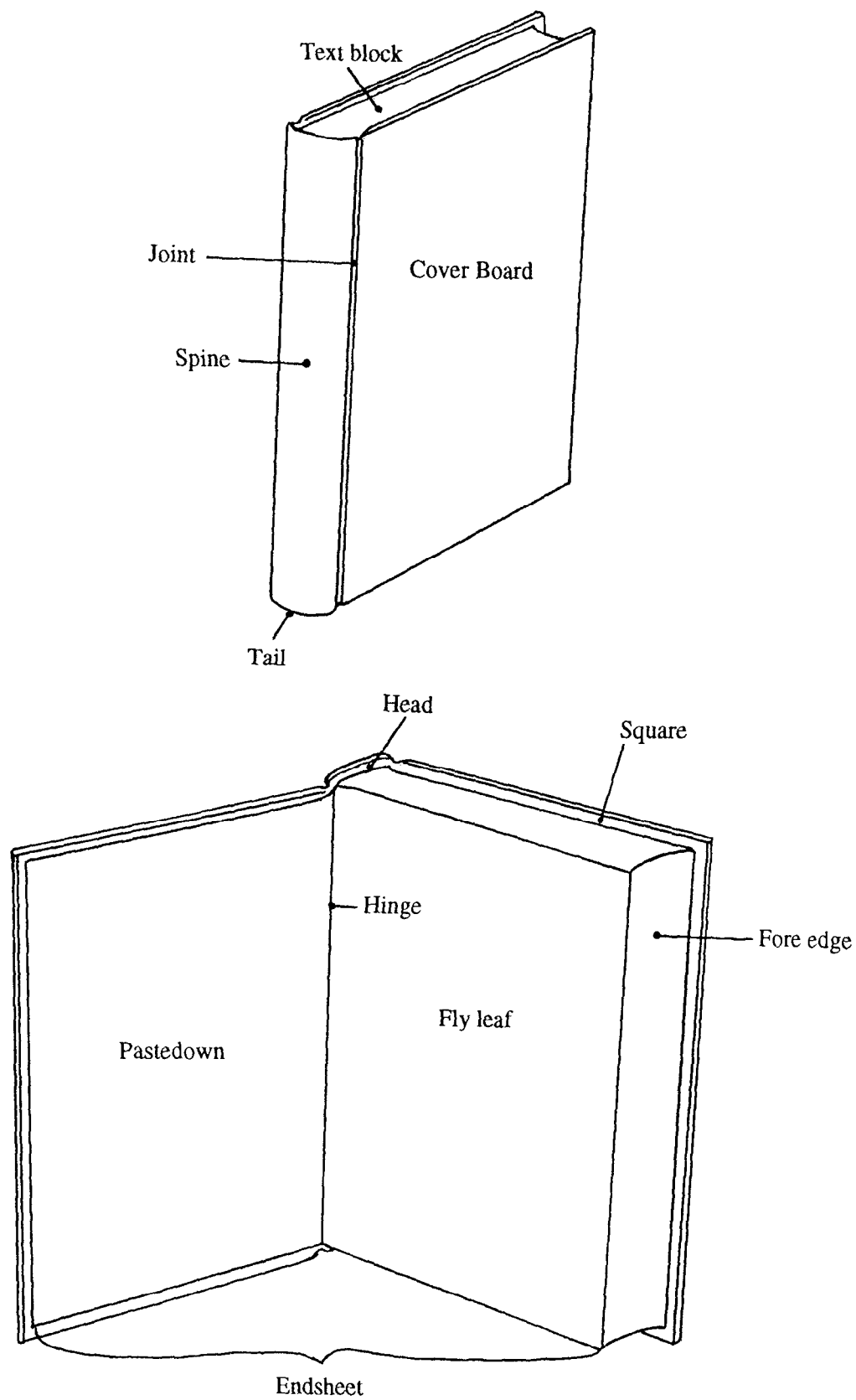
E. PRACTICING REPAIRS

- Initially, it's a good idea to practice each repair either on a book that has been withdrawn from the collection or on plain paper. Different types of paper and different book structures will react differently to the paste or glue. For instance, shiny, coated paper will not absorb as much moisture as uncoated paper so less paste is used on the latter kind of paper. See page 12 for a discussion of types of paper.
- Read the explanation and instructions before beginning a repair. Take time to assemble all the tools and materials called for in the instructions.

- Reread the instructions after practicing a repair two or three times. They will probably be more understandable and some questions that came up during the repair may be answered. Once it is clear why and how a repair works, it is easier to choose a technique to match a particular repair need and not rely on the written instructions.

The materials and techniques used in conservation book repair should not damage books and, if a repair is not successful, it can usually be reversed and repeated. Be aware of your skill level and limitations. If a repair is too advanced, wait until you have more experience. Practice these techniques to improve your skills. Above all, keep working.

CONSERVATION BOOK REPAIR



II. THE BASIC INFORMATION

Understanding book construction, the materials used to repair books and the proper way to handle tools are important components of a successful repair program.

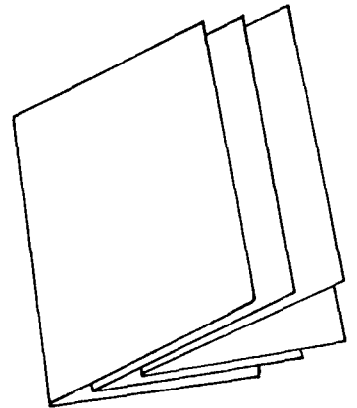
Books are constructed in several ways. Many repair materials work best on certain kinds of paper or in specific parts of a book. "The right tool for the right job" is an axiom that applies to book binding as well as other fields. Having a few specialized tools and understanding how to use them will save time and energy.

A. BOOK STRUCTURE AND CONSTRUCTION

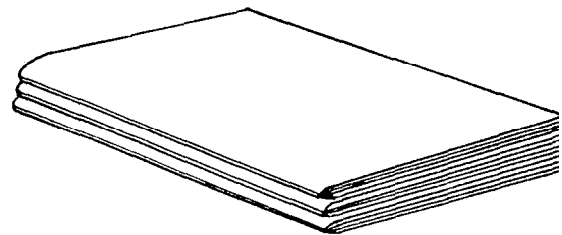
The pages of a book, whether they are sewn or glued together, are called the text block. The covers of a book are called the case. The case is made of the front cover, the spine and the back cover.

1. TEXT BLOCKS IN SIGNATURES

When the text block is sewn, the pages are gathered together in groups; then each group is folded in half.



A group of folded pages is called a section or signature and is usually four to eight pieces of paper (four pieces of folded paper equals sixteen numbered pages).



Books that are constructed of sewn signatures tend to function best because the pages are securely attached to one another and they open flat.

CONSERVATION BOOK REPAIR

Modern manufacturing techniques enable book manufacturers to create a text block with signatures, cut small notches in the folded edge and insert glue to hold the pages together instead of sewing thread. These books look like they are sewn, but they are not. Open the text block to the center of a signature and look for the thread, if it's not there, the book is glued.

2. TEXT BLOCKS IN LOOSE SHEETS

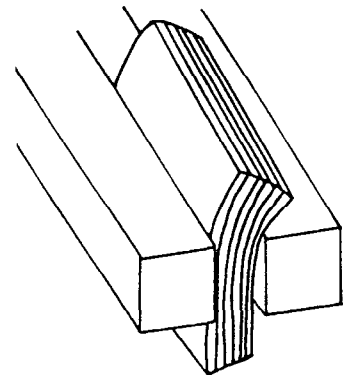
Text blocks can also be single sheets glued together in a process called adhesive, perfect, or fan binding. In this process, fast drying glue is applied to the spine of the text block.

Adhesives that dry very quickly are often brittle and that is why the spine of a book cracks when the book is opened. Once the spine glue is cracked, the pages will begin to fall out.

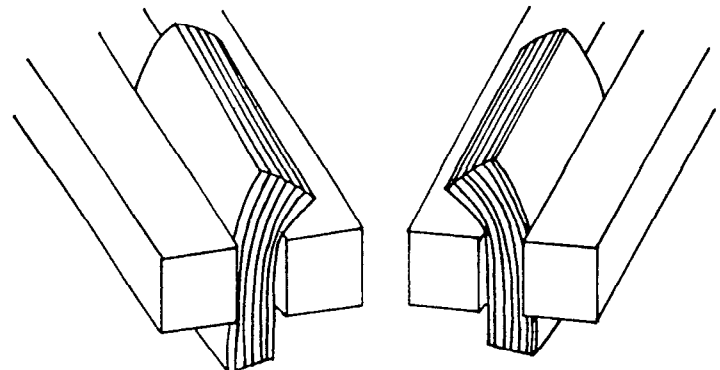
In addition to the problem of brittle glue, there is often very little glue attaching each page to the adjoining pages. When the glue is only in contact with the very thin edge of each sheet of paper, pages can easily separate over time.

3. SINGLE AND DOUBLE FAN BINDING

In single-fan binding, the pages of the text block are fanned in one direction and glued along that fanned edge. In this style of binding, a thin line of glue penetrates the inner margin of each page, not just the spine edge.



Double-fan adhesive binding goes another step beyond single-fan binding. After the pages are fanned in one direction and glued, they are also fanned in the opposite direction and glued along the second fanned edge. Double-fan binding applies glue on



the inner margin of each side of the page, not just on the spine edge or the inner margin of one side of the paper. It is much stronger than single-fan binding.

When library binders bind a book using double fan binding, they use adhesives that dry slowly and flexible. In addition, they usually reinforce the spine edge of the adhesive bound text block with cloth and paper so it is stronger and the text block opens flat.

A library binder can be a good source of information to understand the binding processes. Keep in mind the bindery is selling a product and as the customer, you can question the binder until all the techniques are fully explained. The services offered must meet the specifications that a library has defined for its collections.

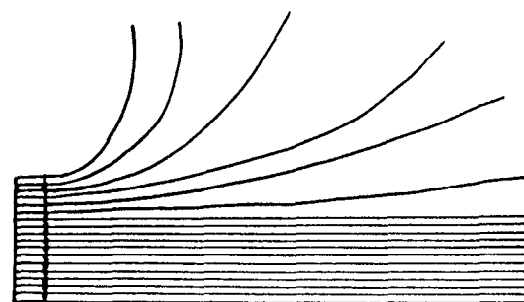
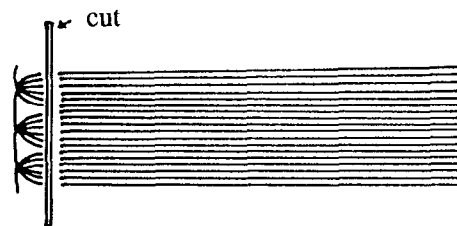
In order to set minimum levels of excellence in library binding, the Library Binding Institute has published the *Standard for Library Binding*. This booklet explains the different types of bindings and what standards should be met in library bound books. The *Guide to the Library Binding Institute Standard For Library Binding* written by Jan Merril-Oldham is a plain English explanation of the Standard.

4. OVERSEWN TEXT BLOCKS

Before library binderies began to fan bind books, the most common form of library binding was oversewing.

In the oversewing process, the folds of the signatures are trimmed off and the pages of the text block are oversewn to one another with a diagonal whip stitch.

Since the sewing threads tend to pierce deep into the inner margin, the pages are restricted from turning easily.



Oversewing is a strong form of binding, but it is often so strong that over time the pages can break out of the binding as they are forced to turn against the sewing threads. Oversewn books may not be candidates for rebinding since much of the inner margin was trimmed off or damaged by the oversewing threads.

Books should not be oversewn unless they are very heavy and have wide gutter margins to accommodate the sewing threads. Many libraries stipulate their binders must have permission to oversew a volume.

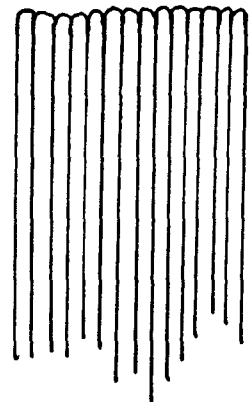
5. SEWN TEXT BLOCKS: Flat Back and Rounded and Backed Text Blocks

The pages of a book attached together by sewing or gluing is called a text block. Before a text block is attached to a paper or book board case, it can be treated in several ways.

Flat Back Text Blocks

Flat back books are a type of binding which has a flat text block spine. The case spine of flat back books is usually a piece of book board covered with book cloth.

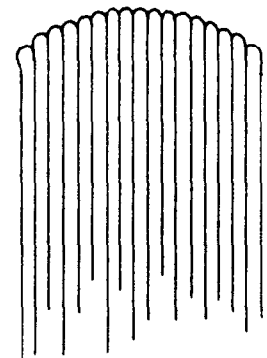
The spines of flat back text blocks have a tendency to become concave over time. To prevent this, the spine of the text block can be rounded and backed.



Rounded and Backed Text Blocks

Text blocks are rounded and backed to shape the flat spine of a text block into a curved spine with shoulders.

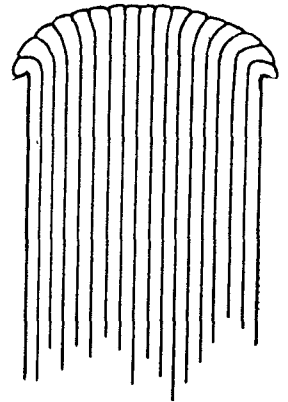
Rounding a text block is the process of molding the spine of a text block into an arc of approximately one-third of a circle. Rounding takes place after the pages of the text block are attached to one another by sewing or gluing. A light coat of adhesive is applied to the spine which is then worked into shape with light



pressure, applied with your fingers or a special hammer called a backing hammer.

Backing is the process of shaping a ridge or shoulder on each side of the spine of a text block prior to attaching the spine lining material.

Using a backing hammer, the folds of each signature or glued pages are bent over from the center to the left and right until shoulders are formed against which the boards will fit. The width of the shoulders is determined by the thickness of the cover boards.



In addition to providing space for the cover boards, backing also distributes the swell caused by the sewing threads or adhesive and helps maintain the round of the text block over time.

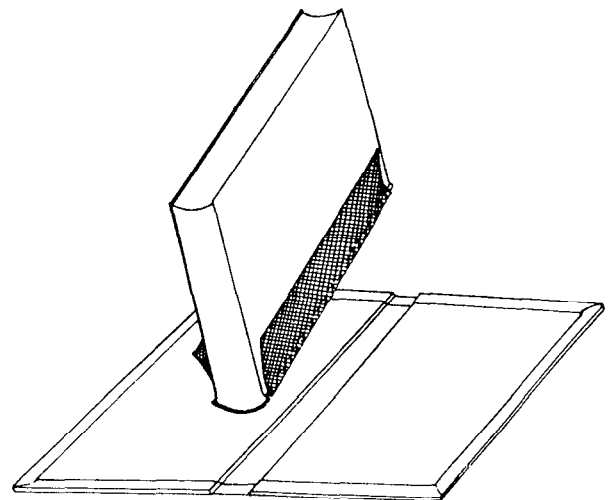
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6. BOOK CASE CONSTRUCTION

Regardless of how the text block is assembled, modern books are usually manufactured in two stages.

The text block is constructed in one operation where the pages are attached to one another, the spine covered with a cloth liner, called crash, and a paper spine liner is added over that.

The book case, consisting of a front cover, a spine and a back cover, is constructed separately in a second operation and the two parts of the book are attached by gluing the crash and end papers to the case covers. The crash holds the text block into the case while the end papers cover up the crash.



B. PAPER AND BOOK CLOTH

Many types of paper or book cloth can be used in manufacturing, binding and repairing a book.

1. PAPER

Although many different types of papers are used to print and manufacture books, three important types of paper to be familiar with in book repair are uncoated paper, coated paper and acid-free paper.

Uncoated Paper

Uncoated paper is the most common type of paper and is made from plant or tree fibers that are processed into sheets. Originally, most uncoated paper was handmade from linen or cotton rags. These older papers age very well because they contain few damaging chemicals.

In the 1860s, a process was developed to turn cellulose fiber from trees into paper. This type of paper can be made in large quantities but contains some very damaging chemicals that cause paper to become brittle more quickly than paper made from cotton or linen.

Coated Paper

A sheet of paper can be impregnated with very fine clay to produce a very fine printing surface. Introduced at the end of the 19th century, coated papers is ideal for printing halftone illustrations. Unfortunately it is not very strong and is highly susceptible to water damage.

Often the text pages of a book are printed on uncoated paper while the pages that contain illustrations are printed on coated paper. The coated paper may be part of the signature or tipped onto a page uncoated page.

Acid-free Paper

Acid-free is a designation given to paper that has a pH value of 7.0 or greater on a scale of 1 to 14. Fibers from any source can be made into paper that is acid-free. Both coated and uncoated papers can be acid-free.

Acid-free paper used in conservation book repair includes photocopy paper and Japanese repair tissue.

2. BOOK CLOTH

Book cloth is a specially woven cloth backed with thin paper. The paper backing gives the cloth support, minimizes stretching and allows the material to maintain a crease.

There are three main categories of book cloth.

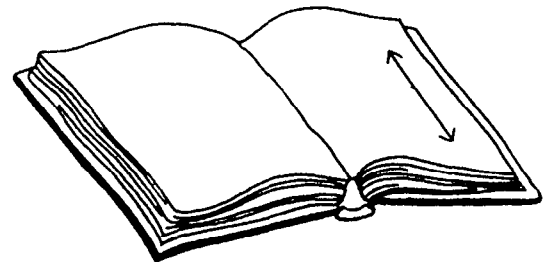
- Starch-filled book cloth in which the weave of the cloth is filled with starch. This type of cloth is sometimes called sized book cloth.
- Acrylic-, polyoxylin-, or vinyl-impregnated book cloth.
- Plastic coated book cloth

Heavier book cloth is sometimes called buckram.

3. PAPER AND BOOK CLOTH GRAIN

Paper and book cloth have a grain just as fabric does and it is important to understand how that grain affects repairs.

When the grain of the paper and book cloth runs parallel to the spine of the book, the cover and pages open freely and stay open without much effort. This is called "with the grain".



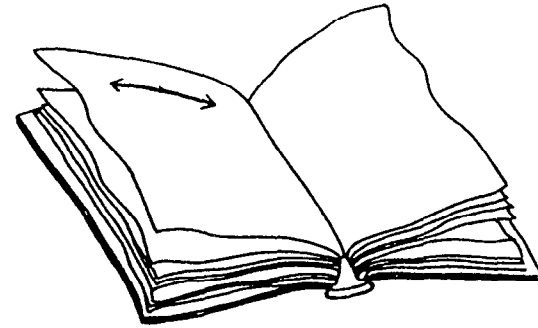
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CONSERVATION BOOK REPAIR

Paper that is bound into a book with the grain running perpendicular to the spine of the book is called "against the grain".

Modern publishers often print the pages of a book against the grain to get more pages on a large sheet of paper.

When the grain runs perpendicular to the spine of a book, the book can be difficult to open and it will not remain open without a great deal of pressure.



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Books printed against the grain are easily damaged since patrons must force the book open to read or photocopy it.

When pages or the case of a book are repaired, the grain of the repair materials should always run parallel to the spine of the book.

Determining the Grain of Paper or Book Cloth

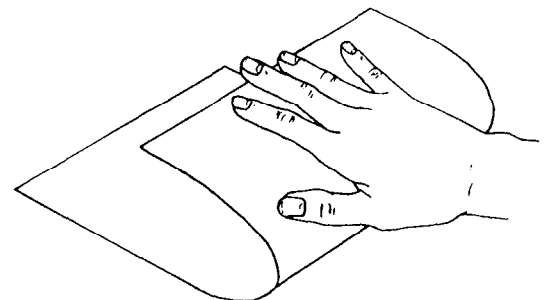
All paper and book cloth has a dominate grain. Paper can be tested for grain using the bend test, the tear test or the water test.

The grain of book cloth usually runs parallel to the selvage or bound edge of the fabric. If the selvage of the book cloth has been cut off or if there is any doubt about the grain of book cloth, the bend test or the tear test can be used to determine the grain.

Bend Test

The quickest way to test the grain is to bend the paper or cloth slightly in each direction.

Bring two opposite edges of a piece of paper or cloth together but do not crease. Instead, gently press down on the bend with minimal pressure. Feel any resistance.



Now bring the other two opposite sides of the paper or cloth together and repeat the process.

In one direction there is more resistance than the other. The greater resistance means the paper or cloth does not want to bend in that direction because it is bending against the grain.

When the paper or cloth is bent in the opposite direction, there is much less resistance. The bend that offers the least resistance is the bend that goes with the grain of the paper or book cloth.

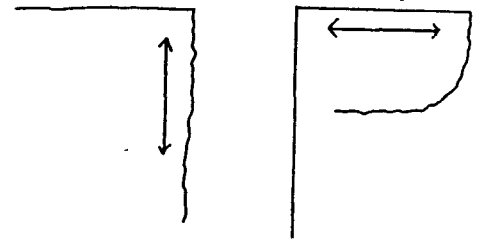
Mark the direction of grain on the paper for future reference.

Tear Test

Another way to test for the grain is to tear the paper or cloth.

Paper or cloth will tear easily and straight along the direction of the grain.

When forced to tear against the grain, the paper or cloth will be difficult to tear and the tear will tend to curve until it meets the grain.

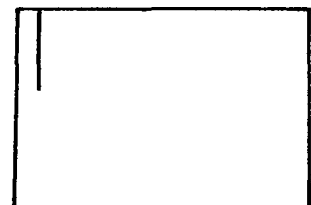


Tear the cloth or paper close to a corner and then pencil a small straight line in that corner indicating the direction of the grain so it won't need to be determined every time it is used.

Water Test

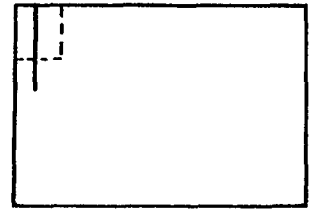
When grain is particularly difficult to find, a water test can be used. Use this test only to test paper being used to repair a volume, **not** on pages bound in a book.

Draw a 4" straight line along one corner of a large sheet of paper. This line will not necessarily be the grain line, it is simply an orientation line.

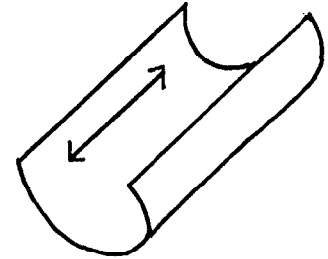


CONSERVATION BOOK REPAIR

Cut a square out of the corner, including 1/2 of the line.



Moisten the small square of paper and lay it on a work surface. As the water is absorbed into the paper fibers, the square will begin to curl. The two edges that curl toward one another are parallel with the grain. Mark the correct grain on the square.



Replace the curled square in position on the large sheet of paper (match the cut pencil line) and mark the correct grain on the large sheet. Remember, the first pencil line is not necessarily the grain line.

C. PAPER REPAIR MATERIALS

Conservation book repair generally uses Japanese repair tissue, wheat paste, and heat-set tissue or archival repair tape to repair paper tears.

1. JAPANESE REPAIR TISSUE

Japanese repair tissue is sometimes called "rice" paper, but this thin paper is made from the fibers of the mulberry tree, not from rice as the nickname implies. The strength of Japanese repair tissue comes from its long fibers which make the paper very strong, even though it is very thin.

Handmade Japanese repair tissues are made on a mold and have mold or "chain" lines which can be seen in the paper. These lines generally run the same direction as the paper grain. The lines are visible when the paper held up to a light or held down to let the light shine from above. The grain can also be determined by using the tear, bend or water test discussed previously.

In general, Japanese repair tissue is torn rather than cut. A piece of torn Japanese tissue has a delicate feathered edge that blends into the repaired paper, so there is no sharp edge for the repaired page to turn against. Different methods of tearing Japanese tissue are discussed later in the **BOOK REPAIR TOOLS AND TECHNIQUES** section.

Japanese repair tissue can be purchased in different weights and colors. Generally, three weights will cover most repair needs. Since most paper is not truly white, buy the "natural" or "toned" colors.

- TENGUJO light weight for working over type or illustrations
- KIZUKISHI medium weight for most repairs
- SEKISHU heavy weight for heavier paper

Although Japanese repair tissue may seem very expensive, only a small amount is used on any one tear. One sheet of Japanese repair tissue will last a long time.

2. HEAT-SET TISSUE

Heat-set tissue is a thin tissue that has been coated with a heat activated, acrylic adhesive. The tissue is torn or cut to fit the tear or paper loss, laid in position and covered with silicone release paper (so the tissue doesn't stick to the hot iron). The tissue is adhered to the paper with a heated iron (approximately 100 degrees F.).

A standard household iron or tacking iron from a book repair supply house or hobby store can be used to adhere heat-set tissue. Heat-set tissue is sold with the silicone release paper.

Heat-set tissue tends to be more brittle than Japanese repair tissue as it does not have the long, strong fibers of the Japanese tissue. It is not recommended for use on the folds in paper or areas that need to flex and bend. Since heat-set tissue is not applied with moisture, it works quite well on shiny, coated paper that can buckle when wet.

3. DOCUMENT REPAIR TAPE

Document repair tapes differ from common clear plastic in several ways.

The carrier (the part of the tape that holds the adhesive) is thin, acid-free paper, not plastic. It is not as stiff as plastic tape so a page can turn and bend more easily. The adhesive used is a neutral acrylic adhesive that should not dry up, yellow over time or seep out the edges of the document repair tape. Because this adhesive is neutral (neither acidic nor alkaline), it should not react chemically with the paper.

The manufacturers of these tapes have tested the materials using artificial aging tests and they believe these tapes will remain stable over time and can be removed easily. Actual experience is not always so positive. Some libraries are finding that these tapes dry hard and crack or that the adhesive dries up and the paper carrier falls off leaving the paper discolored. In addition, some tapes are not reversible over time.

Because of these problems, document repair tapes should not be used on valuable books or books that are a part of a long-term permanent collection.

Document repair tape has become accepted for use in some circulating collections and is definitely better than clear plastic tape. Some libraries choose to use document repair tape on materials that will not remain in the collection for a long time, such as reference books or children's books. Document repair tape can be a quick way to repair paper tears, and staff can use it easily after very little training.

Document tape is sold under several brand names. Some of these are Filmoplast P, Filmoplast P-90, and Document Repair Tape

4. CLEAR PLASTIC TAPE

Many library books are repaired with clear plastic tape. What appears to be a quick solution can become a long term headache in a library repair program. Before using plastic tape, it is important to understand how it works and how it affects books.

Plastic tape is dangerous to use in books because it is unstable and causes a great deal of damage. Often two or three layers of tape will cover a single repair. The first repair did not work and additional layers of tape were added to correct the problem. Unfortunately, adding more layers of tape only creates a thick pile of tape; it does not repair the book.

Plastic tape has two main parts: a clear plastic carrier and an adhesive that sticks to the paper. As the tape ages on a piece of paper, the adhesive penetrates the paper fibers of the page and causes a chemical reaction that stains the paper and makes it brittle. Once the adhesive has dried, the plastic carrier falls away and the stain remains. The adhesive on the tape seeps out the edge of the plastic carrier, attracting dirt or adhering one page to another.

Once tape is in a book it is very difficult, if not impossible to remove. Simply lifting the tape off the page will damage the paper because the top layer of paper is removed with the tape. If the tape covers the text, it cannot be removed without damaging the print. Removing plastic tape is difficult even for trained conservators who work with chemicals and special tools.

Using tape to reattach a loose page restricts the page from turning freely. The tape has a sharp edge and makes the original paper heavier than before so the paper tends to turn against the edge of the tape and not at the hinge. Soon the paper breaks against the edge of the tape and falls out of the book. Now a second repair is needed and if the page is repaired a second time with plastic tape, the same problem occurs.

Wide, clear plastic tape is also used to repair the cover spine or corners of a book and special "repair wings" are sold to repair corners as well. While tape covers up the problem but it does not repair it. Often the tape slides out of position or detaches entirely while the adhesive remains on the book cover attracting dirt or sticking books to one another on the shelf.

Some libraries that practice conservation book repair may use plastic tape in very specific instances. Plastic tape might be used when a book will not remain in the collection for a long time, such as children's books, reference books that are updated regularly, or books that need "one more circulation" before they are discarded.

Decisions regarding when and how to use clear plastic tape should be made ahead of time. Be certain a book is not important in a long term collection

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policy before repairing it with plastic tape. Keep in mind that once the tape is in the book, it cannot usually be removed without damaging the book.

D. REPAIR ADHESIVES

There are two main kinds of adhesives used in conservation book repair: paste and glue. Each has special properties and should be used in specific instances.

1. PASTE

Paste is generally a cooked mixture of water and vegetable starch, such as wheat or rice. Repairing paper with paste will give a stronger bond than repairing it with glue because the paste soaks into the paper fibers and bonds them together. Since paste contains water, it can stretch and cockle paper. It dries slowly and can usually be reversed with water.

Wheat Paste

Wheat paste is used to mend torn paper, attach Japanese tissue or soften old paste and glue. It is not usually used on book cloth or the case of a book. Wheat paste can be purchased uncooked, instant or pre-made. Wheat paste prepared from scratch will last for 3 - 4 days before it begins to mold. Prepare a small amount of paste and keep it refrigerated.

Instant commercial or prepared pastes can be convenient in some situations. These pastes are available from several sources listed in the SUPPLY SOURCES, page 118.

Thick Wheat Paste (general pasting)

6 TBS wheat starch
2 Cups cold water

Place the wheat starch in the top of a double boiler.
Mix the water into the starch stirring constantly.

Bring the mixture to a boil.
Lower the heat and stir constantly as the mixture simmers.
Cook until mixture thickens.
Remove from heat and cool.
Put through a sieve and store refrigerated for 3 - 4 days.

Thin Wheat Paste (used to thin PVA)

3 1/2 TBS wheat starch
2 Cups cold water

Follow the instructions for Thick Wheat Paste above.

Microwave Wheat Paste

one tablespoon wheat starch
five tablespoons distilled water

Place the wheat starch in a deep container, add distilled water and place in microwave. Microwave on high setting 20 - 30 seconds, remove paste and stir. Return to microwave and cook another 20 - 30 seconds. Remove and stir again. Continue this process for 3 - 4 minutes depending on the power of your microwave. Paste should stand a few minutes before using.

2. GLUE

Several types of glue have been used in bookbinding over the years, the most common being animal hide glue. In recent years, animal-based glues have been replaced with synthetic vinyl resin glues, the most common of which is polyvinyl acetate emulsion (PVA).

Polyvinyl Acetate (PVA)

PVA is a good all-around adhesive. It has a low moisture content and dries quickly. It dries flexible, so it can be used to tighten hinges, repair book cover corners and reattach loose book cloth to book board. PVA is not

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affected by mold or fungi. However, it is damaged by freezing, so most book repair supply houses will not sell PVA by mail from October to March. If PVA freezes, it separates and loses its adhesive properties.

PVA can be thinned with water or thin wheat paste for different consistencies and effects. Thinning PVA with water adds moisture and does not add any additional adhesive properties while thinning with wheat paste adds the adhesive qualities of the paste to the glue. Many book binders or repair technicians use a 50/50 mixture of PVA and wheat paste strained through a sieve. Other books may describe different adhesives or mixtures of adhesives.

PVA glues cover a wide range of brand names and not all are used to repair books. For instance Elmer's glue is technically a PVA but is not flexible when dry so it has limited use for repairing books. Two common brand names for PVA glues used in book repair are AT-1100 from Colophon Book Arts Supply and Jade 403 available from Talas. These companies are listed in the SUPPLY SOURCES.

3. WORKING WITH ADHESIVES

Most people learning to repair books use too much adhesive. The belief seems to be that if a little is good, a lot is better. In book repair, that just isn't true. A thin, even coat of adhesive makes the best bond. Too much adhesive will ooze out of the edges of a repair and bond to the pages. Also, too much adhesive causes the paper to wrinkle and takes longer to dry. Watch each repair carefully. If there is excess glue or paste, wipe it away. Next time, try to use less paste or glue.

When applying adhesive, choose a brush that matches the size of the surface. When pasting or gluing a small area, use a small brush. When the area is larger, use a bigger brush.

E. LINEN THREAD

Books are traditionally sewn with linen thread which is very strong and can be purchased in several sizes. Choosing the right thread is important for a successful repair. Using thread that is too thick can damage a book because the text block may not fit back in the original case. Thread that is too thin can tear through the folded signature paper. In general, it's best to use as

thin a thread as possible, but choosing the right thread depends on the kind of paper and how many signatures are being re sewn.

1. THREAD SIZES

Common sizes of linen thread are 12/4, 18/3, 25/3, 35/3 and 60/3. The first number is the thickness of the strand or ply and the second number is the number of strands or ply per thread. So 12/4 is composed of 4 strands that are 12 thick. The 12 refers to an industry designation that relates to the weight of the wholesale quantities of thread. In this sizing system, the smaller the number, the thicker the thread so 12 thread is thicker than 60 thread.

35/3, 30/5, and 18/3 are a good assortment of thread to have on hand. It can be hard to recognize a particular thread size so it's a good idea to mark the size of thread on the inner cardboard spool before discarding the paper wrapper.

2. WAXING AND THREADING LINEN THREAD

Like all thread, linen thread has a tendency to tangle. Waxing sewing thread with beeswax keeps the thread from tangling and helps the thread "grip" the paper. Run the thread through a cake of beeswax two or three times to coat it with wax, then run the thread through your fingers. The heat generated from the friction will melt the wax into the thread.

3. MEASURING THREAD LENGTH

The length of thread needed depends on the height of the book and how many signatures need to be re sewn. Save time by measuring the thread directly on the book.

For instance, a book with one unattached signature will need a piece of thread that is at least three text block heights long plus one text block height for tying knots.

4. ADDING ADDITIONAL LENGTHS OF THREAD

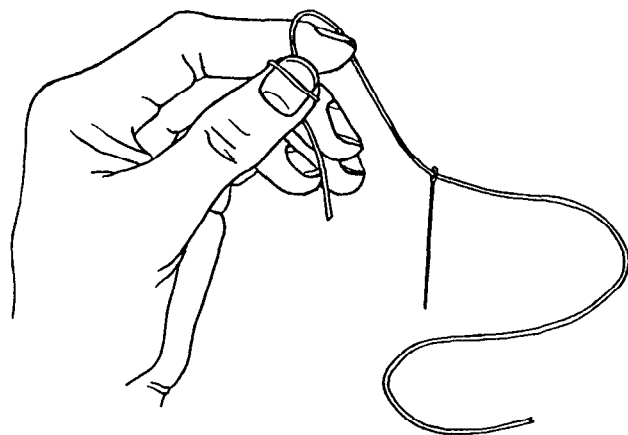
It's not a good idea to try to work with more than 4 - 5 book heights of thread at one time. There are two ways to add additional lengths of thread discussed in **TYING KNOTS IN THREAD**, which follows.

5. LOCKING THE THREAD ONTO THE NEEDLE

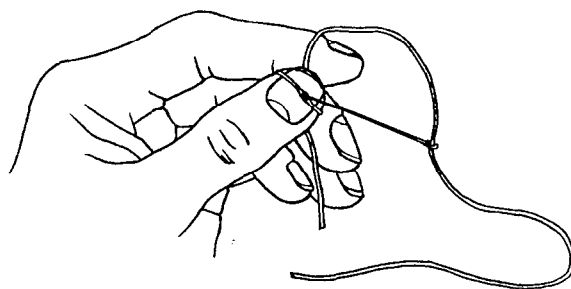
It can be very frustrating to have a needle fall off the sewing thread in the middle of a repair. Lock the needle onto the thread before beginning a repair to assure the needle will not fall off during the repair.

Thread the needle as usual.

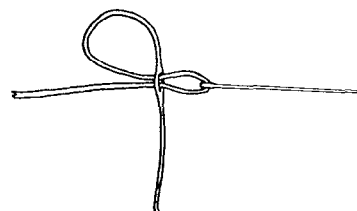
Grasp the leading end of thread (the end that was threaded through the eye of the needle) and wrap it around your thumb.



Carefully pierce the thread with the needle against your thumbnail.



Pull the needle through the pierced thread.



Hold onto the sewing thread and pull until the pierced thread is tight against the sewing needle.

6. TYING KNOTS IN THREAD

There are two basic knots used in book repair, the weaver's knot and the square knot.

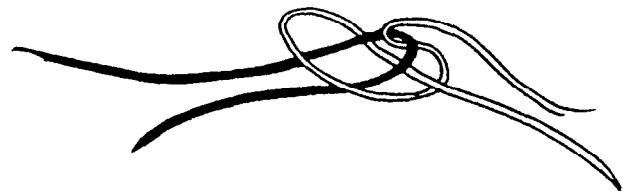
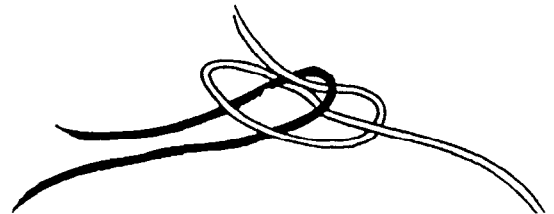
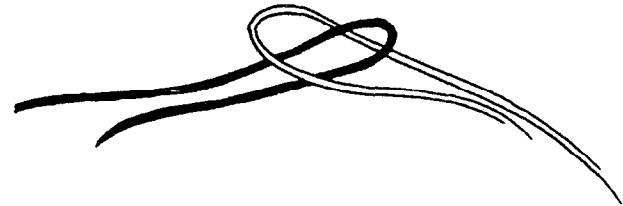
The Weaver's Knot

Since sewing with a very long piece of linen thread can be difficult, the weaver's knot is used to tie on additional lengths of thread so shorter lengths can be used.

Tie on additional thread when there is about 6" of thread left on the needle.

Tie the knot inside the signature, as close to the last sewing station as possible. A knot cannot easily pass through a sewing station hole so it should lie between the sewing station holes on the inside of the signature.

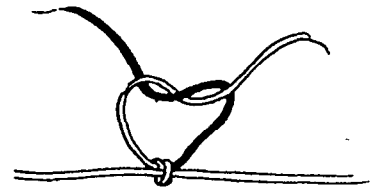
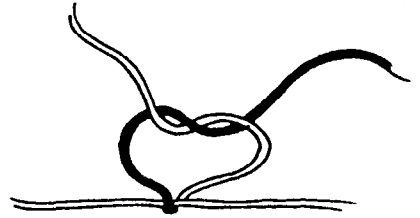
1. Make a loop of the remaining thread and hold it in your left hand, with the short end of the loop on the bottom.
2. With a new thread, make a loop with the short end on the bottom and hold it in your right hand.
3. Insert the left-hand loop underneath and *into* the right-hand loop and hold both in place with your left thumb.
4. Take the short end of the right-hand loop under and through the left-hand loop as illustrated.
5. Pull the short end of the left-hand loop and both ends of the right-hand loop away from each other until the knot is secure. Trim both ends.



The Square Knot

Square knots are used to tie off sewing thread when resewing a text block or attaching materials into pamphlet binders.

1. Take one end of thread in each hand.
2. Pass the right-hand thread over the left-hand thread and through the loop. Pull tight.
3. The *original* right-hand thread is now on the left side. Place it over the right-hand thread and bring it through the loop. Pull tight. Trim the end of the original thread.
Do not cut the added thread.



