

Hand-Punching My Own Rolls From Midboek Templates

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Like a lot of COAA members, I'm a retired guy with an "I can do that myself" attitude toward life. After finishing *Epona*, my John Smith Senior 20 organ, I purchased a number of commercial rolls for the organ, but knew from the beginning that I wanted to produce some of my own.

I started construction of a computer controlled punch, but got bogged down when trying to wire and install a bunch of tiny infrared sensors. I hope to finish it sooner or later, but in the mean time I decided to do some hand-punching. In this article I will outline how I constructed a traditional foot-operated, single-hole punch, used free Midibook software to print templates, and produced my first rolls from my own MIDI arrangements.

Two COAA members helped me develop a sense of direction. Mike Knudsen's article covered several aspects of this approach in "Punch Your Own Organ Rolls (with Computer Help)" in the *Carousel Organ*, Issue 15, April 2003. Mike uses a computer program that he wrote himself and which runs only under the Linux operating system. He punches holes with a modified spring-loaded center punch and cuts slots with a craft knife. Dave Wasson also discussed both hand punching and computer-based arranging when he hosted COAA members at his home in Erie, PA, before the 2006 DeBence Rally.



Figure 1. This shows the overall configuration of my punch. Pressure on the foot treadle is transmitted to the punch rocker by a steel push-tube. Most of the return force is provided by the weight of the push-tube, but a loop of shock cord provides a bit more "omph." I usually punch with the side extensions down, but use the extensions for trimming and stapling.

My Punch

Figure 1 provides a general picture of the punch I built. I unsuccessfully tried to find plans for a "simple" foot operated punch. Terry Haughwout's "The Haughwout Book-punching Machine" in issue #22 of the *Carousel Organ*, and a description of book production with a single photo in Chapter 10—"The Notation of the Organ Books" in De Waard's *From Music Boxes to Street Organs*, are available for review, but too complicated for what I had in mind. I knew I had to meet about six critical requirements:

- To punch through at least one layer of roll paper.
- To punch 4 mm (5/32 inch) holes.
- To span a 140 mm (5 1/5 inch) wide strip of paper.
- To have a way of handling paper strips up to 30 meters (100 feet) in length.
- To use a foot to punch holes, leaving both hands free to handle paper.
- To be cheap, quick, and easy to build.

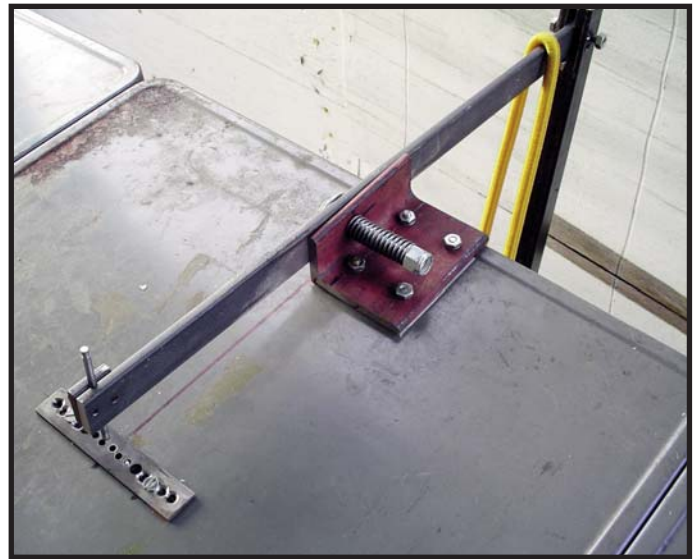


Figure 2. The pivot-arm is made from a 19 inch piece of 3/16 by 1 inch hot-rolled steel bar. The pivot is located 11 1/2 inches from the rear end. When this photo was made the original mild steel die and non-hardened punch were in place.

Also I did not need anything as massive as a book punch since I would be punching paper, not cardboard. I decided on configuration using a rocking punch beam, shown in Figure 2, a rocking foot pedal, shown in Figure 3, and a push-rod connecting them.

I began construction with an old typing stand. Most of the dimensions were based on materials I had on hand. Only three modifications to the typing stand were required. I added a wooden cross-member to support the foot pedal pivot, and added a steel channel to the underside of the table top to stiffen it. I put a notch in the back of the drawer to clear the die plate attachment screws.



Figure 3. The treadle is made from a 15 inch piece of 3/4 inch by 1 1/4 inch steel channel. The pivot is located four inches from the rear end. The vertical bolt through the treadle provides an adjustable down-stroke stop.

The punch itself is made from oil-hardening drill rod. The initial die plate was hot-rolled steel, but it wore out quickly and I made a replacement from oil-hardening steel strip (**Figure 4**). I bought the heat-treatable steel from Enco (www.use-enco.com). All other metal came from scraps and a local home center.



