

Project Book

PUTTING YOUR
WORDS TOGETHER
WITH SIGNATURES,
GLUE, AND STITCHES

DIY Bookbinding

Bind Your Own Book by Hand

Brian Sawyer



O'REILLY®

Maker
PRESS™

Project Book

DIY Bookbinding

Bind Your Own Book by Hand

Bookbinding may well be a dying art in this digital age, but you can still learn how to do it yourself with this easy-to-follow ebook. In fact, you can reverse the course of evolution and convert this particular digital specimen into a durable, hand-stitched book that will last for generations. When you're finished, this ebook will truly be "hands-on."

O'Reilly Senior Editor Brian Sawyer takes you through the process with step-by-step instructions and scores of instructive photographs. All you need to bring to the table are a few simple materials—including magazines you'd like to preserve. Discover how simple, unmessy, fun, and satisfying binding books by hand can be.

- **Print the pages of this ebook or remove the existing cover from a magazine**
- **Create signatures and prepare them for stitching**
- **Glue the spine**
- **Build and attach the cover boards**
- **Cover the exterior and interior of the cover boards**

US \$4.99

ISBN: 978-1-449-307691



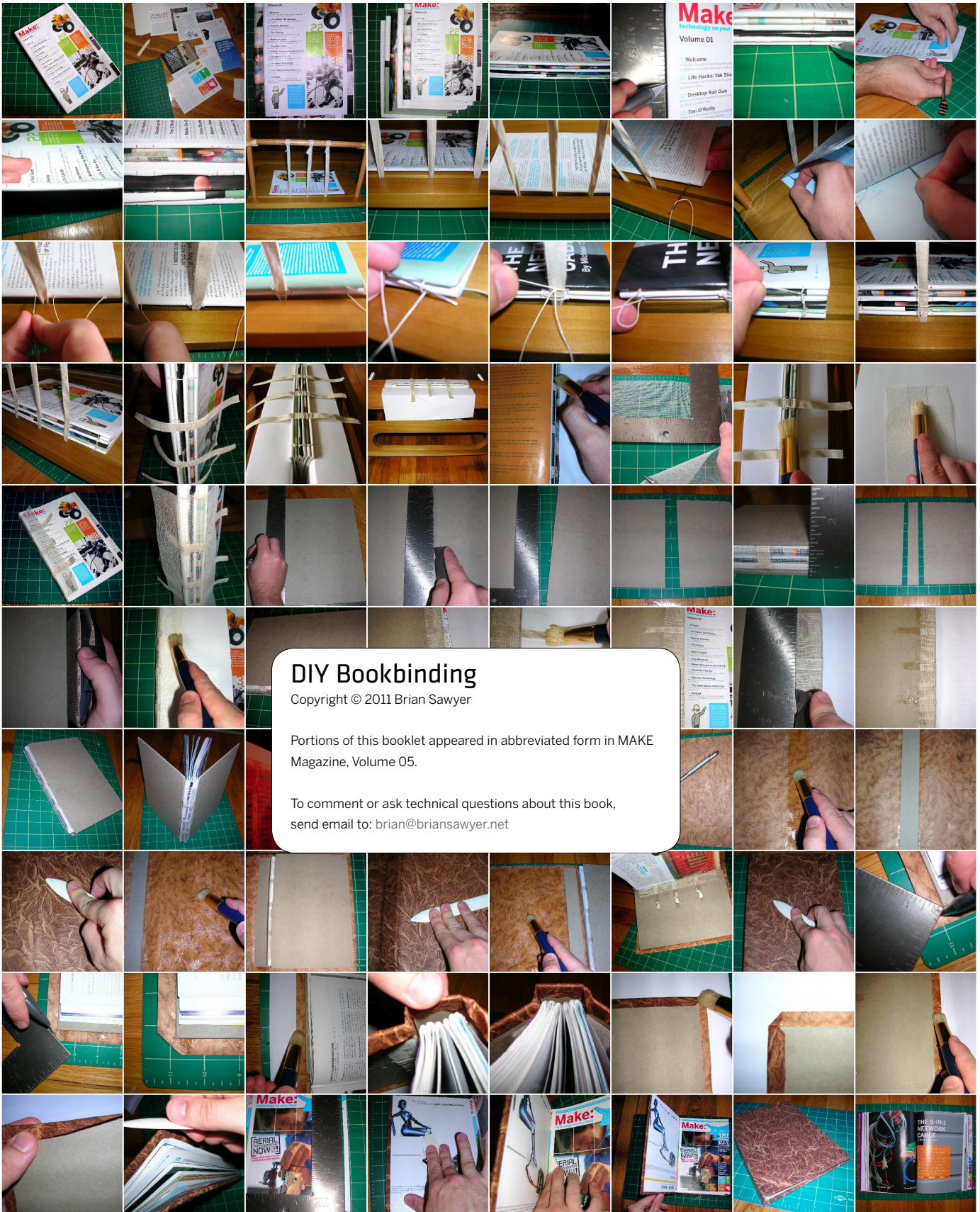
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II DIY BOOKBINDING



Introduction

Magazines aren't really built to last, and in the rush to digital delivery, some folks might argue that they're all but obsolete anyway. But for makers who work with their hands and bibliophiles who still appreciate the physical artifact of the written word, there will always be something special about print. If you're one of these stubborn Luddites, you might just want your library of magazines to last. You might even want your digital content (even this very document) to take on new life as an aesthetic object that survives as a dead-tree edition.

When you've completed this 32-page project (when printed double-sided, it's an even *signature*), you'll have a durable, attractive hardcover copy of this booklet (or your favorite magazine, in the event that the two are not one and the same) that will last forever and lie flat, allowing future generations to carry on the craft and tradition of preserving bona-fide pieces of printed matter.

Most thick magazines or paperback books (such as [MAKE](#), used as an example in this project) are *perfect bound*: individual leaves (a leaf represents two pages, front and back, on one sheet of paper—just like what you'll have if you print this article on 8½" x 11" paper) are collected and glued directly to the spine, where the front and back cover (a single continuous wrapped sheet) meet. Shorter magazines are often *saddle-stitch bound* (longer sheets, representing two leaves each, are folded and stapled at their spine), which actually cuts out a number of steps for hand binding. If you've decided to bind a saddle-stitched magazine (or several into a single book), you've saved yourself a lot of trouble and can skip ahead to stitching the signatures on page 9.

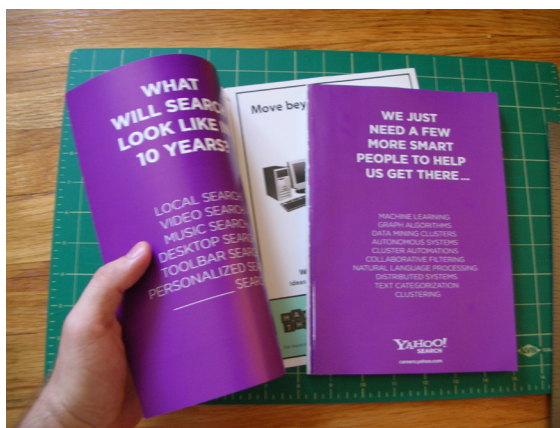
“ Print Pages or Strip the Existing Cover

Before you can begin binding, you'll first need to print this 32-page article or remove the cover and glued spine of a perfect-bound magazine. I found that [MAKE](#)'s cover could be pulled away cleanly by applying gentle but heavy pressure where the cover meets the spine.