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F. SEWING NEEDLES

Using the right needle will make sewing easy and more successful.

Needles should be as small in diameter as possible, have a blunt point, and have an eye no larger than the shaft of the needle. If the sewing needle is much bigger than the thread used, it will make a hole that the sewing thread cannot fill up.

Many book suppliers advertise needles that are very large, sometimes much larger than the sewing thread. Leather harness called Egg Eye needles (#4) work very well with most thread and are available in leather shops. Sources are listed in the SUPPLY SOURCES list.

III. BOOK REPAIR TOOLS AND TECHNIQUES

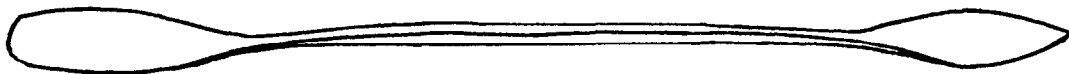
The repairs explained in this book will be easier to accomplish using the right tools and a few specific techniques.

If you already have tools and techniques that seem to work, practice each repair using the tools and techniques given in the instructions, then decide which is better. If a tool or technique does the same job and doesn't harm the book, feel free to use it.

A. BOOK REPAIR TOOLS

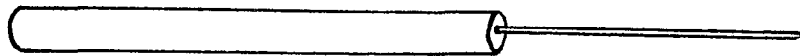


A **folder** is a tool approximately 6 - 8" long and about 1 - 1 1/2" wide. A typical folder is approximately 1/8" thick, smooth with one pointed end and one rounded end made from animal bone or plastic. Folders are used for many things such as creasing paper, smoothing down repair tissues and working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



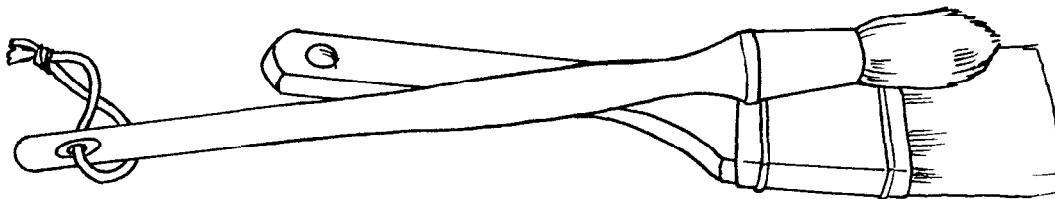
A **microspatula** is a metal tool, approximately 6 - 8" long with one rounded end and one pointed end. Use a microspatula to pick up pasted strips of Japanese repair tissue, lift book cloth or endpapers away from the book board, or apply glue or paste in a very tight area. Microspatulas are manufactured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

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A **needle-in-a-stick** can be used to apply glue to small, tight areas, mark cutting lines or score tear lines on Japanese repair tissue.

This kind of tool can be purchased from a pottery material supply house (needle in a wooden handle) or botany material supplier (needle in a plastic handle). It can also be constructed by drilling a very small hole in the end of a wooden dowel and inserting the needle into the hole. The needle should fit tightly into the hole in the dowel. A small drop of glue on the end of the needle will help it hold better.



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

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

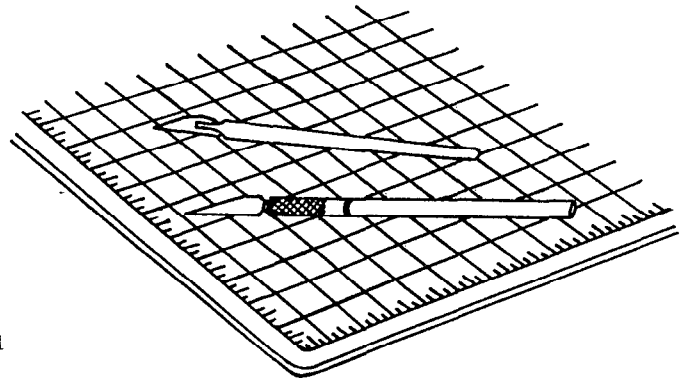
While natural bristle brushes are usually best for performing repairs, some libraries recommend using a synthetic bristle brush for PVA glue as it can be difficult to wash all the glue out of a natural bristle brush. A buildup of PVA glue can ruin a brush. Some people like to use separate brushes for paste and glue.

A brush should never be allowed to dry with the adhesive on it. Keep the brush in the adhesive or water and always wash a brush out when finished. Mild hand soap or dish washing liquid can be used to thoroughly clean brushes.

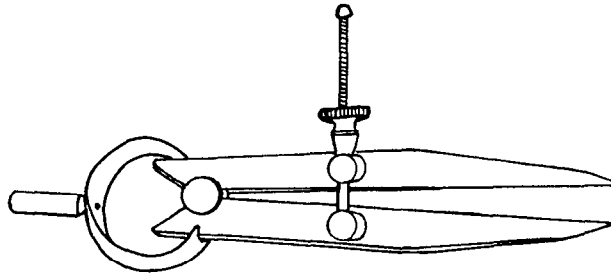
When storing a brush in water, use only enough water to cover the bristles. If the water extends above the ferrule of the brush (the metal ring around the shaft of the brush that holds the bristles in place), the wood of the shaft can expand with moisture. As the wood dries and contracts, the ferrule and the brush's bristles can loosen.

Shake out all the water from a brush before putting it in paste or glue.

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



Cutting on cardboard is not always a good idea because the knife blade can be caught in the "track" of a previous cut and ruin a repair. Self-healing cutting mats allow numerous cuts to be made without tracks forming. These mats can be purchased in various sizes from book supply sources, art stores or fabric stores.



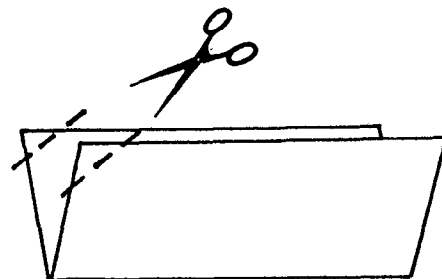
Dividers can be used to transfer and mark measurements from one place to another.

Other basic tools include sharp **scissors** and a rigid, metal **straightedge**.

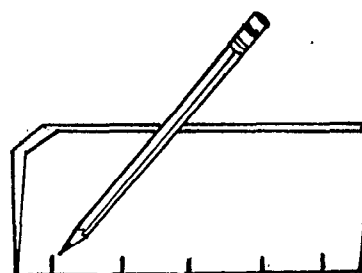
CONSERVATION BOOK REPAIR

Punching sewing holes in folded signatures can be tricky. Using a **punching jig** and a **signature punching cradle** will make the job much easier.

To construct a **punching jig**, simply fold a piece of paper in half lengthwise and clip one end diagonally. This diagonal cut marks the top of the printed page.

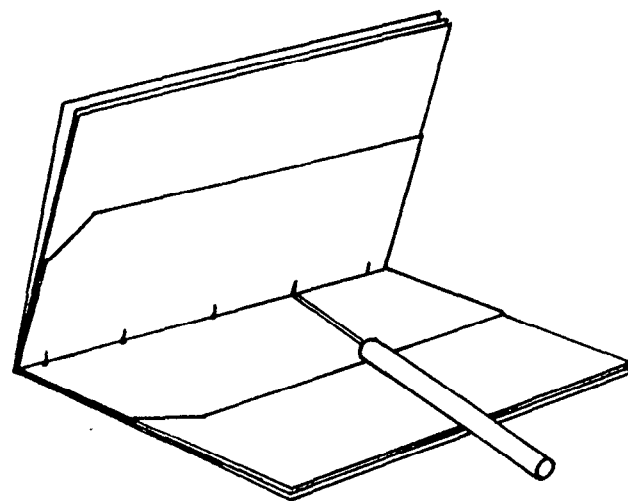


Mark the desired sewing hole stations on the outside of the fold in pencil.



Turn the jig inside out so the pencil marks are on the inside of the fold.

Place the punching jig inside the pamphlet or folded signature. The jig should be seated all the way down into the fold and lined up with the top edge of the book.

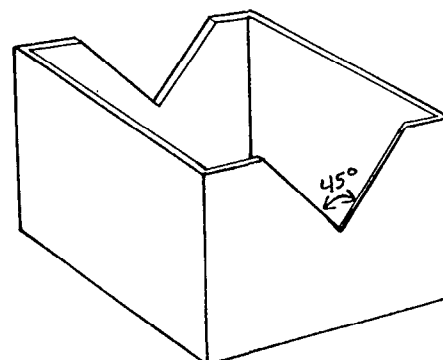


Lay the pamphlet/signature flat on the table and carefully punch holes through the fold with the needle-in-a-stick.

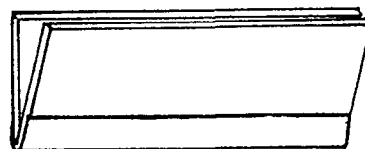
(Remember the diagonal cut on the punching jig should be at the top of the book page.)

A **signature punching cradle** helps control placement of the sewing stations and can be constructed out of thin plywood, mat board or cardboard.

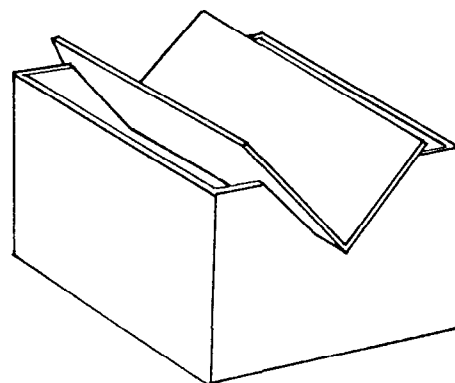
To construct a simple cradle from a cardboard box, make a 45 degree angle "V" cut in both ends of a box.



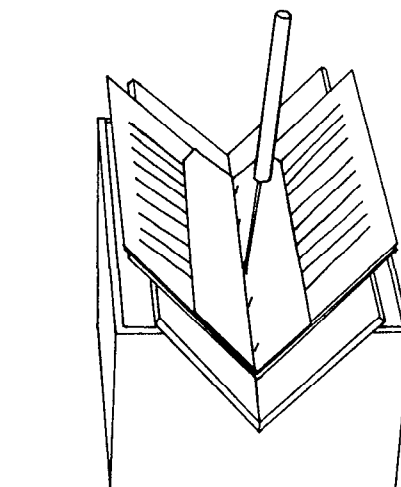
Cut two pieces of cardboard 2" longer than the length of the box and 1" wider than the length of one side of the "V" cut.



Glue a 1 1/2" strip of book cloth connecting the two pieces of cardboard along one long edge.



Glue the cardboard strips into the cut out "V" with PVA.

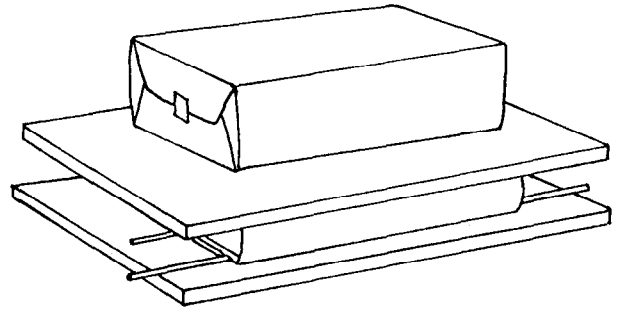


Open the material to the center of the signature and lay it in the cradle. Make sure the material is seated all the way down into the cradle. Lay a **punching jig** on top of the material and punch with a **needle-in-a-stick** (page 28).

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Paper wrapped bricks or jars filled with coins or buckshot can be used as **weights** while a repair is drying.

1/4" glass with ground edges makes a perfectly flat work or drying surface. The glass should not be larger than 18" x 18" or it can be difficult to move from one place to another. Thin pieces of plywood or Formica can also be used.



1. CARING FOR TOOLS

It is very important to keep book repair tools clean, especially tools that are used to apply paste or glue.

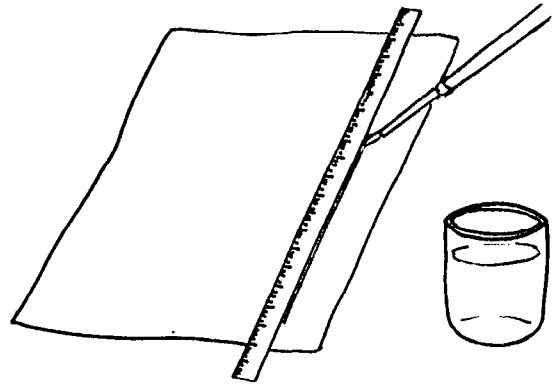
Wash folders, knives, needle-in-a-stick and brushes with warm soap and water. If adhesive is left to dry on a tool, it can build up over time and damage the tool. This is especially true for brushes.

B. BOOK REPAIR TECHNIQUES

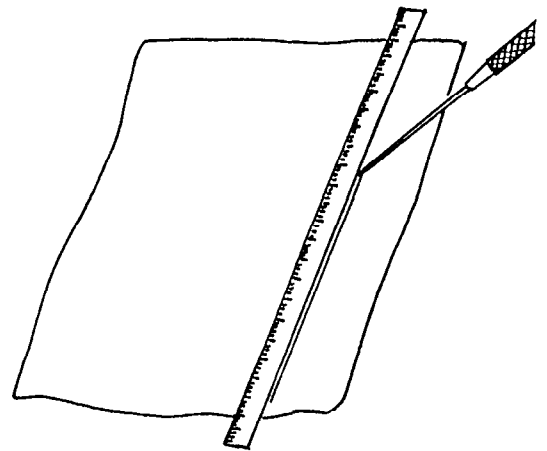
1. TEARING JAPANESE REPAIR TISSUE

Japanese repair tissue is usually torn so that the edges are feathered, not cut sharp as they would be with a knife or scissors. The feathered edge allows the repair tissue to "blend" onto the text paper. Repair tissue can be torn with a **water tear** or **needle tear**. A needle tear gives a slightly less feathered edge than a water tear.

To **water-tear** a piece of **Japanese repair tissue**, use a small, pointed natural bristle paint brush to draw a wet line or shape on the Japanese tissue. For a straight line, wet a piece of repair tissue against the edge of a ruler or straight edge. The water weakens the fibers of the tissue and allows it to tear along the wet line.



To **needle-tear** a piece of **Japanese repair tissue**, use a needle-in-a-stick (page 28) to score the surface of the Japanese tissue. The point of the needle creates a "dotted line" on the surface of the Japanese tissue to tear along.

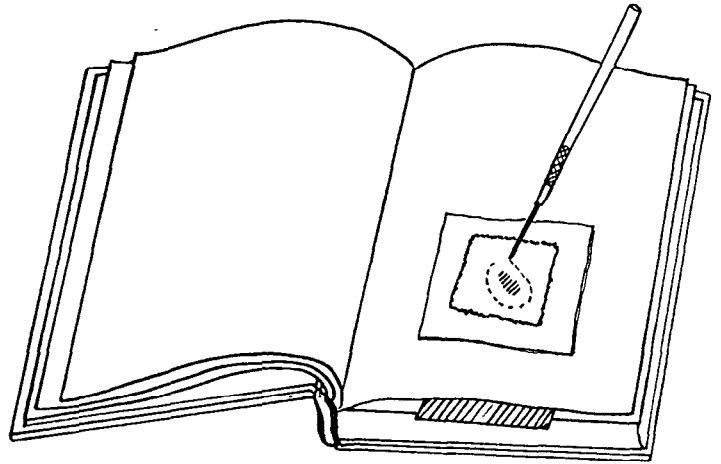


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To **tear a piece of Japanese tissue to a specific shape**, such as to repair a missing corner or mend a hole in the middle of a page, tear the tissue as follows:

Lay a piece of black mat board or paper under the missing area to make the outline of the loss more visible.

Put a piece of Mylar polyester film over the loss to protect the page from the water and needle; then lay two layers of Japanese repair tissue over the Mylar and **water tear** or **needle tear** (above) the patches to fit the loss. One patch will go on each side of the loss.



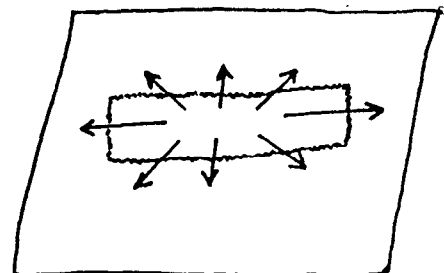
If the damaged page is not attached to the text block, it is possible to use a light table or the light from a window to see the area that needs to be patched. Put the text page on a light table or window, cover with Mylar and repair tissue. With the Mylar film protecting the page, needle or water tear the Japanese repair tissue to the desired shape.

2. APPLYING ADHESIVE TO JAPANESE TISSUE

When applying adhesive, choose a brush that matches the size of the surface. If the area is small, use a small brush; a bigger area needs a bigger brush.

A thin, even coat of adhesive makes the best bond. Too much adhesive will ooze out the edges of a repair and can stain other surfaces.

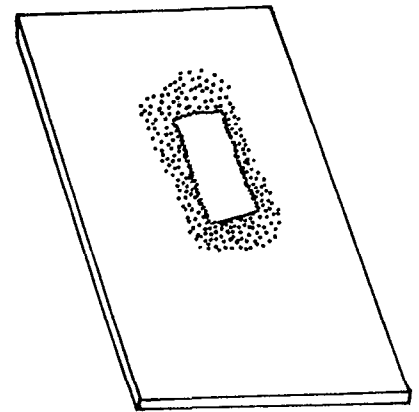
Apply paste or glue to paper or cloth by brushing from the center of the materials being glued toward the outer edges in a star burst pattern.



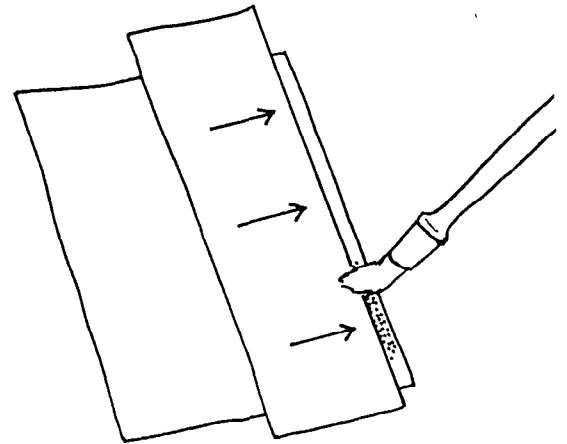
Brushing from the center out in a starburst pattern protects the edge of the paper or cloth. There might be small tears at the outer edges of a piece of paper or cloth that the brush could catch and tear or the brush might "grab" the edge of the paper and turn it back on itself, sticking the two surfaces together.

In addition to applying adhesive directly to a piece of paper, it can also be applied indirectly. This method is especially useful when working with very small pieces of paper or cloth.

Brush the adhesive onto a piece of glass or plastic then lay the paper or cloth on top of it. The paper or cloth acts as a sponge and absorbs the adhesive from below. Use the bristles of a brush or fingers to work the paste into the Japanese tissue. When Japanese repair tissue is transparent, it has soaked up all the paste it can.



Masking is another technique used to apply adhesive to paper. By using a strip of waste paper to protect most of a sheet of paper, you can apply adhesive to a very specific area in a controlled way. This is especially helpful in operations such as TIPPING-IN A PAGE.



3. Drying Repairs

Most repairs involve moisture of some kind, be it paste or glue. When moisture is introduced into paper, board or cloth, special precautions need to be taken.

A wet repair should be isolated from other pages in a book or it can adhere itself to adjacent pages and the book will not open correctly. Repairs

CONSERVATION BOOK REPAIR

to the cover of a book must also be protected until dry.

The simplest way to isolate and protect a paper repair is with a **moisture barrier**, such as wax paper, Mylar or by using a combination of a non-stick, porous material such as Hollytex or Pellon with blotter paper.

Since moisture cannot pass through a barrier such as wax paper the repair can take longer to dry.

Non-stick, porous material, such as Hollytex (purchased from book repair supply sources) and Pellon, a woven polyester material (available from fabric stores) can also be used to protect a repair. Both these materials allow moisture to pass through so repairs dry faster, but keep in mind the moisture has to go somewhere. When using porous materials, be sure to use blotter paper to absorb the moisture so it does not travel to the pages of the book.

Blotter paper is a thick unsized paper made from rag or cotton linters. Because it does not contain size (the additive to paper that makes it moisture resistant), it can absorb moisture easily. When blotters are used to absorb moisture in a book repair, they should be replaced with dry blotters periodically so the moisture of the blotter will not remain in the book.

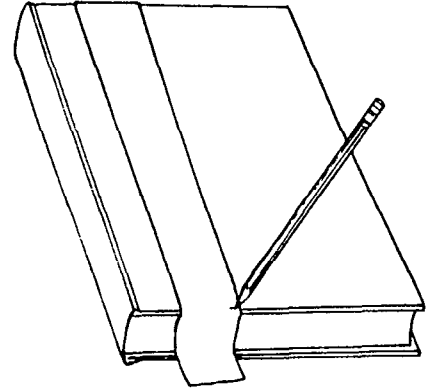
Repairs must always dry on a smooth surface under weight so that they do not buckle and curl. 1/4" glass with ground edges or pieces of plywood covered with Formica can be used to create a smooth surface anywhere. Glass or plywood can be stacked so that several repairs take up very little space. Paper wrapped bricks, jars filled with coins or buckshot can be used on top of the glass for weight.

4. MEASURING BOOKS

Measuring books accurately can be a challenge since books are not always square or flat. It's standard practice in book repair to take most repair measurements with a piece of scratch paper rather than a ruler.

Measuring the Height of a Book

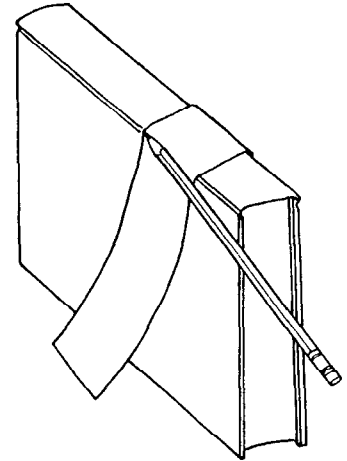
Lay the scratch paper in position and mark one or both ends of the measurement. Add direction arrows to indicate where the measurement starts and stops.



Measuring the Spine Width

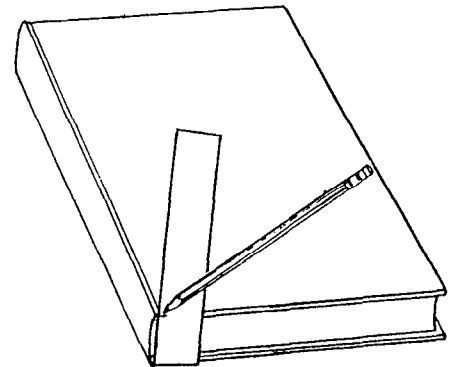
The spine can be measured in two ways.

Measure actual distance across the spine from shoulder to shoulder.



Measure the actual thickness of the spine by laying the book flat on the table and measuring vertically across the spine.

Be sure to measure the thickest part of the book. It might be the spine, the fore edge or part way inbetween.



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With the measurements on paper, the exact measurement can be transferred to paper or cloth as often as necessary. Label each measurement so as not be confused later.

Sometimes it is easier and faster to **mark a cutting line with a needle point** instead of a pencil. Use the needle-on-a-stick to mark a measurement by slightly piercing the paper, rather than marking it with a pencil.

Dividers (page 29) can be used to mark and transfer measurements from one place to another.

IV. SIMPLE BOOK REPAIRS

Most book repairs begin as simple problems. If a simple problem is ignored or handled incorrectly, it becomes a complex repair. When a book is repaired early, there is much less work and the volume stays in circulation longer.

A. CLEANING PAGES

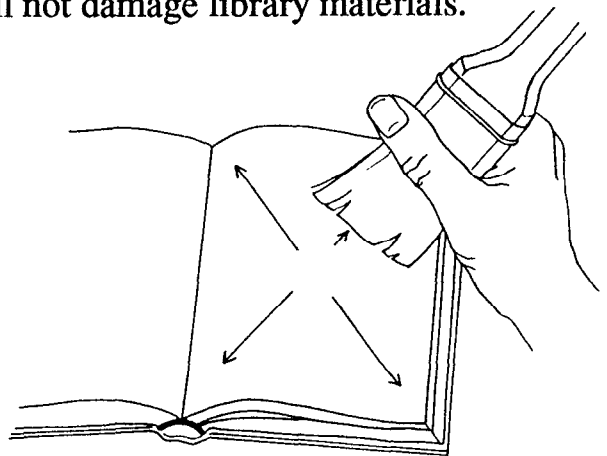
When attempting to clean paper, always start with the least abrasive cleaning method before trying others.

Keep in mind that cleaning library materials be a time consuming task. Evaluate each book before attempting to dry clean it. Make sure that cleaning a particular volume is a good use of time.

1. Dry Cleaning

Dry cleaning is any kind of cleaning that does not use water or liquid cleaners. Done correctly, dry cleaning will not damage library materials.

Some dirt can be swept off the page using a soft, natural bristle brush. Always brush from the center of the page out toward the edges in a star burst pattern and up and down the hinge area to remove dirt or eraser crumbs.



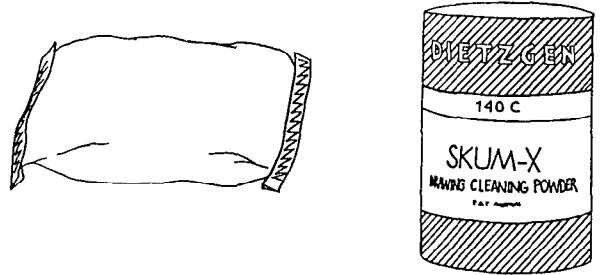
Brushes can be of any size but should have soft, natural bristles. Plastic or nylon bristles can scratch the paper. Brushes used for dry cleaning should not be used for water, paste or glue so it's best to designate a brush just for dry cleaning.

CONSERVATION BOOK REPAIR

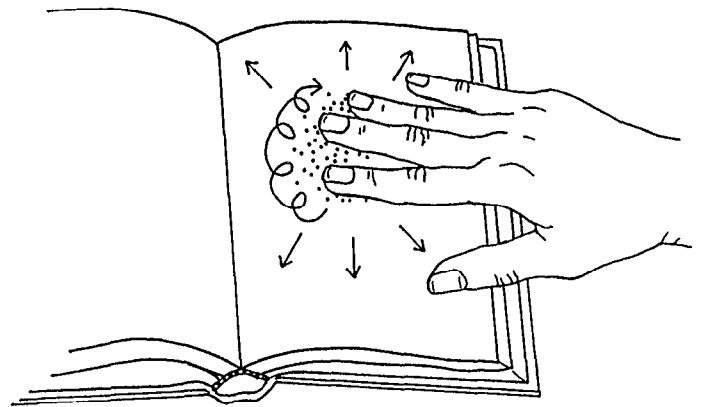
Watch out for paper tears that can catch on the brush and **NEVER** brush from the edge of the paper toward the middle. The brush could "grab" the edge of the page, pull it back on itself and cause a tear. This is especially important to remember when there are small tears on the edge of the page.

After using a dry brush to sweep off the surface dirt, products such as Opaline or Skum-X can be used to remove more stubborn surface dirt.

Opaline and Skum-X are both eraser products. Opaline comes in a bag and Skum-X in a shaker dispenser. Opaline is applied by kneading the bag above the paper until the paper is covered with a fine powder of tiny eraser crumbs. Skum-X is applied like salt from a salt shaker.



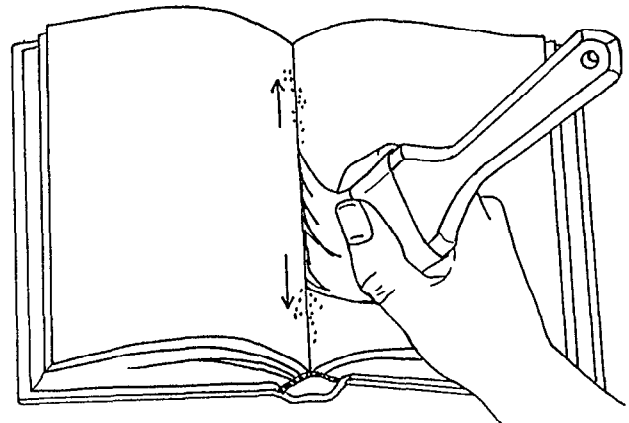
Using clean fingers, rub the paper lightly in a circular pattern. **DO NOT RUB THE PAPER WITH THE OPALINE CLOTH BAG** or the bag will become soiled quickly and transfer that dirt onto the page. It is possible to protect the page from skin oil by rubbing through a soft cloth or a piece of polyester film, such as Mylar.



ALWAYS work in a circular motion from the center of the page toward the outside edge. Be very careful of the edges of the page; they tear easily.

The eraser crumbs change color as they pick up dirt. Once they seem to have picked up as much dirt as possible, brush the eraser crumbs off the page.

Use a natural bristle brush to sweep the eraser crumbs off the page. Brush from the center of the page toward the edge of the paper and don't forget to sweep the eraser crumbs out of the hinge area. If the page is



B. TIGHTENING OR REPAIRING CASE BINDING HINGES

Case binding is a general term for the process of constructing a hard cover book in two parts: the text block and the case or cover.

As detailed in BOOK CASE CONSTRUCTION, the major point of attachment between the text block and the cover is the crash cloth that covers the spine of the text block and is glued to the cover boards. The text block is usually attached to the case so that it sits approximately 1/8 - 3/16 above the shelf. This means that gravity is constantly pulling the text block down.

The adhesive in the hinge area can dry up over time and become weak while the spine and endpapers are still intact. When the glue dries up, the crash separates from the book board and the hinge area becomes loose. Often the end paper will split along the hinge and the crash will be visible underneath.

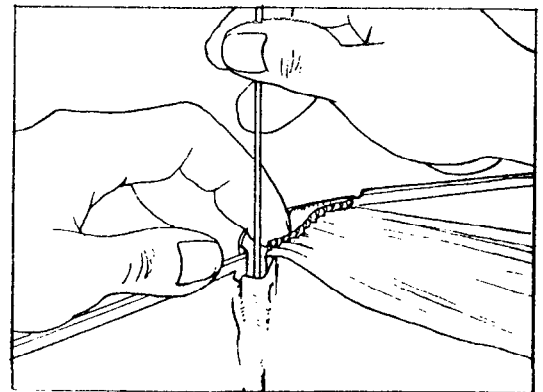
The common repair practice of applying plastic tape to the hinge area does nothing to reattach the crash to the case board, it only adds a layer of tape in the book.

1. TIGHTENING LOOSE HINGES

NOTE: If a book needs other repairs such as recasing or rebacking, do not tighten the hinges until those repairs are completed. Tightening hinges is generally the last repair to be completed.

When the hinge area is loose and the endpaper is not torn, use a wooden stick such as a bamboo skewer or thin knitting needle coated with PVA to feed a small amount of PVA into the joint area.

Carefully insert the PVA-coated knitting needle or stick into the hinge area at the top of the book, rotating as the stick is pushed down.



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still dirty, repeat the procedure. When the eraser crumbs do not change color, they have picked up as much dirt as possible.

Librarians often find pencil or pen notations on the page of a book. While most pens are permanent, some pencil marks can be erased from paper. A white vinyl eraser, such as Faber Castell brand Magic-Rub eraser, is recommended because it is less abrasive than most other erasers. These vinyl erasers come in several sizes and can be shaped with a knife or purchased in a pencil form and sharpened to reach small areas or between lines of print.

Erase in one direction, working from the center of the paper toward the edges of the paper. DO NOT rub the eraser back and forth or erase from the edge of the paper toward the center of the book.

Use a natural bristle brush to sweep away the eraser crumbs, paying special attention to removing eraser crumbs from the inner margin of the page. Remember to brush from the center of the page toward the edge.

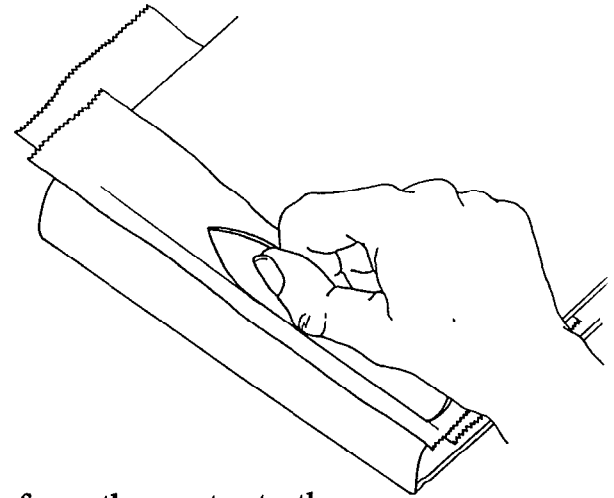
2. Other Types of Cleaning

Dry cleaning will only remove surface dirt. More advanced cleaning techniques include taking the book apart and washing each page. That is a time consuming and costly process. If simple dry cleaning does not seem to be successful, it may not be feasible to clean the book. If the book is still usable as is, return it to the shelf. If it is not usable, consider replacing the book. Keep in mind that staff time is valuable and many books need attention. Consider educating patrons with a "Keep Our Books Clean" campaign.

Pull the stick out, turn the book over and repeat on the opposite end. Be careful not to get any glue on the spine of the text block.

After both ends of the hinge are glued, put a piece of wax paper or non-stick material in the hinge area to protect the end paper from any excess glue that might seep through the torn hinge area or out the head or tail. Remember, glue in the wrong place could glue the book shut!

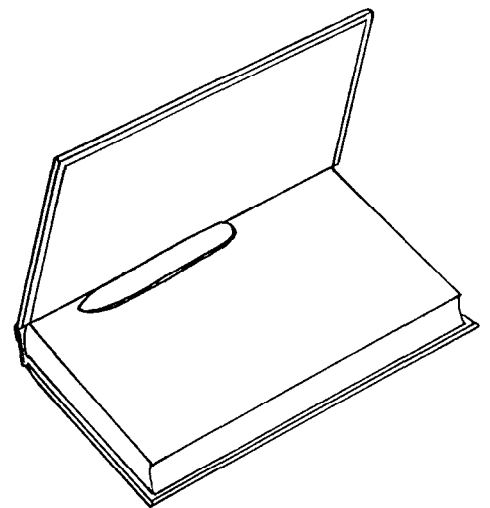
Close the book and use the long thin edge of a folder on the outside of the cover to work the book cloth down into the case joint. Use the long edge of the folder as the ends, even the rounded one, can sometimes tear through the book cloth.



Work from the center to the top of the book, then from the center to the bottom of the book. This will adhere the crash, end paper and book board and move any excess glue out of the hinge area.

Note: Rubbing the folder along the spine joint can make the book cloth shiny. To prevent this, lay a piece of non-stick material or thin paper on the book cloth before working with the folder.

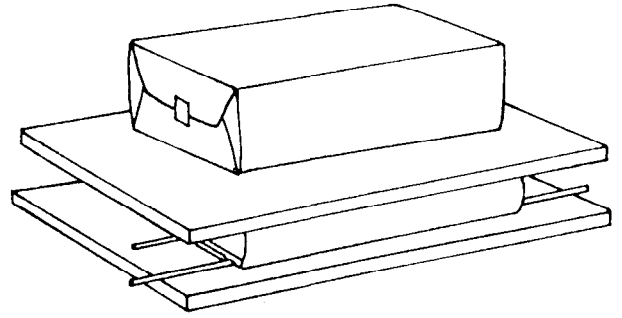
Open the book cover and use a folder to gently work the end paper back into the hinge. Again, use the long flat edge of the folder as the ends can tear through the paper.



Replace the wax paper in the hinge, close the book and rub the folder in the outer joint once again.

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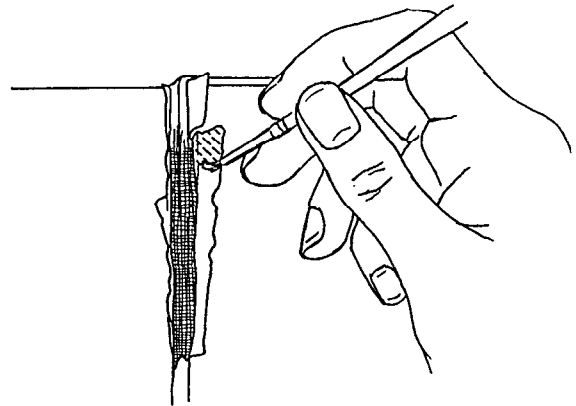
Place the book in a book press to dry. If a book press is not available, put knitting needles or shelf list drawer rods in the hinge areas of the case and place weight on the book. Let dry overnight and return to the shelf.



TIGHTENING/REPAIRING DAMAGED HINGES ON A CASE BINDINGS

A variation of the TIGHTENING LOOSE HINGES technique can be used when an endpaper is split at the hinge. Check the crash carefully, if more than 1/4 of the crash is torn, it should be replaced. (Replacing crash is discussed in RECASING, page 99).

Use a small paint brush or microspatula to apply glue to the split endpapers and work them into position.



Put a piece of wax paper or non-stick material in the hinge area to protect the paper from any excess glue and close the book.

Use the long thin edge of a folder on the outside of the cover to work the book cloth down into the case joint. Remember the rounded ends of the folder can sometimes tear through the book cloth.

Work from the center to the top of the book, then from the center to the bottom of the book. This will adhere the crash, end paper and book board and move any excess glue out of the hinge area. Wipe away any excess glue and try to use less glue in the future.

After setting the joint with the folder, carefully open the book cover and gently work the folder along the inside hinge, working the end paper back into the hinge. Again, use the long flat edge of the folder as the ends can tear through the paper.

Replace the wax paper. Place the book in a book press or put knitting needles or shelf list drawer rods in the hinges and weight with paper covered bricks. Let dry for at least one hour, then check the repair.

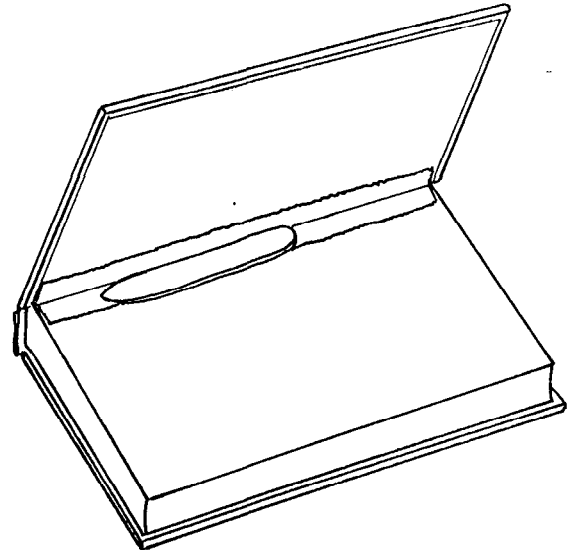
Sometimes the repaired end papers will not quite meet. This space will not affect the strength of the repair but it can be covered with a strip of Japanese tissue and wheat paste for a cosmetic touch.

Tear a piece of Japanese tissue (page 33) the height of the text block and wide enough to cover the hinge repair. Apply paste to the Japanese tissue (page 34) and gently lay the tissue on the hinge.

Use a folder to carefully work the tissue back into the hinge.

Insert a piece of wax paper or non-stick material, close the book and use the long edge of the folder to work the cloth into the cover joint.

