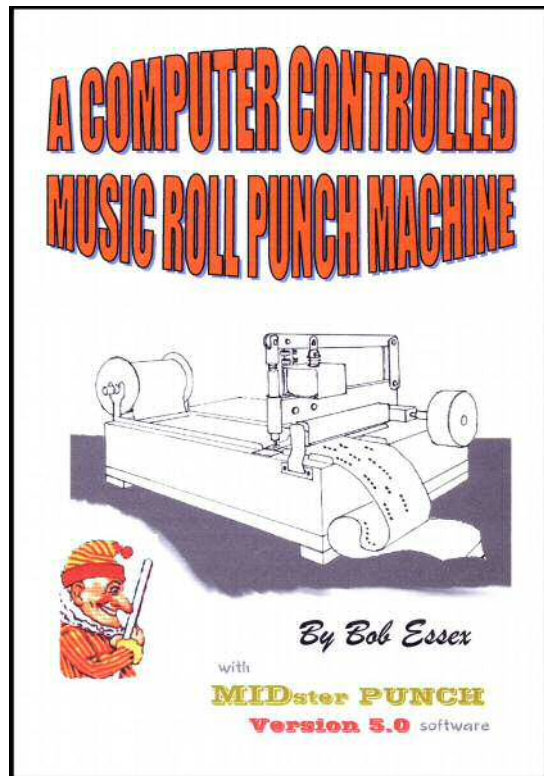


Running the MIDster Punch

abstracts from



Note: The MIDster booklet was produced by Bob Essex between about 2000 and 20010. It appears that Bob is no longer supporting the machines. This abstract contains only information regarding operation of the machine, and was created solely for the use of individuals who may have acquired one of these elderly orphan machines.

===== From the booklet =====

1. SCOPE OF THIS BOOKLET

This booklet sets out to describe, in very general terms, the construction and operation of a computer controlled punch which produces organ-roll music from Standard MIDI* files. (*MIDI stands for Musical Instrument Digital Interface.)

It should be appreciated that this booklet is not a set of plans. It is a description of the punch machine that I have built, with as much detail as I can manage to include. With it there is a diskette containing the MIDster PUNCH v5 .0 software to run the machine.

I made this punch machine to produce perforated paper roll music of the type standardised by Joseph Raffin of Germany, in both 20note and 31note formats. It also produces the strange (but useful) 26note scale, ... A later software modification now enables it to punch the John Smith 20note format also. The MIDster PUNCH software is flexible and its user interface allows wide variations in the spacing, increments and numbers of notes . Of course the diameter of the punched holes is determined by the punch itself.

6. THE MIDster PUNCH SOFTWARE

Your MIDster PUNCH software is on the diskette which accompanies this booklet. It will run on any suitable Personal Computer which has DOS as an operating system, either with or without Windows.

Copy the contents of the diskette to your C: drive in this way:- (Go into the DOS screen if in Windows) At the C:\> prompt type **A:.** The A:\> prompt will appear. Then type **load .** The diskette will copy the software program to the C: drive. The menu will appear, with the C:\> prompt below it.

Alternatively you can run the punch software directly from the diskette if you wish by accessing the A: (or B:) drive: At the C:\> prompt type **A:.** The A:\> prompt will appear. Type **run .** This will give you the menu screen.

When you see the menu, enter **1 2** or **3** for the type of roll to be punched. These are batch files which will run a Roll.exe file to actuate the punch. Enter **X Y** or **Z** if you wish to set up the punch parameters beforehand. This will run an Editini.exe file. (See chapter 6.1. below).

The punch software will need setting up before you can accurately punch a roll of music. This needs only to be done once for each of the three roll formats; 20/26note, 31note and John Smith 20note. Some care will be needed to produce an accurate hole layout, using the "Align.mid" file to produce a punched line of holes as a test-piece. Once this is done, the parameters are automatically saved until you wish to alter them again.