If you're printing this article on your home printer, you'll have 32 pages on 16 leaves (assuming you're printing on both sides of the paper). If you're stripping a cover from a magazine you own, use a utility knife and a heavy ruler (a carpenter's square is ideal) to cut about $\frac{1}{8}$ " from the spine (or as far in as it takes to clear the thickness of the glue). The issue of [MAKE](#) magazine used as an example in this article has 192 loose pages, or 96 leaves.

Regardless of the magazine you might be binding, it's likely that its pages can be divided into even groups of 16 or 32 pages (similarly, it's no coincidence that this article is 32 pages long). Because of the way books and magazines are produced (many pages are printed on large sheets, which are then folded and cut as a group), it's more cost efficient to keep the page count to a number that is divisible by a standard number of pages for a pass on the printer (like this booklet, for example). Even if the magazine ends up being perfect bound, the publisher doesn't want to waste any pages for a pass the printer's already making any more than it wants the printer to make an additional pass for an extra page.

When each group of pages leaves the press, it's then folded and cut to form a *signature*: a collection of pages that looks just like a saddle-stitched magazine and acts as a basic building block for a longer book. If you're printing this article to bind, you'll have one even 32-page signature. If you're binding a magazine, you'll likely have some combination of pages that work out to a similarly even signature count.



This article was originally written to show how to bind a perfect-bound magazine—specifically, the first issue of [MAKE](#) magazine. The example used works out to six 32-page signatures. If you're printing this article on double-sided pages on your home printer, you'll have one 32-page signature, excluding the front and back cover. With the exception of the steps on page 10 (in which multiple signatures are stitched together), all other steps in this article work identically for binding this single-signature article.

“ Create Signatures

If you turn a hardcover book on its end and look into its spine, you'll likely see the pages grouped into signatures. Grouping pages like this makes the book's spine much stronger and more durable, keeps pages from falling out (as sometimes happens in a perfect-bound book when the glue wears out), and allows larger books to lie flat, which will particularly come in handy for a magazine like this one, which contains instructions you'll want to keep open for review as you work. Since our perfect-bound magazine is now just a collection of loose pages, we'll need to create the signatures.

Collect your pages into six groups of 32 pages each, discarding leaves that contain only ads. Clothespins do a good job of keeping them sorted while you work. (Note that I turned around the first page, so that the book now begins with the Table of Contents, rather than an ad—just a small personalization you might as well make if you're going to all the trouble of hand-binding the darn thing anyway.)

Start with the first group, moving the others to the side. Opening the group as if it were a book, split it in half, such that pages 16 and 17 are facing as verso (left) and recto (right) pages, respectively.



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Now, pair pages 16 and 17 and set them aside. The facing pages beneath them should be 14 and 19. Keep them facing each other and set them aside. The next facing pages should be 12 and 21. Keep them facing and set them aside, and continue in this way through the rest of the group.

Perhaps this grouping seems strange, but it serves an important purpose and must be followed precisely. You'll now glue these facing pages as you've paired them, so they'll retain the original sequence of the magazine when they're folded together where pages 16 and 17 meet.

On page 16 (and, as you join the other pairs, on all verso pages in the group), make a mark $\frac{1}{4}$ " from the right edge and use your ruler to extend the mark the height of the page.



Cover the left side of the verso page with a piece of scrap paper (you're going to use a lot of scrap paper for this project, so you might want to stock up now), up to the line you've drawn. Using an acid-free, nontoxic adhesive (I'm a YES! man, myself) and a brush, apply a thin coat of glue to the $\frac{1}{4}$ " gully on the right side of the page. Match the page up with your line to glue the two facing pages together.



Do the same for each pair of leaves in the group and return them to the order the pairs were in when you first split the group in half.



Jog the group together to stack them evenly, and fold them along the center of the facing pages. Holding the outside edges of the pages and making a crease at the top and bottom first helps keep the fold uniform and centered. Optionally, and for the smoothest fold, use a bone folder (found by that name in the bookbinding section of most craft stores) to smooth out toward the crease. You've just completed your first signature.

Do the same for each group of pages and collate the finished signatures in their original order.



To make sure your signatures remain in the correct order when you stitch them together, you might want to use a pencil to lightly sign each signature (this is where the term *signature* actually comes from) with a number near the spine. You've now turned your loose pages into a collection of *folded and gathered sheets* and are at the stage of the publishing process known as *F&Gs*.



“ Prepare Signatures for Stitching

Before actually binding your F&Gs, you must sew them all together around strong, ¼"-width linen tapes (ask for *bookbinding tape* at your local craft store) at the spine. This process creates the added durability offered by a hand-bound book.

Using three tapes, running perpendicular to the folds of the signatures, provides for the strongest spine. With your ruler and pencil, make eight marks along the fold of the first signature. Make your first mark ½" from the head of the signature, and make another ½" from the foot; these marks will hold the kettlestitches (the points where one signature is sewn to the next).

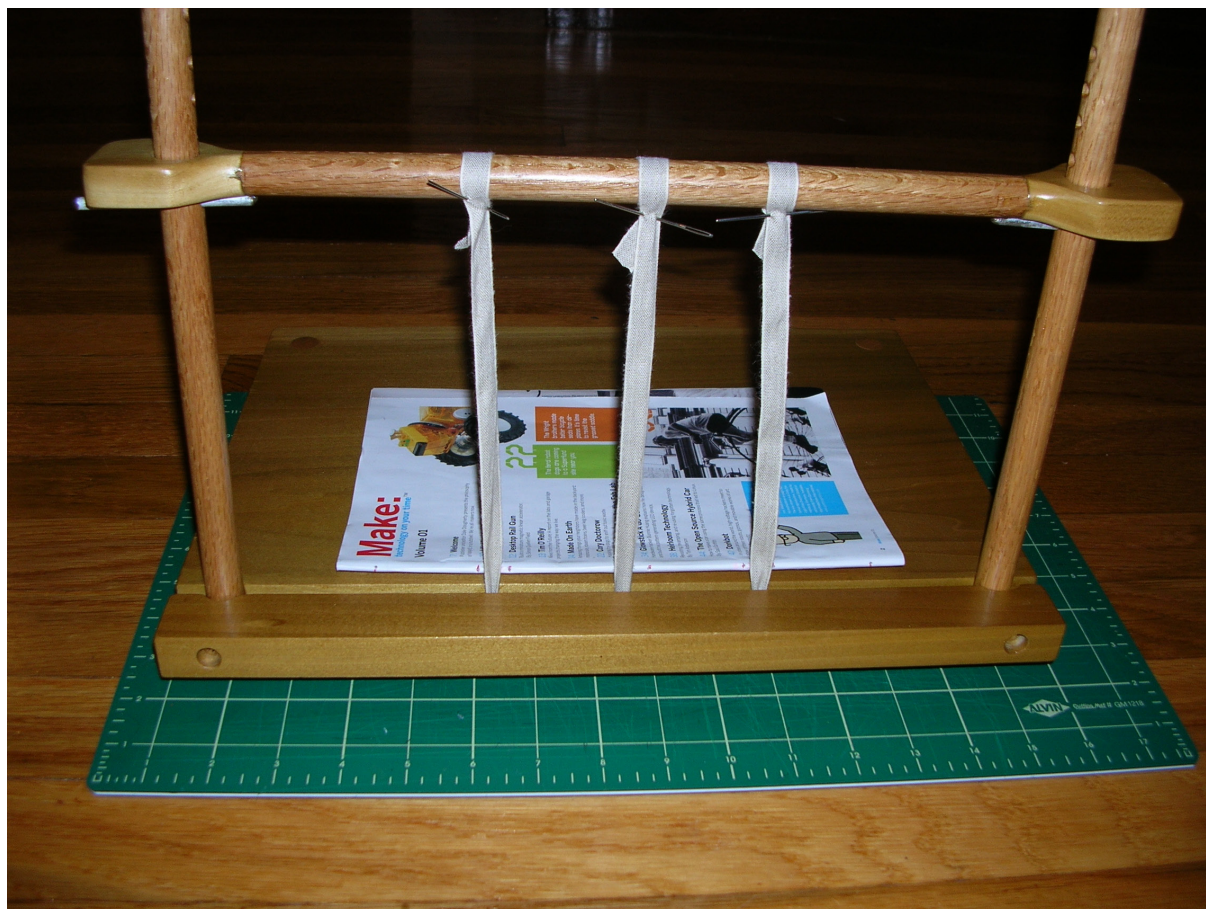
The other six marks represent the points where you'll sew around the tapes (two marks—an *in point* and an *out point*—for each tape). Keeping these marks in pairs just a fraction wider than ¼" (to prevent puckering near the tape when you sew around it), space the three pairs evenly between the two kettlestitches. Stack the remaining signatures to make the same marks, at the same measurements.