Place the repaired book in a press or insert rods or knitting needles in the joints, add weight, and dry overnight before returning it to the shelf.



C. MENDING BOOK CASE CORNERS

The corners of a book take a great deal of stress and can be damaged while the rest of the case is still in good condition.

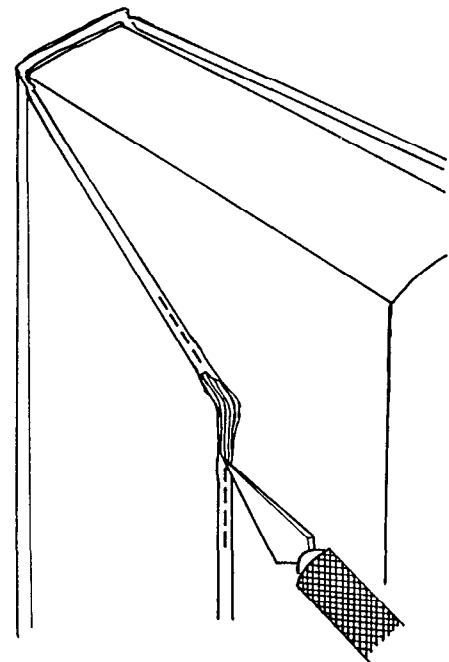
This is another repair that is often handled with plastic tape or purchased "repair wings." Applying tape or wings does not repair the corner; instead it adds a layer of tape on top of the problem. The adhesive on the tape can seep out or dry up over time, causing the plastic carrier to fall off. That can leave behind a sticky residue that is often impossible to clean up.

NOTE: If the book cloth has been worn off the top or bottom edges of the cover boards, replacing the book cloth at the corners may not be a wise use of time. Consider rebinding the book.

1. REPAIRING BOOK BOARDS CORNERS

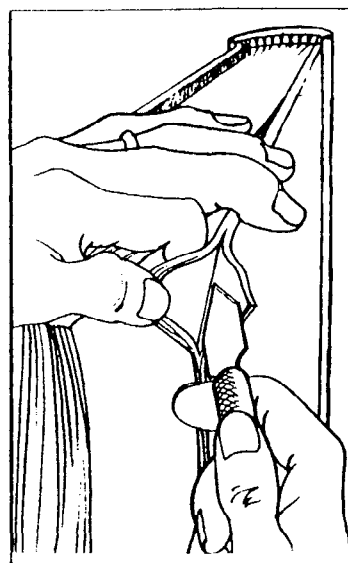
The book board used in book case construction consists of many layers of board. If the book cloth is damaged or torn open at a corner, the different layers of board are often visible. When damaged corners are repaired with plastic tape, the book board is not repaired, it is only covered up. To truly repair the book corner, the various layers of book board must be glued to one another and the book cloth repaired or replaced.

In some cases the corners are damaged while the book cloth is still intact. Other times the book cloth will be torn or missing. In either case, cut through the book cloth on the top and fore edge of the board. Cut well past the damaged board into sound board and cloth.



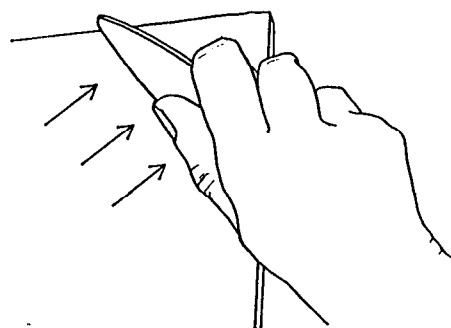
Separate the layers of board and use a microspatula or knife to apply PVA glue to several of the book board layers. The PVA will seep through the thin layers of board so every layer does not need to be glued. The number of glued layers depends on the condition of the book board.

If the original book cloth covers the corner, paint a small amount of glue on the wrong side of the book cloth and smooth it over the corner. If the book cloth needs to be replaced, follow the instructions for **Attaching New Corner Book Cloth**, page 48.



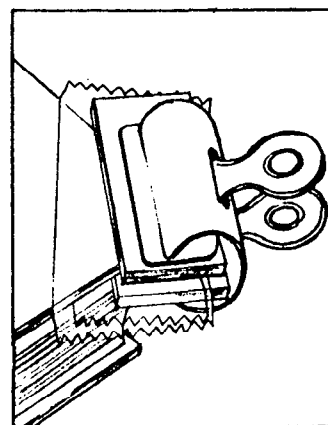
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With fingers or a folder, press the book cloth onto the board, moving from the base of the repair up toward the corner edge. Wipe away any excess glue with a cloth or paper towel.



Note how much excess glue came out of the corner and use that as a gauge to decrease or increase the amount of glue used. A **small** amount seeping out is good because it means that the glue has reached all the layers of cardboard. Too much adhesive seeping out is wasteful and makes a mess to clean up.

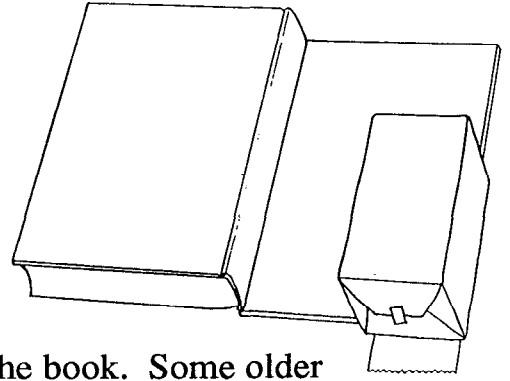
For sharp flat corners, cover each side of the corner with wax paper or non-stick material and clamp between two pieces of book board using Binders or Bulldog clips (available in most office supply stores or catalogs). Use dense mat board or book board, not corrugated cardboard that will compress under the pressure of the clips.



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Another way to achieve flat corners is to lay the repaired corner flat against the work table and weight it down with a paper covered brick.

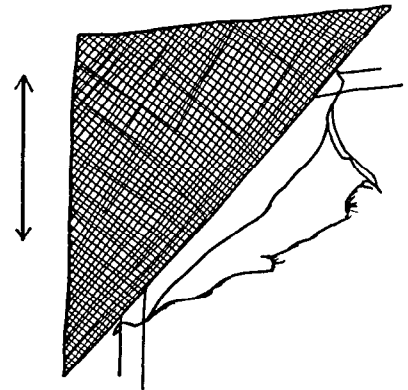


Corners do not have to be sharp or flat to protect the book. Some older books may look more "natural" with rounded corners, especially when only one or two corners are repaired. If rounded corners would look better, mold the corners into position while the glue is wet and let the repair dry without weight or pressure.

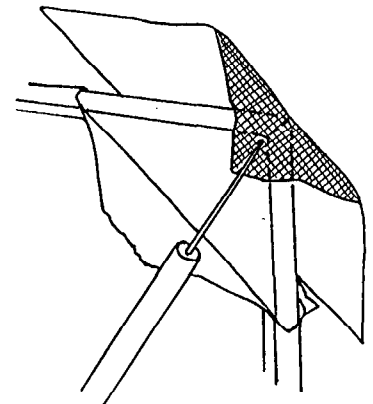
2. ATTACHING NEW CORNER BOOK CLOTH TO A REPAIRED CORNER

After the corner book board is repaired, cut a piece of new book cloth to cover the repair. The grain of the book cloth (page 14) must run parallel with the spine of the book.

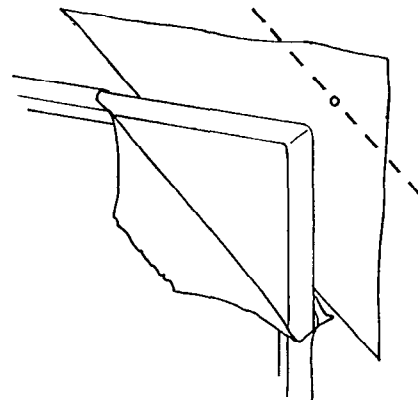
Glue the book cloth patch in place on the outside of the book cover. Dry under weight.



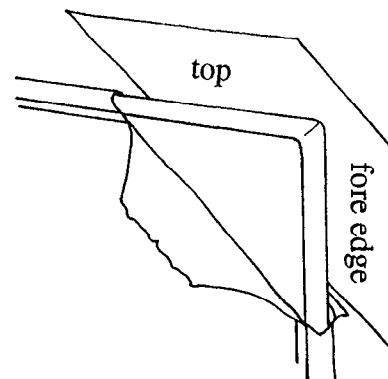
Fold the point of the new book cloth corner over the book board so it forms a 45 degree angle. Use a needle-in-a-stick to mark the position where the book cloth covers the corner. This mark should be as close to the edge of the corner as possible



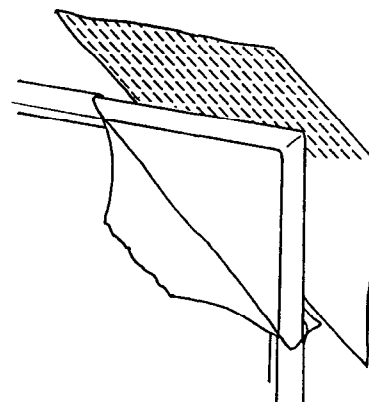
Unfold the new book cloth corner and draw a line through the needle point, along the 45 degree fold. Cut the book cloth along this line.



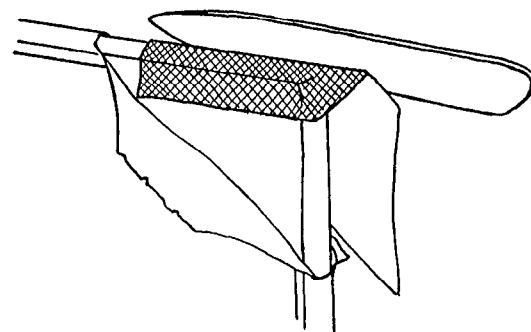
The new book cloth patch has two edges. Regardless of which corner is being repaired, the top or bottom edge of the book will be designated as the top. The other edge will be the fore edge of new book cloth patch.



Apply PVA along the top edge of the new book cloth then fold the edge over the book board.

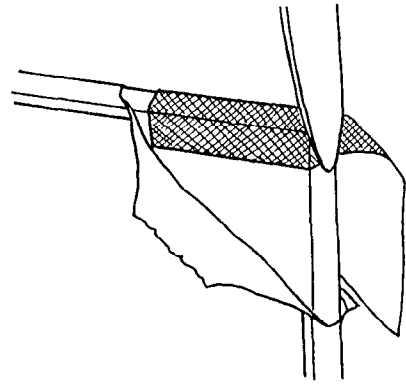


Use a folder to press the book cloth flush against the thickness of the book board. The book cloth should be glued completely flat to all sides of the book board.

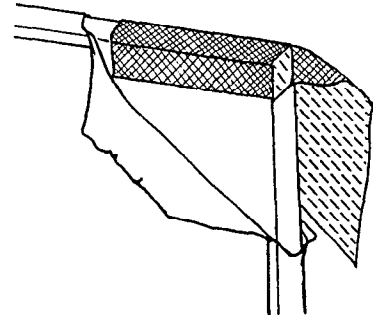


CONSERVATION BOOK REPAIR

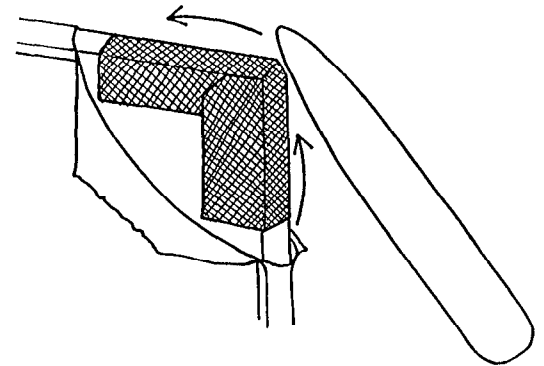
The new book cloth has a tendency to bulge out at the corner so push the new book cloth downward against the front edge of the book board with the point of a folder.



Apply glue to the fore edge of the new book cloth and work the cloth into position over the book board with a folder.



Use a folder to work the new book cloth flat against the book board and slightly round the corner.



The original cloth can be trimmed to eliminate the ragged edges and glued down or the ragged edge can be glued as is. Gluing the loose threads down can sometimes help camouflage the new book cloth if it is not a good color match.

Dry the repair under weight using paper covered bricks (page 48) or between pieces of book board with Bulldog clips (page 47).

Some older books may look more "natural" with rounded corners, especially if only one corner is being repaired. For rounded corners, mold the corners into position while the glue is wet; dry without weight or pressure.

D. PAPER TEARS, CUTS AND LOSSES

Illustrations in this section show each repair completed in a bound book. The same techniques are used for a single sheet of paper not bound in a book.

Paper tears are a simple repair often handled incorrectly with clear plastic tape. Clear plastic tape covers up the problem but it does not repair it and it can cause additional damage to the paper over time. As discussed in **CLEAR PLASTIC TAPE** on page 18, plastic tape should only be used on materials that are not considered a part of a permanent collection.

1. REPAIRING SIMPLE OR COMPLEX TEAR

Paper tends to tear at an angle so most tears will have a top and a bottom. If the tear passes through the text or an illustration, it is easy to see which is the top or bottom because the bottom of the tear will show the white paper fibers. If the tear does not pass through text, look at the tear very carefully before pasting it together.

Some tears will go with the grain of the paper while others go against the grain. Tears that go with the grain of the paper will usually be smooth and straight while tears that go against the grain will tend to have more feathered edges and will curve as they try to align themselves with the paper grain.

In **simple paper tears** the page has been torn one time and the tear has an obvious top and bottom. This is easy to see when the tear passes through the text or illustrations.

Complex tears are really more than one tear. When a torn page is not repaired, the page can easily tear again and the second tear can have a different top and bottom. Always look at the tear and lay the edges in position before applying adhesive to make sure the tear is in the correct

CONSERVATION BOOK REPAIR

position. If the edges are not in the correct position, the repair will not lie flat and the text or illustration may be obscured.

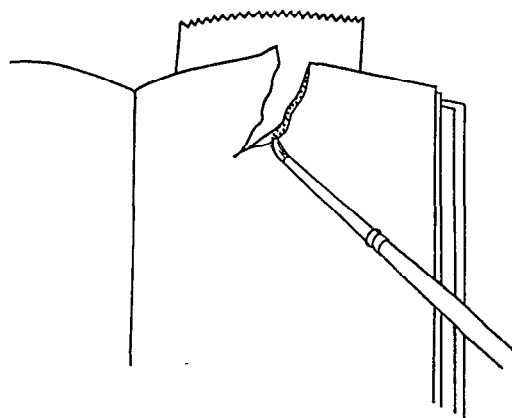
There are three ways to repair paper tears in conservation book repair:

- using wheat paste alone
- wheat paste with Japanese repair tissue
- document repair tape.

Repairing Tears With Wheat Paste Alone

When the paper tear has a strong, obvious top and bottom edge, applying wheat paste to the edges of the tear can be enough to bond them together.

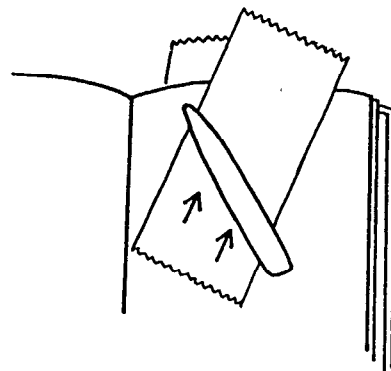
Use a very fine paint brush, microspatula or needle to apply wheat paste to the top and bottom edges of the tear and press them together.

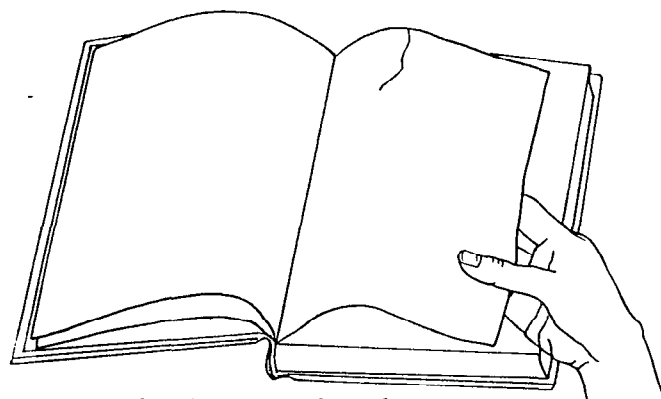
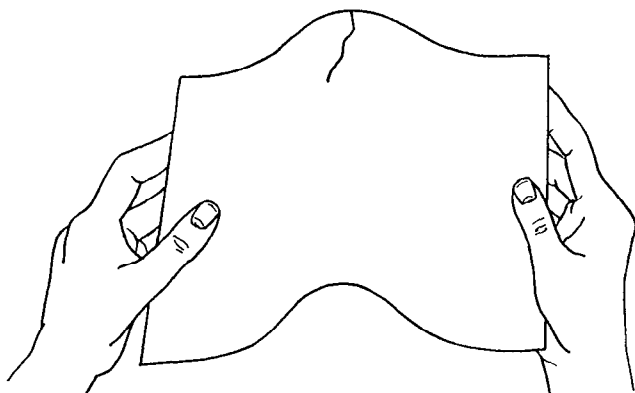


Cover the repair with wax paper or Hollytex and press the edges of the tear together with a folder.

Remember to always best to work from the base of the repair toward the edge of the page.

Wipe away any excess paste that is forced out of the edge of the tear. Note how much excess paste was used and try to use less for the next repair. Always aim for enough paste; not too little, not too much.





When the repair is dry, curl the paper around the repaired tear and make sure all the edges are well adhered.

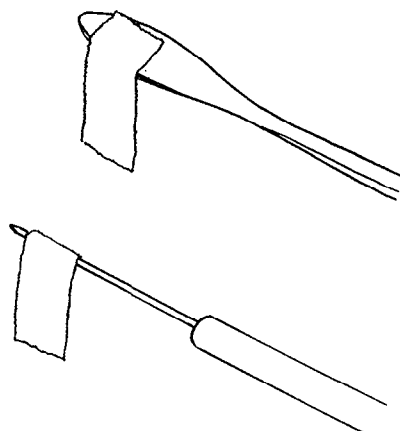
If there are loose edges, repaste and dry under weight. If the page creases at the repair, consider applying a **Japanese repair tissue** (below) patch over the repair. If the tear is not properly aligned, moisten the area with water to release the repair and redo it.

Repairing Tears With Japanese Repair Tissue Patch and Wheat Paste

Japanese repair tissue adds strength to a repair. It is used when the tear does not have wide, overlapping edges and needs reinforcement.

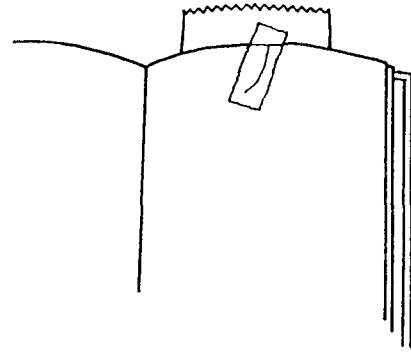
Read **BOOK REPAIR TOOLS AND TECHNIQUES** (page 27) for instructions on tearing and applying paste to Japanese repair tissue. Choose the best method for tearing and applying paste before beginning the repair.

Apply paste on the Japanese repair tissue, then pick up the tissue using a needle, microspatula or fine tweezers.

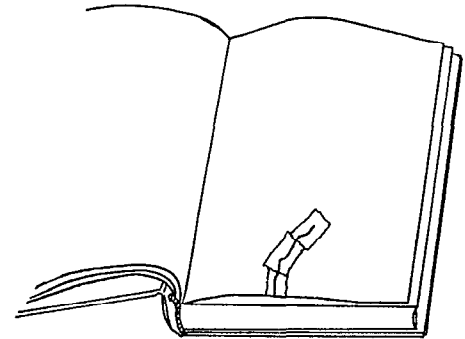


CONSERVATION BOOK REPAIR

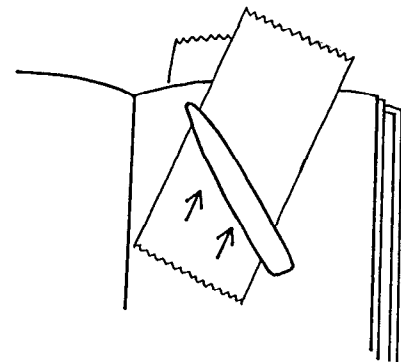
Carefully lay the tissue on the tear. If the tear is at the edge of the page, extend the Japanese tissue $\frac{3}{8}$ " past the edge of the paper. This extension can be turned under now or trimmed when the repair is dry.



It can be difficult to work with a piece of Japanese repair tissue over 3" so try repairing long tears with several short, overlapping pieces of Japanese tissue. While it may seem inviting to use one long piece of tissue, it is much harder to control, and the finished repair can look clumsy.



Once the pasted Japanese tissue is laid over the tear, cover it with a strip of wax paper and use a folder to gently press the edges of the tear together. Remember to always work from the base of the repair toward the edge of the page.



Wipe away any excess paste that is forced out of the edge of the tear. If there is much excess, use less next time.

When the entire tear is repaired, cover it with wax paper or non-stick material and blotter paper, then put it under weight. Remember, if the repair does not dry under weight, the paper can buckle and curl.

After the repair is dry, curl the paper around the tear and make sure all the edges are well adhered. If there are loose edges, repaste and dry under weight. If the page creases at the repair, consider applying a second Japanese repair tissue patch on the opposite side of the original repair.

Repairing Tears With Document Repair Tape

Document repair tape is discussed on page 18. In general, it should only be used on books that are not valuable or part of a library's permanent collection.

Make sure the edges of the tear are lined up correctly and apply the tape over the tear. Do not try to repair a long tear with only one piece of tape. If necessary, apply tape on both sides of the paper to attach loose edges but remember that this will add two extra layers of thickness to the book.

Archival tapes are usually 5/8 to 1" wide. Tape that wide can often be cut in half or thirds so as to lessen the amount of tape used in each book. In addition to saving money, it will also be better for the book. When tape is applied to both sides of a repair, cut the second piece a little wider than the first so the edges are offset.

2. REPAIRING PAPER CUTS

Paper cuts slice completely through the paper fibers so they do not have a top or bottom feathered edge. Paper cuts must be repaired with a Japanese repair tissue patch or document repair tape. Since the cut is unsupported, it might be better to put repair tissue on both sides of the cut or wrap a short amount of the Japanese repair tissue or document repair tape around to the back side of the repair to reinforce the repair. Follow the instructions for applying Japanese Repair Tissue Patch and Wheat Paste or Applying Document Repair Tape.

3. REPAIRING PAPER LOSSES

It is not too common to find holes in the middle of the page, but it can happen. While the print can not be restored, the page should be mended to prevent further damage.

Choose two layers of Japanese tissue that will be close in thickness to the repaired page.

CONSERVATION BOOK REPAIR

Tear two pieces of Japanese tissue to cover the hole using the techniques covered in **TEAR A JAPANESE TISSUE PATCH OVER THE DAMAGED AREA**, page 34.

Protect the text block with wax paper on either side of the damaged page.

Paste up one piece of Japanese tissue, position it on the page and work the edges into place. Paste up the second piece of repair tissue and lay it in place, working edges down with a folder.

Cover with wax paper or non-stick material and blotter. dry under weight.

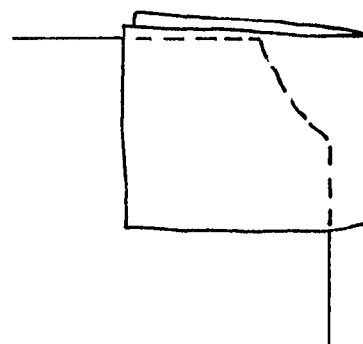
After the repair is dry, curl the paper around the tear (page 53) to ensure all the edges are well adhered. If the edges are loose, repaste and dry under weight, then test again.

4. REPAIRING MISSING PAGE CORNERS

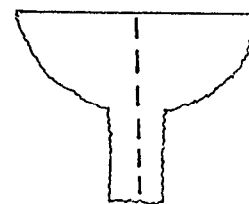
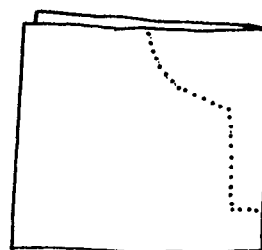
Choose two layers of Japanese tissue that together will be close in thickness to the repaired page.

Protect the pages behind the repair with wax paper. Use a piece of black mat board to highlight the edge of the repair.

Fold a piece of Japanese tissue in half and place over the missing corner. The edges of the patch should extend past the edges of the page.



Needle or water tear (page 33) the two layers of tissue. The patch should be about 1/16" wider than the loss.



Apply paste to the repair patch (page 34) and position the repair patch on one side of the missing corner. Work the edge of the patch into place.

Fold the patch over and work the edges of the patch into the page.

Dry under weight and trim any excess margin.

After the repair is dry, curl the paper around the tear (page 53) to ensure all the edges are well adhered. If the edges are loose, repaste and dry under weight, then test again.

V. INTERMEDIATE BOOK REPAIRS

Intermediate repairs can be handled easily in a library and will keep books circulating and available to patrons. Read through the directions for each repair before starting and be sure to have all the materials needed on hand.

A. TIPPING-IN DETACHED PAGES

Tipping-in is one way to reattach a detached page or plate, errata sheet or replacement page. Tipping-in is not used to put a entire book back together. If too many pages are loose from the binding, the book should be resewn, sent to the bindery, or replaced. "Too many pages" can vary from book to book, but generally more than 3-5 pages is too many.

Tipping-in is generally used on text blocks that are adhesive bound with tightly glued spines. The tight spine keeps the book from opening flat and will help to hold the tipped-in page in place. See THE BASIC INFORMATION, page 7, for a full discussion of adhesive bound text blocks and how these text blocks are constructed.

While the general rule is to use paste when repairing paper, glue is used when tipping in a page. Paste can be a better bond between paper, but it is not as flexible as glue. Since the tipped-in pages need to flex and bend, flexible adhesive is very important.

1. TIPPING-IN A SINGLE TEXT PAGE

Each book will accept a repaired or replaced page in a different way. Some pages will sit easily into the hinge area, others will slide in from the top or bottom of the text block. Practice putting the page into the book before gluing to see how the page goes in the best.

Often a repaired page cannot be replaced as far back into the spine as when the book was new. If the edges of the repaired or replacement page extend beyond the text block, the page can tear and need future repair.

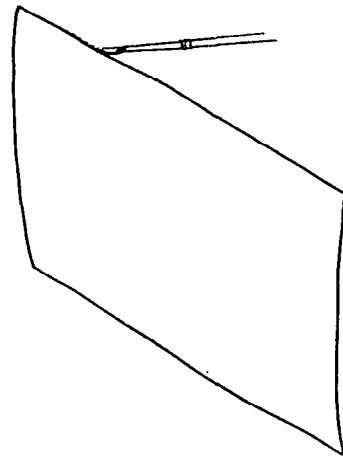
If the page does not fit correctly in the text block, especially in the case of replacement pages, trim the height of the page so that the top and bottom edges will be flush with the edges of the text block. Use a sharp X-acto knife and straight edge to trim the margins as scissors will not give a straight edge.

Leave an oversized margin at the fore edge of the page which can be trimmed to the correct size after the page is tipped-in the book (page 64).

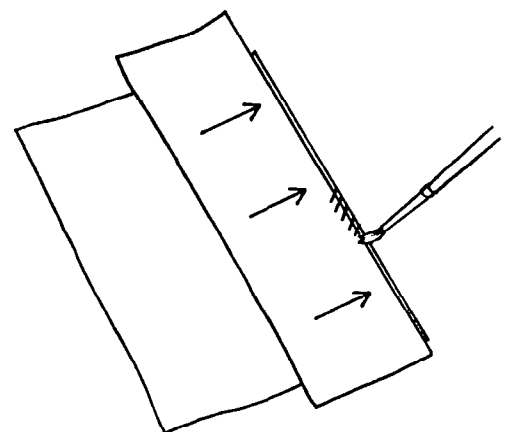
Applying Glue to A Page To Be Tipped-In

Several methods can be used to apply glue to a page; practice each one and see which works best. Often, different techniques will work in different situations.

- 1) Using a very small paint brush apply glue to the edge of the page. Do not attempt to use a large brush to apply a small amount of glue. It is very difficult to control a large brush in such a small area and the glue could wind up in all the wrong places.

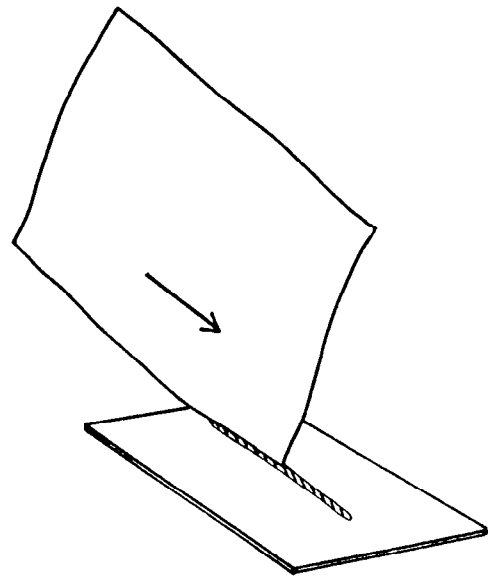


- 2) Use a piece of waste paper to mask the inner margin of the page. Leave approximately 1/16" exposed of the page exposed. Apply glue across the waste paper toward the edge of the page. Remove the waste paper before placing the page in the book.



CONSERVATION BOOK REPAIR

- 3) Apply a 1/8" line of glue on a discarded shelf list card or a piece of stiff card stock. Draw the inner edge of the paper along the line of glue making sure the paper edge is covered in a thin, even bead of glue. If the page needs more glue, draw it through the glue again. If there are some areas that have too much glue and others that are not covered, draw the page over a dry piece of card stock to even out the adhesive.



Once the glue is applied to the page, carefully maneuver the page into the book. Use the technique that worked best when the page was positioned in the book before the glue was applied.

Put wax paper directly in front and behind the tipped-in page. Besides keeping moisture from traveling throughout the book it also protects the pages from excess glue that can adhere the pages to each other.

Put the repaired book under weight and let dry overnight. When the repair is dry, carefully remove the wax paper and make sure the page is securely attached in the book, then return it to the shelf.

2. TIPPING-IN PLATES

Plates are illustrations that are printed separately from the text of a book.

Many plates are smaller than the text block page and are attached to a page of a text block by tipping them in along one edge. This is common even in books with sewn text blocks because plates are often printed on coated paper that is heavier than the paper used to print the text block. When the original glue dries up, the plate separates from the text and falls out of the book.

The best way to tip a plate back into a book is to apply glue to the edge of a plate using the second technique on page 59.

It can sometimes be a better choice to use the HINGING-IN A PLATE technique described on page 65.

B. HINGING-IN DETACHED PAGES

Hinging-in is generally used when the text block is sewn and the pages open flat, or when reattaching a plate that was originally tipped onto a page in the text block. THE BASIC INFORMATION on page 7 has a complete description of sewn text blocks and how they are constructed.

A detached page can be hinged to the page in front or in back of it. While each mend should be evaluated individually, the strongest mend is usually accomplished by hinging from the back of the detached page to the front of the page immediately behind it. That way, the Japanese repair tissue will support the page underneath as it is turned.

Checking the Attachment of Both Halves of a Folio

Each signature of paper is made of folios (single folded sheets) and each folio is made of 2 leaves (one single 2 sided page). When one leaf is detached, always check that its other half is still well attached to the text block. The other half might still held in place by the original glue, or it might also be loose.

1. Check the attachment of the second half of a folio by finding the center of the signature with the detached page. Look for the sewing threads at the center of the signature and mark the center with a slip of paper.
2. Count from that center toward the detached page, then go back to the marker at the center of the signature and count the same number of pages in the opposite direction. That should be the other half of the folio.
3. If the other half of the detached page is still firmly attached to the text block, hinge in the detached page using the technique outlined in the HINGING IN A SINGLE PAGE.
4. If the other half of the detached page is also detached or loosely attached, both halves must be reattached. Options to reattach the pages are covered

CONSERVATION BOOK REPAIR

in REPAIRING AND REATTACHING DAMAGED OR SEPARATED LEAVES, FOLIOS OR SIGNATURES (page 108).

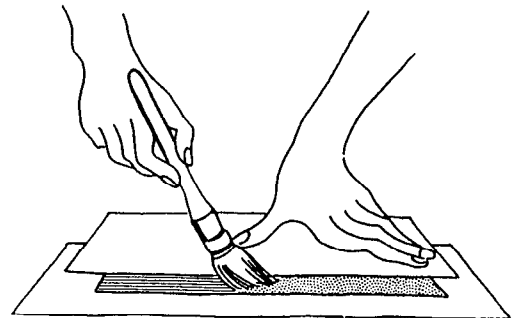
5. If the spine of the text block is accessible, use the instructions in REATTACHING A SEPARATED SIGNATURE PAGE (page 111) to reattach both pages.

1. HINGING-IN A SINGLE TEXT PAGE

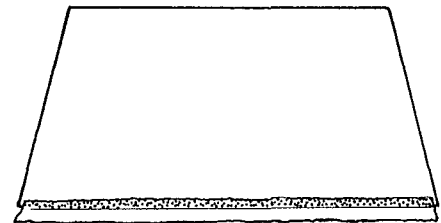
Tear a strip of Japanese repair tissue (page 33) approximately 1/2" wide and as long as the height of the page. Japanese tissue tends to stretch a little lengthwise when wet so it can be trimmed a little shorter than the page.

Lay the page to be hinged on a piece of wax paper or non-stick material.

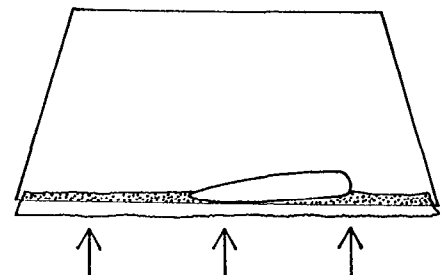
Lay a strip of Japanese repair tissue on a piece of waste paper and mask one half of the width of the tissue. Brush wheat paste on to the exposed side, remembering to brush across the waste paper toward the edge of the Japanese tissue.



Remove the waste paper from the Japanese repair tissue and carefully lay the repair tissue on the inner margin of the page to be hinged. The pasted half of the Japanese tissue strip should be laid on the page while the half that is not pasted hangs off the page.



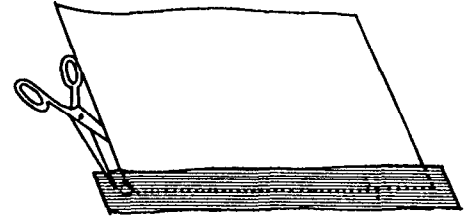
Use a folder to gently smooth the feathered edge of the repair tissue into the repaired page working from the middle of the Japanese tissue strip toward the edge. Take note of any excess paste. Try to use just enough



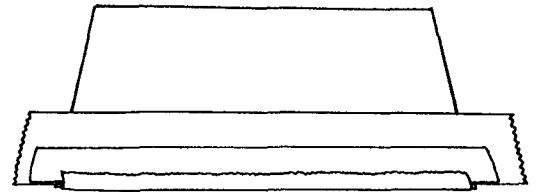
paste to adhere the tissue to the paper and not so much that it is forced out the edge of the repair.

Cover the repair with wax paper or non-stick material and blotter paper then dry under weight. If blotter paper is used, changing it every 10 - 15 minutes will speed the drying time.

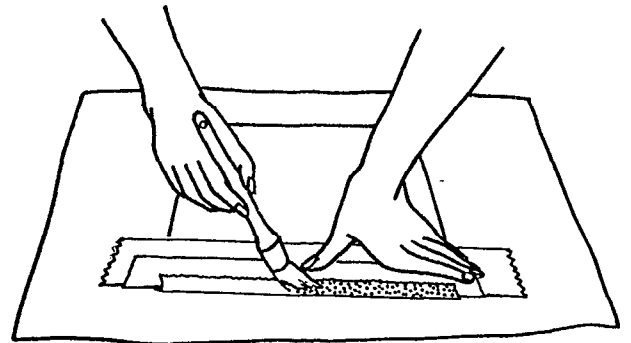
When the first half of the repair is dry, trim the top and bottom edges of the Japanese tissue if they extend past the edge of the paper.



Fold the Japanese tissue back toward itself to form the hinge. Place wax paper and waste paper under the folded hinge, with the waste paper closest to the pasted Japanese tissue.

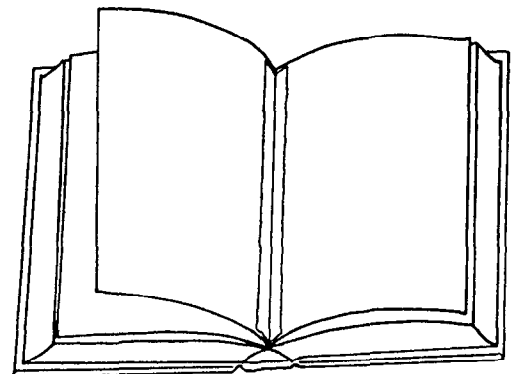


Lay the page, wax paper and waste paper on a sheet of waste paper and carefully paste the exposed Japanese tissue. Be careful not to get paste under the Japanese repair tissue or beneath the printed page.



Remove the waste paper and carefully position the hinged page in the book.

Use a folder to work the page and repair hinge into the inner hinge.



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Double check placement of the page and hinge. Make sure the hinge is smooth and all the way back into the hinge area. Check to see that the edges of the hinged page match the edges of the top and bottom of the text block. **MAKE SURE THE PAGE IS RIGHT SIDE UP!**

Place a piece of wax paper on either side of the Japanese tissue repair so the moisture will not travel into the text block.

Put the book in a press or rods in the joints and dry under weight. Keep the book under pressure until it is completely dry. If the Japanese hinge or the paper feels cool, it is not completely dry.

If the edges of the hinge have not adhered to the page, apply a small amount of paste to the edge and gently work it in place with a folder. Replace the wax paper or non-stick material, close the book and dry under weight.

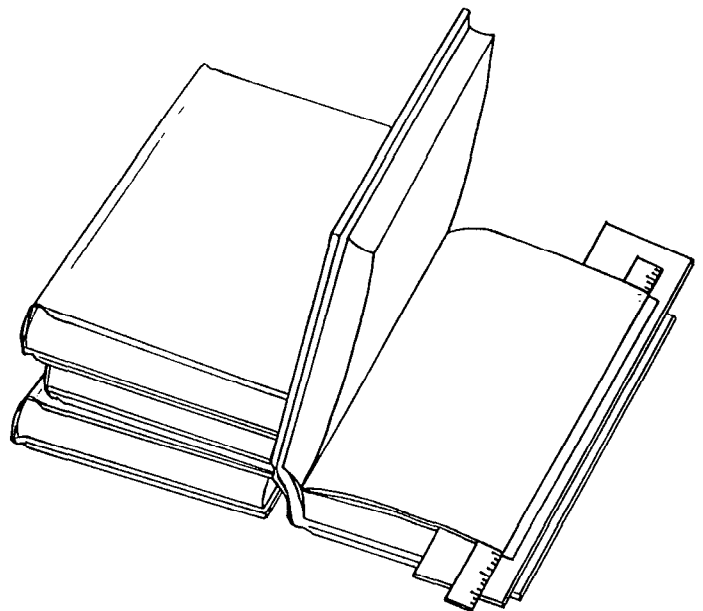
Trimming The Hinged-In Page

The edges of the hinged-in page may not be even with the rest of the text block. If the paper extends beyond the edges of the text block, trim it with an X-acto knife and ruler. **Do not use scissors** as they will not cut a straight edge.