Figure 4. This shows the punch and die assembly. The punch is made from rod by lathe-turning a taper of about three degrees near both ends, making it reversible. Each die plate has a series of nine holes, allowing shifting between three positions as the holes dull. The attachment holes in the table surface are over sized. The punch is brought into the hole to set the plate's location, then the screws are tightened to lock it in place. Both parts were made from oil-tempering steel, heated until red hot, and dropped into waste motor oil.

Except for the punch and die, none of the dimensions are critical, but those shown do work.

For a swinging punch like this, the punch should be cone-shaped, as shown in **Figure 5** and it helps if the underside of the die is taper-reamed as well.

This design could easily be adapted to punch standard 20 or 26-hole rolls just by changing the punch and die diameter.

I position the paper by eyeball, and for most tunes I just let the paper fall off the two ends of the table into plastic boxes. I move the paper from left to right with my right hand while my left hand does the vertical positioning and serves as a hold-down. You could do slots for sustained notes by punching the ends and then cutting the sides with a knife, but I have found it easy enough to just punch a series of overlapping holes.

More traditional punching machines use stop fences to precisely set the vertical, or cross-wise, position of the notes. This is probably important when punching from hand-marked templates, but with computer-printed templates note outlines can be printed to an accuracy of about 0.1 mm. At least for 20er rolls hand-and-eye positioning is sufficiently accurate.

I wasn't sure whether my punch could handle more than one layer of paper. As it turns out, it punches a double layer of paper—currently a top layer of computer paper and a backing layer of light butcher paper—more cleanly than a single layer. Usually I use the two layers as two copies of the composition, but sometimes as repeated verses of the song.



Figure 5. This photo of a cheap hand-punch shows the conical shape desired on a swinging arm. On such a design the punch actually rotates as it enters and leaves the die, and the taper allows both smooth motion and reduced clearance.



Midiboek for Windows

Midiboek is a software package developed by a Dutch team to translate MIDI files to templates for many kinds of mechanical musical instruments. It can print rectangular notes of specific lengths for fair or street organ books, circular notes printed as one circle per note for music boxes and pianolas, or chain a series of circular holes for pneumatic instruments such as keyless organs. For more complex instruments, it provides support

for percussion, counter melody, and register mechanisms. There is also some support for multiple tracks and absolute lengths for use in preparing barrel templates for music boxes or organs. **Figure 6** shows portions of several roll templates printed with Midiboek.

Midiboek is a printing program, not an editor because it makes no changes in the original MIDI file. Many adjustments, including note lengths, tempo, and key transpositions can be made during processing but these are not saved.

Midiboek accepts standard midi files in both Type 0 and Type 1. To allow a single program to produce virtually any form of roll or book template, it uses a scale file called a Gamma file. This scale file includes the spacing of the tracker bar holes and the card or the paper, the speed of the book or roll, note arrangement of the tracker bar, counter melody and percussion assignments in the MIDI file, and several other things. Midiboek is packaged with several standard scales, and the user can write additional scales. Once a Gamma file is selected, the program lets you preview the approximate end result by playing only those notes which fall within the instrument's scale.

Midiboek for Windows is written to run on Windows '95 and later versions, including Vista. Basically, if any sequencer program like Cakewalk runs well on a machine, Midiboek will work without problems. Midiboek is distributed FREE as a zip file of about 4 Mb via the Internet.

During translation Midiboek produces an intermediate file as input for preview or print called a "printscript file." This file remains on disk until the next translation and it can be edited and reloaded or used for other purposes. This file is in fact a text description of the print result. Since the file is a plain text translation of the MIDI file, a semi-skilled programmer, like myself, could use it for all sorts of purposes. Wagner Mello, of Herndon, VA has a web page describing how he uses the Midiboek printscript file as input to a punching machine working under a CNC protocol.

The program has a banner printing option. This makes it possible to print on a continuous piece of paper. If you have suitable paper, the output can be punched by hand and used directly as a roll.

The programming was done in Dutch, but the operating menu allows the user to display menus in English, French, German, or Dutch. The supporting documentation is also available in all four