Use a medium-duty awl to pierce through the marks you've made in each signature. The holes should be just wide enough to allow a needle to work its way through, keeping the thread as snug as possible against the hole; don't create a huge opening.



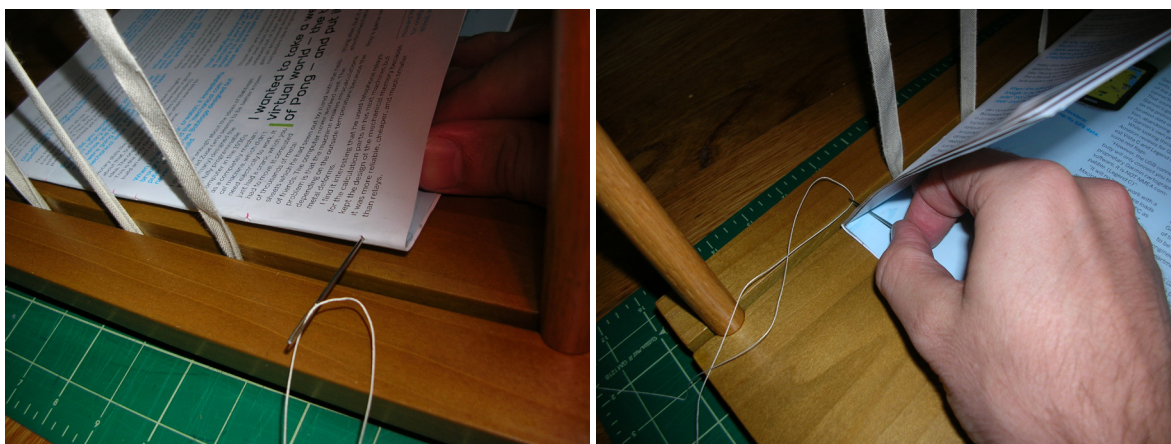
Now, you're just about ready to sew. Though using a *stitching post* is not absolutely necessary (as long as you keep a steady hand, make sure the tapes remain taut, and ensure that the signatures stay even while you sew), it does keep the work organized and easier to manipulate with only two hands. If you have one available, set it up with the tapes stretched tight and spaced to match your holes.



If you're stitching freehand, simply line up the tapes as you stitch; keeping in mind the way they look when attached to the stitching post should help you visualize the goal.

“ Stitch the Signatures

Using a *binder's needle* (or similarly heavy needle, such as a tapestry needle), draw about 30" of *binder's thread* (a thick, durable, acid-free linen) through the kettlestitch at the foot of the last signature.



Exit the spine at the next hole and then enter the spine again, stitching around the first tape.

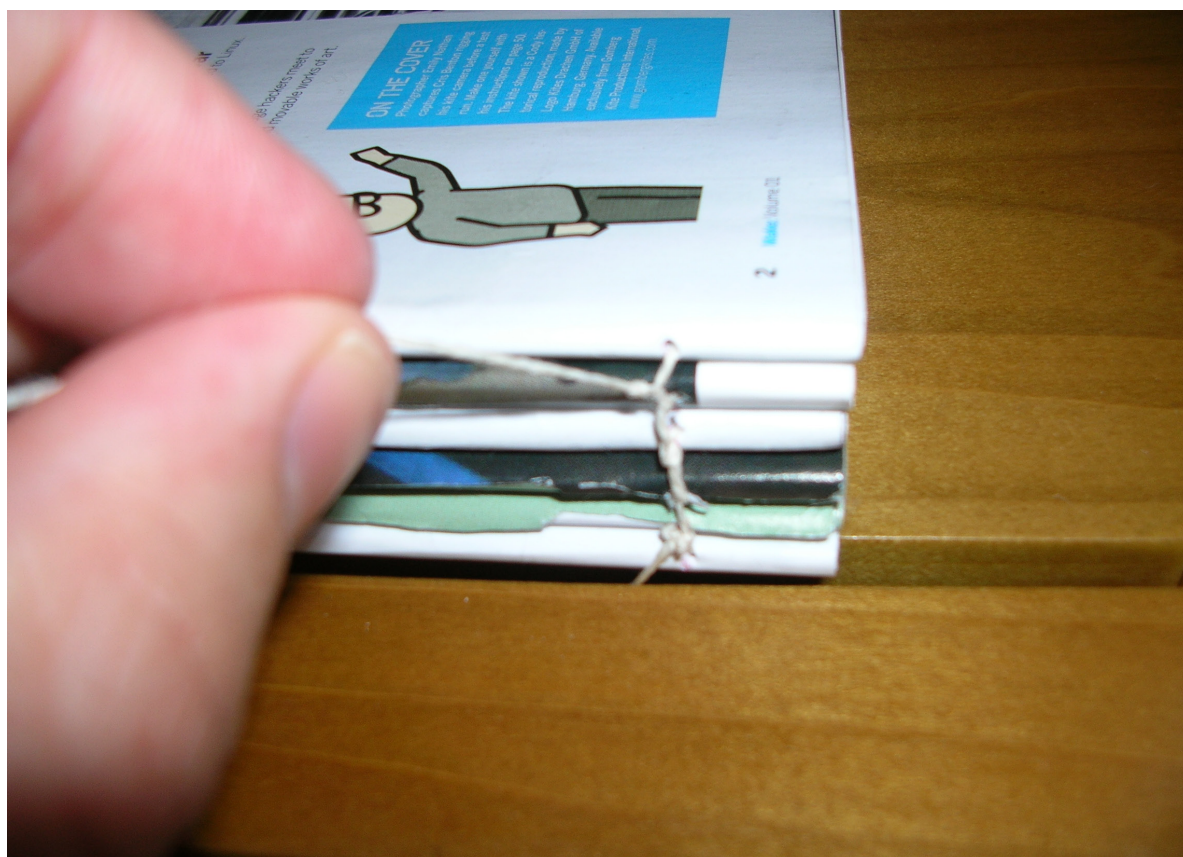
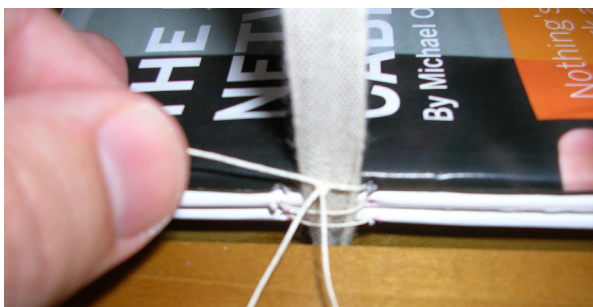
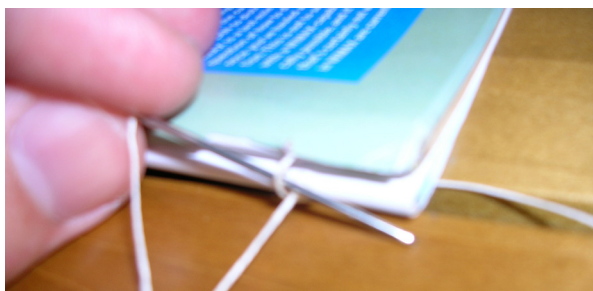