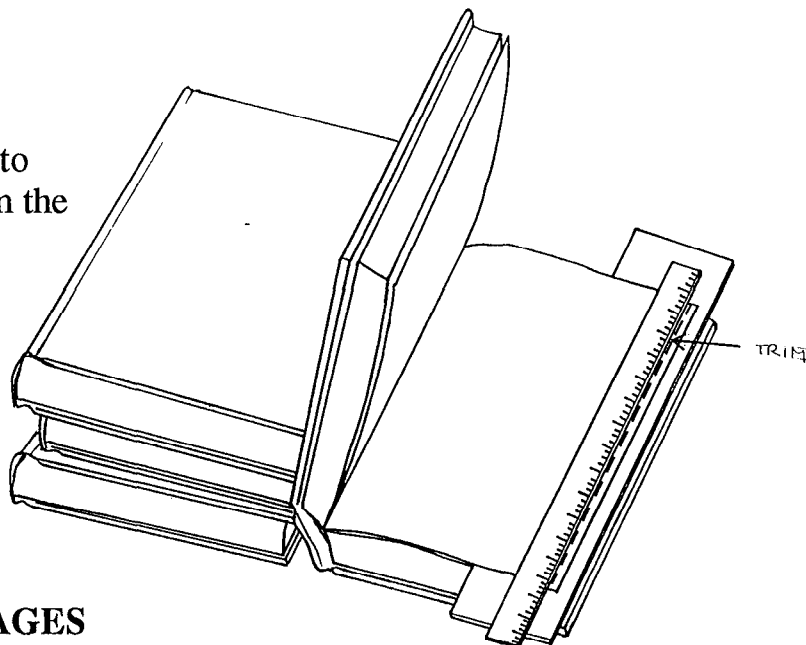
Place a thin piece of cardboard under the page to be trimmed to protect the text block.

Slip a flat metal ruler between the page to be trimmed and the page before it.

Line up the edge of the ruler so it is even with the edge of the page before it.



With a very sharp scalpel or X-acto knife, trim the excess margin from the page beneath the ruler.



3. HINGING-IN SEVERAL PAGES

The exact number of pages that can be successfully hinged-in will vary from book to book. Remember, when pages are hinged-in, additional thickness (the Japanese repair tissue and paste) are being added.

Do not attempt to replace more pages than the width of the book spine will allow.

There are several options to use when hinging in multiple pages. One choice is to hinge the loose pages to one another as a unit and then hinge the unit into the text block. In another case it is best to hinge each page into the text block one page at a time, especially if only 1 or 2 pages are being hinged-in. The method used will be determined by the individual book.

4. HINGING-IN PLATES

Plates can be attached to a text block in several ways.

Some plates are printed on folded sheets that are sewn into the text block as part of a signature. Other plates are printed on shiny, stiff paper, then tipped onto the page with glue. As the original glue dries up, the plate can separate from the text and fall out of the book.

Plates can be replaced by re-tipping them to the page or reattached by creating a Japanese tissue hinge between the plate and the text block page. Use the HINGING-IN A SINGLE TEXT PAGE technique (page 62) to hinge a plate into a book.

CONSERVATION BOOK REPAIR

Check the original placement of the plate on the page as some plates are smaller than the pages of the book and are often centered on the page.

If the plate was originally tipped in along the side (usually the left side of the plate) it can be reattached along that edge or along the top edge of the plate. Hinging from the top edge of the plate gives more support to a heavy plate.

C. REPLACING DAMAGED OR MISSING PAGES

When a page is damaged beyond repair or has been previously mended with clear plastic tape, it may have to be replaced to keep the book usable. If a page is missing entirely, the only option is to replace the page.

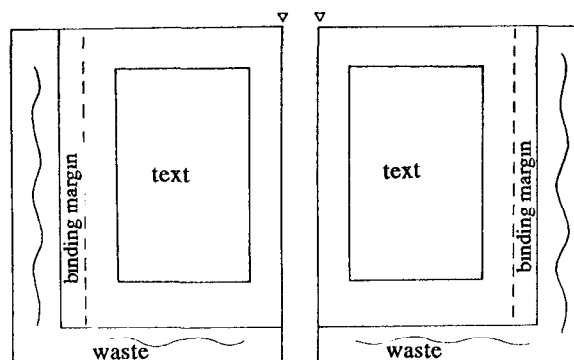
Check to see if the library has a second copy of the damaged book to use to photocopy a replacement page. If there is not a second copy, request one through interlibrary loan, noting that the book is being used to photocopy replacement pages to repair a library book.

Whenever possible, ask to receive the book, not photocopied pages from the book. If the requested book does not circulate, ask for photocopies that are actual size, not reduced. The 8 1/2" x 11" photocopy paper will probably be larger than the book so the page(s) will need to be trimmed to fit the book.

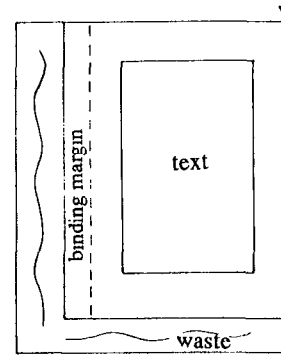
Replacement pages add thickness to the spine that can cause it to swell or split. Usually only 3 or 4 replacement pages can be safely inserted. All pages should be photocopied front and back to keep the added thickness to a minimum.

All photocopied pages need to have a 3/4 - 1" wide inner margin for tipping or hinging into a book. Replacement pages that fold out of the book, such as maps, should be copied in sections, hinged together, then trimmed to text block height.

The margins of the copied page should be uniform. The text on both sides should be in alignment.



Single-sided copies should be aligned with the upper right hand corner of the paper.



Since most books are not 8 1/2 x 11", it will be easiest to photocopy each page, cut and paste them into the correct position on a single sheet of paper, and then photocopy that page front and back. The edge margins can be trimmed to the correct size after the page is copied.

Use a light table or work on an outside window to line up the print and margins on the two pages for the correct placement.

If the cut and pasted photocopy came directly from the book, the finished replacement page will be a second generation copy. The more generations a copy is from the original, the less clear the print will be.

If possible, use acid-free bond paper to make copies for replacement pages. Regular bond paper is acidic and can cause future damage to the book. Acid-free bond can be more expensive than regular photocopy paper but one package of acid-free paper will last a long time if it is only used for photocopying replacement pages. Acid-free paper is also available in 11 x 14" and 11 x 17". These larger sizes can be useful when replacing end sheets printed with maps or printed information.

Some photocopy machines have double-sided copy features, but it is not always best to use this feature. When a photocopy machine has a double-sided copy feature two separate paper trays are used, one outside the machine to load the paper and one inside the machine to store the paper between the first and second printing steps. Using two different paper trays often means the margins on the two sides of paper do not line up correctly.

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Each machine is different so experiment to see how a particular machine works.

If a photocopy machine does not have a double-sided copy feature or it does not make accurate double-sided copies, double-sided photocopies can still be made by copying the first page and then manually re-inserting the paper into the paper tray to print the second. For proper registration, **IT IS IMPORTANT TO USE THE SAME LEADING EDGE OF PAPER IN BOTH PROCEDURES.** There may still be a difference in the margins but it will be consistent each time and the cut and pasted copy can be readjusted to compensate for it. For instance, the second page of copy might need to be 3/8" lower than the first for the final copy to be even on both pages.

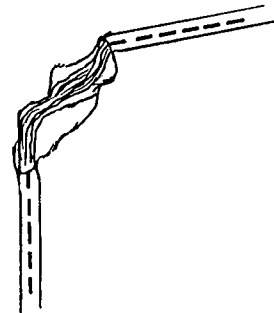
It may take several attempts to determine the correct difference between page 1 and page 2.

Trim the finished copy to the correct height then tip-in (page 58) or hinge-in (page 61) the page. Trim the fore edge to the correct width using the instructions in this chapter.

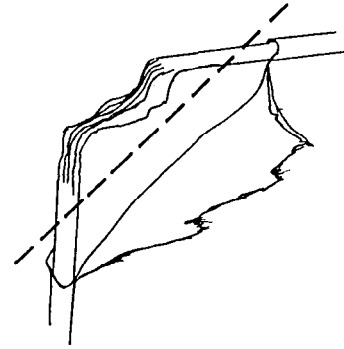
D. REPLACING MISSING CORNERS ON CASE BOUND BOOKS

It is not uncommon for a corner of a hard cover book to be damaged or destroyed while the rest of the case is in reasonably good condition. These corners can be replaced, and the book returned to the shelf. Instructions for simply **MENDING BOOK CASE CORNERS** is covered on page 46.

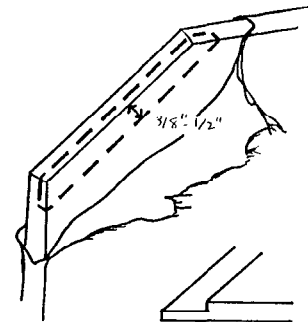
Cut through the book cloth along the top and side of the book board, cutting from the undamaged cloth toward the damaged corner. Make sure to cut far enough back so that the ragged edge of the book board is fully exposed.



Fold the book cloth out of the way and make a diagonal cut, trimming off the ragged edge of the damaged corner. Trim only as much board as necessary.

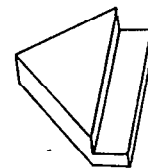


Make a second diagonal cut, about $\frac{3}{8}$ - $\frac{1}{2}$ " inside the first cut. This cut should only go through half of the thickness of the book board. Use a knife or microspatula to remove half the thickness of the book board to create a step.

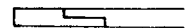


cross section

Cut a replacement corner out of binder's book board or mat board. This replacement corner should be the same thickness as the original board and should have a reverse step that will fit into the cut out step on the book cover.



cross section



replacement corner

original board

Two or more layers of binder's board or mat board can be glued together to achieve the desired thickness. Board from a discarded book can also be saved and used. If the undamaged corners have become rounded with use, it might be better to round the replacement corner to blend in with the other corners.

Fit the replacement corner onto the book and make sure it is the proper fit.

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Apply glue to the "step" in the book board and the replacement corner and fit in place.

Dry the repair under weight using paper covered bricks (position corner so it is flat against the work surface (page 48) or bull dog clips (page 47).

Cut a piece of new book cloth to fit the corner repair. Remember the grain of the corner cloth must run parallel with the spine of the book.

Follow the instructions beginning on page 48 to attach the book cloth patch to the repaired corner and finish the repair.

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**.

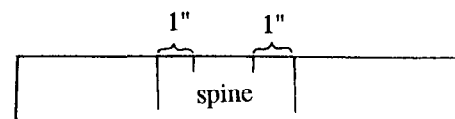
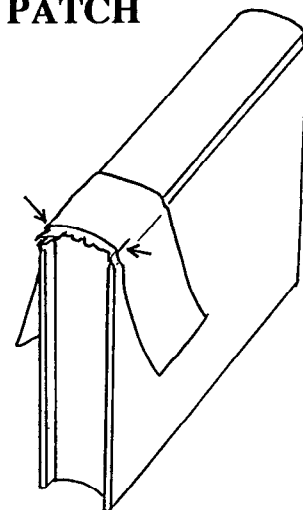
NOTE: This set of instructions can be used to repair the head or tail area of a spine. To simplify the instructions, the repair is described for the head of the book.

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.

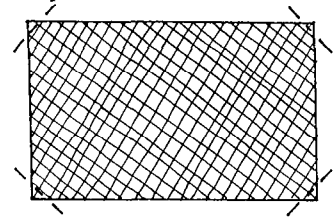
Add 1 - 2" to both sides of the book spine marks depending on the amount of damage. This measurement is the width of the book cloth patch needed to repair the torn header.



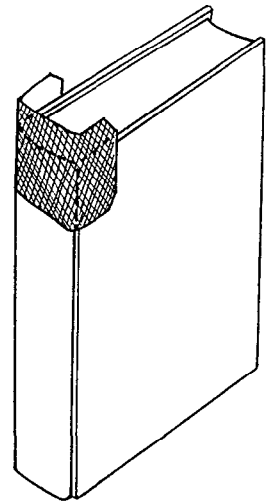
CONSERVATION BOOK REPAIR

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.

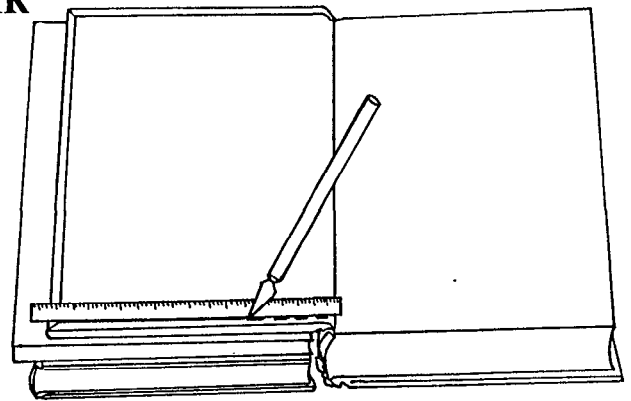


Fit the repair patch on the outside of the book and check to see that the fit is correct. The patch should extend at least 5/8" above the book board and 1/2" below the bottom of the spine damage.

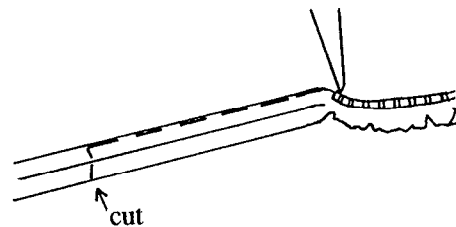


2. PREPARING THE BOOK FOR REPAIR

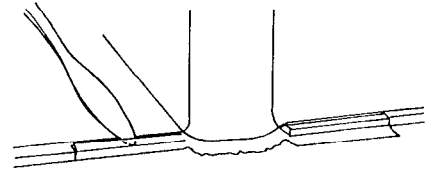
Support the book with another book or a stack of boards. Use an X-acto knife and ruler to cut through the book cloth turn-in along the edge of the endpapers at the head of the book. The cut should be 1 - 2" long.



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.

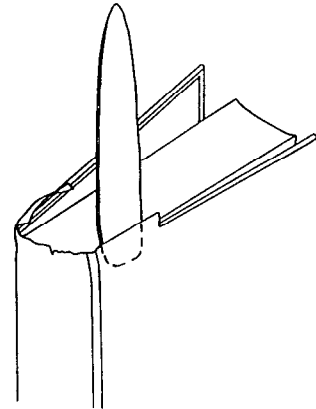


Use a knife or microspatula to lift the book cloth away from the book board. If necessary, clip through the original book cloth turn-in at the hinge to allow the cloth to lift up. **DO NOT** clip through the endpaper or the crash.



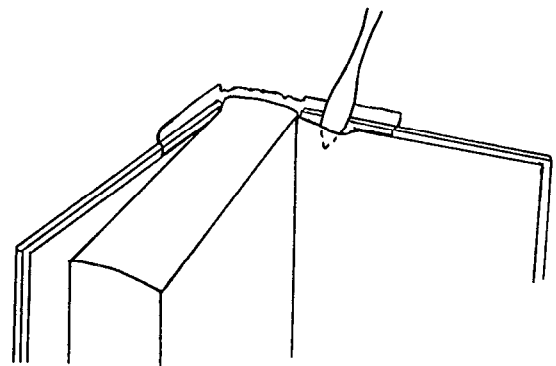
Repeat these two cuts on the opposite book board. If the original spine turn-in is completely loose, remove it.

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.

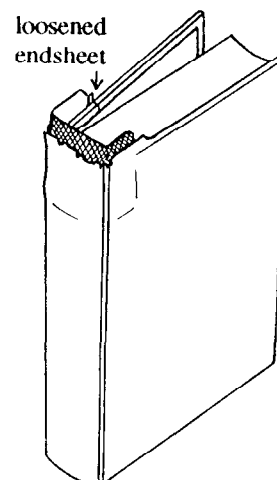
Insert a dull knife or microspatula under the original turn-in (the part of the book cloth under the endpaper that was cut but not lifted up above) and the book board. The original book cloth will help support the endpaper as it is lifted.



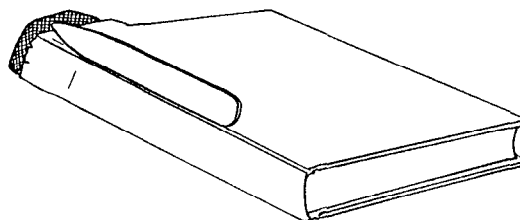
Carefully separate the endpaper away from the board with a gentle prying motion. Lift only as much of the end paper as needed to slip in the repair patch.

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.

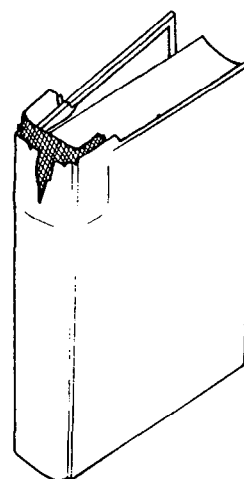


Use the long edge of a folder to work the patch into both cover joints.



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 $\frac{5}{8}$ " above the top of the book board and should extend at least $\frac{1}{2}$ " 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.

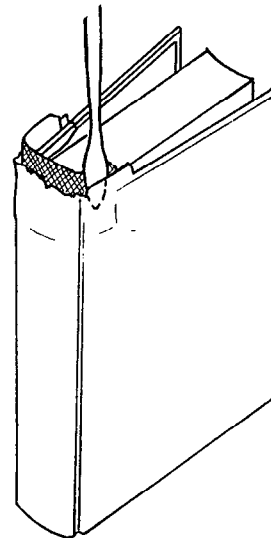
4. GLUING THE REPAIR PATCH IN PLACE

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

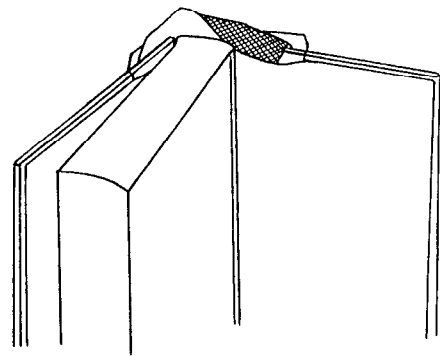
Double check the repair. Make sure the new book cloth patch lies flat against the text block and the original book cloth lies flat against the patch. There should not be any wrinkles or buckles in the patch or the book cloth spine. If it is not a good fit, readjust it or replace it before the glue dries.

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

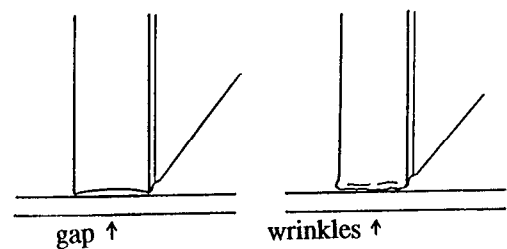
Before applying any glue to the repair patch turn-in, fold it in position to make sure the patch is placed correctly.

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.

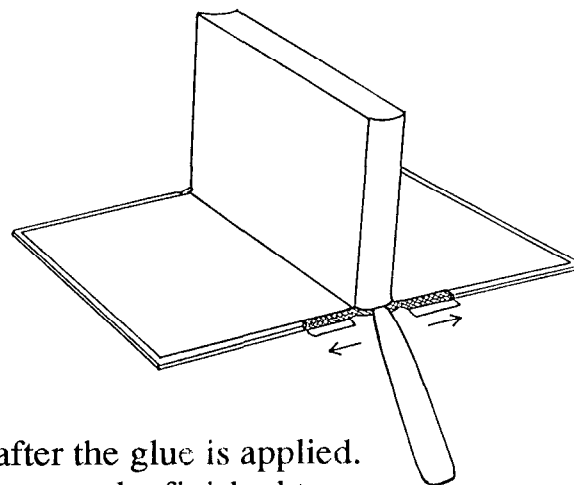
Set the book on the work table with the repaired end of the spine resting on the table. The edge of the new spine book cloth should be level with the original boards so it rests flat and even against the table.



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.

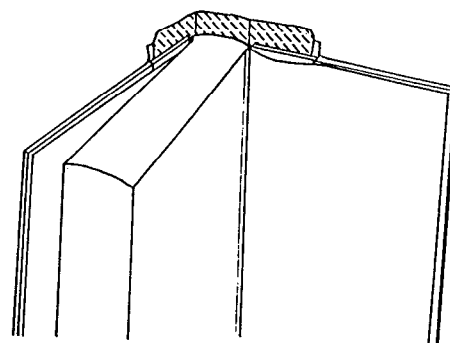
When the turn-in is positioned correctly, lay the book on the table so that the spine is flat against the table.

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.

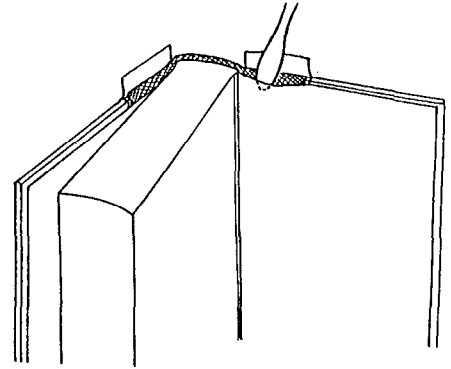
Position the book on the table so that the length of the spine is resting on the table (see illustration above). Use a pointed end of a folder to crease the folded and glued repair patch along the top of the book boards and the spine turn-in.

CONSERVATION BOOK REPAIR

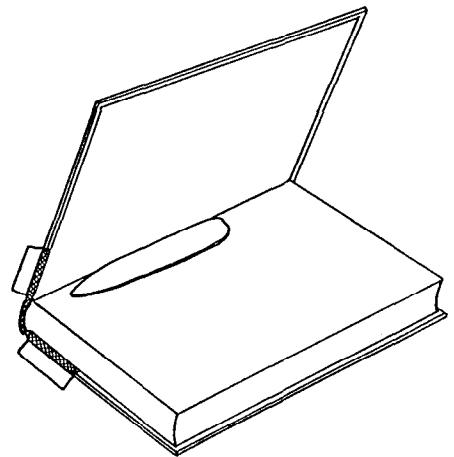
Use the long edge of a folder to work the repair patch and book cloth into the hinge joints of the book. At this point the patch will be attached to the original book cloth and the book boards.

6. GLUING DOWN THE ENDPAPERS AND TIGHTENING THE HINGES

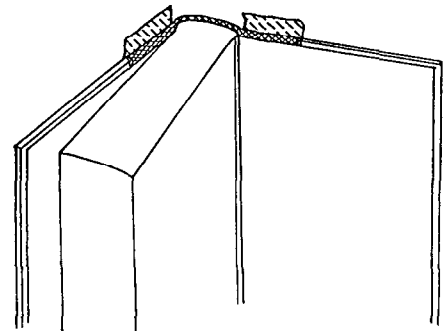
Use the rounded end of a microspatula to feed glue between the lifted endpapers and the cover boards. Feed the glue all the way down to the point where the end papers are still attached to the board and into the hinge area.



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

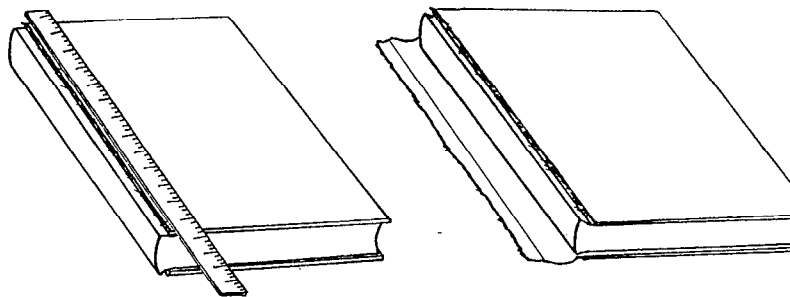
If the print or decoration on the spine is legible, save the spine to glue to the new book cloth spine. If the print or decoration is not legible, discard the spine after it is removed.

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

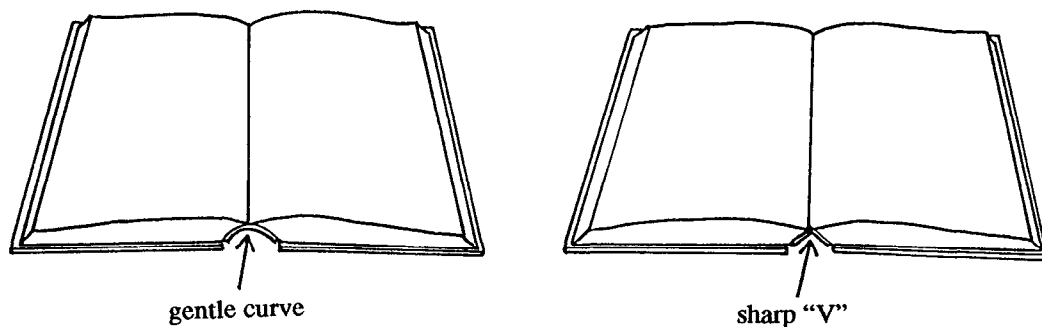
If more than $1/4$ of the total height of the original crash is torn or broken, it should be replaced before the book is rebaked. That procedure is covered in RECASING A CASE BOUND BOOK, page 99.

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.



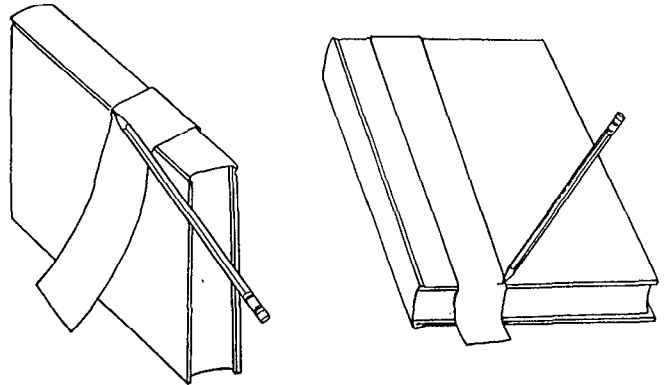
Open the text block to the center of the book and see how the spine arches. Does it form a gentle curve or a sharp "V"? When a book opens with a sharp "V", all the stress of opening the book is concentrated in one place. A gentle curve evens out the stress of opening the book.

If the original paper spine 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.

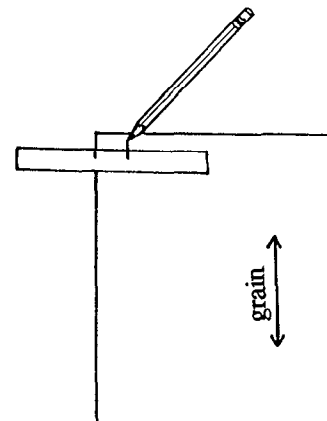
If the original paper spine liner is well adhered but not heavy enough to form a gentle curve when the book opens, add additional paper liners to create the gentle curve.

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.

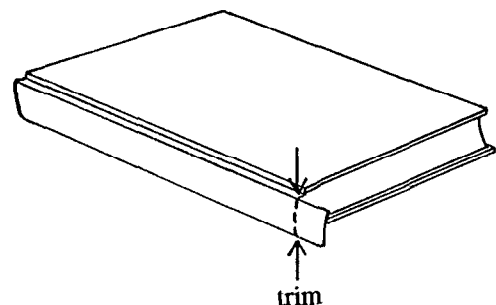


Transfer measurement A to the spine liner paper and cut a strip of spine liner paper. The cut strip should be longer than the height of the book boards. Remember the grain of the spine liner should run up and down the spine of the book.



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.

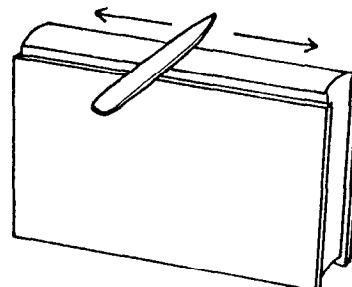
Lay the spine liner against the spine of the text block, mark the height and then trim the spine liner to the exact height of the text block.



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

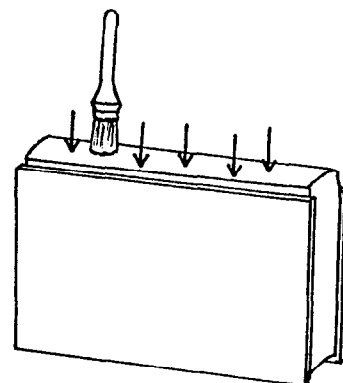
Firmly attach the paper spine liner to the text block spine using one or both of the methods below.

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.

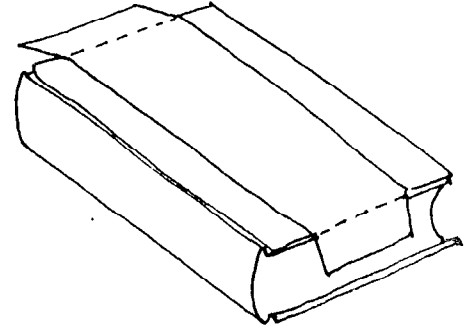
2. METHOD ONE: Rebacking With Book Cloth On The Outside Of The Original Book Cloth

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.

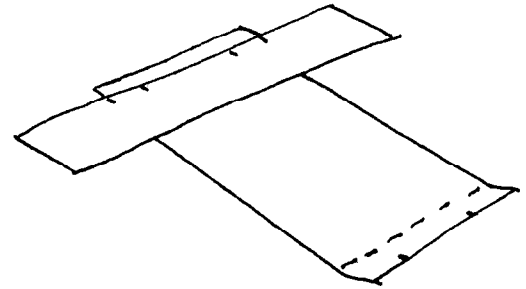
CONSERVATION BOOK REPAIR

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.

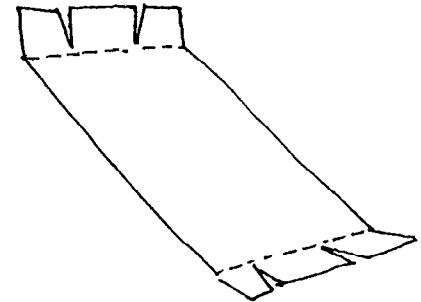


The new book cloth should be as close to the original color and texture as possible. If it is not possible to match the color, select a color that has the least amount of contrast, i.e., new black book cloth on a dark blue book.

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.

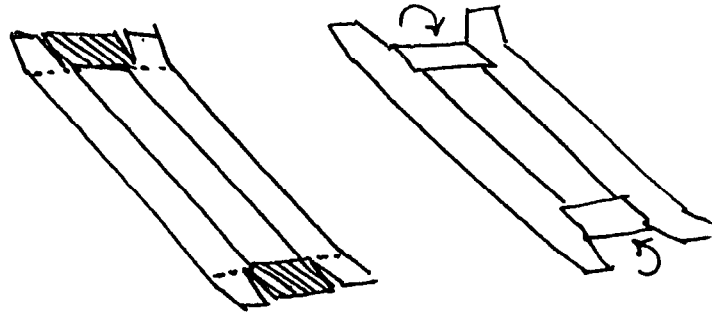
Cut a piece of acid-free paper to line and stiffen the book cloth spine. This liner is called the spine inlay. Sometimes two or more layers of acid-free bond are used for the spine liner. Mohawk Superfine or Daniel Smith Archival Paper has also been used with good results. The BOOK BINDING SUPPLY SOURCES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

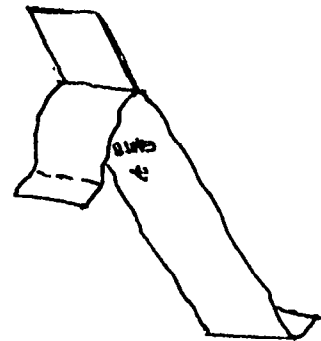
Apply glue to the center section of the spine turn-in at the top and bottom of the spine cloth; fold them over, and rub them down with a folder.



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

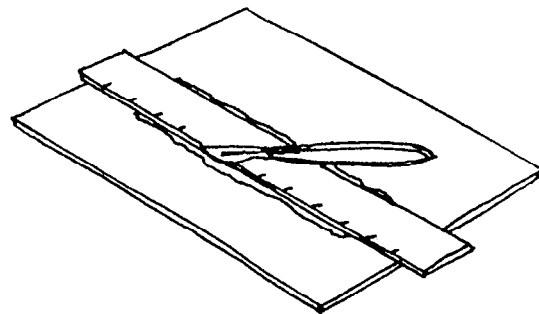
If the original spine can be reused, lift up the turn-ins and peel the paper inlay away from the book cloth spine.

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.

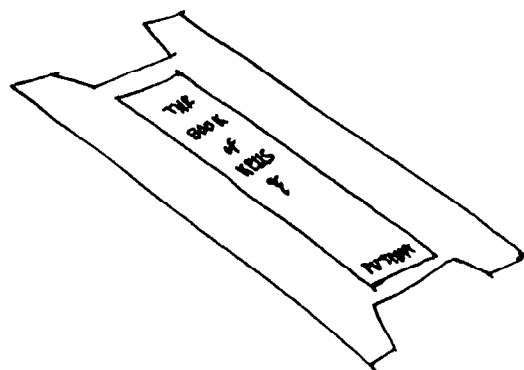


The original spine should be slightly narrower than the text block spine, so the original cloth won't interfere with the joint cloth of the replacement spine when the book opens and closes. Do not trim away any lettering or decoration. If the original spine is being re-used, save it.

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.

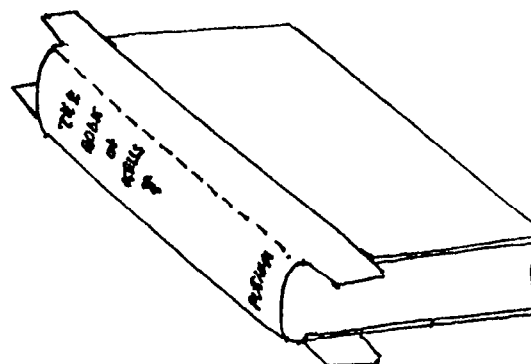
Center the original spine or new label on the right side of the replacement spine. Cover it with a piece of waste paper, and rub it down with a folder. All the edges should be well adhered.



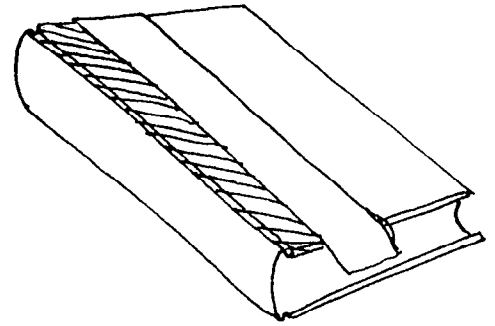
Protect the spine cloth with a piece of wax paper, and place under weight to dry.

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.



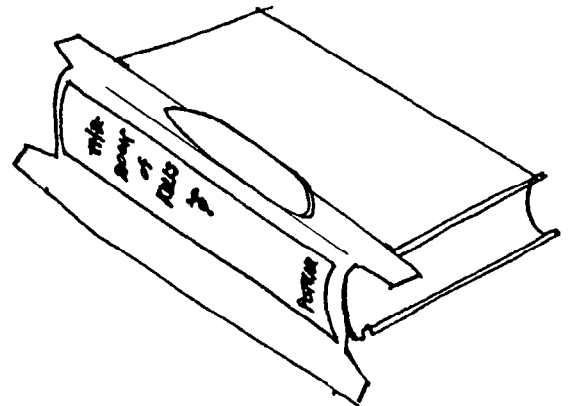
Put a strip of waste paper on the cover, lined up with the marks and glue from the waste paper toward the spine of the text block. Be careful not to get glue on the spine of the text block.



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

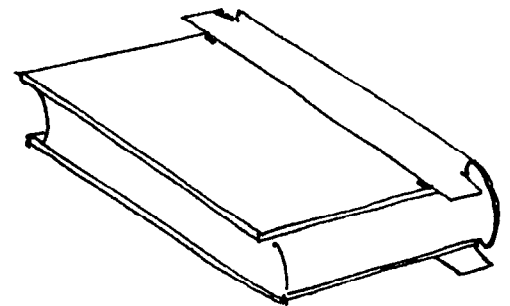
Position the replacement spine on the book. Center the head and tail; then lay the edge of the replacement spine against the line of glue on the cover.

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

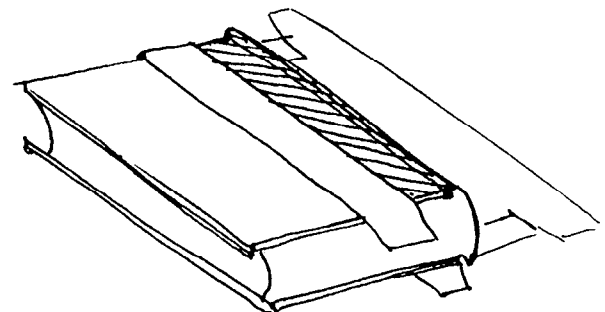


Insert rods into the joint. Dry under weight for a few minutes.

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



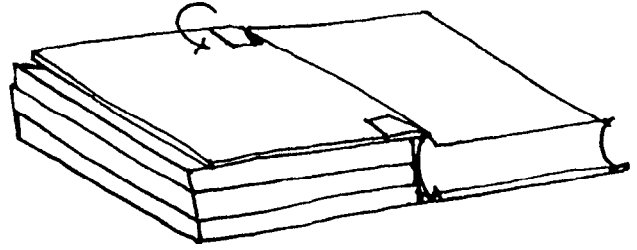
Lay a piece of waste paper along the marks. Apply glue working from the waste paper toward the joint. Be careful not to get glue on the spine of the text block.



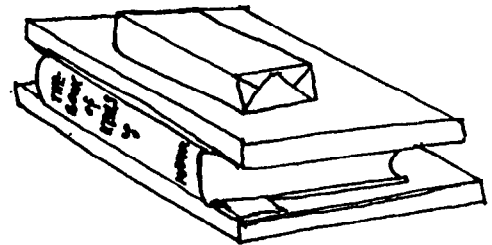
CONSERVATION BOOK REPAIR

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.



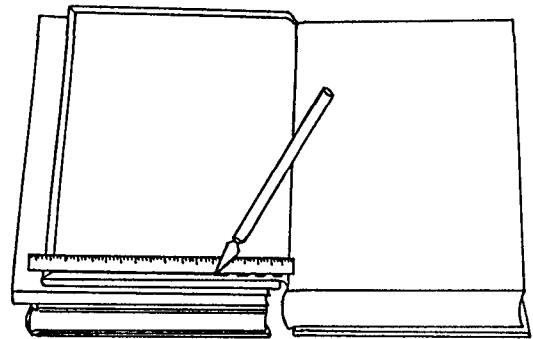
Put rods in the joints. Dry the book overnight in a press or under weight.