The three software suites on the disk have identical program software, although their Editini.exe files contain default values for 20/26 note, 31 note and John Smith 20 formats respectively. You may create more suites by copying the files into a new folder, or change the existing format values to the type of music you wish to punch.

6.1. EDITINLEXE

When you run the set-up program, X, Y or Z for one of the three types of format, the dialog box asks you to state new parameters or confirm the existing ones [shown in brackets] with an "enter" (.) command.

LPT Port? This refers to the printer port on the computer which you are using. If there is only one printer socket then enter 1. If you are using a second printer port, (LPT2) enter 2.

MIDI Chan? Assume you are going to read MIDI channel 1 until you are thoroughly conversant with MIDI formats. N.B. When you prepare MIDI files in Cakewalk or other sequencer program for punching they will need to be saved in format '0'+ on channel 1.

Baseline relative to edge? (In half-steps) The baseline is the absolute reference point some 55 mm. from the front edge of the paper (bass side). Mine is set at 10,600 half-steps but yours will depend upon where you have set the linear vane. Vary this numerical setting to line up your John Smith format and for 20/26 and 31notes.

Carriage movement limit? This is to stop the thing running away in the event of a fault occurring! Leave it at 40000 for 140 mm. paper. (40000 steps = 200 mm. travel.) If you have built a punch for much wider music, increase the number accordingly.

Carriage step time (microseconds)? This relates to how fast you can drive the traverse motor. Mine is set to 600µsec. Any shorter time than this and the motor just fails to turn. Experiment!

Roller steps per increment? My gearing to the pinch roller means I set this at 135 steps. Yours will almost certainly be different (unless you have a WW2 aircraft bombsight computer gearbox!). The roller needs to increment the paper by 4.0 mm. John Smith20 music increments by 3.5mm. which produces continuous slots.

Roller step time? (µsec) My roll motor is set at 4000 microseconds. It won't go with any shorter pulse time than this.

Time value of roller increment (µsec)? This should be calculated with the formula:
$$10^6 \times \frac{\text{increment length (mm.)}}{\text{playback roll speed (mm./sec.)}}$$
 which for Raffin type music is $10^6 \times \frac{4.0\text{mm.}}{70\text{mm./sec.}} = 57143$

this figure is used to determine the intervals at which the MIDI file is scanned.

Punch time (µsec)? This depends on your punch solenoid. Start it at 200000 and reduce it until just works OK. The solenoid will overheat if the pulse is too long. The punch will fail occasionally if the punch time is set too short.

Relay operate time (µsec)? Not too critical. This should be about 200000

Number of notes? The answer, for Raffin type rolls, should be 20, 26 or 32. For John Smith type music it should be 20. If you answer anything else you must afterwards specify the notes and their spacings etc. which you want. It should be noted that Raffin 31note music has 32 holes, because hole #1 is used to actuate the bandmaster or other device and may be shown on the music stave as note 41.

Hole #1 MIDI note [] If you have answered 26, for instance, it will then ask for the note number for each hole from 1 to 26, and provide default answers. Check as you go and enter each one. Chapter 6.3. has a table showing the notes in each roll format.

Distance from edge (steps) This is the number of motor half-steps the above hole is from the edge of the paper. Irregular hole spacings present no problems as each hole has its own individual reference in relation to the edge of the paper.

Once you have set these parameters they save automatically. You do not have to set them each time you use the punch.

6.2 RUNNING THE PUNCH

In the directory, type **1, 2 or 3 ↵** to determine which of the three software suites you wish to use. The associated Roll.exe file will run.

By using the **↑** and **↓** keys you can scroll through all the MIDI files in the directory, (those with a .mid extension). When you see the file you wish the machine to punch, press return. Punching will commence. You can pause punching by pressing the space-bar. Continue by pressing return or finish by pressing **X**. A good file to start the

punch is Align.mid. This will punch out the whole tracker-bar layout in a staggered form so that you can check it.