Keep stitching in this way until you exit the spine at the head kettlestitch. Place the next signature over the one you've just stitched and enter the spine at its head kettlestitch. Stitch this signature around the tapes just as you did the previous signature. When you exit the foot kettlestitch, before entering the foot kettlestitch of another signature, loop the thread around the foot kettlestitch of the preceding signature, making a knot.

You'll do this at the foot and head kettlestitches for the remaining signatures, to prevent gaps between these otherwise unstitched contact points between adjoining signatures.

When you run out of thread, knot a new 30" length to the existing thread. The best place to add new thread is just before re-entering the spine around a tape.

Keep stitching till all the signatures are connected, and tie a knot at the last kettlestitch.



Your signatures are now all sewn up and are just about ready to join to a cover and spine.

Remove the work from the stitching post if you used one. At this point, it's a good idea to apply a bit of glue (about $\frac{1}{4}$ " from the spine) to the inside of the first and last signatures (use a piece of scrap paper to protect the portion of the page you don't intend to glue) and put the work under heavy weights (I find *The Compact Edition of the Oxford English Dictionary* works quite well) overnight. Even after the tightest stitching job, you'll likely find the signatures are a little loose on these outside edges, and this does a good job of firming up the book block as a solid unit.



“ Glue the Spine

We now need to attach the *mull* (a strip of cloth) to the spine and tapes. Connecting cover boards to the mull, rather than directly to the signatures themselves, allows for a strong but flexible backbone (hint: this is the key to creating our lay-flat binding), reinforcing the spine and giving you something to connect the front and back covers to. The best cloth to use for mull is white linen fabric with a weave that's loose enough to allow sufficient paste penetration but tight enough to remain strong under pressure. Your knowledgeable craft store clerk should direct you to the perfect cloth specific to this task.

Making sure to keep the work even on all sides and the spine straight, tighten your work in a *press and tub*. If you don't have one of these lying around (and if this is your first bookbinding project, chances are, you don't), no worries: a vise should work just as well. Just make sure to protect the work from any harsh edges of the vise.



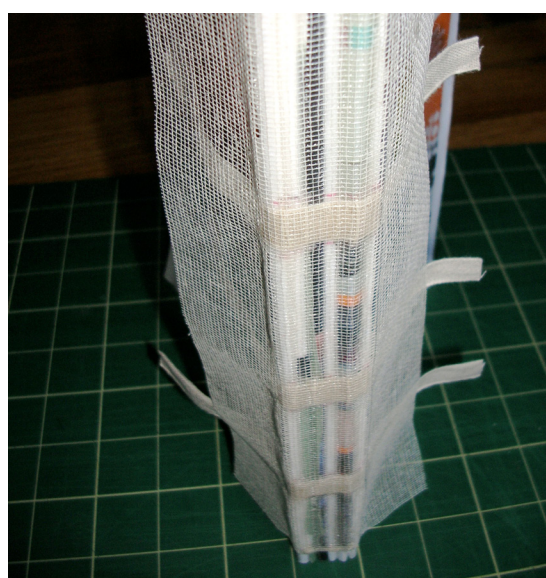
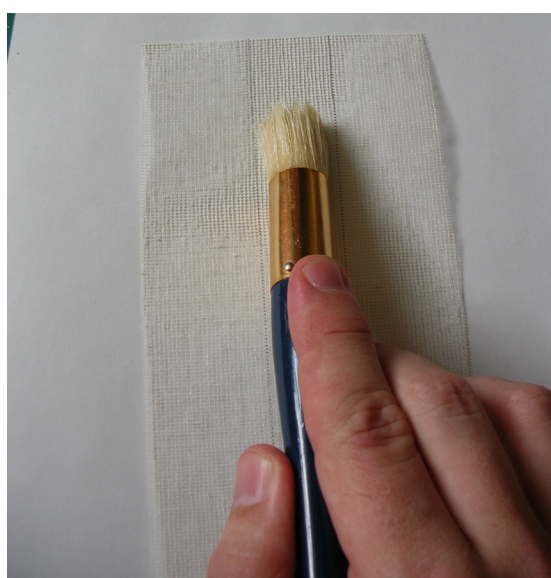
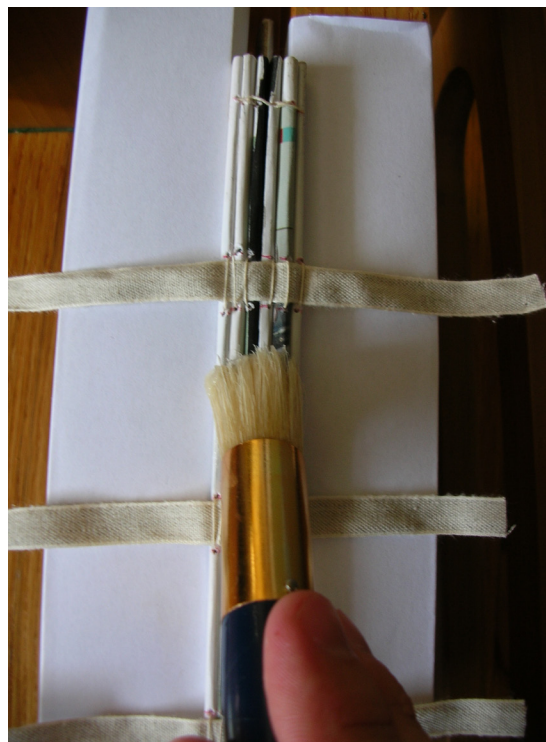


Cut a piece of mull tall enough to cover your kettlestitches and three inches wider than the width of the spine.

Brush a generous amount of glue from the head kettlestitches to the foot kettlestitches and the full width of the spine, including the portions of the tapes that rest over the spine (don't paste the free ends of the tapes).

Measure $1\frac{1}{2}$ " in from either side of the mull to mark the area where it will attach to the spine. Then, generously brush the spine area with glue.

Attach the mull to the spine, covering the head and foot kettlestitches, and work the cloth into the spine with your fingers and a clean, dry rag until the glue is set (brush on a little more glue, if necessary). Leave in the press to dry overnight. Your basic book block is now (finally!) ready to bind.