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

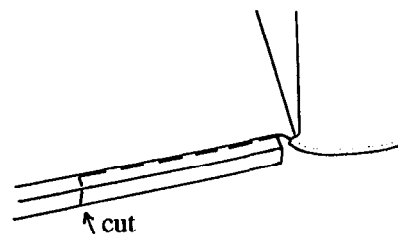
Lifting The Endpapers

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.



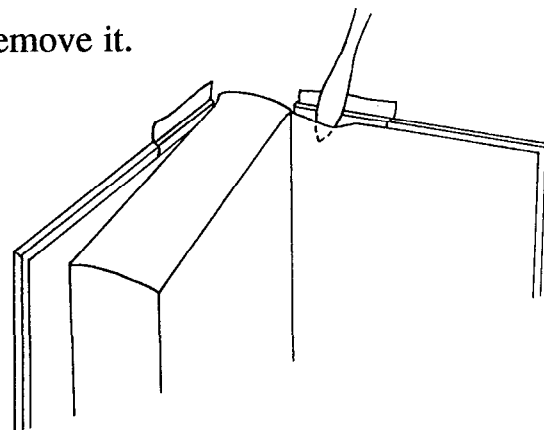
Use a knife or microspatula to lift the book cloth away from the book board.

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.

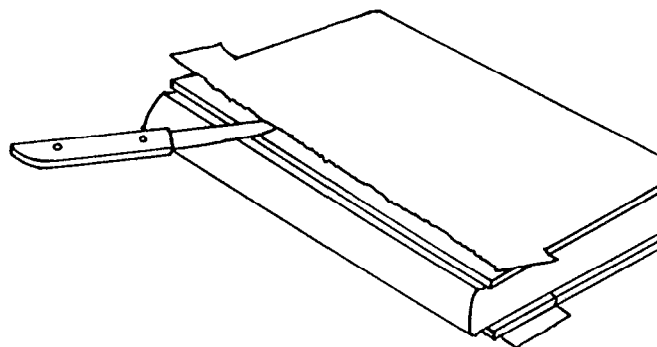
Insert a microspatula or dull knife between the original turn-in under the endpapers (the part of the book cloth cut but not lifted above and the book board. The original book cloth turn-in will support the endpaper as it is lifted.



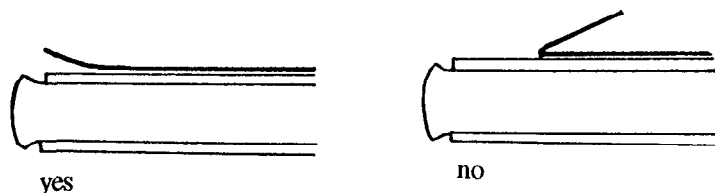
Loosen only a small amount of the endpaper as more can be separated later if needed.

Lifting and Trimming the Original Book Cloth

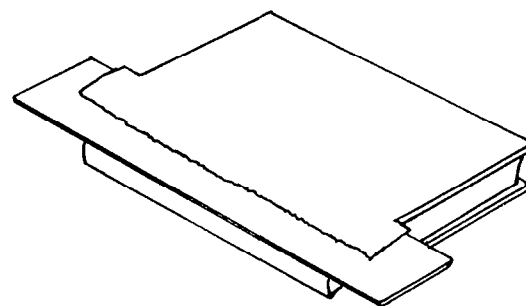
Gently lift the book cloth away from the board by sliding a folder or dull knife under the book cloth on the outer cover.



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.

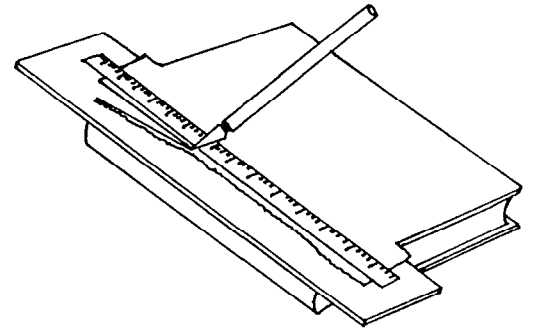


Try not to crease the book cloth as it is lifted or the crease line will show when the cloth is glued back in position.



CONSERVATION BOOK REPAIR

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



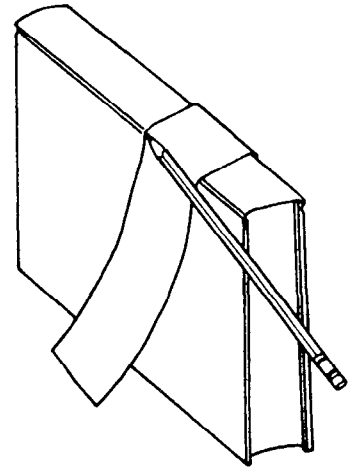
Place a straight edge along the ragged edge of the book cloth and use an X-acto knife or scalpel to trim the book cloth away from the hinge area.

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

Turn the book over and repeat on the other side.

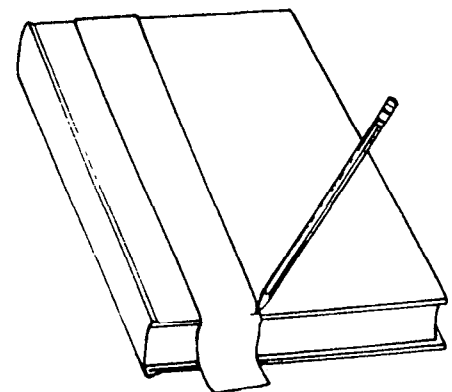
Measuring the Text Block Spine

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

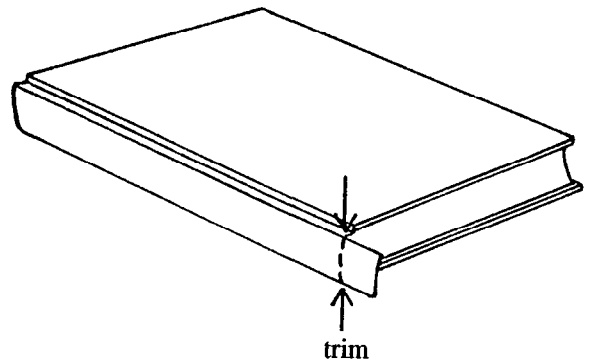
The spine area of the new spine cloth should be reinforced with an acid-free paper such as Bristol, Mohawk Superfine paper, or several layers of acid-free bond paper.

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.

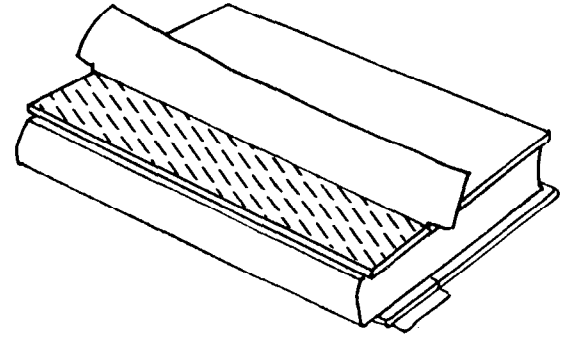
If a close color match isn't possible, select a color that has the least amount of contrast, i.e., black book cloth on a dark blue book would be less noticeable than light blue book cloth.

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

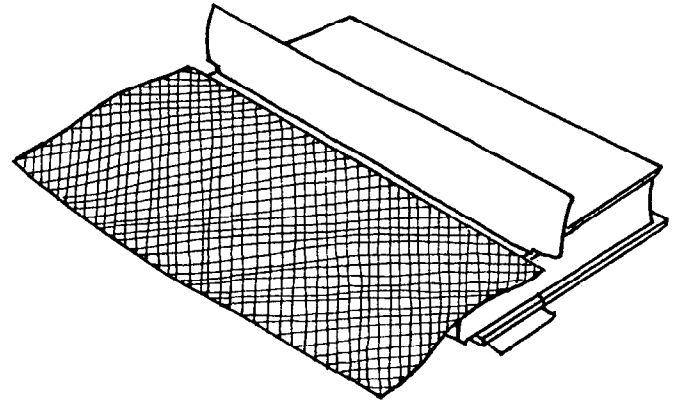
Turn back the original book cloth on one cover (be careful not to crease it). Brush PVA glue on the exposed board. Work the glue all the way back into the area where the original book cloth and book board are still attached.

DO NOT put glue in the joint area.

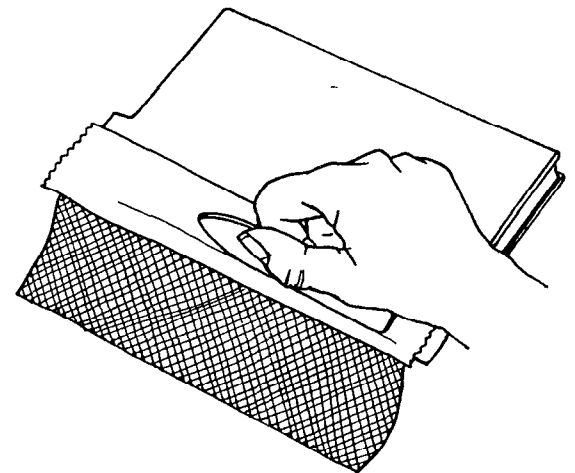


Lay the new book cloth on the glued book board, with the right side up. Use a folder to press the new book cloth onto the board.

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.



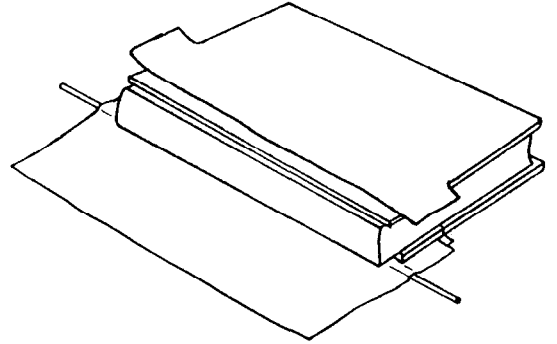
Insert rods in the joints and put under weight. Let the book dry for at least 10 minutes, so the glue will set.

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.

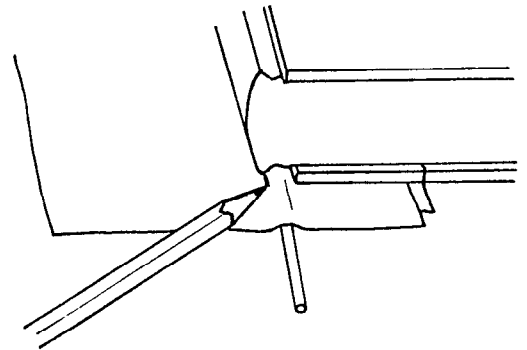
Method 1:

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.

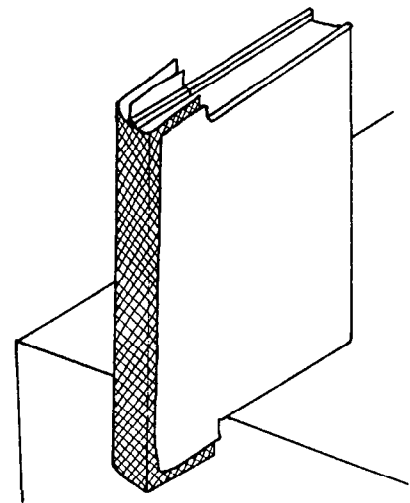


Repeat this measurement on the other end of the book.

Method 2:

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

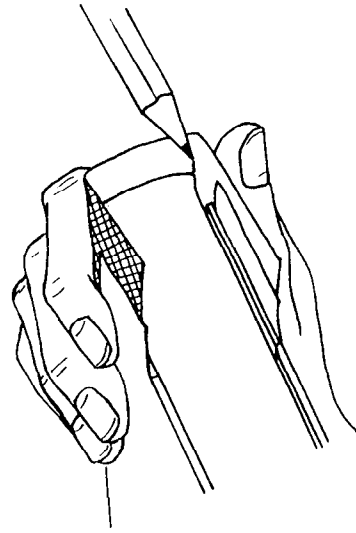
Protect the new book cloth by supporting the text block on the edge of the work table or a pile of books.



CONSERVATION BOOK REPAIR

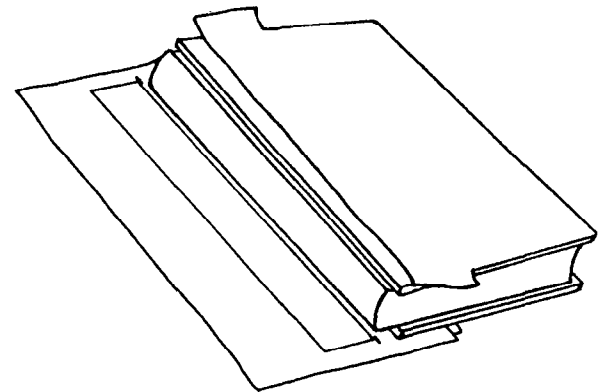
Wrap the new book cloth around the spine and press the new cloth into the joint with your fingers.

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.

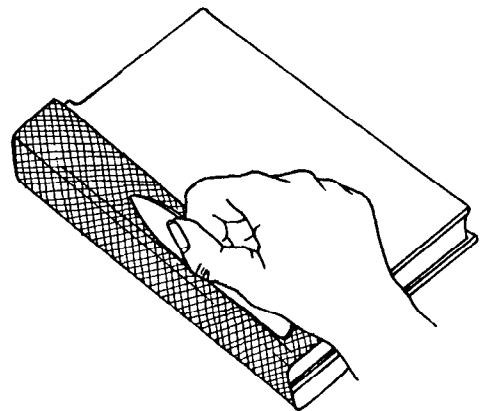


Attaching The Second Side of the New Book Cloth Spine

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

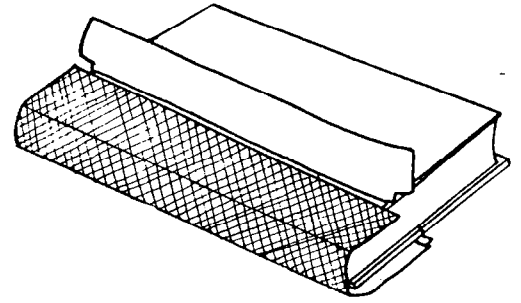
When the spine inlay is dry, gently wrap it around the text block with the new book cloth on top of the original book cloth.

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.

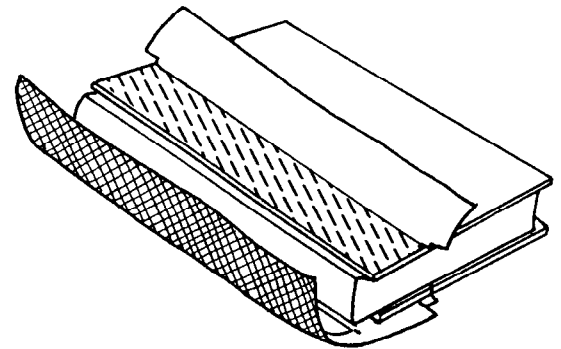
If the new spine cloth is too wide to fit, trim it down.



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.



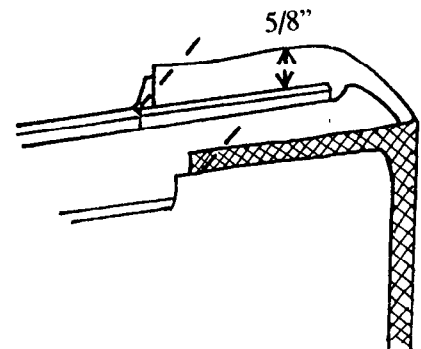
Lay the new book cloth back in place. Work the cloth into the hinge area with the long edge of a folder.

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.

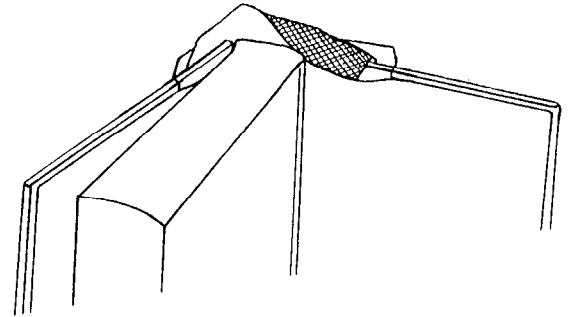
Clip the points off the corners for ease in turning-in.



CONSERVATION BOOK REPAIR

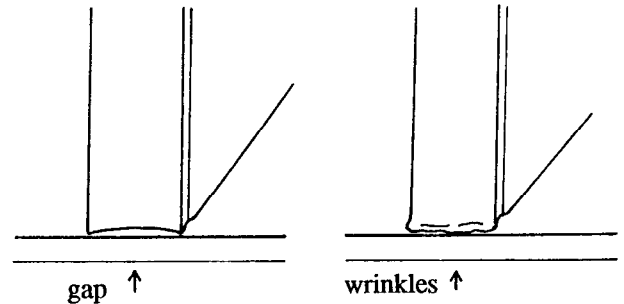
Protect the bottom extension of spine book cloth by placing the book on another stack of boards or another book.

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



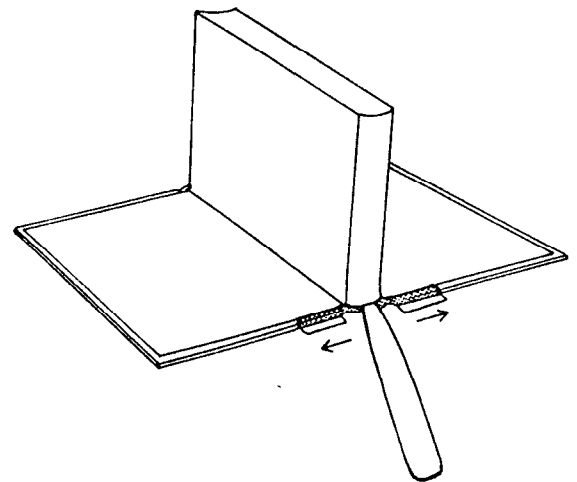
With the entire patch tucked in place, gently crease the top edge of the patch along the boards and in the spine area with your fingers.

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.

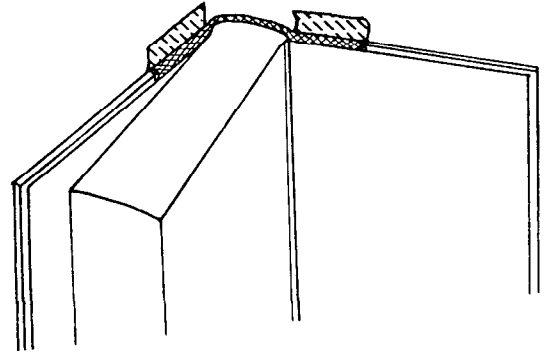
Wipe away any excess glue. Work the new book cloth into the hinge area with a folder.

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.

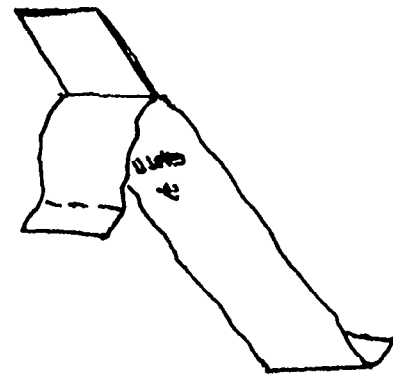


Lay a strip of wax paper in the joint areas, insert rods or knitting needles and dry overnight under weight.

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.

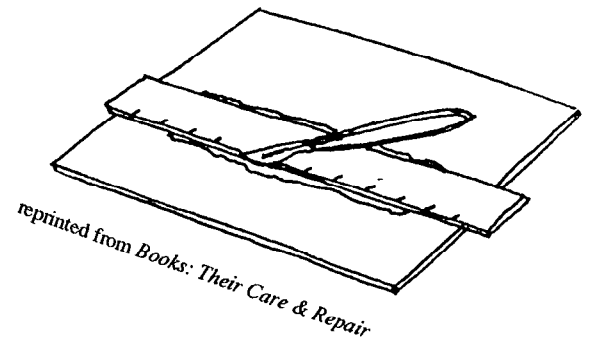
If the paper is well adhered to the cloth, don't force it off the spine cloth.



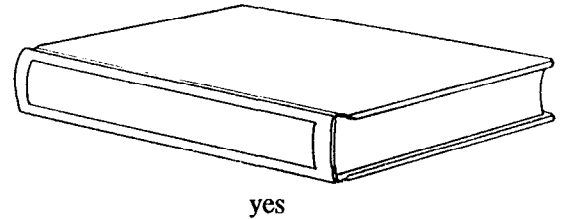
reprinted from *Books: Their Care and Repair*

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.

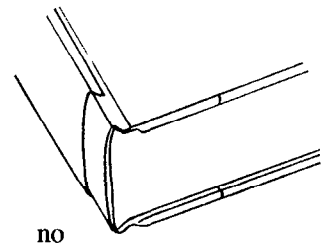


Lay the original spine against the new book cloth spine to check for a proper fit.



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.



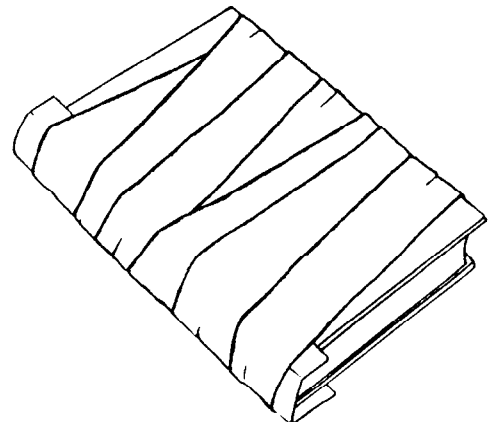
Lay the original spine wrong side up on a piece of waste paper and apply PVA glue in a star burst pattern.

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.

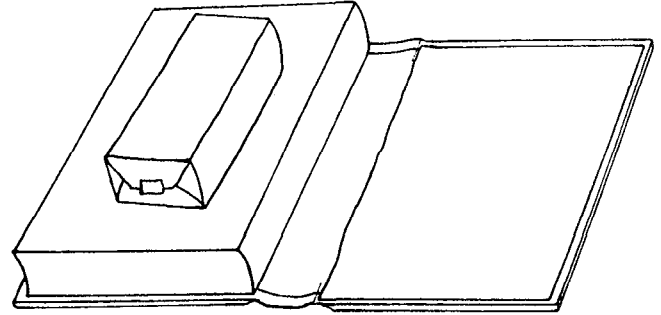
When the rebacking (spine and hinge repair) is complete, recase the text block.

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.



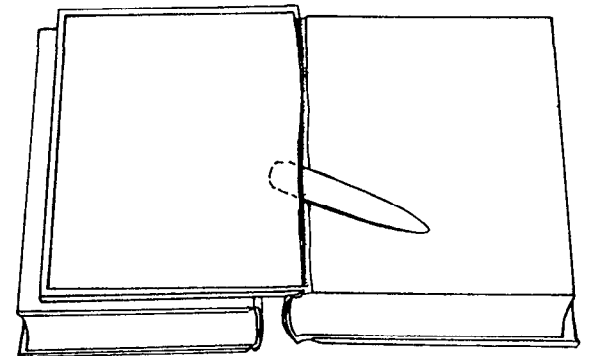
Check the original spine liners. If they are not glued down, carefully feed PVA or PVA/mixture between the spine liner and the spine of the text block. Use a folder or 1" stencil brush to work the liner in place.

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.



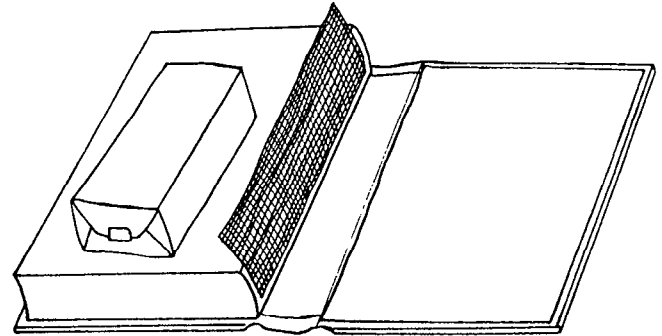
The pastedown can tear easily so try to work the folder or knife under the old crash to support the pastedown as it is lifted up.

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.



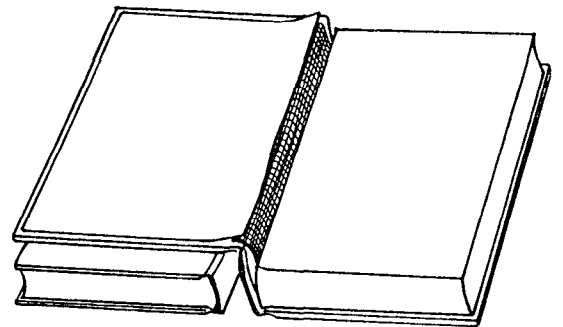
Use a folder or stencil brush to work the crash onto the spine. Let dry thoroughly.

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.

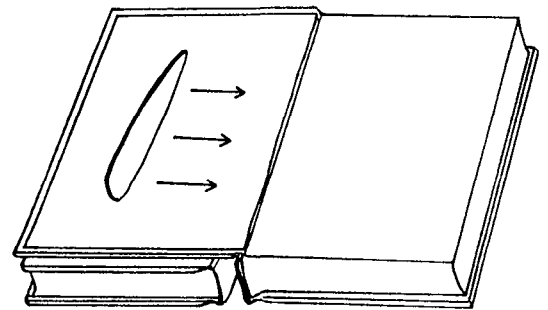
Slide the loose flap of crash back under the lifted pastedown. Work it into place, making sure there are no lumps or folds in the crash.

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.

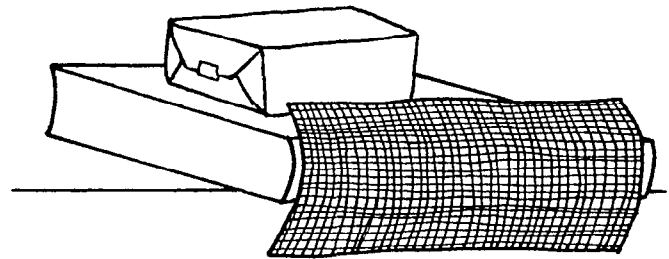
In strict conservation repair, the spine should be lined with Japanese repair tissue before a text block is recased. Since this layer is applied with wheat paste, it is reversible in water and acts as a liner for the other layers of spine materials. The spines of books that are considered valuable or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



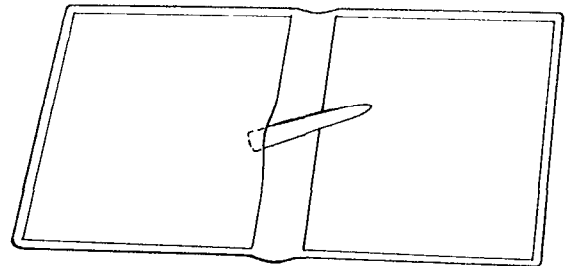
Line the spine. The number and type of spine liners depends on the size of the book. See **Lining the Text Block Spine** (page 81).

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.



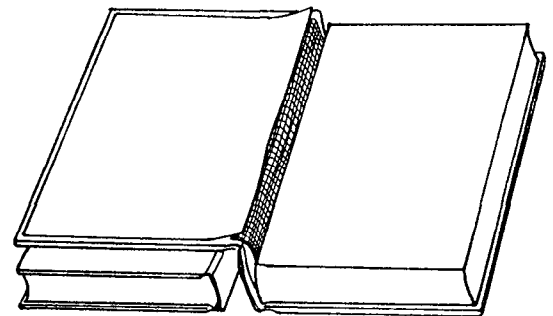
Lift only enough pastedown to slip in the new crash. Place the text block into the case.

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.

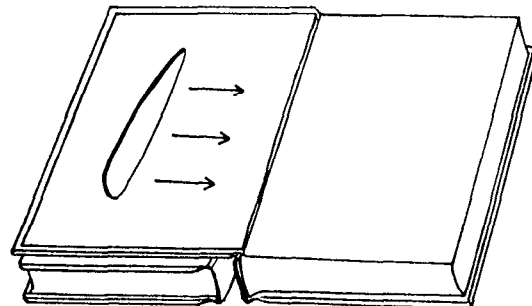
Slide the loose edge of the crash back under the lifted pastedown. Work it onto the glued board. Make sure there are no lumps in the crash.

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.

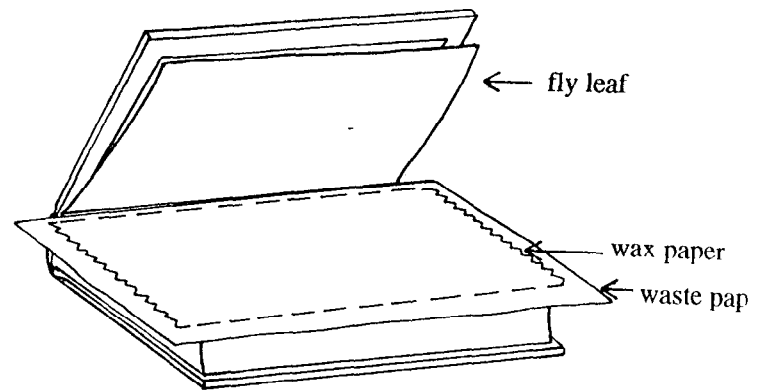
METHOD 2: Original Pastedown Lifted Off Board or Endpaper Replaced

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.

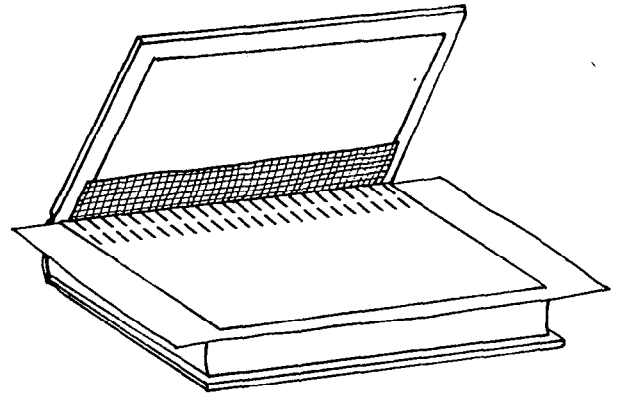
CONSERVATION BOOK REPAIR

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.

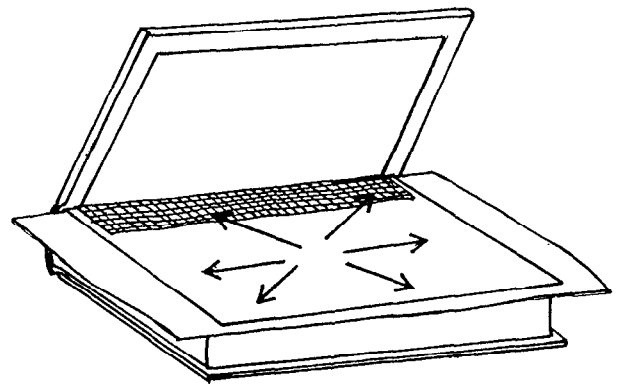
Cover the wax paper with a sheet of waste paper. The waste sheet should also be larger than the endpaper.



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.

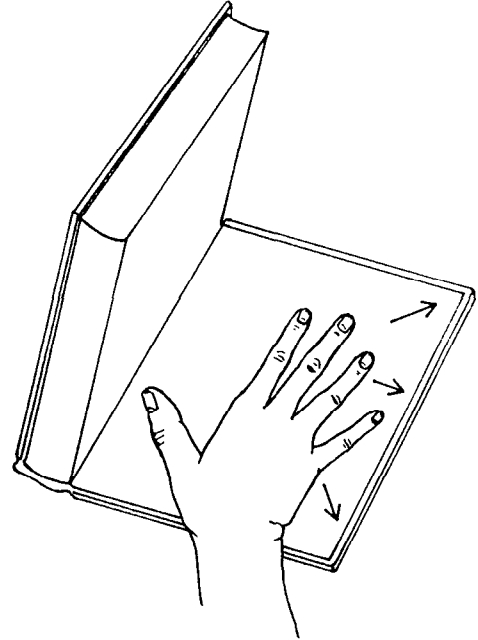
Remove the waste paper, keeping the wax paper in place.

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.

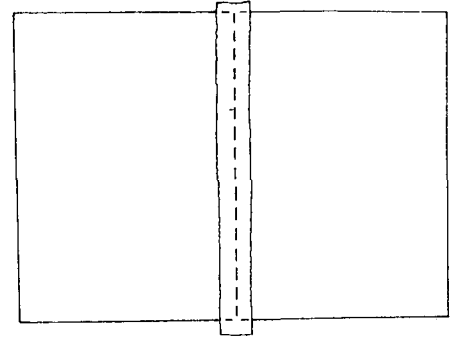
Repairing The Center Folio of a Signature

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

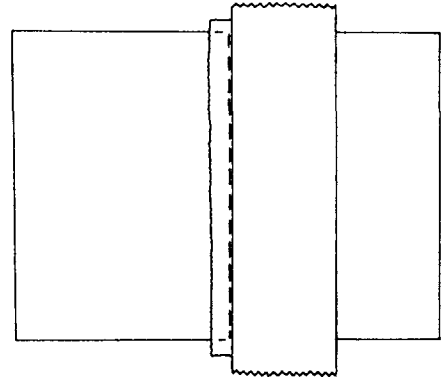
Use the technique on page 33 to tear a piece of Japanese tissue and apply paste to the Japanese tissue (page 34). The width of the Japanese tissue will vary depending on how much of the signature page is damaged.

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

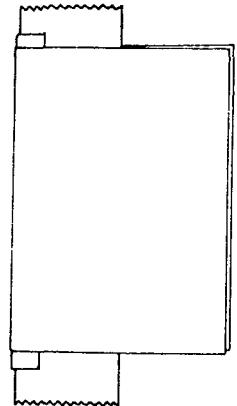
Lay the pasted repair tissue down the center of the folio.



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.

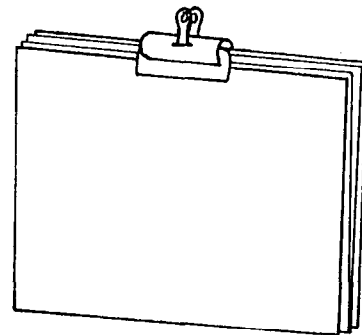
If the other folios in the signature do not need repair, place them in the correct position around the center folio then reattach the signature to the text block following the instructions in **3. REATTACHING PARTIALLY OR FULLY DETACHED SIGNATURES.**

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

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.

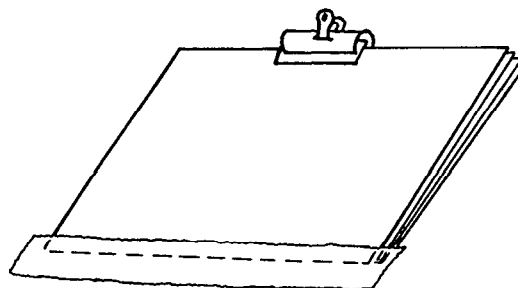
If a folio has separated into two halves, place both leaves in the correct position, and clip them together at the fore edge.



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.

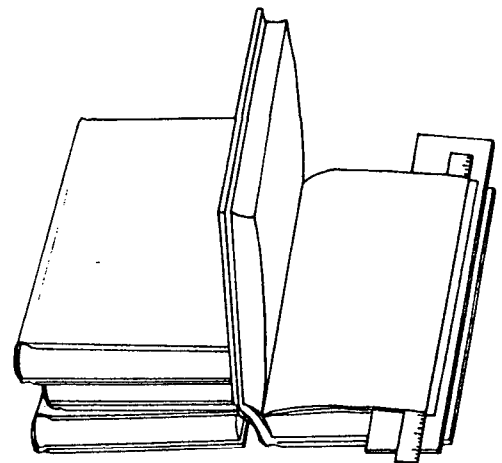
Tipping Endpapers Onto The Text Block

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

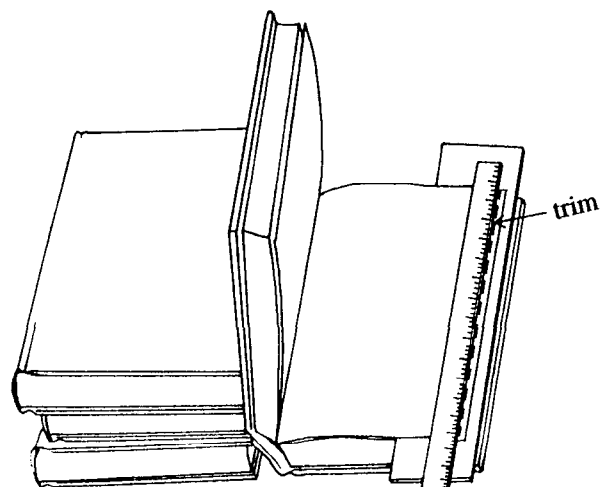
Once the endpaper is firmly attached to the text block, lay the text block endpaper down on the cutting surface.

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.

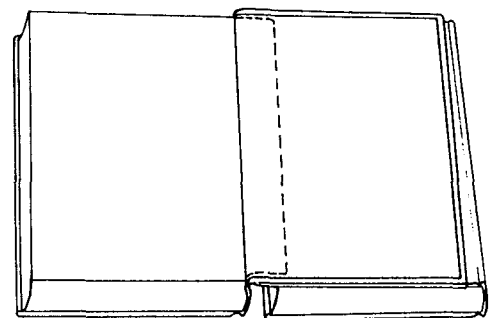
Work through the instructions at least once before attempting them in a library book. Fold pieces of paper to create signatures, punch sewing holes and number them so the directions are easy to follow. Save the practice signatures to serve as a model for future reference.

1. GAINING ACCESS TO THE TEXT BLOCK SPINE

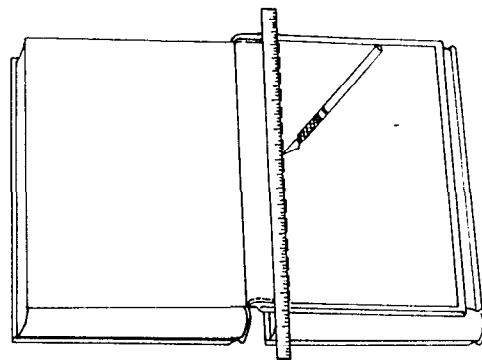
The spine of the text block must be accessible to re sew loose or separated signatures. If the endpapers are separated at one hinge, cut through it with scissors or a knife to gain access to the spine. Whenever possible, separate the back hinge so the repair will be less noticeable.

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.

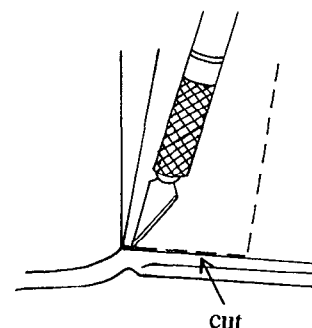
Support the cover with books or boards.
Find the edge of the crash. It is usually either visible through the endpaper or can be felt as a ridge.



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. Relining 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

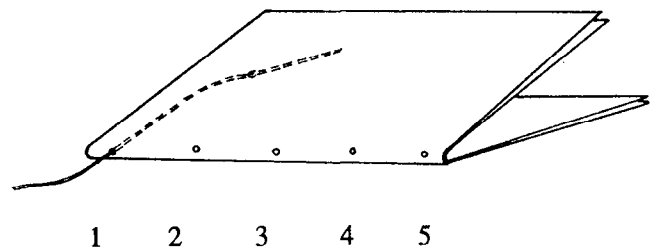
Begin sewing one signature before the first loose/unattached signature.