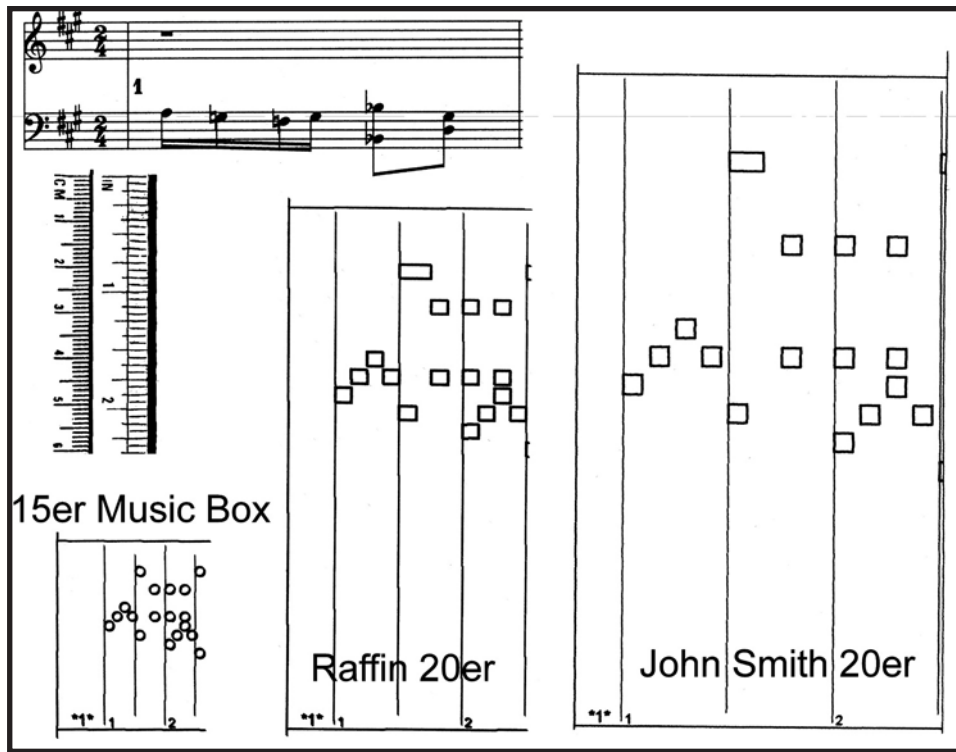


Figure 6. These are scans of roll templates prepared with Midiboek for three different instruments, a standard "Raffin 20," a "John Smith 20," and a 15-note Kikkerland (Yunsheng) strip music box, along with the score for the same music. The bass notes are at the top, and the music has been transposed to fit the scale of each instrument.

languages, and I found the English translation to be to a very high standard. Preparing Gamma files and reading some reports will require you to learn a few technical words in Dutch (i.e. "TOETS" means "Note" and "SLAGW" means "Slagwerk," or "Percussion").

My Experience with Midiboek

Since I am only punching rolls for a Smith 20er organ, I have only needed and tested a limited set of the features found in Midiboek.

It takes a little care to write and fine-tune a gamma file, but the print output can be adjusted to provide 0.1 mm precision on most printers. I had no trouble writing a John Smith 20er Gamma file, starting from the "Raffin 20" file included in the distribution package.

Although the program is intended for use with Microsoft Windows '95 and '98, it will run under Windows XP and print individual page templates on my laser and inkjet printers. These had to be cut on all four sides and taped together to produce a roll.

It would not, however, print continuous rolls properly, even when used with printers set to run in banner mode under XP. I spent a considerable amount of time trying various old printers, and a new printer, trying to solve this problem. I exchanged emails with the Midiboek developers and found that they have the same problems with Windows ME, XP and Vista. It seems Microsoft has decided that we should not want to use dot matrix printers, or print in banner mode, so they have stopped providing that support for us. The three most recent versions of Windows count the number of lines sent to the printer and insert line and/or carriage return signals.

Eventually I found a simple solution by moving to an older computer, replacing Windows ME with Windows '98, and buying a new Panasonic KX-P1150 model, available at about \$150, which will handle both fan-fold computer paper and narrow paper.

In addition to printing JS-20 rolls, I made a gamma file for a 15-note Kikkerland (Yunsheng) strip music box which I bought at The Music House, in Traverse City, MI after the 2007 COAA St. Joseph Rally. I printed it on card stock with my laser printer, punched it with the small hand punch which came in the music box package, and it plays properly.

Paper for Music Rolls

When I started on the computer controlled punch I needed rolls of 140 mm wide paper. I built a simple roll slitter that cuts three 140 mm strips from an 18 inch wide roll. Finding 18 inch by 1000 foot rolls of white “butcher paper” at my local Sam’s Club, I can slit and spool strips which are sufficiently accurate for my process.

Since my transition to Midiboek I have been printing on traditional letter-size fanfold computer paper with the holes on the edges. This has the advantage of assuring accurate feeding, but must be taped at each fold. This paper is still available at office supply stores at about \$20 per box.

I am now printing on fan-fold paper, taping the joints with scotch tape, stapling the printed copy on top of a strip of the white butcher paper—the staples are along one edge at about two foot intervals—and punching two layers..