“ Build Cover Boards

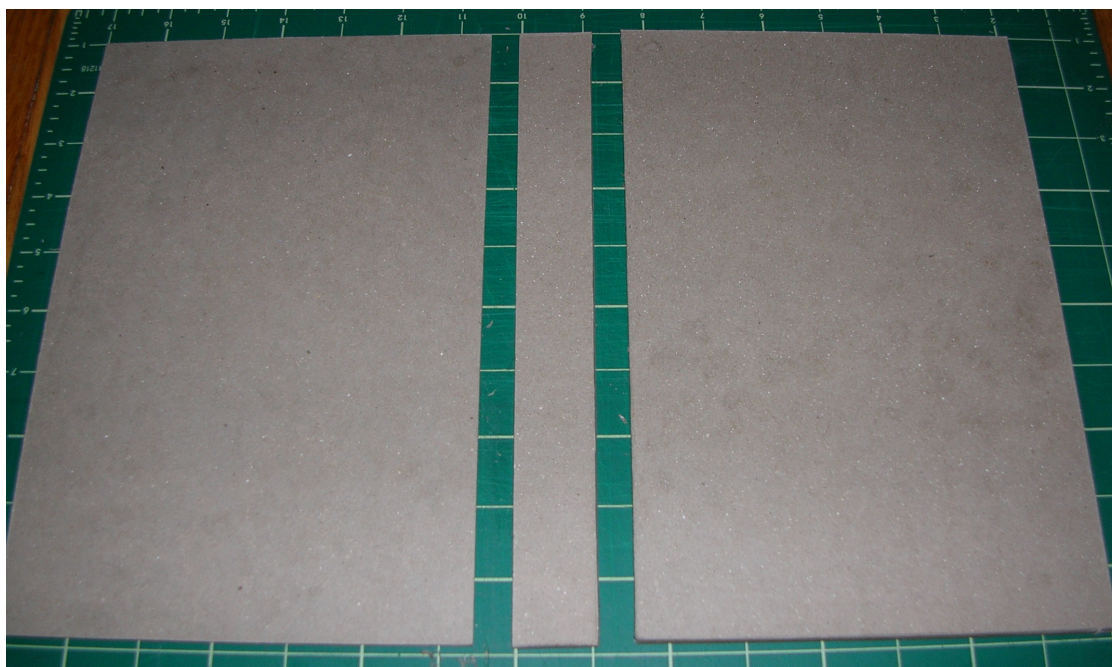
You'll need to cut three boards for your hardback case: the front cover, the back cover, and the spine. Your local craft store should stock *binder's board* (a durable, yet flexible board, about $\frac{1}{8}$ " thick) for this specific purpose, but in a pinch, chipboard or illustration board should also work.

Using your carpenter's square and utility knife, measure and cut the cover boards. Each cover should be $\frac{1}{8}$ " longer than your pages on the head, foot, and fore edges. Every board has a grain, which usually runs the length of the board. Make sure to cut every board with the grain; otherwise, if any stretching or warping occurs, the error will be much more obvious when two boards stretch in different directions.

The edge on the spine side of the front cover should be reduced by the thickness of two boards (in my case, $\frac{1}{4}$ "), to accommodate the hinge. Altogether, then, the front cover should be cut to $\frac{1}{4}$ " taller than the height of the book ($\frac{1}{8}$ " added to the head and foot) and $\frac{1}{8}$ " narrower than the width of the book (after adding $\frac{1}{8}$ " and subtracting $\frac{1}{4}$ ").



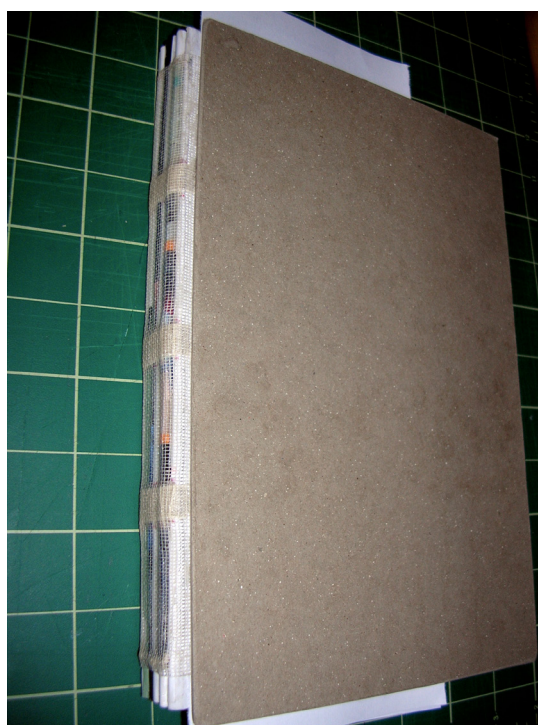
You now have your rough boards. Before attaching them to your book block, use a medium-grit sandpaper to smooth out the rough edges. Otherwise, over time, these edges might catch on shelf edges and wear through the cover paper.



“ Attach the Cover Boards

With your book block of signatures lying face up, place a piece of scrap paper (wax paper actually works better, if you have it) between the mull and the tapes and another piece beneath the tapes. Brush the mull with glue.

Remove the top piece of scrap paper. Press the front cover board against the mull, making sure $\frac{1}{8}$ " of the board extends over the head, foot, and fore edges.