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.

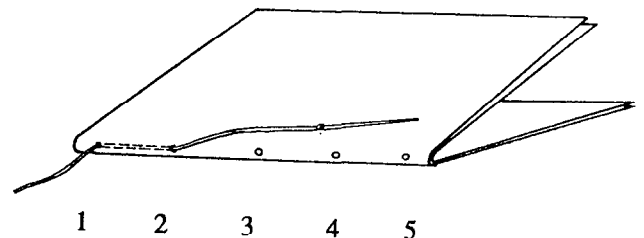
To follow these instructions, station 1 can be the kettle stitch station at either end of the signature.

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.



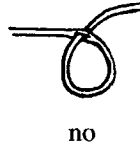
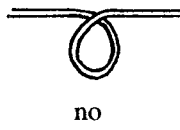
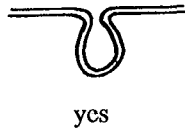
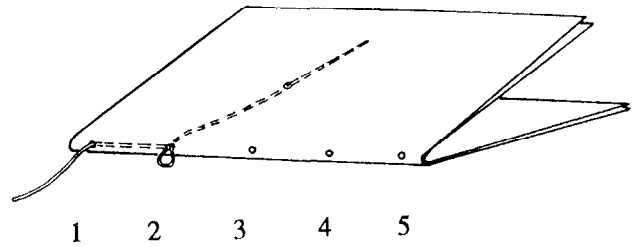
IMPORTANT: Always pull and tighten the thread in the direction of the sewing. Thread tightened in the opposite direction, against itself, can tear through the paper between the sewing stations.

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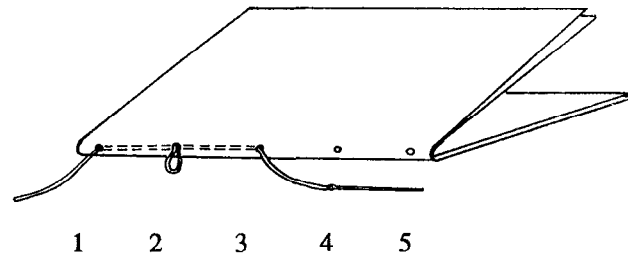
On the outside of the signature, insert the needle back into station number 2 and pull the thread to the inside of the signature, leaving a loop of thread on the outside of the sewing station 2. The loop should be about 1/2".



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

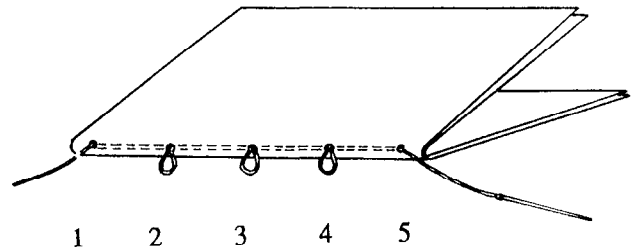
NOTE: It can be difficult to locate the sewing hole on the back of the signature fold. If this is a problem, place an unthreaded needle or awl in the sewing station on the inside of the fold so that it protrudes onto the back of the spine. Slowly pull the needle or awl out of the hole and insert the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

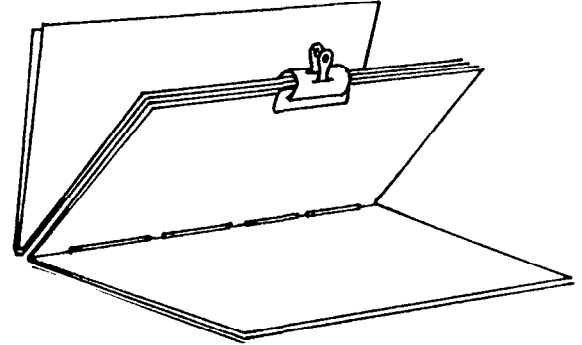
At sewing station 5, the thread will be on the outside of the signature. The first signature is now sewn. This sewing provides the anchor for the next signature to be attached to it.



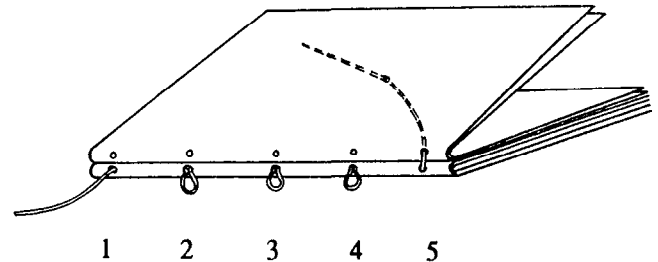
2) *Sewing The First Unattached Signature With A Link Stitch*

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.



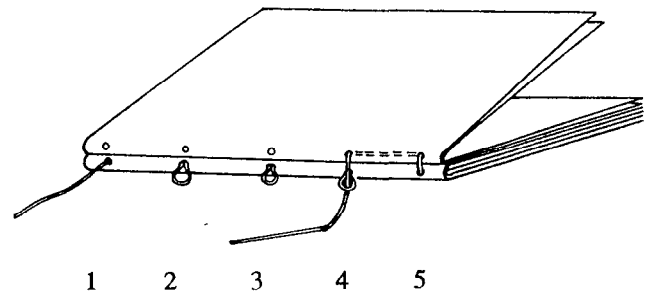
On the outside of the second signature, insert the needle into station number 5 (a kettle stitch station) and pull the thread to the inside of the signature.



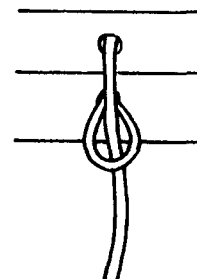
Do not pull the thread so tight that any of the loops in the first signature are lost.

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.

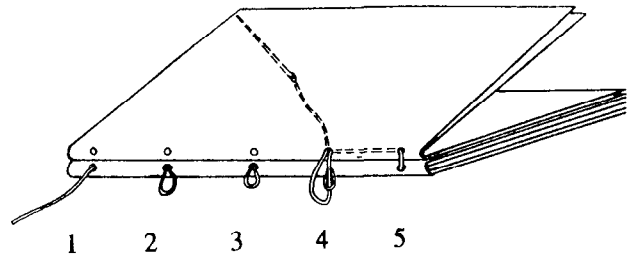


Take the thread through the loop at sewing station 4 of the first signature.

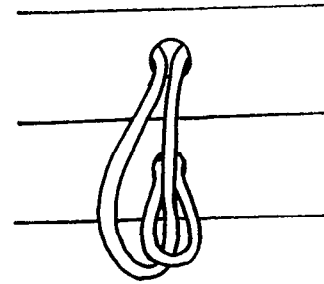


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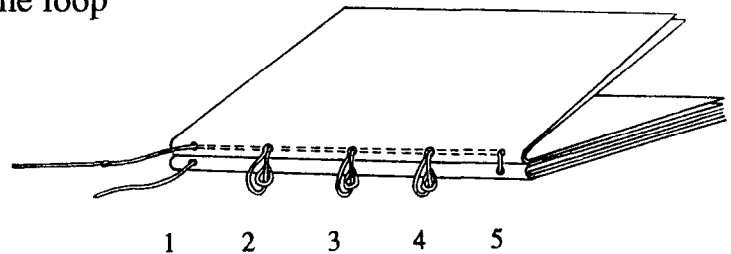
Bring the needle around the loop and back up into sewing station 4 on the second signature.



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.



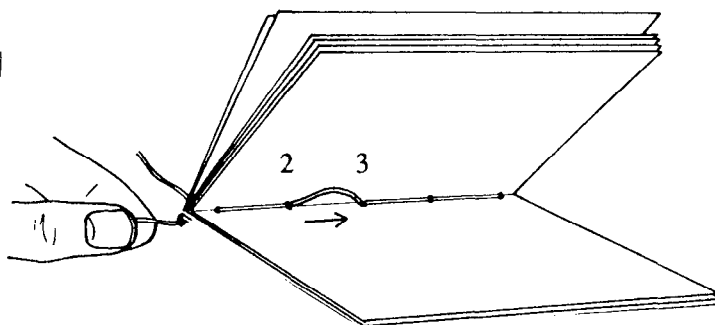
3) Tighten The Sewing Threads On The First Two Signatures

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.

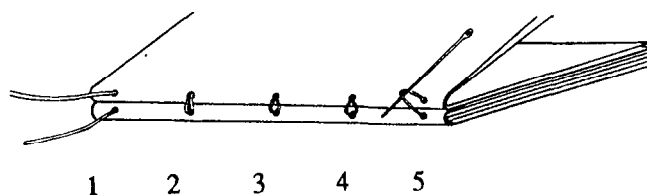
Hold the tail end of the sewing thread (sewing station 1) in one hand, and grasp the thread between sewing station 2 & 3.



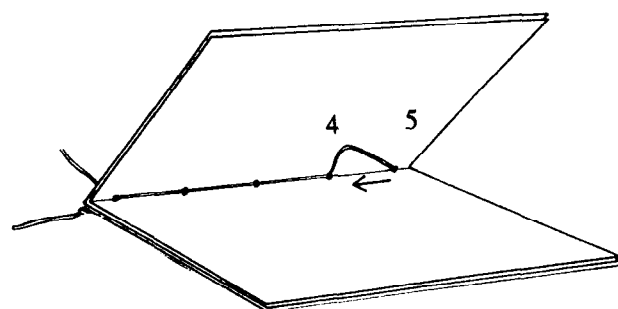
Pull the sewing thread toward sewing station 3.

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.

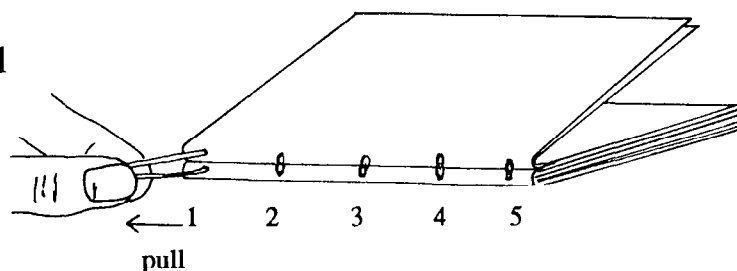


Using the same technique, tighten the sewing thread in the second signature one sewing station at a time. Work the excess thread from sewing station 5 toward sewing station 1.

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.



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.

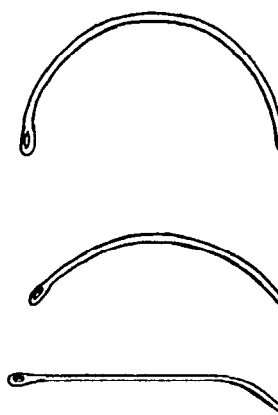
Pre-punch the sewing stations if needed and place the signature in place in the text block. It can be helpful to clip the second and third signatures together (page 123) so the centers of both can be easily located in the sewing process.

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.

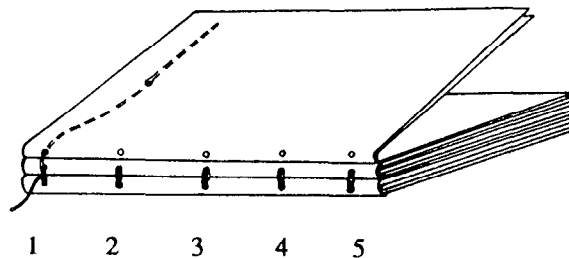
Curved needles can often be purchased in a sewing or craft store, but some people find these manufactured needles too curved. Many book binders like a more specific type of curve and bend needles to suit a particular task.

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).

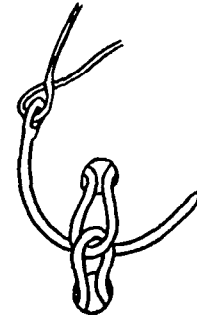
Using the technique for a curved or straight needle, pass the needle behind the loop at sewing station 2.

Curved Needle:

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

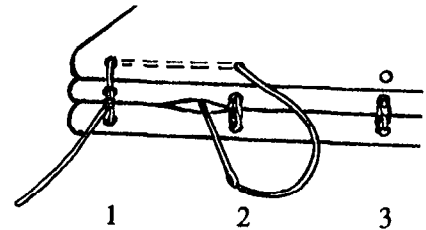
Pull the thread tight and reinsert the needle into sewing station 2. Be careful not to pierce the sewing thread already in sewing station 2.

Continue onto sewing station 5.

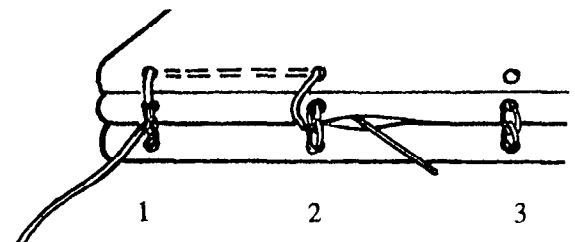


Straight Needle:

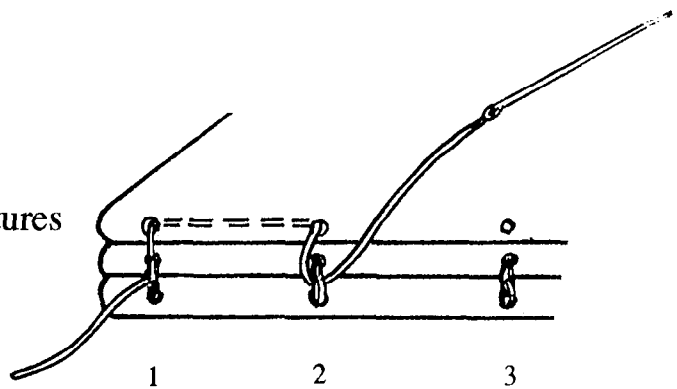
Insert the needle in between the first and second signatures. The needle should be between sewing station 1 (kettle station) & 2. Pull the thread to the inside of the text block.



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.



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.

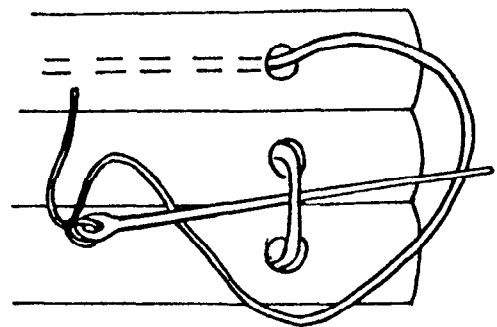
Repeat this procedure for sewing station 3 and 4 then proceed to sewing station 5.

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.

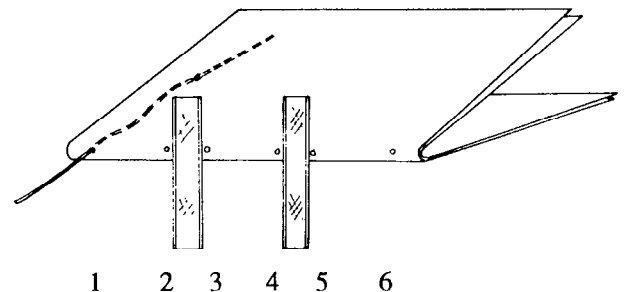
The sewing thread is pictured very short in these illustrations. In reality the thread should be as long as needed providing it is a comfortable length to sew with. See page 24 for information on adding sewing thread.

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).

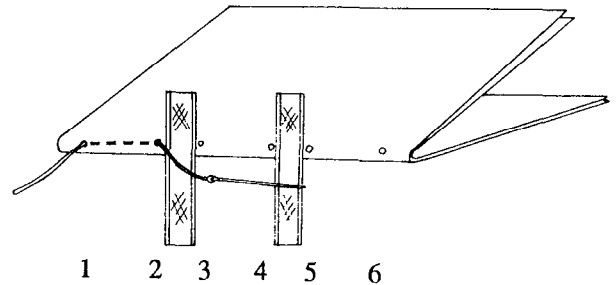
To follow these instructions, station 1 can be either kettle stitch station at the end of the signature.

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.

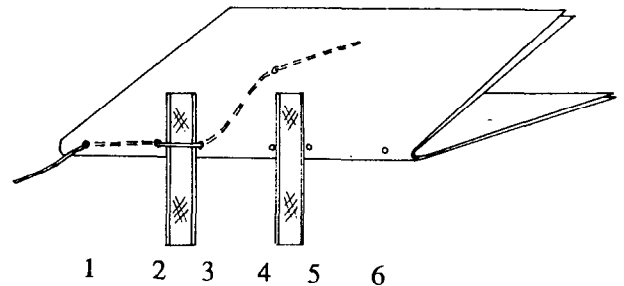
On the inside of the signature, insert the needle in station number 2 and pull the thread to the outside of the signature. Remember to pull the thread in the direction of sewing (toward station number 3).



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.

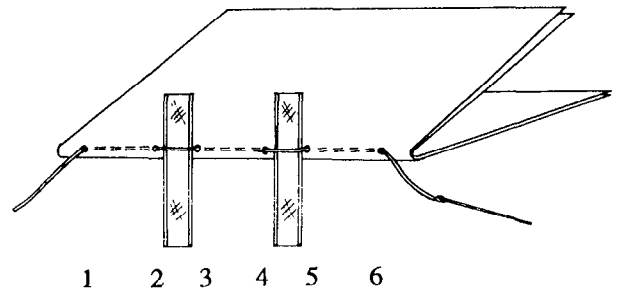
Linen thread is very strong, but it will still break if pulled hard enough. Also, pulling too tight can tear through the paper. When tightening sewing thread, pull on the thread firmly until it just slips through your fingers.

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.



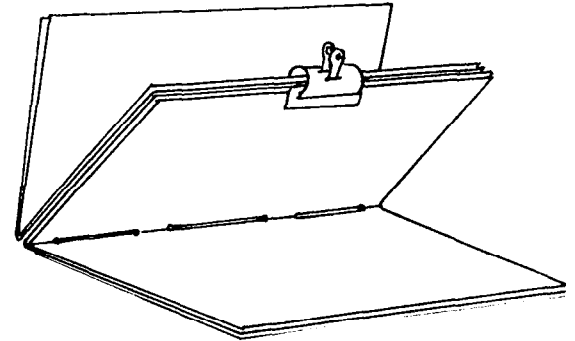
Pull the thread to the outside of the signature. Remember to pull in the direction of sewing so the paper doesn't tear.

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

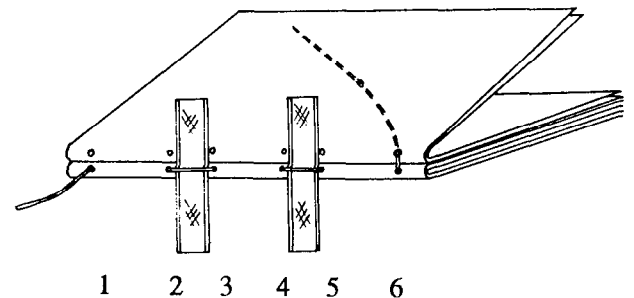
2) Sewing The First Unattached Signature With A Lap-Link Stitch

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.

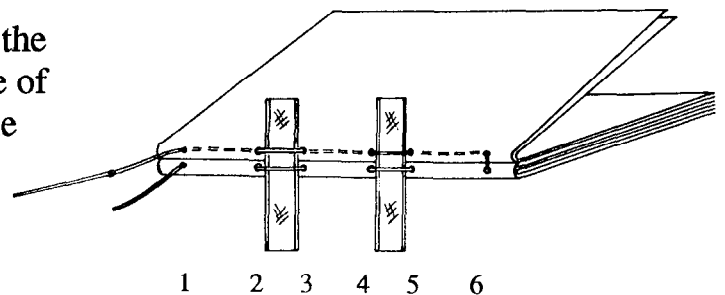


On the outside of the second signature, insert the needle into station number 6 (a kettle stitch station). Pull the thread to the inside of the signature.

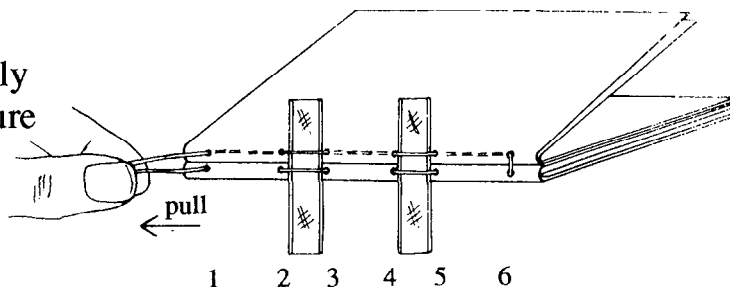


The two signatures are now joined together at the kettle stitch stations.

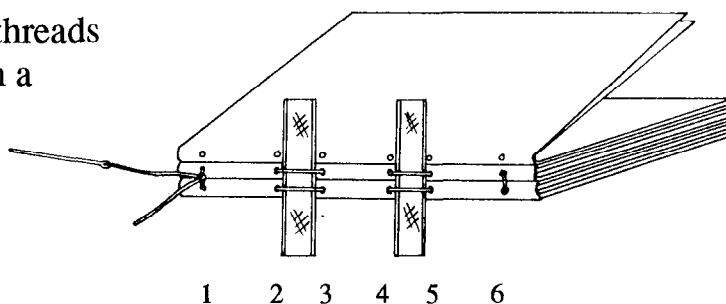
Proceed along the spine sewing around the tapes or cords until the needle is outside of the signature at sewing station 1, a kettle station.



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).

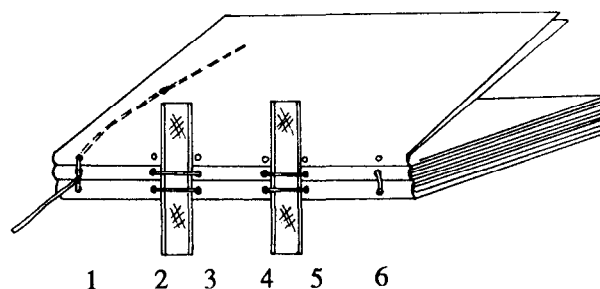


3) Sewing The Second Unattached Signature OR Sewing An Anchor Thread Into An Attached Signature

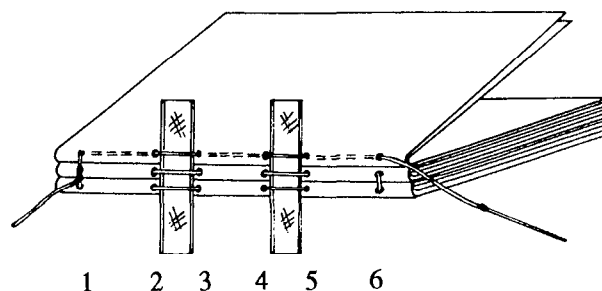
The third sewn signature will either attach another loose/unattached signature or anchor the first loose/unattached signature to the text block.

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.

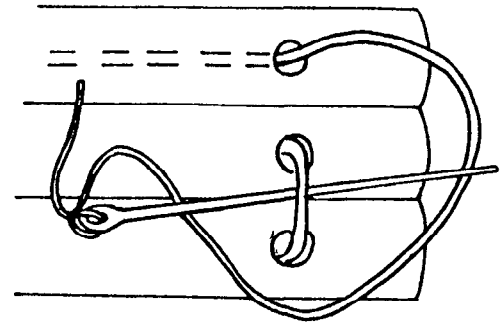
4) *Kettle Stitch*

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.

VII. MAINTAINING A LIBRARY COLLECTION

All library materials need proper handling and treatment to remain in good condition and available to patrons. Using these simple techniques and practices will prolong the life of the books in a library collection.

A. CLEAR PLASTIC TAPE

See page 18 for a complete discussion of the dangers of clear plastic tape.

B. POST-IT NOTES

Post-It Notes are commonly used as book marks in library materials. This practice is damaging to books and should be stopped whenever possible. Really, a Post-it Note is no different than putting a piece of plastic tape in a book. While the Post-it Note is easy to remove, some of the adhesive from the Post-it Note remains on the page long after the Note is removed. It attracts dirt and can cause pages to discolor or stick together.

C. THE PHOTOCOPY MACHINE

Photocopiers are wonderful, time saving devices that unfortunately can cause a lot of damage to library books.

The spine area of many books is not always flexible. The glue used in constructing modern books is dries rigid and brittle. Books that have been oversewn at a library bindery can have tight spines. When books like these are put on the photocopier, the spine is usually pressed down on the photocopier glass with a great deal of pressure which causes damage.

Heavy books are especially susceptible to damage while photocopying. The book must be picked up and turned over for each copy made. This puts a lot of stress on the hinge areas of the book, as well as on the spine of the text block. The book might be dropped or pages accidentally torn.

If a book is to survive to be photocopied by successive patrons, it must be handled properly. Guidelines for photocopier use should be established to protect library materials.

- Watch patrons and staff using the photocopier. If people put too much pressure on the spine area, explain the dangers of this practice. Most people don't want to damage books.
- Books that are fragile or in danger of being damaged should not be photocopied. This is especially important if the book is a permanent part of a library collection.
- When it's time to purchase a new photocopier, consider buying one with special features for copying books. These photocopiers are built in such a way that the book is supported without being forced to open entirely so there is less pressure on the spine area.

D. SHELVING TECHNIQUES

Books often receive a lot of abuse before they even leave the library. They are yanked off the shelf by the top of the spine, forced back on the shelf between tightly packed books, and shelved on their fore edges when they are too tall. Often the bookends used in a library are not strong enough to support the weight of a shelf of books so the books lean at precarious angles.

1. REMOVING BOOKS FROM THE SHELF

Books should **not** be removed from the shelf by pulling on the spine of the book. The book cloth in that area can be weak and tear, especially when the book is old.

The best way to remove a book from the shelf is also the most time consuming. First, loosen the bookend and push the books around the desired book toward the back of the shelf. Grasp the desired book and pull it straight off the shelf, then reach to the back of the pushed back books and slide them forward. Finally, tighten the bookend.

A second, perhaps more practical, method involves paying attention as a book is removed from the shelf and using one special technique. If the book

seems wedged tightly between other books, stop and loosen the bookend. Instead of pulling the book off the shelf by the top of the spine, the cover's weak point, put an index finger on about 1" of the top of the text block. Pull the book off the shelf with that finger.

The most important thing to remember is not to force the book off the shelf.

2. RESHELVING BOOKS

When reshelving, don't force a book back into a tight shelf. Loosen the bookend if necessary and carefully slide the adjacent books out of the way. Shelf the book then tighten the bookend pressure. Never force a book onto the shelf.

Bookends can be dangerous for books. Many bookends are very thin and it is easy to shelve a book right into them. Pay attention as books are being retrieved or shelved.

3. LEANING BOOKS

Keep books well supported on the shelf with proper bookends. Poorly supported books tend to lean at precarious angles, putting a great deal of stress on the front and back hinges.

4. SHELVING BOOKS ON THEIR FORE EDGES

Oversize books are often shelved on their fore edges so that they will fit on a standard height shelf. This practice is deadly for books. As explained in **BOOK STRUCTURE AND CONSTRUCTION** (page 7), most modern text blocks are only held into their cases by a small amount of crash and glue. When a book is shelved on its fore edges, gravity is constantly working on the text block, forcing it to separate from the cover. If a book is too tall for the shelf, consider creating an Oversize Section (see below).

5. OVERSIZE BOOKS

Shelving oversize books can be a challenge to libraries. The best way to shelve them is lying flat on the shelf. Many libraries designate a special Oversize Section where books can be shelved flat in call number order. Other libraries designate the bottom shelf of a range of bookcases as the Oversize Shelf, again shelving flat.

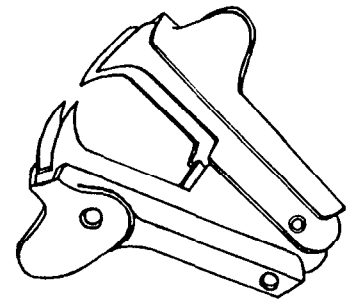
Books shelved flat can be tricky to manipulate. If a patron wants the book on the bottom, the tendency is to just pull it out, sometimes bringing all the books out with it. Leave an empty shelf to use as a staging area so books on top of the desired book can be placed on that shelf, then returned once the desired book is in hand. Library workers will also appreciate the work space when re-shelving oversize books.

E. REMOVING STAPLES AND PAPER CLIPS

Staples and paper clips need to be removed when they are rusty, when pages are photocopied or sewn into a pamphlet binder, and when the fasteners are damaging the materials. Removing staples and paper clips without damaging the paper can be fast and easy when the right tools are used.

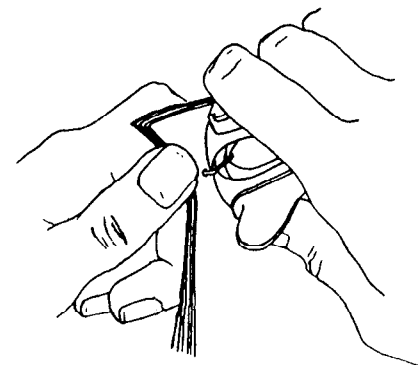
1. REMOVING STAPLES

The traditional double-jawed staple remover can be extremely damaging to paper materials.

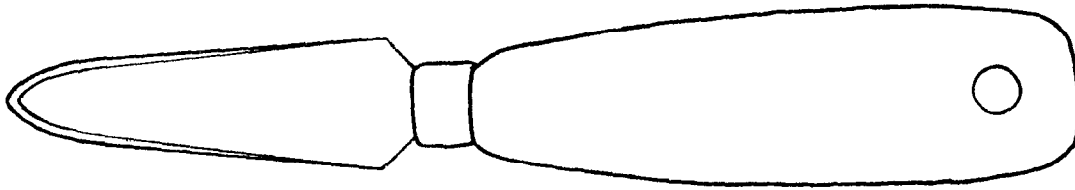


The staple remover grips the bridge of the staple and forcibly pulls the legs out of the paper.

If the paper is thin or weak, it often tears before the staple is open. When the stapled papers are thick or strong, they will resist the force of the staple remover until the legs



of the staple are partially open. The great force exerted to force the staple partially open can damage the paper as can removing a partially open staple.

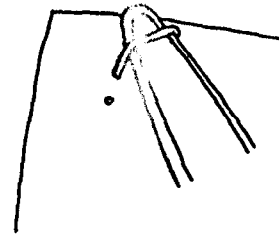


Using a specially beveled tool called a staple extractor or a common oyster knife, staples are easy to remove without damaging the paper.

Working from the back side of the staple, slip the beveled edge of the staple extractor under each leg of a closed staple and lift each leg up gently.



Turn the materials over and slip the beveled point of the staple extractor under the bridge of the staple. Lift the staple straight out of the paper.



Staple extractors can be purchased from most book repair supply houses and less expensive oyster knives are available where kitchen utensils are sold.

2. REMOVING PAPER CLIPS

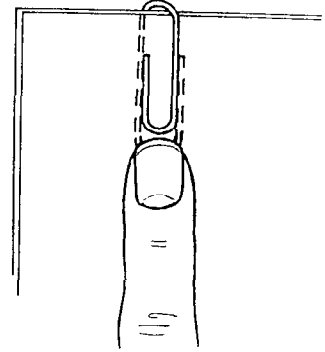
Paper clips are not always the best way to attach a group of pages to one another. They can rust or bend the paper when left in place for long periods of time. When a paper clip is removed, the blunt end of the clip can catch on the paper and tear it.

CONSERVATION BOOK REPAIR

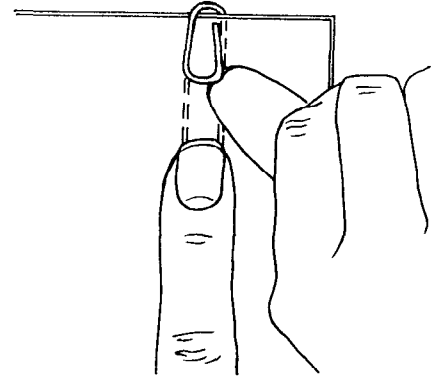
The best way to remove a paper clip without damaging the paper is to gently pry it open.

Lay the clipped materials on a work table with the short side of the clip facing up.

Through the paper, press the long side of the clip firmly against the table with one finger.



Gently pull up on the short side with the thumbnail of the other hand. A microspatula or staple remover can also be used to lift up the short leg of the paper clip.



When a paper clip is rusty, gently insert a small piece of Mylar between the clip and paper on both sides of the paper clip then repeat the instructions above.

F. PAPERBACK BOOKS AND SPIRAL BOUND BOOKS

A great deal of current information or literature is only available in paperback and spiral bound books. These structures need special care to remain in the collection and available to patrons.

1. PAPERBACK BOOKS

Many libraries have an abundance of paperback (PB) books. Unfortunately, many PB books are not well constructed so they are often in need of repair. It can be a poor use of staff time, as well as extremely frustrating, to attempt to repair a PB book that was not constructed to be repaired.

PB books that are constructed in single pages glued together can pose quite a problem for repair. Unlike the techniques used by library binders (double-fan binding with flexible glue) mass produced PB books are not constructed for multiple use. They are not usually fan bound, and the glues that are used in their construction tend to be with fast drying, brittle glue.

Higher quality PB books are constructed with sewn signatures (Smythe sewn) that can be repaired just as hard cover books with signatures.

There are several options for libraries with large collections of PB books.

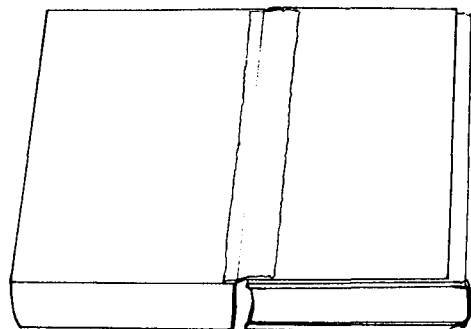
- Small, thin PB can be housed in pamphlet binders (page 144).
- If a PB book is considered part of a permanent collection, such as a reference book, reinforce it in-house before shelving it or send it to a library binder before use.
- If a PB book is projected to have a great deal of immediate use, but is not seen as part of the long-term permanent collection, give it minimal reinforcement and repair as possible. When the book has been repaired once or twice, either discard it or buy a replacement copy and reinforce or bind it for use. Do not attempt to continually repair a book that is not constructed so that it can be repaired.
- If a PB book is projected to have minimal use, give it minimal reinforcement and repair if possible.

Reinforcing Paperback Books With Board and Japanese Tissue

Open the book cover to its natural fold line and crease with a folder.

Photocopy any information on the inside of the front or back covers. Trim the photocopies and tip (page 58) onto the text block.

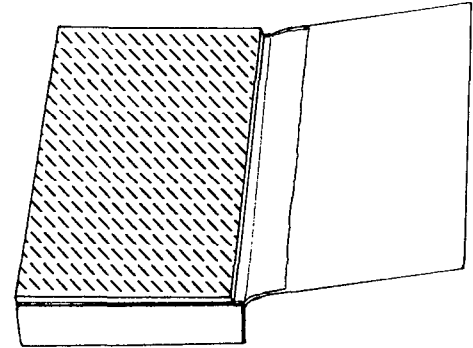
Reinforce the cover hinge fold with a 1" strip of Japanese tissue. 1/4" of the tissue should extend onto the text with 3/4" on the cover. Dry with the covers open under weight.



CONSERVATION BOOK REPAIR

Cut two pieces of thin board. The boards should be the exact height of the cover and the width should be the width of the cover minus 1/4"

Apply PVA to one piece of board and lay it onto the text block **GLUE SIDE UP**. Line up the board with the top, bottom and fore edge and carefully close the cover. The board will be 1/4" less wide than the text block so it will not sit flush with the cover hinge.



Use a folder or a book press to press the board onto the cover.

Repeat on the second cover and dry under weight.

Reinforcing Paperback With Clear Plastic

Many library supply companies sell self-adhesive clear plastic cover protectors to protect and reinforce PB books. These plastic cover protectors may be a good solution for maintaining a PB collection.

Remember that these covers are basically large pieces of plastic tape and should not be used on materials that are part of a permanent collection or cannot be replaced. The book cover cannot be bound into the volume at a library bindery once a plastic protector has been applied.

Look for cover protectors that are very flexible. This is very important as the added stiffness of the cover can put a great deal of stress on the glue between the spine and the text block. Too much stress at the hinge can cause the cover to separate from the text block.

Many of these manufactured covers come with special tape used to reinforce the attachment of the cover to the text block. Again, any material used to reinforce the cover hinge needs to be very flexible. If this tape is not flexible, the first page of the book will not turn freely. If that page doesn't turn freely, the page will crease along the edge of the tape and fall out.

Spiral Bindings

Spiral bindings can be reinforced for longer life. This technique was developed at the University of Michigan Library and uses a special product called Tyvek. Tyvek is strong, lightweight polyester "paper" that will not tear. Tyvek and PVA have a similar chemical makeup and bond very tightly.

Tyvek can be purchased through library or art supply sources or can be recycled from Tyvek mail envelopes sold at the post office. When using recycled Tyvek, glue the print side down.

Photocopy any information on the inside of the front or back covers. Trim the photocopies and hinge (page 61) onto the text block.

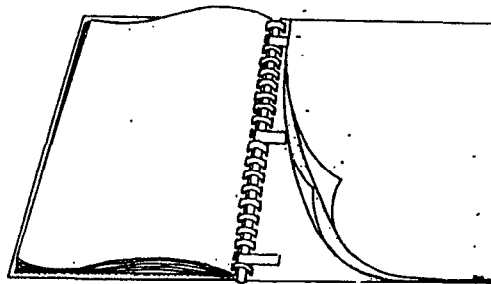
Cut two pieces of 60 point board:

Height = exact height of the cover

Width = distance from the spirals to the fore edge minus 1/4"

Use a pair of utility scissors to slip three or more rings from the spiral binding: top, middle and bottom. The number depends on the size and weight of the book.

Cut three strips of Tyvek a little narrower than the space left by the cut spirals, apply PVA, and thread the strips into the book.



Apply PVA to both pieces of board, and attach to the inside of the front and back covers. Line up the board with the top, bottom and fore edge of each cover.

A pastedown endpaper can be added to the board if desired. Cut the endpaper the same dimension as the board and glue to the board.

Dry under weight.

G. PAMPHLET BINDERS

Pamphlet binders are commonly used to protect small, thin booklets or pages in a library collection. Most pamphlet binders are constructed of two thin boards joined with a cloth hinge. The cloth hinge can have a single fold for thin materials or two parallel folds to accommodate a wider spine.

Library materials can be attached to pamphlet binders in several ways. One common method of attachment is to use a strip of gummed tape that is moistened with water and attached to the front and back covers of the material. Another method is to sew or staple the booklet into the pamphlet binder.

Pamphlet binders that use the gummed tape method of attachment cause problems for library materials in several ways:

- The adhesive used is not necessarily stable so it can discolor and cause permanent staining.
- The adhesive and tape tend to dry stiff and can often hinder the pamphlet from opening easily. Over time, the covers of the materials can begin to fold against the edge of the tape and eventually break off along that edge.
- The library materials are only attached to the pamphlet binder by the front and back covers, which leaves the contents of the booklet totally unsupported. Patron use or simple gravity causes the contents of the booklet to fall out of the binder while the covers stay attached to the pamphlet binder. When the contents separate from the cover, both parts can be lost or damaged.
- Thicker materials are usually side-sewn, side-stapled or glued together. Even without the pamphlet binder, they can be difficult to open flat, which has become more important in this age of photocopiers. These materials can be even harder to open once they are put in a pamphlet binder because many binders have hinges that are too narrow to allow easy and complete opening.