A Few Remarks on Arranging

In general, Midi files need to be re-arranged with a sequencer program before they are usable on a mechanical instrument. At the very least, you will need to fit the notes in the MIDI file to the scale of your instrument. Usually you will need to shorten most, or all, of the notes to get a proper band organ sound.

You don’t have to understand music theory, or even read music, to edit music files for grind organ rolls. In the “piano roll” view, included in most sequencing programs, one can play the music slowly, listening to each note. Where you think you can improve the music you can stop and adjust any note’s beginning or end point, change the pitch, or insert or delete notes. Of course the more you know about music the more successful you are likely to be, but a good ear is more valuable than a lot of theory.

You can start your roll by entering notes from sheet music, by playing on a MIDI keyboard, or with MIDI files from any source. There are a lot of MIDI files available on Internet. These range from ones created by people who seem to have taken no music lessons at all through full concert arrangements of symphonic and band works. I have found about 350 scans of Wurlitzer band organ rolls and scans of over 4000 piano rolls, in addition to a couple dozen ready-made 20er arrangements.

The Wurlitzer band organ roll scans seem to be an excellent beginning for producing a grind organ roll. They still require a significant amount of massaging such as transposing bass notes up and/or dropping piccolo trills, but have approximately the right note lengths, and good counter melodies and ornamentation.

The producers of Midiboek also distribute a free editing program called *Noteur*. Their program is much more limited than commercial programs such as *Cakewalk*, *Encore*, and *Record Session* which are sold for general midi editing. On the other hand, *Noteur* is specially written for roll and book editing and has features not found in most other editors. Of special utility are the tools to shorten (or lengthen) all notes by a specified amount, to convert all patches (instrument voices) to organ, and display multiple registers in different colors on the same “piano roll” view.

In addition to using *Noteur* I use *Power Tracks Pro* from PG Music, which costs under \$50. Both *Noteur* and *Power Tracks* have a piano roll editing window, which I use for detailed work.

Each of the two programs has its own strengths.

Power Tracks lets users view an event list for each track. When working over MIDI files obtained from others, I examine that list and delete all events other than musical notes.

In *Power Tracks* note length, tone, and start time are easily adjusted with a mouse, or removed with the <Delete> key. *Noteur* requires the use of <Shift> and <Ctrl> keys with the mouse to accomplish the same tasks, and I find that is less convenient.

Noteur has convenient ways to identify, select and transpose notes which fall outside the organ’s scale.

On playback, *Midiboek* can be set to play only the notes included in an instrument’s scale, but otherwise play the file as coded. This can result in a poor representation of the final result if the original file has not been properly modified.

First of all, it is important to choose an appropriate sound for the voices. For my simple organ I use “church organ.” In addition to selecting the initial voice, some MIDI files I have found that this requires removing voice changes and/or pedal signals from the event list.

Second, it is important to adjust the volumes of the various tracks to the correct levels. For my simple organ this means using the same level for all notes. When starting from some MIDI files I have found this also requires modifying the velocities of the notes.

Third, I have found that overlapping notes can be deceptive. When the rhythm in the melody is carried over the same tone in an extended note in the harmony, on a simple organ only the extended note will be heard, and the melody may be lost. After deceiving myself with a couple of tunes I now go through the file repeatedly in piano roll view eliminating every note overlap I can find. I also use the “remove overlapping note” command in *Power Tracks*. I then use *Noteur* to remove all notes which fall outside the 20-er scale.

A file should be edited until you consider it faultless. It is better to do many electronic edits before punching than to punch a roll many times.

When you first think about hand-punching organ rolls, it looks like a nearly impossible task. When trying it, you find that it is just punching one hole at a time, and I’ve found that I can punch something on the order of sixty holes a minute. With each punching session I feel more confident that I will be able to have a good number of the rolls I want. When you stop to think about it, maybe it’s a lot like knitting. Most of us can not envision knitting a sock, but know women who turn out sweaters in family size lots. To paraphrase Mao Tse Tung “a Gavioli roll for Beethoven’s *Fifth Symphony* starts with a single hole.”

Resources

R. De Waard (Translated from Dutch by Wade Jenkins), *From Music Boxes to Street Organs*, The Vestal Press Vestal, New York, 1967, Library of Congress Card Catalog Number 67-27808

Mike Knudsen, “Punch Your Own Organ Rolls (with Computer Help),” *Carousel Organ*, Issue 15, April 2003. Available on *Carousel Organ* back issue CD.

You can download the *Midiboek for Windows* software (in version 5.3 as this is written) and *Noteur* from <http://huizen.daxis.nl/~Ppaardekam/>

You can download my John Smith 20 note “Gamma” file, and a .GAM file for 15 note music box strips, from my web site www.Wallace-Venable.name

You can download Mike Knudsen’s *UtiMusE* program, and some of his MIDI files, from his website <http://members.aol.com/>

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