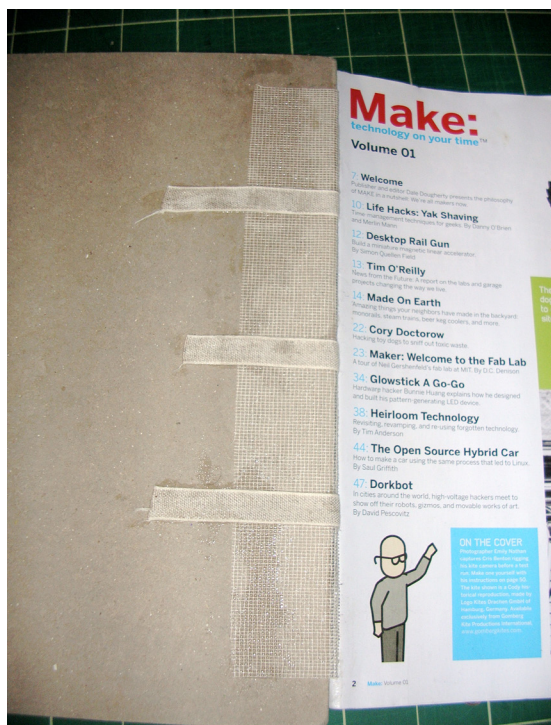


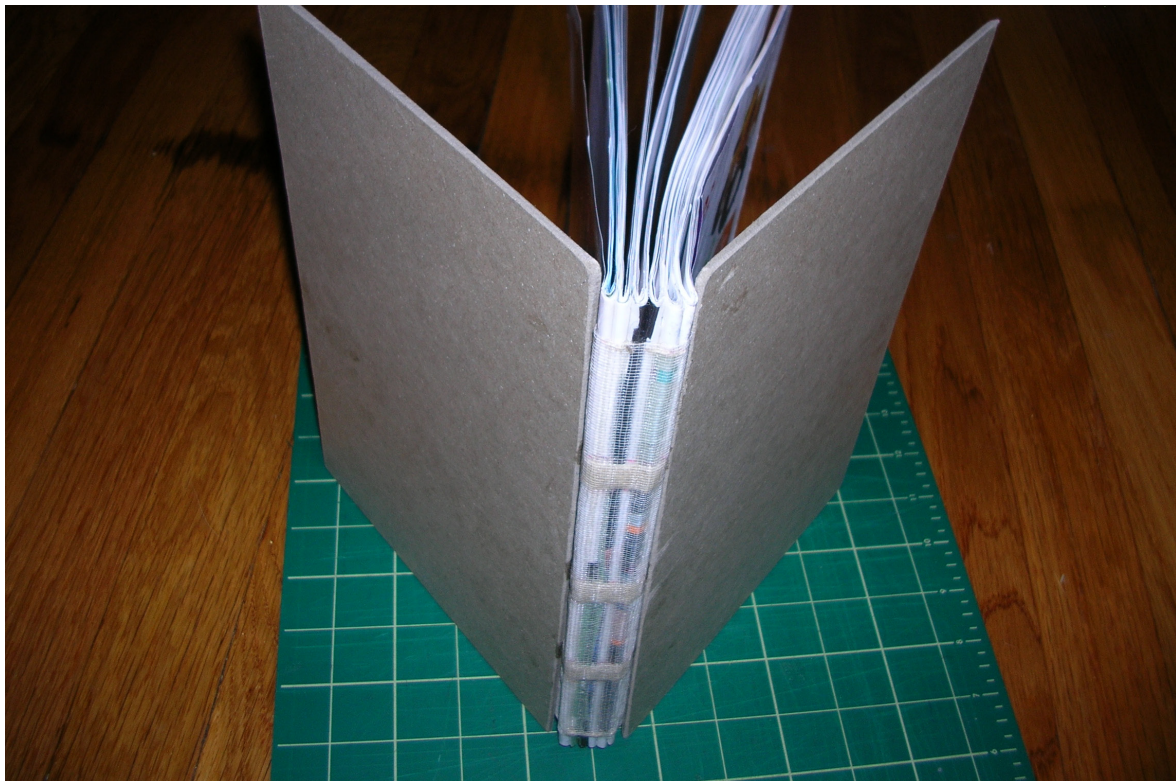
Open the front cover and rest it against a board (or another book) roughly the same thickness as your book along the spine for support. Rub down the mull with a clean, dry cloth or paper until the glue works into the board and becomes almost dry.

Now, apply glue to the tapes and glue the tapes to the mull and cover board, making sure the tapes are perpendicular to the spine. Discard the second piece of scrap paper, and place a clean piece of scrap paper between the cover board and the first signature. Making sure the board is still straight, place the book under weights to dry for half an hour.

To make a more uniform surface (because any variance might show through the endsheets), draw a line on the inside of the cover 1" from the spine and use your utility knife to trim only the mull and tapes along the line (don't cut into the board).

Place a fresh piece of scrap paper between the cover and the first signature, and turn the book over. Repeat the process for the back cover. Your project should start to look like something resembling a book at this point.





““ Cover the Cover

To cover the unsightly skeleton you've created, you'll now cover the exterior of the boards with a single piece of decorative paper, which will wrap around the front cover, back cover, and spine. To accommodate this wrap, use your utility knife to slit the mull by $\frac{1}{2}$ " where the covers meet the spine at both the head and foot edges; doing so creates room to slide the paper's turnovers over the edges of both the covers and the boards.

Now, you're ready for your paper. Pick a piece of decorative paper or cloth that suits your project. It should be thin enough to fold easily (I've learned the hard way how difficult leather and thick cloth are to work with) but strong enough to hold up to glue and wear. The piece you use should be large enough to more than cover your front cover, back cover, and spine.

Lay your cover paper face down and use your carpenter's square and pencil to measure and mark the placement of your boards. Allow $\frac{1}{2}$ " (or the thickness of four boards) turnover (the area of paper that extends beyond the edge of the board, which you will turn over to finish the edge) for all edges and $\frac{1}{4}$ " (or the thickness of two boards) for each hinge (the area between the spine and cover).

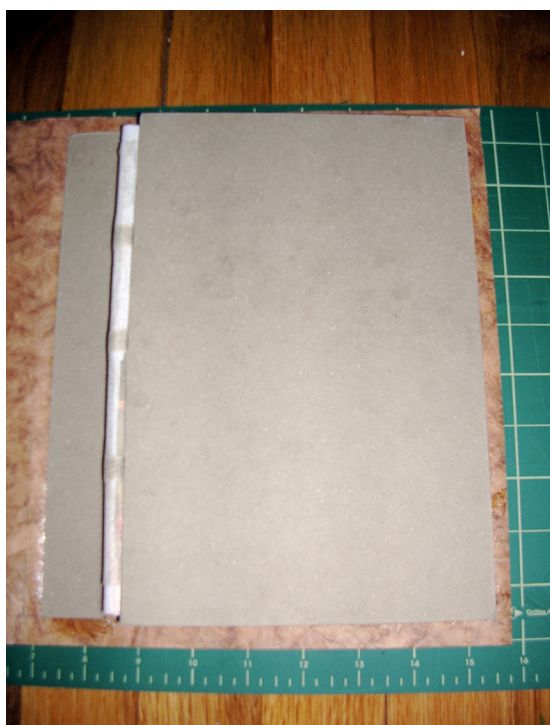


Attach the spine to the cover paper where marked by brushing the paper with glue, positioning the spine board, and pressing firmly.