If pamphlet binders are an important aspect of a collection maintenance program, there are several options for using them successfully.

- Small (one, two or three signature) materials can be center-stapled or center-sewn directly into pamphlet binders so the entire item is supported, not just the cover. Simply ignore or remove the gummed adhesive strips and use the **THREE or FIVE HOLE PAMPHLET STITCH** (page 149 & 151) or staples to attach the material to the binder.
- Side-stapled, side-sewn or glued materials up to 3/8" thick can be side-sewn or side-stapled into a pamphlet binder if the binder has a wide enough flexible hinge area. This will support the entire contents, not just the covers. Again, see the **THREE and FIVE HOLE PAMPHLET STITCH** (page 149 & 151) for sewing instructions or use staples.
- Small or fragile materials can be housed in an envelope or a modified four-flap wrapper (page 163) which is glued into the binder.

Take care not to damage materials when removing the original staples. **Removing Staples** is discussed on page 138.

Library supply catalogs offer special various sized, non-rust staples and staplers to accommodate center stapling or thick items.

If the gummed adhesive is used to attach the booklet to the binder, align the bottom of the booklet with the bottom edge of the pamphlet binder. The shelf will support the entire book and binder, and the book will be less apt to fall out.

Always check the attachment of library materials to binders when they are checked out or returned. If the contents are in danger of separating, the item can be repaired before it is lost or damaged.

Improved Pamphlet Binders

New and improved pamphlet binders have come onto the market in the past few years and many older pamphlet binder suppliers have improved their products as well.

Companies such as Gaylord or Demco have introduced binders with archival boards that offer a more stable adhesive to attach the booklet to the binder.

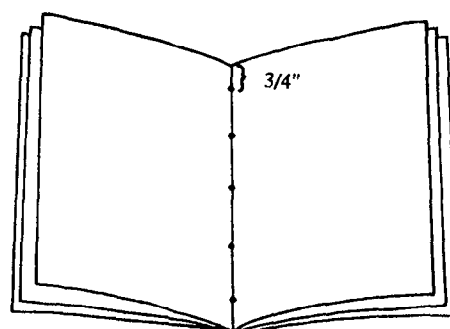
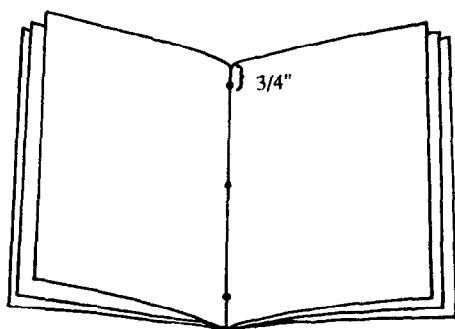
Archival Products manufactures a binder constructed of a tough, archival back board coated with acrylic and a clear stable polyester front board which allows the contents to be visible so a title label is not necessary. Materials are sewn or stapled into the binder and the hinge is 1 1/2" wide so it is very flexible, opening easily and fully for reading or photocopying.

1. THREE AND FIVE HOLE PAMPHLET STITCH

Pamphlets or booklets are unbound material 1/2" or thinner in spine width. These materials can be individual sheets or single or multiple signatures and can be sewn or stapled into a pamphlet binder.

The three or five hole pamphlet stitch is used to sew individual sheets or signatures into a pamphlet binder. Either sewing stitch works well on most center sewn or stapled materials and on side-sewn or stapled items up to 3/8" thick.

Choose the three hole stitch for fairly thin materials less than 7" tall. A taller, heavier booklet should be sewn with the five-hole stitch. When in doubt, it's better to use the five-hole pamphlet stitch.



Regardless of which stitch is chosen or the size of the pamphlet, the first and last sewing stations (1 & 3 or 1 & 5) should be no more than 3/4" from the top or bottom edge of the booklet and the center sewing station (2 or 3) should be in the center of the booklet.

This placement of sewing stations gives the most support to the entire booklet.

Use the technique on page 138 for REMOVING STAPLES and use the original staples holes for sewing if possible so as not to punch additional holes in the fold of the booklet.

a. Punching Sewing Holes in Pamphlet Materials

Center Folded Materials

For items that are center folded, a punching jig (page 30) and signature cradle (page 31) can be used.

If a sewing cradle is not being used or if the material is loose pages, Binder or Bulldog clips can be used to hold the punching jig in place when the holes are punched.

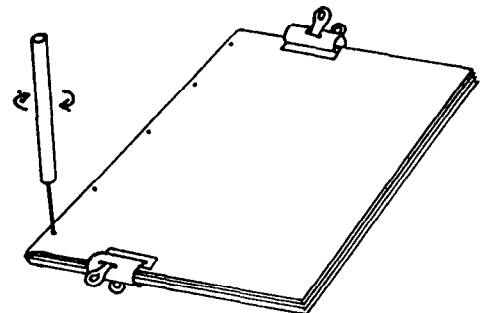
To punch the sewing stations in a booklet and a pamphlet binder at the same time, position the booklet inside the binder and hold both in place with Binder or Bulldog clips.

Side-Stapled or Individual Sheets of Paper

NOTE: Pamphlet materials can be constructed of folded signatures, then side-stapled through the folds. It can be advantageous to remove the staples and sew the signatures together using the **link stitch** (page 121) so they will open completely flat.

To punch sewing holes in individual sheets of paper or side-stapled materials, position the booklet in the binder and hold it in place with Binder or Bulldog clips.

Using a needle-in-a-stick or awl, punch the holes as close to the spine edge as possible making sure there is enough margin to hold the booklet securely in the pamphlet binder.



CONSERVATION BOOK REPAIR

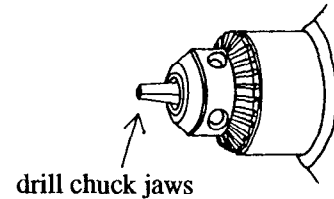
If the needle or awl will not punch the materials easily, try twisting while pressing down. Too much pressure can bend or break the tool.

When punching by hand, it can be convenient to punch into a piece of 1" Styrofoam, available in most craft stores.

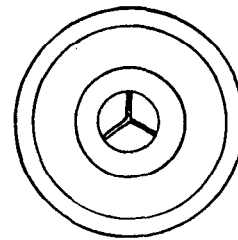
If the material is too thick to punch by hand, drilling is a possibility. Remember to protect the work surface with a sheet of wood when drilling.

When drilling materials, use a small drill bit, about the same size as the sewing needle. Small drill bits are available in hardware, hobby or jewelry supply stores.

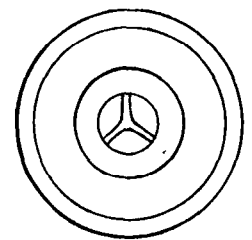
The drill chuck jaws of a standard drill may not hold small drill bits.



Check the jaws of the drill chuck to see if all three jaws meet when it is completely closed. If they do not, the drill will not hold the smaller drill bits.



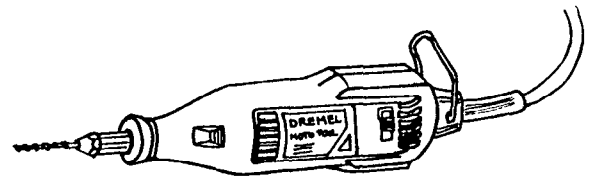
closes tight



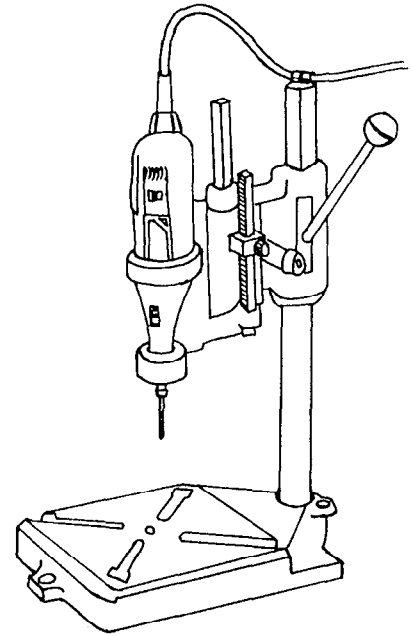
closes loose

The Dremel Company (see **SUPPLIERS**) markets a Moto-Tool with a very small drill chuck to hold small drill bits.

There are several models of Moto-Tools including one speed and multi-speed models. Model 275, a single speed drill, can be attached to a variable speed foot control (similar to a sewing machine foot control) so the operation and speed of the drill is regulated by the foot control and both hands are free to maneuver the tool.



Dremel also sells a drill press for its Moto-Tool which holds the drill press in place. The Dremel is raised and lowered with a pressure arm. Remember to read and follow all the safety instructions.



b. THE THREE HOLE PAMPHLET STITCH

Choose the three hole stitch for fairly thin materials that is less than 7" tall. A taller, heavier booklet should be sewn with the five-hole stitch.

The illustrations for the three hole pamphlet stitch show a one signature pamphlet. The same sewing pattern can be used for items published as individual sheets or side stapled.

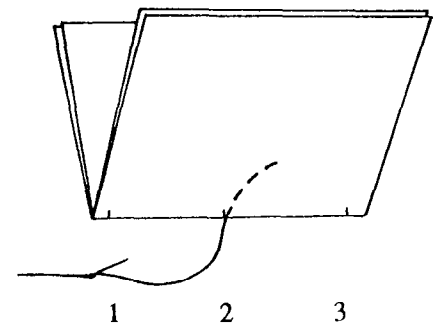
Sewing multiple signature materials into pamphlet binders is discussed on page 153.

Detailed instructions for placing and punching sewing holes begins on page 146 .

Measure a length of thread that is two times the height of the book plus 4 - 6". Choosing, waxing and locking thread onto a needle is discussed on page 22.

Starting on the inside of the pamphlet, insert the needle into sewing station 2.

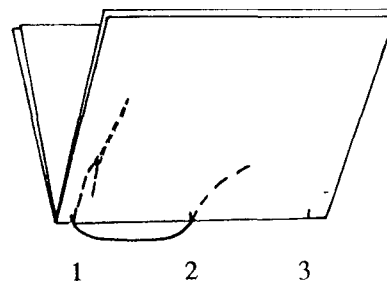
Pull the thread to the outside of the pamphlet, leaving a 2" tail inside the pamphlet.



CONSERVATION BOOK REPAIR

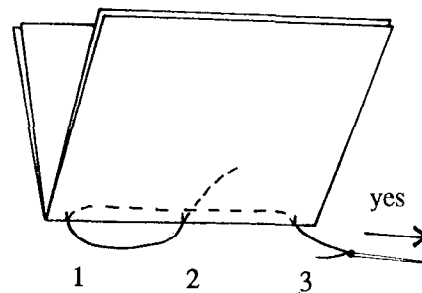
On the outside of the pamphlet, insert the needle into station number 1.

Pull the thread through sewing station 1, being careful not to pull the tail out of the pamphlet at station 2.



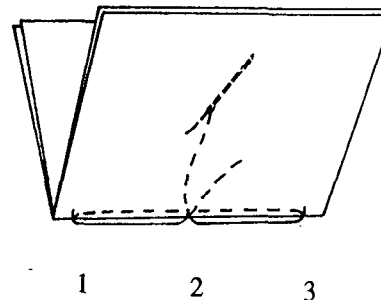
On the inside of the pamphlet, proceed to sewing station number 3, going past sewing station number 2.

Insert the needle into sewing station 3 and pull the thread to the outside of the pamphlet.

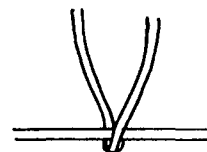


Gently pull the thread snug being careful to pull in the direction of the sewing so as not to tear the paper.

Return to station 2 on the outside of the pamphlet. Insert the needle into sewing station 2.



The two ends of sewing thread should straddle the sewing thread that runs the height of the booklet.



Be careful not to pierce the thread already in sewing station number 2. If the center thread is pierced, it will be difficult or impossible to tighten the threads when the sewing is complete.

Pulling in the direction of sewing, take up any slack in the sewing thread and tie off the two loose ends with a square knot (page 26). Clip the threads to about 1/2".

C. THE FIVE HOLE PAMPHLET STITCH

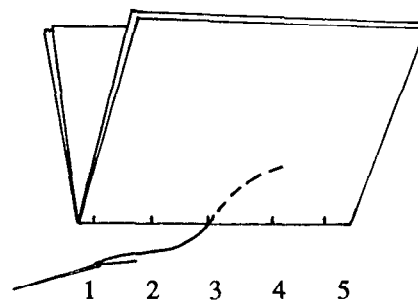
The illustrations for the five hole pamphlet stitch show a one signature pamphlet. The same sewing pattern can be used for items published as individual sheets of folded paper.

Sewing multiple signature materials into pamphlet binders is discussed on page 153.

Detailed instructions for placing and punching sewing holes are given on page 146.

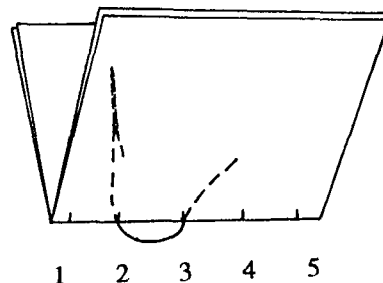
Measure a length of thread that is two times the height of the book plus 4 - 6". Choosing, waxing and locking thread onto a needle is discussed on page 22.

Starting on the inside of the pamphlet, insert the needle in sewing station number 3 and pull the thread to the outside of the pamphlet, leaving a 2" tail inside the pamphlet.

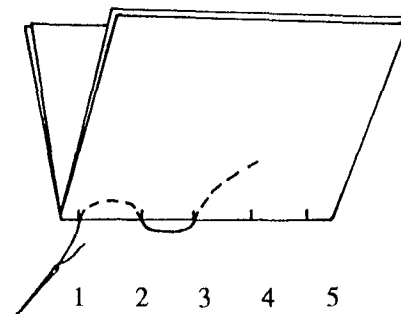


Proceed to sewing station number 2 on the outside of the pamphlet, and insert the needle into sewing station 2.

Pull the thread to the inside of the pamphlet at sewing station 2. Be careful not to pull the tail out of the pamphlet at station 3.

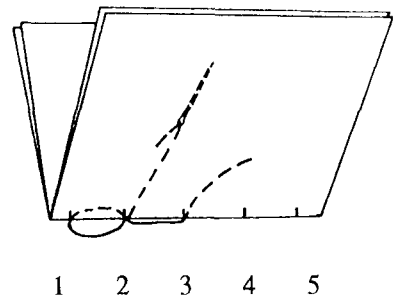


On the inside of the pamphlet, insert the needle at sewing station 1, and pull the thread to the outside. Be careful to pull the thread in the direction of sewing so it will not tear the paper.



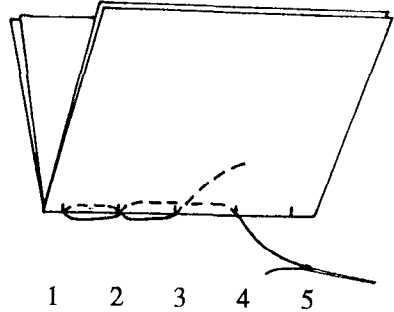
CONSERVATION BOOK REPAIR

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



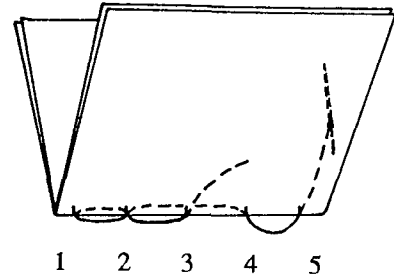
Go past sewing station 3 to sewing station 4 on the inside of the pamphlet.

Insert the needle in sewing station 4, and pull the thread to the outside of the pamphlet.

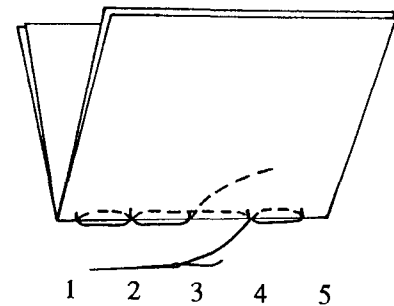


Proceed to sewing station 5 on the outside of the pamphlet.

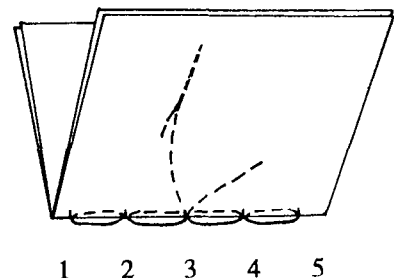
Insert the needle into station 5, and pull the thread to the inside of the pamphlet. Gently tighten the thread by pulling the thread in the direction of sewing.



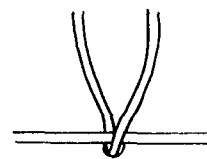
On the inside of the pamphlet, insert the needle in sewing station number 4, and pull the thread to the outside of the pamphlet.



Return to station 3 on the outside of the pamphlet, and insert the needle into sewing station 3.



Be careful not to pierce the thread already in sewing station number 3. The two loose ends of sewing thread should straddle the thread in the fold of the pamphlet.



If the sewing thread has been pierced, as the pamphlet is sewn, it will be difficult or impossible to tighten the threads before tying the knot.

Tighten the sewing thread in the direction of sewing to remove any slack, and tie off the two loose ends with a square knot (page 26). Clip the threads to about 1/2".

d. Sewing Multiple Signature Pamphlets Into Binders

A multiple-signature pamphlet that is side sewn or side stapled can be punched or drilled (page 147) and sewn into a binder using the 3 or 5 hole pamphlet stitch above. Also, the staples can be removed and the signatures sewn individually.

Multiple signature pamphlets that are sewn through the fold may be attached to a pamphlet binder with a secondary sewing to retain the ability of the pamphlet to open flat.

Check the original sewing to make sure it is sound. If the sewing needs to be repaired or the signatures are loose, follow the directions for sewing THE LINK STITCH on page 121 prior to attaching the pamphlet to the binder.

Attach the sewn multiple-signature pamphlet into a binder using THE THREE HOLE PAMPHLET STITCH on page 149 or THE FIVE HOLE PAMPHLET STITCH on page 151. Sew and knot each sewn signature separately so the sewing threads will be tight.

2 Signature Pamphlet: punch and sew each signature to the binder.

3 - 4 Signature Pamphlet: punch and sew the 1st and 3rd signatures to the binder.

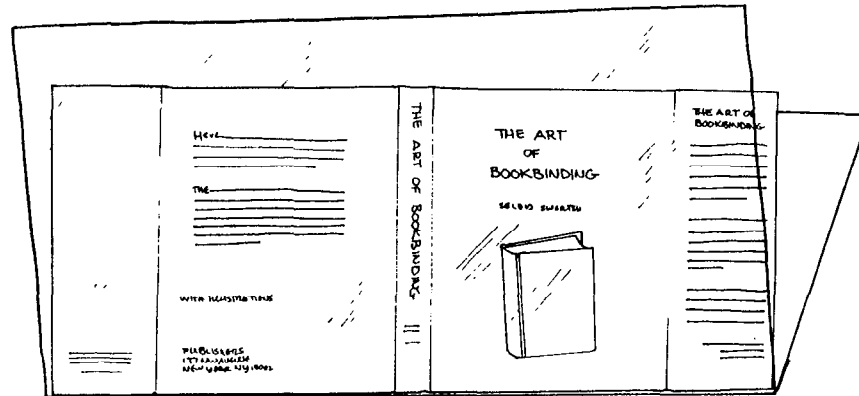
5 Signature Pamphlet: punch and sew the 1st, 3rd and 5th signatures to the binder.

H. PLASTIC BOOK JACKET AND MYLAR COVERS

Used carefully, clear plastic book jacket or Mylar covers are a very good way to protect library books.

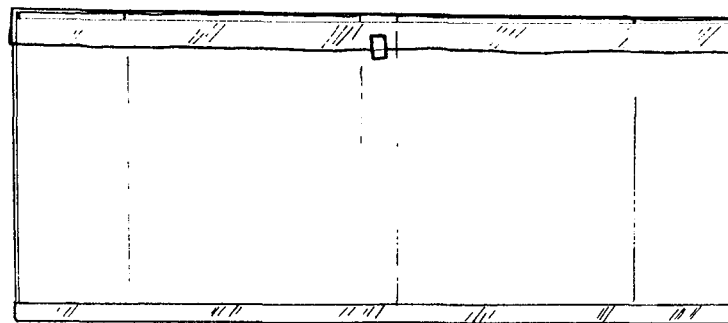
1. PLASTIC BOOK JACKETS

Replacing damaged or soiled plastic book jacket covers is a fast way to make books look new and inviting so they circulate more.



The best kind of plastic book jacket covers to use is the type with two parts: a clear, plastic front and a white paper backing.

Choose a size of plastic book jacket that is long enough to cover the entire length of the book jacket. Slide the book jacket in between the plastic front and the white paper backing.



Turn the book jacket over and fold the clear plastic front over the white backing paper. Tape the plastic front to the backing paper. Do not put tape on the book jacket itself.

Since the tape does not touch the book jacket, it cannot stain or discolor. The book jacket remains safe and clean. When the plastic jacket is soiled or torn, simply replace it and the book jacket will look new again.

Warning! Some plastic book jackets do not have a paper backing. The plastic is taped directly to the paper book jacket. Unfortunately, the adhesive in the tape can migrate to the paper jacket and cause stains. In addition, the paper cover is often torn when the plastic cover is removed. All in all, it is best to avoid this type of plastic jacket.

Some book companies will offer to apply plastic covers for the library. This may seem like a time saving offer but consider it carefully. These companies often apply the plastic book covers in such a way that makes them difficult or impossible to remove without tearing the original book dust covers. Ask about this service before purchasing it. Make sure the plastic book covers can be easily replaced without damaging the original paper book jacket.

Attaching Plastic Jackets to Library Books

The most common way to attach plastic jackets to a book is to tape them down. Be careful about the type and amount of attaching tape used and where it is placed.

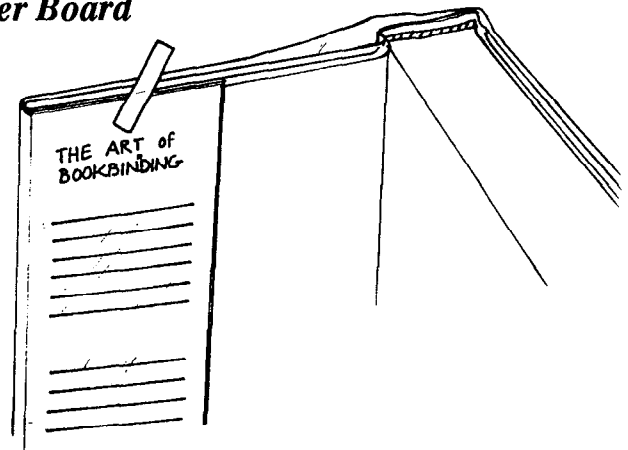
- Try to use a tape that is pH neutral and stable. Since the adhesives used in many plastic tapes are not stable, they can stain the cover cloth on a book or the adhesive can transfer to the cover of the book so that the cover remains sticky even after the tape is removed.
- Use as small a piece of tape as possible, and try to put the new tape in the same place each time it is replaced. CLEAR PLASTIC TAPE, page 18, discusses the dangers of using tape.
- When a plastic book cover is taped onto a book, pay special attention to the endpapers. If there is no special information on the endpapers, tape the turn-ins of the plastic jacket down to the book cover as in *Method 1*.

If a map or chart is printed on the endpapers and the turn-ins of a plastic book cover are taped over it, a library patron will undoubtedly tear the tape or cover to have access to the image. To prevent this, attach the plastic book jacket to the book so that it opens to show the entire end sheet following the instruction in *Method 2*.

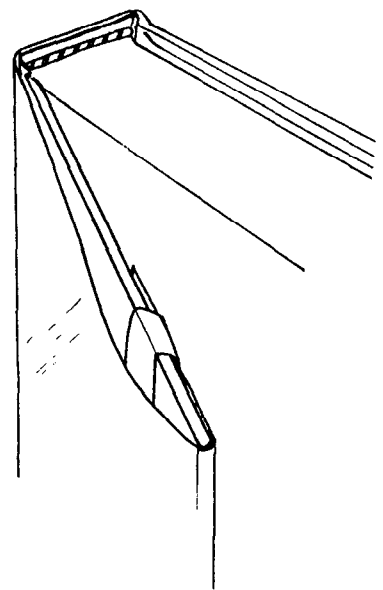
- When due date slips or pockets are placed at the front of the book and will cover important information, check the end sheet at the back of the book. Often the information is repeated on the back cover so the front turn-in can be attached with Method 1 and the back turn-in with Method 2. Pencil a note to patrons on the due date pocket letting them know the map or illustration is visible at the back end sheet.

Method 1: Taping Jacket Turn-in To The Cover Board

Use a piece of tape approximately 1 1/2 - 2" long. Attach one half of the tape on the turn-in area of the plastic cover. Try to place it so that no information is covered.

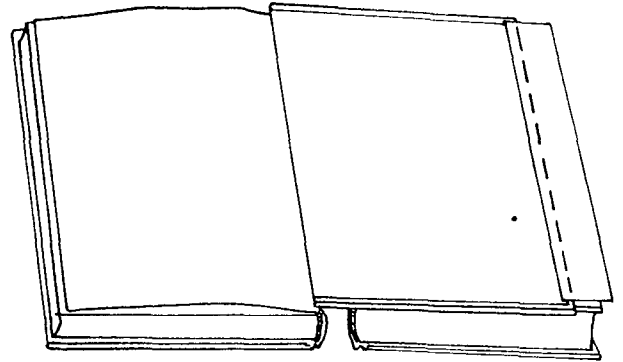


Fold the tape over the book cover and press it in place. The tape can be attached to the outside of the plastic cover or to the front of the book cover. Tape each turn-in at the top and bottom.

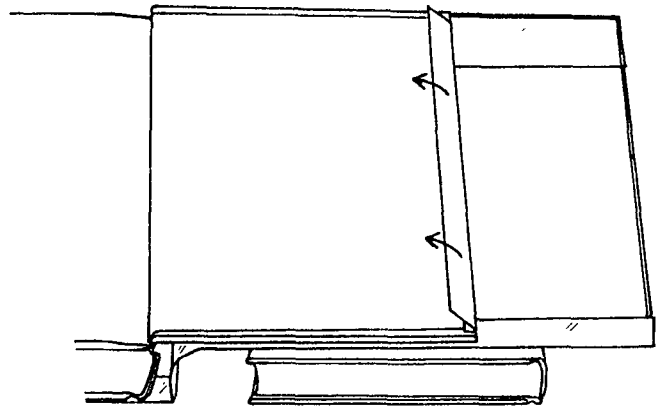


Method 2: Attaching the Plastic Jacket So That the Turn-In Opens

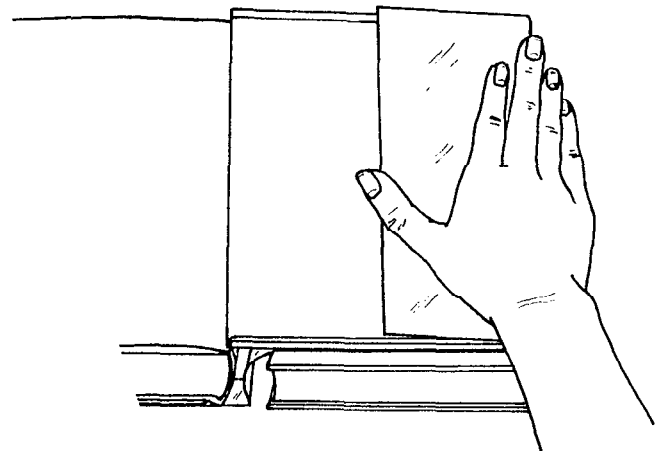
Use a piece of paper tape the height of the book and attach it to the very front edge of the book cover. Try to apply the tape so it covers as little of the end paper as possible.



Carefully fold the tape back onto itself. Position the plastic cover on the book.



Gently fold the turn-in over so that it is in contact with the tape. Press the tape to the book jacket. Repeat for the other turn-in.



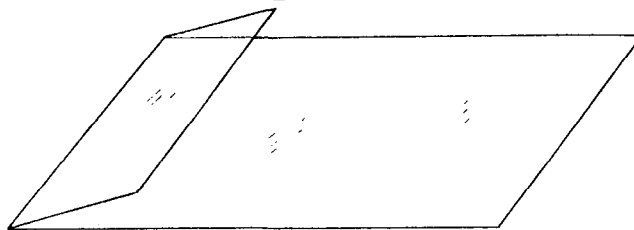
2. MYLAR BOOK JACKETS

Mylar book covers can be used to protect books that do not have book jackets. For instance, it might be faster and cheaper to use a Mylar jacket on a reference book with a torn spine.

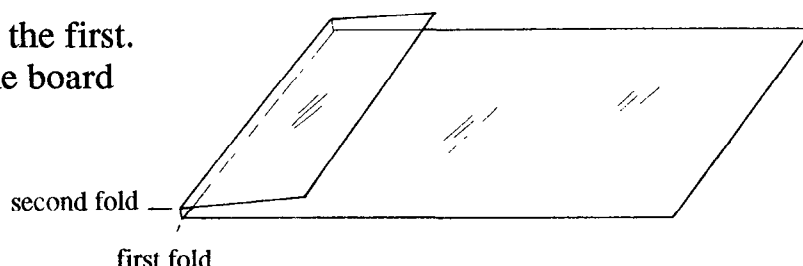
CONSERVATION BOOK REPAIR

Cut a piece of Mylar 1/4" taller than the book and 6" longer than the length of the two covers and the spine.

Make a fold 3" wide at one end of the Mylar.



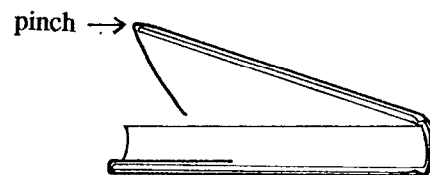
Make a second fold next to the first. The two folds should be one board thickness apart.



Lay the book with the front cover inside the folded flap. Fold the Mylar around the book. Fold the loose edge of the Mylar around the back cover.



Pinch the Mylar to mark the fold. The Mylar should fit around the cover, but not so tight that it puts stress on the cover hinges.



Remove the book from the Mylar cover and make a creased fold at the pinch.

Make a second fold one board thickness outside the pinched fold.

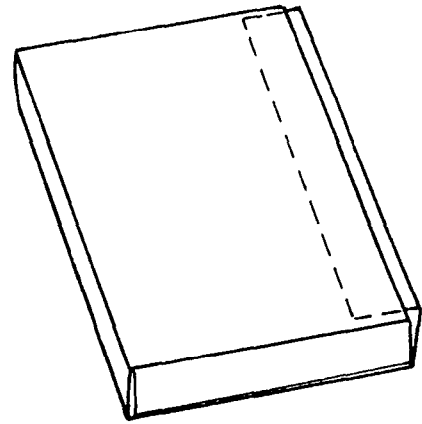
Put the Mylar jacket on the book. Because of the box fold, the jacket will usually stay on the book by itself or the flap can be taped to the cover.

I. WRAPPERS AND BOXES

Wrappers and boxes are other ways to protect books on the shelf. In a general library collection, they might be used to protect Reference books that cannot be repaired or replaced. Some libraries use wrappers or boxes for circulating materials as well. A modified four-flap wrapper (page 163) can be used to house fragile items or loose pages inside a binder.

1. FOUR-FLAP WRAPPER

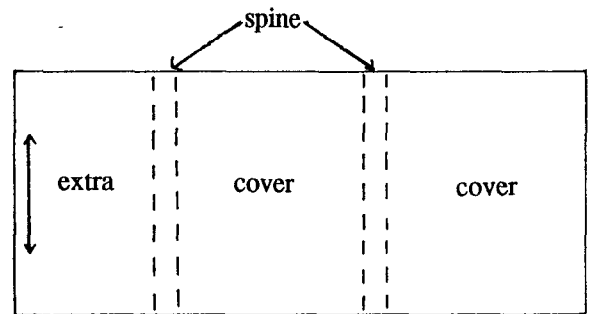
The four-flap wrapper is constructed from two pieces of folder stock which can be ordered from several book supply sources.



Use the technique of measuring with a piece of paper explained on page 37 to measure the height (A), width (B) and thickness (C) of the book or papers. Label each measurement.

Cover Piece 1

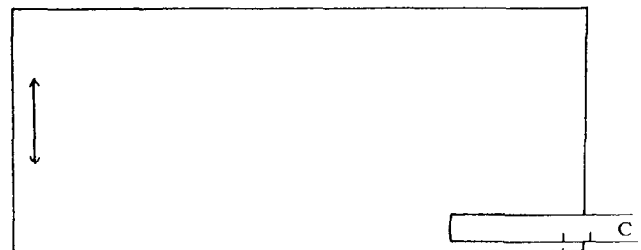
Cut a piece of folder stock the height of the material (measurement A) and about 3 times the width of the material (two covers, two spines and about 4" extra).



cover piece 1

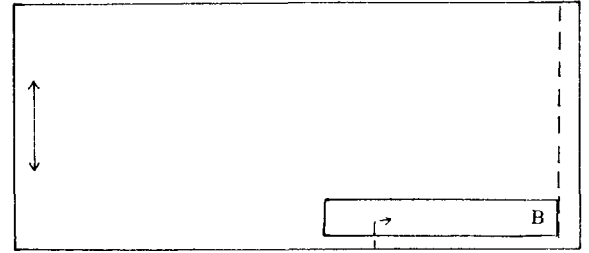
The grain of this piece of folder stock should run parallel to the short side of the folder stock.

Position Measurement C (thickness of the item) on the right edge of Cover Piece 1; then mark, score, and fold.

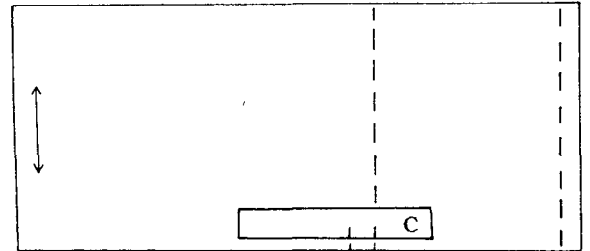


CONSERVATION BOOK REPAIR

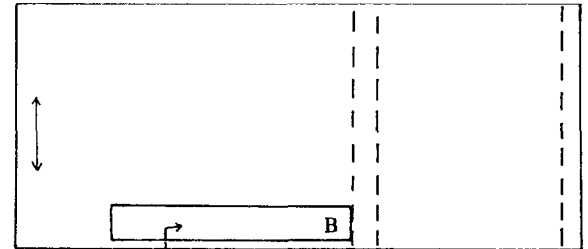
Add Measurement B (the width of the material) to the fold; score and fold.



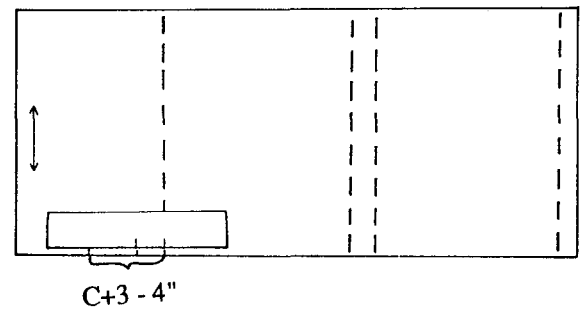
Add Measurement C to the fold; score and fold.



Add Measurement B to the fold; score and fold.



Add Measurement C plus 3 - 4" to the fold and cut.

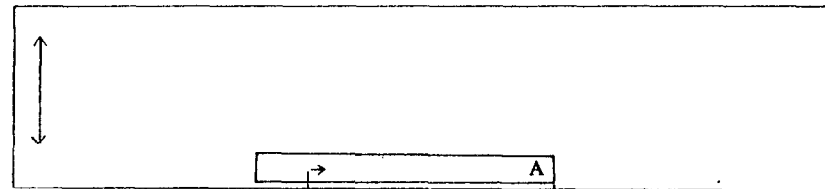


Proceed to cut and score Cover Piece 2.

Cover Piece 2

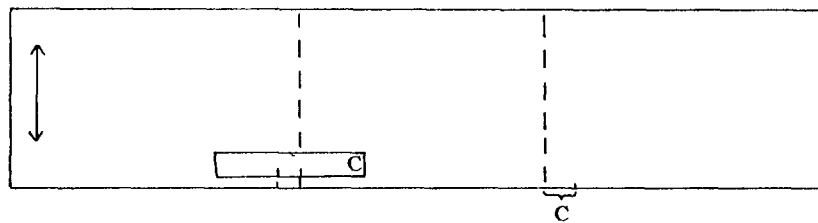
Cut a piece of folder stock the width of the material (measurement B) and about the equivalent of the measurement for the height of three covers and two spines.

The grain of this piece of folder stock should run parallel to the short side of the strip.

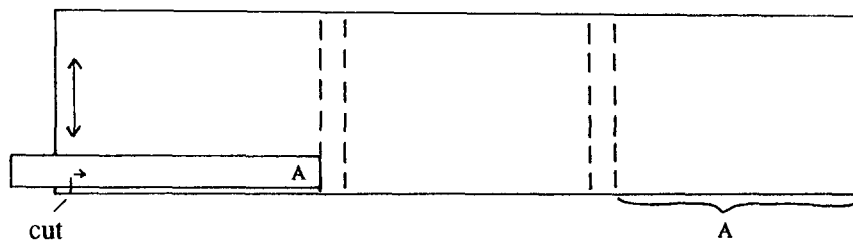


cover piece 2

Center the Measurement A (the height of the book or papers) on Cover Piece 2; mark the height; score and fold.



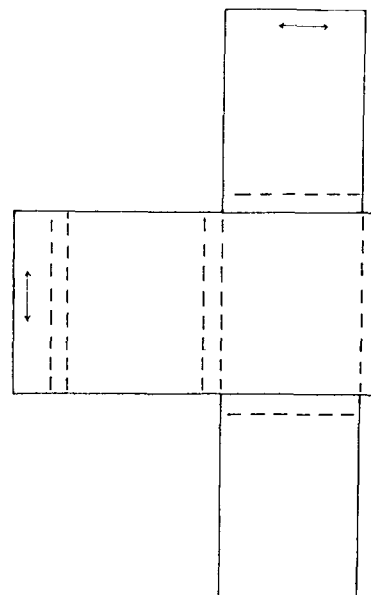
Add Measurement C to each fold; score and fold.



Add Measurement A to each Measurement C. Trim Cover Piece 2 if necessary.

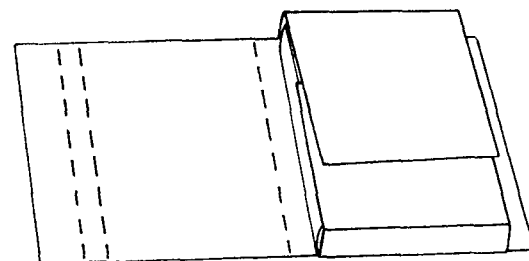
Attaching Cover Piece 1 and Cover Piece 2

Place Cover Piece 1 inside Cover Piece 2 as shown.