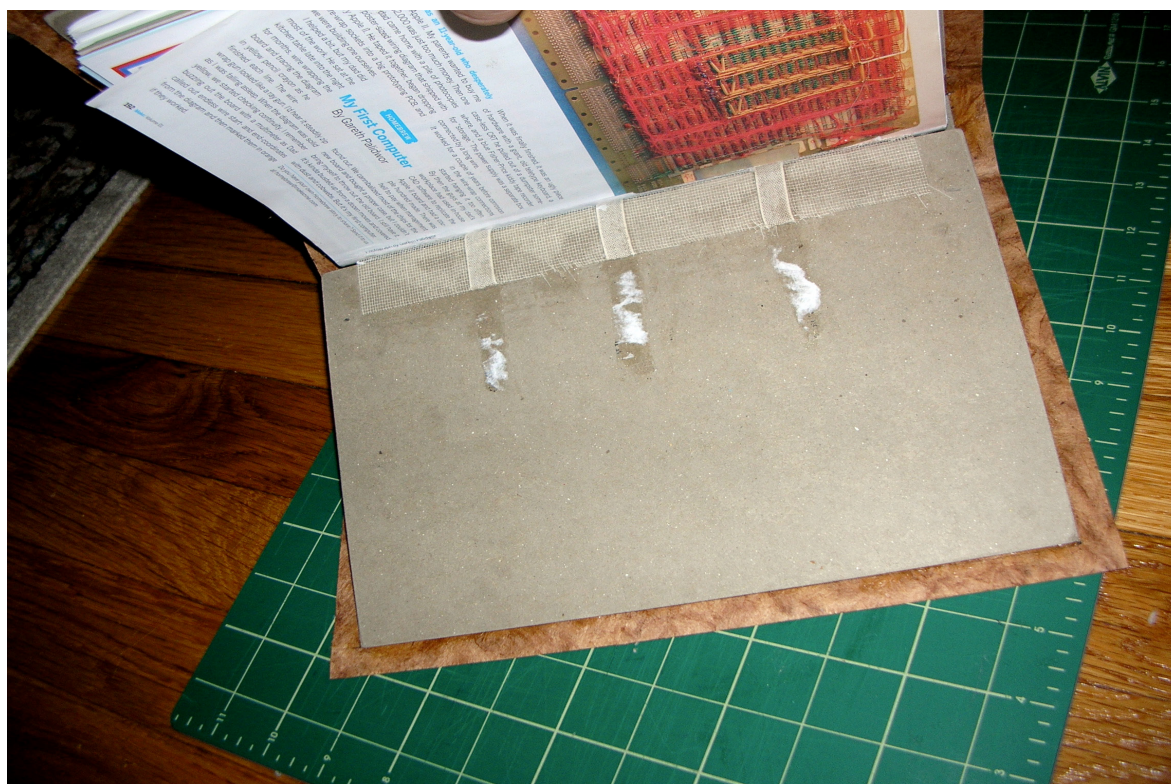
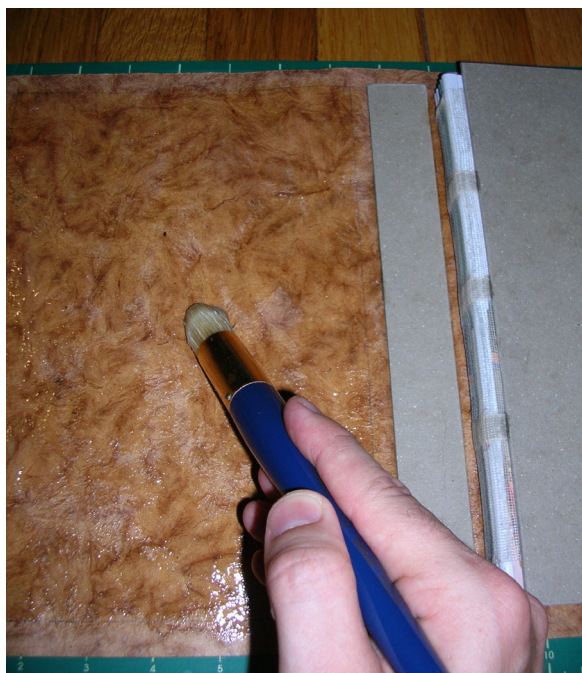
Turn the paper over and rub the paper with your bone folder to secure the spine to the paper and gently mold the paper over the edges of the board.



Next, attach the front cover board. Brush the area you've marked with glue, working from the center outward to just over the line and slightly into the turnovers and hinge. Position the board precisely between your marks and press down firmly. Turn the book over and rub down the exterior of the cover with your bone folder, pressing from the inside out to remove any air bubbles or wrinkles.



Now, it's time to attach the backboard. Apply the glue in the same way you brushed it on for the front cover. To position the board without creating any creases or wrinkles, hold the back cover board with one hand and lay its fore edge down on the paper, lining it up to meet your mark for that edge. With your other hand, pinch the paper to the board on that edge, and slowly work your hand along the back of the book, pressing the paper to the board as you go.

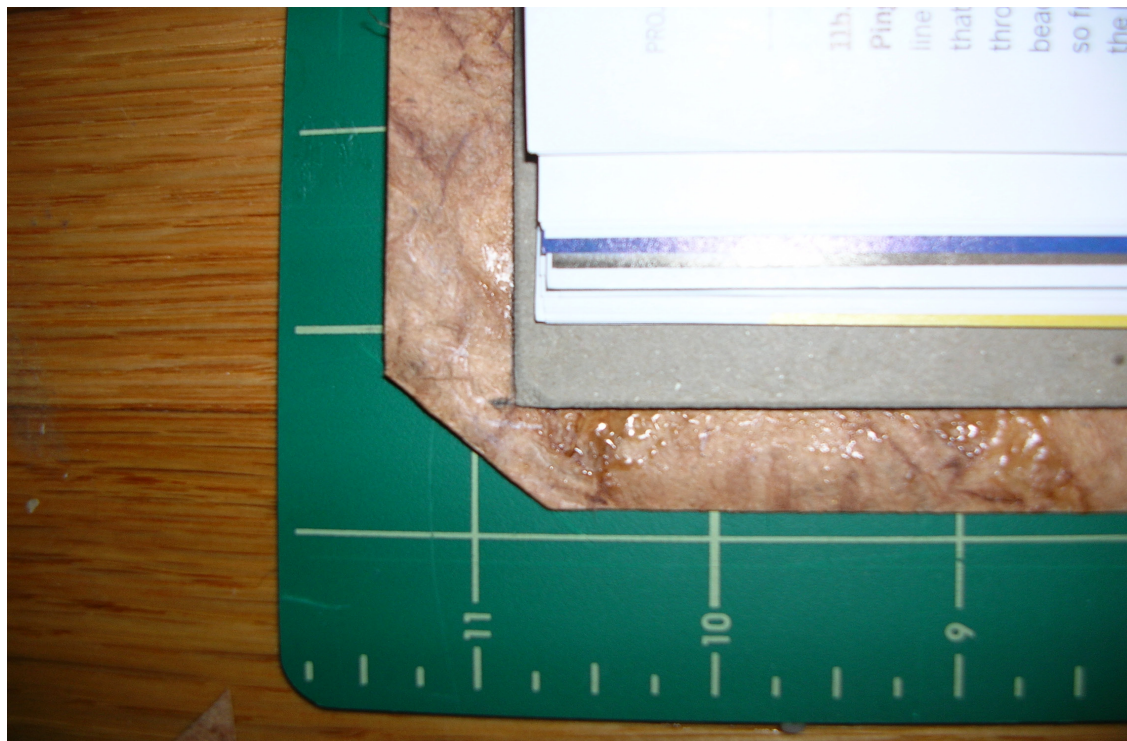


Turn the book over and rub down the back cover with the bone folder, just as you did with the front cover, working the folder into the hinge to seal the paper to your book block around the spine. Turn the book over again and work the folder into the hinge of the front cover.



Wrap the book in wax paper and press for half an hour in your press, in a vise, or under heavy weights.

Before folding the turnovers, you'll need to miter the corners, removing the excess paper at the tip of the corner to prevent an unsightly (and potentially damaging, over time) bulge where the head (or foot) and fore edge fold over each other. Use your ruler and pencil to make a mark $\frac{1}{4}$ " out from the corner of the board. Draw a line at a 45-degree angle and cut away the excess to create your miter. Miter the remaining three corners in the same way.



You're almost done. It's time to fold over the turnovers. Lay the book open and brush a sparing amount of glue across the length of the head turnover. Folding this turnover can be a bit tricky. Stand the book up on its foot edge and use your fingers to gently roll the edges of the head turnover over the top of the board, working from the spine out toward the fore edges. You might need to use your bone folder to work the paper into the spine, since this area might be a little tight, even though you've slit the mull to accommodate the paper (not doing so would have made this step impossible). Do the same for the foot edge.



Before pasting the turnovers on the fore edges, apply a small amount of glue in the crease at the corners and fold over a small portion of paper to create a neat hem. Doing so keeps the paper seam away from the edge of the book and covered by the endsheets.



Brush the first fore edge with glue, fold the turnover, press it firmly, and smooth out any wrinkles or air bubbles.



Use your bone folder to tap each of the corners to make them a little blunt. Removing the sharp edges will help protect the book from wear as it slides on and off shelves.

Lay sheets of scrap paper between the cover boards and your book block of signatures, and press under heavy weights overnight.

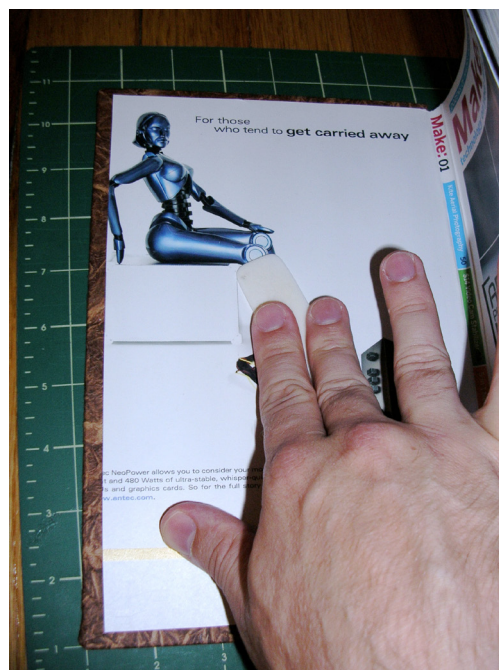
“Finish Up

Your book should now look like a book. The last remaining step is to cover the unsightly interior of the front and back cover. In addition to finishing off the book and making it look more attractive, pasting endsheets also increases the strength of your book, acting as a final reinforcement to draw the cover to the spine. If you were making a blank book, using the first and last pages of the book as your endsheets (and perhaps then covering them with a nice decorative paper to finish them off) would add the most additional strength, because those pages are actually stitched and glued to the spine.

But since your first and last pages contain content (including the important TOC on the first page), you'll want to use paper specific to this task. I decided to use **MAKE**'s original wraparound cover as my endsheet for the front cover board. Its thick stock works well for extra support and looks quite nice. I simply trimmed it to fit (leaving the same distance to each edge of the book) and pasted the back of the wraparound cover to the front cover board. Allow glue to run into the spine of the wraparound cover, because you'll want to use that area to cover the point where the cover meets the spine and extend into the front page by about $\frac{1}{4}$ ". This grips the endsheet to the book block and adds reinforcement to the spine.



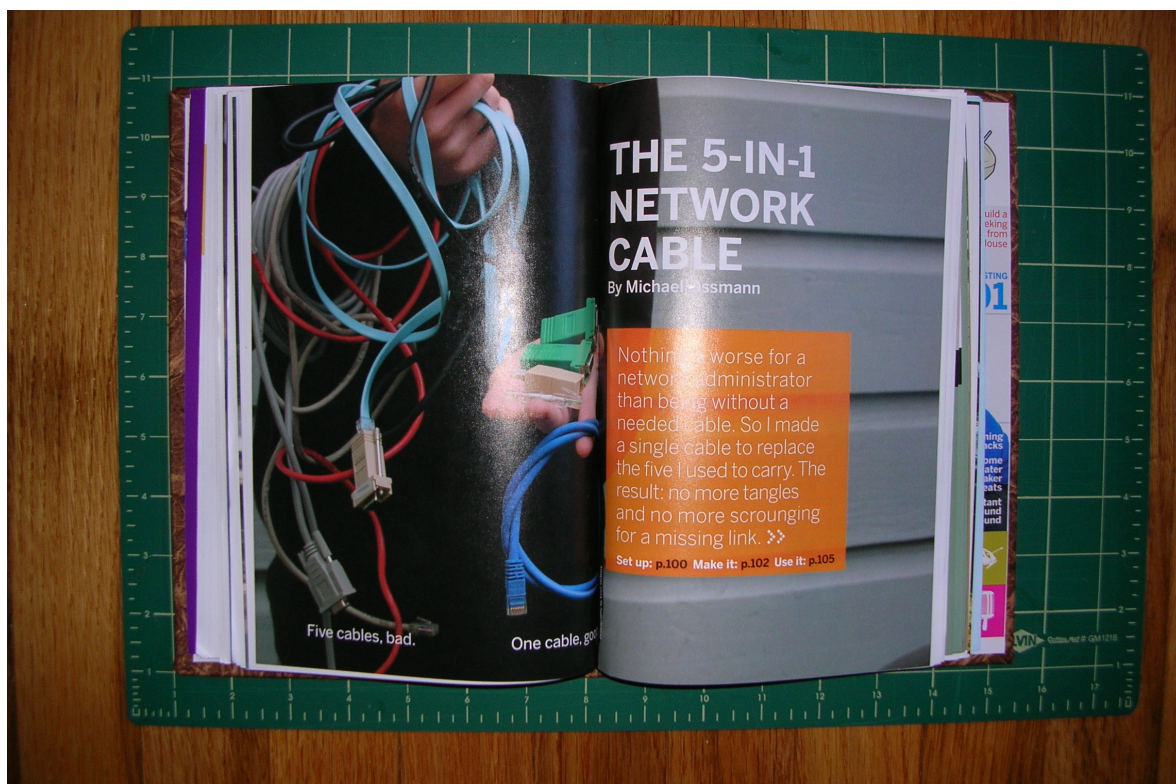
You'll need to cover the back cover board in the same way. Since I'd already stripped the cover from **MAKE: Volume 2** (my next bookbinding project), I went ahead and used that for my back cover (guess I'll need to be more creative with picking my endsheets when I bind Volume 2), trimming off the unwanted back cover ad, but leaving enough room to allow the $\frac{1}{4}$ " spine area to cover the gutter and connect the endsheet to the final page.



Put fresh pieces of wax paper between the covers and the book block, and set the book under heavy weights to dry overnight. You'll wake up to a copy of [MAKE](#) that will last forever, as well as look unique and serve you well.

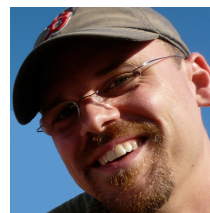


As you can see, the finished book lies flat, perfect for following an article's instructions while working on a project like this one.



“ About the Author

Brian Sawyer is a senior editor at O'Reilly Media, where he manages the Missing Manuals division. He's also served as lead editor for the company's popular Hacks series, editor for Head First and Make: Books, and contributing editor to *Craft* magazine. When not writing, editing, or teaching about the technology, his favorite Android apps help him train for marathons (see Chapter 4 of *Best Android Apps*). You can find him on Twitter at twitter.com/briansawyer, visit his blog at www.briansawyer.net, or contact him at brian@briansawyer.net.



Appendix: What You Need

These materials and tools are available at most craft stores, some of which even have a dedicated bookbinding section.

““ Materials

Magazine (or pages) to be bound
Acid-free nontoxic adhesive
Bookbinding tape, 1/4" linen
Binder's thread (durable, acid-free linen)
Loose-weave white linen fabric
Binder's board (1/8" thick)
Decorative paper (for cover and end sheets)

““ Tools

Utility knife and cutting mat	Stitching post (optional)
Heavy ruler or carpenter's square	Binder's needle
Clothespins	Press and tub or vice
Pencil	Clean rag
Brush	Medium-grit sandpaper
Bone folder (optional)	Scrap paper or wax paper
Medium-duty awl	