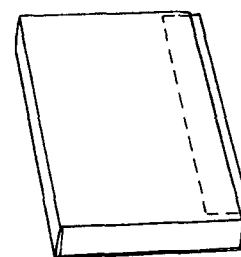
Place the book in position and fold the flaps from Cover Piece 2 over the book. Each flap does not need to cover the entire cover, as long as the two flaps together cover the entire cover.

Trim the flaps shorter if necessary.

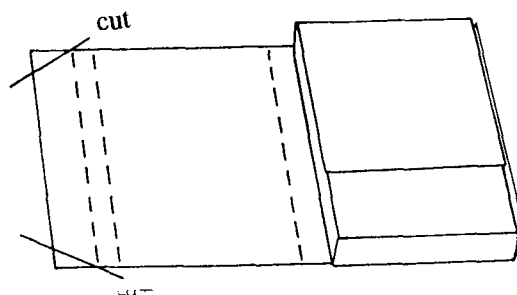


Wrap Cover Piece 1 around the book. The four-flap wrapper should be a good fit without being too tight or too loose.

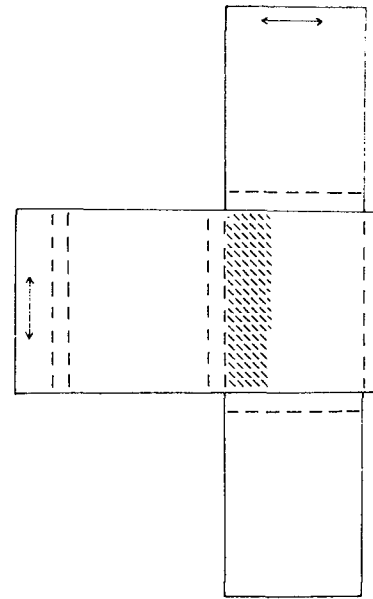
Tuck the last flap (C plus 3 - 4") between Cover Piece 1 and 2 at the right edge. Trim the tuck-in flap shorter if it resists tucking in.



Trim the top and bottom edge of the tucked-in flap diagonally.



Remove the book and separate the Cover Pieces. Apply PVA adhesive to the left quarter of the center A measurement on Cover Piece 2. Replace Cover Piece 1 and dry under weight.



When the glue is dry, put the book into the wrapper, fold over the flaps from Cover Piece 2, then wrap Cover Piece 1 around the book.

Label the spine with the call number, title and author (space permitting). Place on the shelf.

2. MODIFIED FOUR-FLAP WRAPPER

A modified four-flap wrapper can be constructed and glued into a pamphlet binder to protect thin items or loose pages. This wrapper is similar to a four-flap wrapper, but it has a closing tab instead of the flap that tucks into the wrapper to hold the wrapper shut.

The Modified Four-Flap Wrapper can be cut from a single piece of card stock but it will be less wasteful to cut two separate pieces and glue them together.

Use a piece of paper to measure the height (A), width (B) and thickness (C) of the book or materials. Label each measurement.

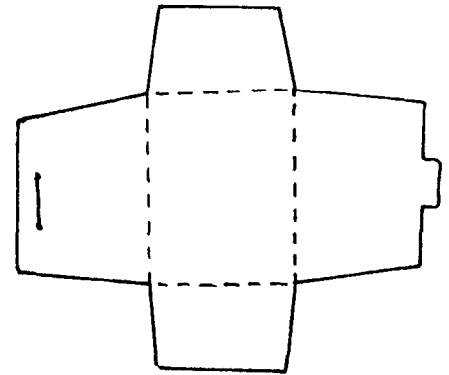
Cut a piece of folder stock the height of the book or papers (measurement A) and about 3 1/2 times the width of the text block (three covers and two spines). The grain of this piece of folder stock should run vertical to the cut stock and parallel to the book spine.

CONSERVATION BOOK REPAIR

Cut a piece of folder stock the width of the book or papers (measurement B) and about 3 1/2 times the height (three covers and two spines). The grain of this piece of folder stock should run horizontal to the stock and perpendicular to the book spine.

Using the same techniques as given for the Four-Flap Wrapper, construct the two cover pieces and glue them together as shown.

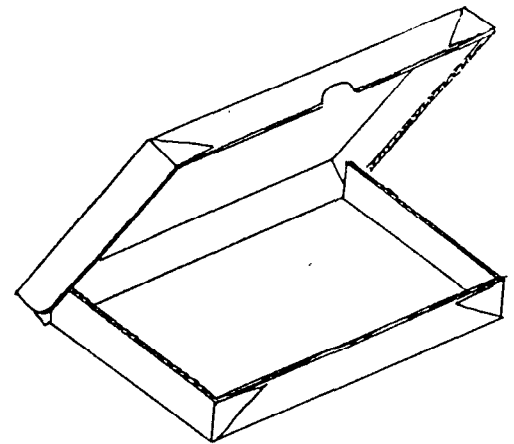
Since the flap does not slip under the cover as in the Four-Flap Wrapper, glue the two pieces completely together where they overlap.



The Modified Four-Flap Wrapper can now be labeled and placed on the shelf or glued into a pamphlet binder.

3. CORRUGATED CLAM SHELL BOXES

A simple corrugated clam shell box can be constructed from a sheet of single wall acid-free corrugated board. These boxes are faster to construct and cheaper than the traditional CLAM SHELL BOX (page 169). They are recommended for books over 1".

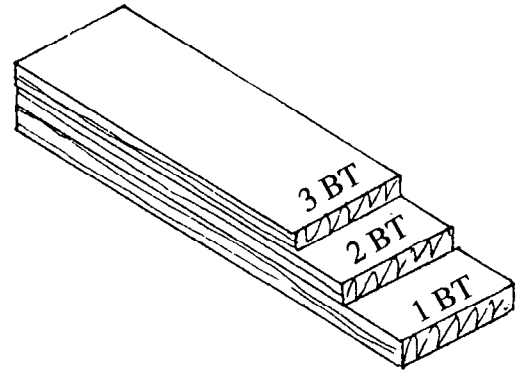


The design for this corrugated box was developed by Andrea Krupp and Lillian Greenberg of the Library Company of Philadelphia and originally printed in *The Abbey Newsletter*, October 1991. Further refinements on the instructions and these illustrations are provided by the staff of the American Philosophical Society.

Like a clam shell from which it derives its name, the corrugated box has a book tray constructed to fit the box and a cover tray that fits over the book tray.

Constructing a Measuring Jig

1. Cut 3 strips of the corrugated board about 12" long.
2. Trim 1 strip to 9" long and trim 1 strip to 6" long.
3. Glue all 3 strips together with one end even. The other end will be stepped.
4. Mark the longest strip 1 BT (board thickness). Mark the middle strip 2 BT and the shortest strip 3 BT.



Measure the Book

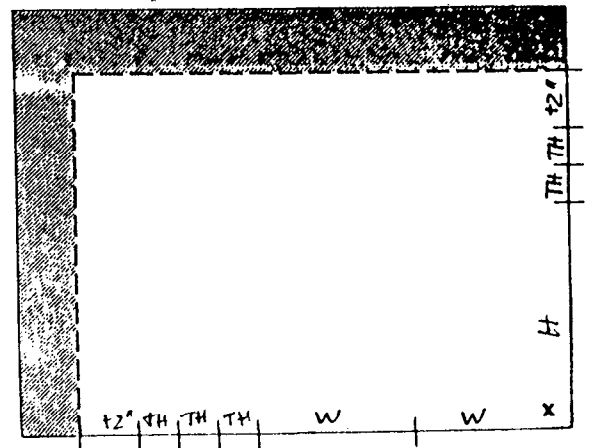
5. Using a piece of paper (page 37), measure the book height (A), width (B) and thickness (C).

NOTE: Not all books are square. Be sure to measure the tallest, widest and thickest part of the book.

Transfer the Measurements and Rough Cut the Corrugated Board

NOTE: The corrugations of the board run parallel to the height of the book.

6. Square a piece of corrugated board on a paper cutter or using a carpenters' square. Mark the square corner with an "X".
7. Starting at the squared corner and working to the left, mark 2 widths (B), plus 3 thickness (C) plus about 2".
8. Again starting at the squared corner and working upward, mark 1 height (A) plus 2 thickness (C) plus 2".



9. Cut the board to size with a paper cutter or sharp utility knife.

Laying Out Cutting and Folding Lines

Vertical Measurements

10. Starting at the bottom left hand corner, mark 1 thickness (C) plus 1 BT. This is the thickness of the cover tray wall.

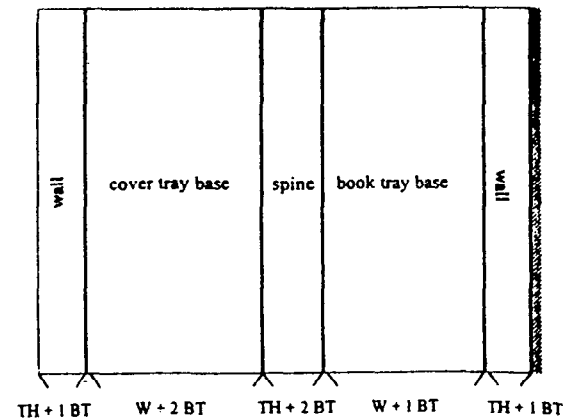
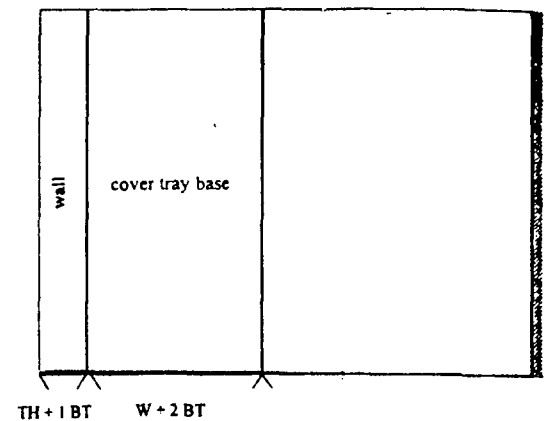
11. Add the width of the book (B) plus 2 BT. This is the width of the cover tray base.

12. Add the thickness of the book (C) plus 2 BT. This is the thickness of the spine.

13. Add the width of the book (B) plus 1 BT. This is the width of the book tray base.

14. Add the thickness of the book (C) plus 1 BT to mark the thickness of the book tray wall.

15. Draw lines using a triangle or carpenters square. Trim off excess board.

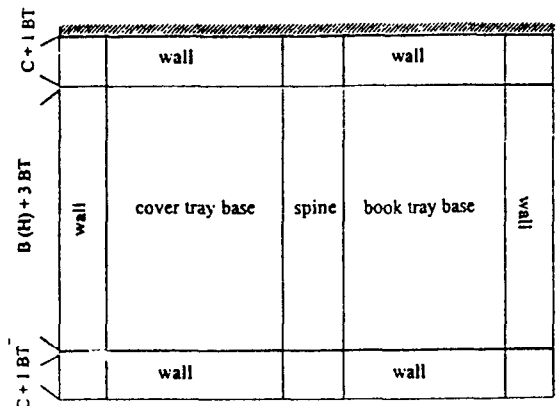


Horizontal Measurement

16. Starting at the bottom left hand corner, mark the thickness of the book (C) plus 1 BT. This is the thickness of the cover tray wall.

17. Add the height of the book (B) plus 3 BT to mark the height of the cover tray base.

18. Add the thickness of the book (C) plus 1 BT. This is the thickness of the cover tray wall.



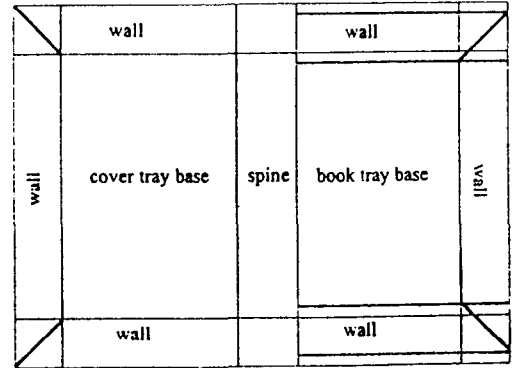
19. Draw lines using a triangle or carpenters square. Trim off excess board.

Decreasing Book Tray and Cutting Excess

The book tray must be smaller than the cover tray so the two trays will nest inside one another when the box is closed.

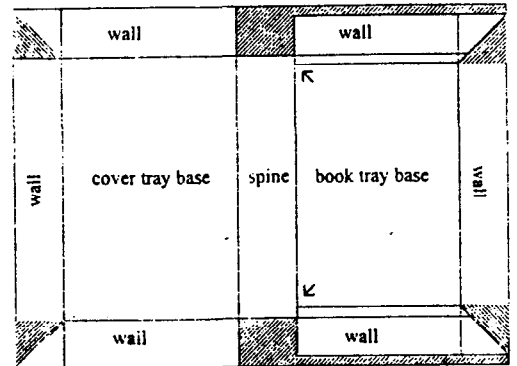
20. Use the BT measuring jig to move the upper and lower book tray walls inward by 1 BT.

21. Draw diagonal lines from the outer corners of the tray bases to the corners of the walls.

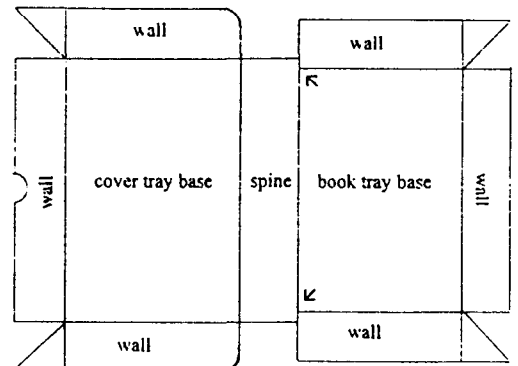


22. Cut away the shaded areas with a mat knife.

Note: Extend the cuts in the new shortened book tray base lines. See the arrows.



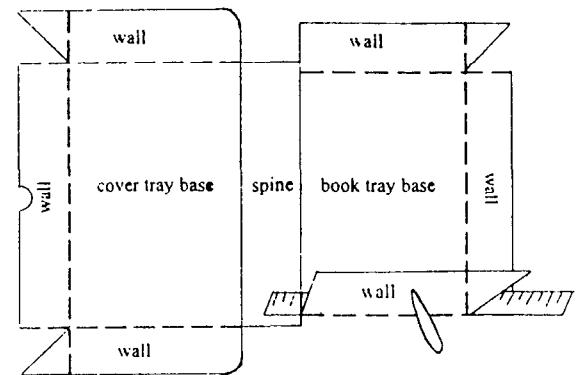
23. Round the corners of the cover tray top and bottom walls and cut a thumb notch on the cover tray fore edge wall. Use a gouge and mallet or scissors.



Folding and Creasing Box Lines

24. Using the rounded end of a folder, score all of the dotted fold lines lightly.

25. Lay a ruler along the scored lines and fold the cardboard against the ruler. Use the folder to sharpen the folds.

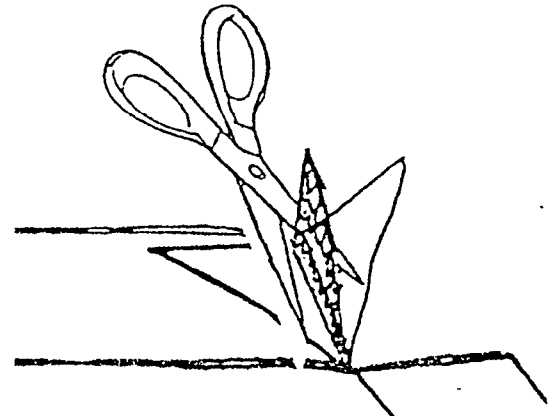


Cutting and Attaching the Tabs

The corrugated board is constructed of two outer layers surrounding a layer of corrugated core.

26. Using the pointed end of a folder, separate the two outer layer from the corrugated core.

27. Fold the outer layers back on the scored line. Use scissors to carefully cut away the corrugated core. **Do not** cut through the corrugated core.

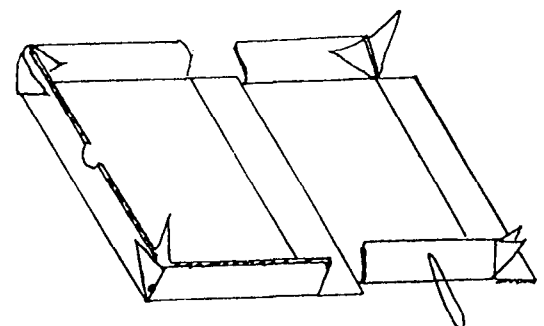
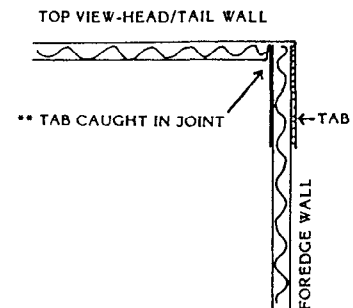


Gluing the Corner Tabs to Construct the Box

28. Use PVA to glue the corner tabs in place. Push the inner tabs well down into the corner joints.

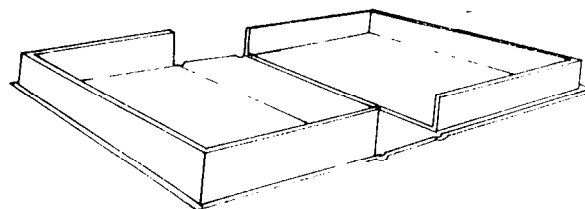
29. Use binders' clips to hold the tabs in place while they dry.

30. Label the spine, place the book in the box and shelve.



4. FULL CLAM SHELL BOXES

Full clam shell boxes are constructed of book board and book cloth. They are usually used as permanent protection for valuable library materials. Constructing a full clam shell box is beyond the scope of this manual. Complete instructions for constructing a variety of boxes are given in *Boxes for the Protection of Rare Books* published by the Library of Congress.



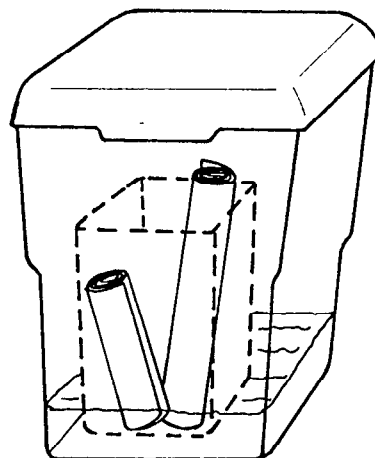
J. FLATTENING ROLLED OR FOLDED MATERIALS

Some materials, such as maps, arrive folded or rolled. These materials are easier to flatten when they are humidified, then dried under pressure.

1. HUMIDIFYING MATERIALS

Humidifying is a process of carefully introducing moisture into paper and then drying it under controlled conditions.

A simple but effective humidifier can be constructed out of two plastic garbage cans. The materials in the humidifier will absorb moisture without ever coming in direct contact with the water.



Place the materials to be flattened in a small garbage can.

Pour about 3 - 4" of water in the large plastic garbage can and place the small plastic garbage can in the water. Hot water will work a little faster than cold.

CONSERVATION BOOK REPAIR

To increase the speed with which the materials absorb the moisture in the humidifier, moisten two pieces of blotter paper and clip them to each side of the small garbage can.

Damp blotters act as a sponge, raising the moisture level inside the container so the paper absorbs the moisture faster.

Remember that the water should NEVER come in direct contact with the materials.

Leave the smaller container uncovered and cover the large container with the lid or a tight fitting plastic bag. Humidifying can take from 1 - 24 hours.

2. FLATTENING MATERIALS

When the materials feel damp and limp, they have absorbed enough water to be flatten.

Place blotters beneath the material, unroll them with the curl towards the table, cover with a layer of Hollytex and/or Mylar. Cover this "sandwich" with glass plates or pieces of board and let dry.

When the materials are not cool to the touch, they are completely dry.

K. MYLAR ENCAPSULATION

Encapsulation is a technique designed to give added support to paper documents and to protect them from physical wear and tear. The paper is enclosed between two sheets of clear polyester film (Mylar) and the edges are sealed with 1/4" double-coated pressure sensitive tape (Scotch #415).

A gridded work surface can be purchased or prepared by taping 1/4" graph paper to the underside of a piece of Plexiglas or glass. This surface will aid in placement and applying tape in a straight line.

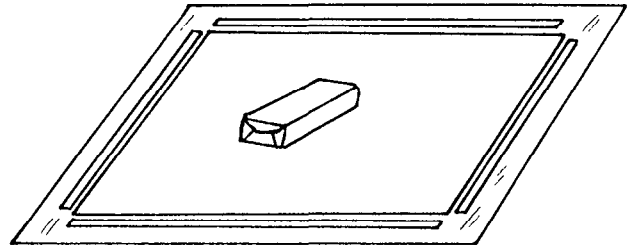
Labels can be attached to the document or on the outside of the finished Mylar encapsulation.

Cut two pieces of Mylar about 2" wider and longer than the document.

Place one sheet of Mylar on a work surface. Wipe the surface of the Mylar with a lint-free cloth to remove dust and create a static electric charge. This charge will cause the document to adhere itself to the Mylar.

Center the document on one piece of Mylar and weight it down.

Apply a strip of Scotch #415 tape along each side of the document. The edge of the tape should be about 1/2" from the edge of the document.

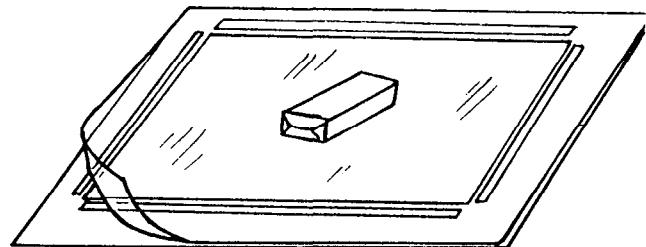


The tape should stop about 1/8" before from each corner so air can escape when the second piece of Mylar is attached.

Wipe the second piece of Mylar with a lint free cloth.

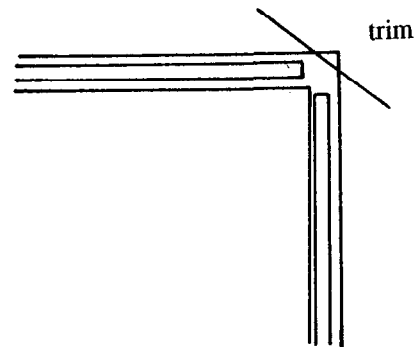
Remove the weight on the document. Position the second piece of Mylar, wiped side down, on top of the document. Replace the weight.

Pick up one corner of the top piece of Mylar. Remove the backing on one piece of tape. Press the Mylar onto the tape.



Repeat this process on the three other sides of the document.

Trim the margins of the Mylar to 1/8" from the tape. Angle cut the corners to prevent injuries to staff or patrons.



L. DISASTER PREPAREDNESS AND RECOVERY

Preparing for disasters is an important part of maintaining a library collection. Several titles listed in the BIBLIOGRAPHY discuss disaster preparedness and recovery in detail.

VIII. GLOSSARY

Bookbinding and the Conservation of Books, Matt T. Roberts and Don Etherington, Library of Congress, 1982, is the main source for the definitions given below.

Acid-free: In principle, materials which do not contain acid and have a pH value of 7.0 or greater. There is some latitude to this number, depending on the material; for instance, papermakers consider a paper having a pH value of 6.0 or greater to be acid free. As used in this volume, the term means materials that are either pH neutral or alkaline buffered.

Acrylic adhesive: A thermoplastic resin prepared by polymerizing acrylic acid or methacrylic acid. Acrylic adhesives are flexible and stable and should not turn yellow or brittle.

Adhesive: A general term for any of several substances capable of bonding materials to each other by chemical or mechanical action, or both, and which can be activated by water, non-aqueous solvents, pressure heat, cold or other means. The two types of adhesives used in this volume are **glue** and **paste**.

Adhesive binding: A method of securing loose leaves into a solid text block by means of an adhesive rather than by means of sewing.

Against the grain: Paper which has been folded at right angles to the direction in which the fibers tend to lie (the **grain**). A well-produced book should have the grain running from top to bottom so the pages of a book are more inclined to lie flat when the book is open.

Alkaline: Materials having a pH of 7.0 or greater a scale of 1 to 14.

Alkaline buffer: A reserve of alkaline substance added to paper for the purpose of counteracting any acid that may be in the paper.

Archival: A term used for neutral materials that are considered safe for long-term use in library materials.

Backing: The process of shaping a ridge or shoulder on each side of the spine of a text block. The backs of the sewn sections or signatures are bent

CONSERVATION BOOK REPAIR

over from the center to the left and right until shoulders are formed against which the cover boards will fit. The size of the shoulders is determined by the thickness of the cover boards. Backing distributes the swell caused by the sewing thread or excessive guarding across the entire width of the spine.

Binder's board: see **board**

Binder's clips: see **bulldog clips**

Blotter paper: A completely unsized sheet of paper made of rag or cotton linters, generally used to absorb moisture.

Board: A generic term for the stiff cardboard used for the front and back covers of a book. Also called Binder's Board.

Bone folder: see **folder**

Book: A collection of written, printed, illustrated or blank leaves of paper bound together. Today, in its most familiar form, a book is considered to be one or more folds and gathered sheets of paper, fastened together at one edge to form a continuous series of uniform pages.

Book cloth: A generic term for the woven fabrics used in covering books. Book cloth can be made of cotton, rayon or silk and is often backed with a layer of paper.

Booklet: See **pamphlet**.

Brushes: Implements used for applying paste or glue to the surface of paper, board, cloth, or other material. A brush is composed of a gathering of hair or bristles (natural brushes) or some synthetic material, secured in a plastic compound and held in a metal ferrule which is crimped around the handle.

Bulldog clips: Stationery or office supply clips with flat jaws used to hold pages to one another.

Case binding: A general term for a method of bookbinding in which the case (covers) of the book is made separately from the **text block** of a book,

then later attached by gluing the **end papers** to the cover **boards**. This operation is known as **casing-in**.

Chain lines: The lines that run parallel to grain of a sheet of laid or hand made paper, usually one inch apart. The lines are caused by the "chain wires" of a paper mold.

Complex paper tears: A tear that has more than one top and bottom. A complex tear is usually two or more separate tears made over time.

Conservation: The planned care and preservation of the resources of a library from the effects of age, use or misuse.

Corner(s): The juncture of the two edges of a board cover at the **fore edge** and the **head** and **tail**.

Covers: The outer covering of a book place on a **text block** to protect it in use and storage. A cover may be paper, book board, **book cloth** or leather.

Crash: A course, open weave, starched cotton material, sometimes napped on one side, and used in library and edition binding for lining the spines of books. This material is also known as super or mull.

Document repair tape: A commercial tape made up of a paper carrier and a stable acrylic adhesive.

Double-fan adhesive binding: See **adhesive binding**

Dry cleaning: Using dry eraser products to remove dirt and marks from a book.

Endpapers: The two or more pages placed in the front and back of a book between its **covers** and **text block**. The endpaper at the front of the book is called the front endpaper, while the one at the back is called the off endpaper. The part of the endpaper nearest the cover is called the **pastedown** or board paper while the part of the endpaper that is not pasted down is called the fly sheet or **fly leaf**. Endpapers can be blank or printed with a design, map or other information.

CONSERVATION BOOK REPAIR

Fan binding: see Adhesive Binding

Feathered edge: The fuzzy effect resulting from water or needle tearing a piece of Japanese repair tissue.

Fly leaf: the part of the endpaper at the beginning or end of a book, that is not pasted to the boards, or covers, of the book.

Folder: A thin length of wood, bone, ivory or other material from 6 to 12 inches long and 1 to 1/12" wide. The typical folder is approximately 1/8" thick. It is tapered to the edges, has rounded edges and ends, and is used in folding sheets by hand and in numerous binding operations.

Fore edge: The edge of a book opposite the **spine**. Sometimes called the front edge.

Fore-edge margin: The space between the text and the outer extremity of the page of a book.

Grain: In machine-made paper and board, the direction that the majority of paper or cloth fibers lie. In cloth, the grain is the direction of the **warp** threads. A well produced book should have the grain running from head to tail so the pages of a book are more inclined to lie flat when the book is open.

Glue: An adhesive originally obtained from animal materials such as bone and hide. Animal hide glue was commonly used in book binding before the introduction of Polyvinyl Acetate (PVA).

Gutter: The white space formed by the adjoining inner margins of two facing printed pages, i.e. the margin at the sewn folds of a **signature**.

Halftone: A picture in which the gradations of light are obtained by the relative darkness and density of tiny dots produced by photographing the subject through a fine screen.

Head: The top of the **spine** of a book. The top edge of a bound book.

Heat set tissue: A lens tissue especially prepared for use in mending tears in paper, strengthening margins, and for laminating weak or badly torn pages, by means of dry application rather than by a traditional wet application.

Hollytex: A commercially produced fiber/cloth that allows moisture to pass through and will not adhere to paper.

Hinge: n. The interior juncture of the spine and covers of a case-bound book. The outside of this same juncture is called the **joint**.

v. To attach one piece of paper to another by means of a narrow strip of Japanese repair tissue.

Hinging-in: The process of reattaching a loose page to a text block by affixing 1/2 of a strip of **Japanese repair tissue** to one edge of the page (usually the inner margin), then attaching the other half of the Japanese repair tissue to the text block.

Inner margin: The margin of a page next to the binding edge of a book. See also **gutter**.

Kizukishi: A medium weight Japanese repair tissue.

Japanese repair tissue: Paper made from vegetable fiber. It comes in various weights and is incorrectly called rice paper.

Jig: A device for guiding a tool or for holding work in place. See **punching jig** and **signature punching jig**.

Joint: The exterior juncture of the spine and covers of a case-bound book. The inside of this same juncture is called the **hinge**.

Kettle stitch: The stitch or knot made near the **head** and **tail** of the book which holds the sections together.

Library binding: The business of providing specialized binding services to libraries. Library binding differs from commercial binding in that library

CONSERVATION BOOK REPAIR

binderies often strive to use sound conservation techniques and materials that will not damage the book.

Masking: Using waste paper to isolate one part of a piece of paper so adhesives can be applied to that one area only while the rest of the paper is protected.

Mold lines: See **chain lines**

Microspatula: A metal tool, approximately 6 - 8 " long with one rounded end and one pointed end. Microspatulas are used to maneuver strips of pasted **Japanese repair tissue** or to feed glue or paste into tight places.

Mixture: A combination of adhesives, usually **PVA** and **wheat paste**.

Mull: See **crash**

Mylar: A stable, clear polyester material used as a moisture barrier or to encapsulate materials.

Needle-in-a-stick: A tool that consists of a needle embedded in a plastic or wooden handle. A needle-in-a-stick can be used to score or tear **Japanese repair tissue**, mark materials for cutting or feed glue or paste into tight places. A needle-in-a-stick is also called a needle.

Needle-tear: Using the sharp end of a needle to score paper so the paper can be torn along that scored line.

Non-stick porous material: A synthetic material that allows moisture to pass through but will not stick to the repaired material.

Outer margin: see **fore-edge margin**

Oversewing: A method of sewing the pages of a text block by hand or machine so that the sewing threads pass through the inner margin of the page.

Pamphlet: A small, usually thin booklet made up of one or more signatures. See also **booklet**.

Paper: A thin sheet of material made of cellulose pulp, derived mainly from wood, rags and certain grasses processed into flexible sheets.

Paste: n: A soft adhesive generally prepared by heating a mixture of starch and water which sets into a paste as it cools. Paste has been used for centuries to join porous, non-greasy materials. It can be made from a variety of starches, the most common being wheat and rice.

v: To adhere one material to another using a vegetable starch mixed with water.

Pastedown: the part of the endpaper at the beginning or end of a book that is pasted to the case of the book.

Pellon: A commercially produced fiber/cloth that allows moisture to pass through and will not adhere to paper.

pH: The measure of acidity or alkalinity in repair materials. The pH scale runs from 0 to 14 and each number indicated a ten-fold increase. Seven is pH neutral. Numbers below 7 indicate increasing acidity, with 1 being most acidic. Numbers above 7 indicate increasing alkalinity, with 14 being the most alkaline.

Plate: An illustration printed separately from the text of the book, often on a different type of paper. Plates may be bound into a book, **tipped-in, hinged-in** or housed in a pocket.

Plastic tape: see **pressure sensitive tape**

Polyester film: A chemically inert, stable, clear polyester sheet used to encapsulate or isolate a repair.

Polyvinyl acetate: A vinyl resin, one of the clear, water-white, synthetic resins produced from its monomer by emulsion polymerization. Polyvinyl acetate is usually referred to as **PVA** and has the advantage of being readily available in the form of an emulsion that is readily diluted with water, easily applied and safe because it contains no flammable solvents. It does not

deteriorate quickly and is unaffected by mold or fungi. PVA should not be allowed to freeze as it will separate and lose its adhesive properties.

Press: n: A simple piece of machinery used to apply pressure evenly over the surface of a page or book. While there are many different types of presses, a nipping press is the most common.

v: To apply even pressure to material(s).

Pressure sensitive tape: The kind of pretreated tape that adheres to a surface when pressure is applied without the necessity of first applying adhesive or moistening or otherwise treating its surface.

Punching jig: A creased piece of paper with sewing holes marked and punched in the valley fold. The paper jig is aligned with the top of the signature to show the correct place to punch sewing holes.

PVA: see **polyvinyl acetate**

Rebinding: The more-or-less complete rehabilitation of a worn and/or damaged book; the minimum amount of work involving resewing and the attachment of new covers.

Rebacking: The replacement of the material covering the spine of a book. The term may also be applied to the reattachment of the original spine material after it has been repaired.

Recasing: In a strict sense, a text block that is separated from its case, and, following repair to text block and case, is then placed back in the *same* case, perhaps with new end papers. In more general terms, a book is recased when the text block is removed from its original case and placed in a new case made specifically for it. The first might be said to be the work of a hand binder or repair person while the second is the work of a library binder.

Rice paper: Rice starch was traditionally used to size papers made of Kozo (mulberry plant). The paper is not made with rice. See **Japanese repair tissue**.

Rounding: The process of molding the spine of a **text block** into an arc of approximately one-third of a circle. Rounding takes place after the pages are attached to one another by sewing or gluing and before **backing**. Rounding can be achieved by hammering gently on the spine with a special round-headed hammer.

Scalpel: A small knife with a very sharp blade.

Score: The process of making a indentation or crease in a sheet of paper or board by pressing into the paper or board with a **folder**.

Sekishu: Heavy weight Japanese repair tissue.

Selvage: The border of a roll or section of book cloth or the edges of fabric woven tighter to prevent reveling or tearing. In all materials, the selvage is meant to be cut off.

Sewing stations: The holes along the fold of a signature through which the sewing thread is passed.

Shoulder: The part of the spine of a text block which is bent over in the **backing** process to form a ridge to accommodate the thickness of the cover board.

Signature: A gathering of flat pages that are folded, usually in half, to create a unit. A signature usually contains multiples of 4 printed pages (4, 8, 16, etc.) Historically the signature was the identifying mark left on the first page of a gathering of pages.

Signature punching jig: A device for holding a signature open to allow sewing holes to be punched quickly and consistently.

Silicone release paper: A paper treated with silicone so it will not adhere to paper or heat set tissue.

Size: The gelatin, rosin, starch or another synthetic substance that is added to paper to provide resistance to the absorption of moisture and to eliminate ink feathering and bleeding through.

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Spine: In a text block: the edge of the book where the folded pages or individual pages are attached to one another, either by sewing or adhesive. In a book case: the part of the covering material of a book which covers the folds of the sections of the book and which is the part usually visible as it stands on the shelf. It generally bears the title, author, name of the publisher and the call number.

Spine inlay: The piece of paper used to line the book cloth spine of a case bound book to give the book cloth spine support and impart a certain degree of rigidity, while still maintaining the necessary flexibility for proper opening.

Spine Liner: Layers of **paper** and **crash** used to reinforce the spine of a book after gluing and rounding or backing. This material supports the spine and imparts a certain degree of rigidity, while still maintaining the necessary flexibility for proper opening.

Square: The portion of the book board cover that projects beyond the text block of the book.

Starburst pattern: The pattern achieved by applying adhesive or water from the center of a piece of paper toward the outer edges.

Super: see **crash**

Tail: The lower end of the text block spine; the bottom edge of a bound book.

Tengujo: Light weight Japanese repair tissue.

Text block: The body of a book, consisting of the pages or sections which make up a unit to be bound or repaired.

Tipping-in: The process of attaching a loose page to the text block by applying glue to one edge (usually the inner margin) and inserting the page into the book.

Turn-in: The portion of the book cloth covering material that is turned over the edges of the case board.

Warp: A series of parallel yarns extended lengthwise in a loom, forming the lengthwise threads of a fabric.

Watermark: The translucent design or name easily visible when a sheet of paper is held to the light.

Water-tear: Using a thin line of water to weaken paper fibers so the paper will tear along that line.

Wheat paste: An adhesive made from cooked wheat flour and water.

VII. SELECTED BIBLIOGRAPHY

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BOOK BINDING SUPPLY SOURCES

GENERAL BINDING/CONSERVATION

BOOKBINDER'S WAREHOUSE

31 Division
Keyport, NJ 07737
908/264-0306
908/264-8266 (fax)

BOOKMAKERS

6001 66 Ave., Suite 101
Riverdale, MD 20737
301/459-7629

CONSERVATION MATERIALS

12165 Marietta Way
Sparks, NV 98431
702/331-0582
702/331-0588 (fax)

LIGHT IMPRESSIONS

439 Monroe Avenue
Rochester, NY 14607-3717
800/828-6216

COLOPHON BOOK ARTS SUPPLY

3046 Hogum Bay Road NE
Olympia, WA 98516
360/459-2945

TALAS

568 Broadway
New York, NY 10012
212/219-0770
212/219-0735 (fax)

CONSERVATION RESOURCES

8000-H Forbes Place
Springfield, VA 22151
800/634-6932

GENERAL LIBRARY MATERIALS SOME CONSERVATION

GAYLORD BROTHERS

Box 4901
Syracuse, NY 13221-4901
800/448-6160 (orders)
800/634-6307 (customer service)

UNIVERSITY PRODUCTS

Box 101
Holyoke, MA 01041
800/628-1912 (orders)
800/762-1165 (customer service)

GENERAL ART SUPPLIES

DANIEL SMITH

4150 1st Ave., S.
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Seattle, WA 98124-5568
800/426-6740 (orders)
800/426-7923 (customer service)

NEW YORK ART SUPPLY

62 Third Avenue
New York, NY 10003
800/950-6111

ASSORTED SUPPLIERS

AIKO'S

3347 N. Clark Street
Chicago, IL 60657
312/404-5600
312/404-5600

DREMEL

Division of Emerson
Electric Co.
Box 1468
Racine, WI 53401

Japanese paper

Dremel Tools

JOHNSON'S

**BOOKBINDING
SUPPLY**

32 Trimountain Avenue
South Range, MI 49965
906/487-9522
906/487-9744 (fax)

book cloth

OREGON LEATHER

110 NW 2nd
Portland, OR 97228
503/228-4105
503/228-0210 (fax)

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