The screen displays the current bar number of the music. If a fault occurs during punching, punching will cease and a specific error message is displayed on the screen.

Feel free to add more MIDI files to your directory. These will be MIDI files you have modified or composed yourself and put into MIDI "0" format (single merged track). MIDster PUNCH software will respond to this format only. A MIDI file must be transferred into the 26note, 31note or jsmith20 directory, whichever applies, before it can be punched.

6.2.1. HOW THE MIDster PUNCH SOFTWARE WORKS

MIDI files are structured in a time-ordered list of notes to be played. MIDster PUNCH works its way through the MIDI file in steps which correspond to the length of time one increment of the paper roll takes to pass over the organ's tracker-bar when the roll is played. At each step, whatever notes the MIDI file says should be playing at that time are punched onto the roll, provided that they are notes included in the list of notes you have set for that roll format. Any other notes will just be ignored. If the MIDI file contains rests or non-punchable notes before the real music begins, these are ignored to save wasting paper at the beginning of a roll.

The punch head movement is controlled so as to maximise punching speed by only moving as far as is needed to make a row of holes. Also a row is started from whichever end is nearest the punch head's current position.

Every time the punch head passes the baseline or absolute reference point in the course of its traverses, the software calculated position of the punch head is checked against the signals from the baseline sensors to see if any steps have been lost. This can happen if the punch head sticks momentarily. If so, the calculated position is re-calibrated and a warning is shown on the screen showing the extent of the error. This re-calibration ensures that a number of errors will not accumulate to an error sufficient to ruin the punched roll.

The MIDster PUNCH software makes use of the accurate clock built into every computer and can run on a wide range of systems without the timing being affected.

6.3. MUSIC SCALES

The punch machine was initially designed to punch Raffin standard 20 note and 31 note roll music and the Alderman 26 note scale. This latest Version 5.0 the software now enables it to punch the John Smith 20note format. The MIDster PUNCH software, however, is much more flexible in its range of abilities and could just as easily operate a punch for 21 note or 48 note book music, 88 note piano rolls even. This book does not give details of these other scales.

The Raffin/Alderman scales are not chromatic, as several notes are omitted. Furthermore, in the case of the 26 note scale, the layout of the available notes on the tracker bar is not sequential. MIDster PUNCH software is able to accommodate all these differences. It refers to notes by their MIDI note number within its internal

mapping. This is the information it receives as it sequentially reads the MIDI file it is required to punch. In this way it translates music notes into hole positions on the paper roll, in two dimensions.

For convenience, the 20/26 musical note scales have been transposed down into a single range of notes within the usual 31 note range: that is from low G, 17 semitones below middle C, to high C two octaves above middle C. The positions of the notes relative to each other are not affected by this transposition, so that any 20, 26 or 31 note organ will play normally with music rolls punched this way, whatever range of notes it is actually tuned to. This common range of notes can easily be shown in stave for the purposes of editing in a MIDI sequencer software package, such as Cakewalk.

In practice, 20 and 26note organs tend to be tuned to a higher pitch than 31note organs. This is due to their smaller dimensions and hence smaller pipes.

John Smith organs use a conventional scale of 20 notes. Because the pipes are directly blown through holes in the paper, 4mm holes are punched on 140mm. wide paper rather than the usual 3mm.holes on 110mm. wide paper. The spacing of the holes is unusual. The first (bass) hole is 10 mm. from the edge of the paper. The next three holes are 9 mm. apart; then the remaining 16 holes are 6mm. apart

The original 20 note tracker bar, devised by Carl Frei, is sequential. Ian Alderman added another 6 notes in the spare portions of the width, making a 26 note scale which is musically almost as versatile as the larger 31 note scale, but which is punched on the smaller and cheaper 110 mm. width paper. Another advantage is that 20 note music rolls can be played on 26 note organs, although not vice-versa.

Other music scales can be easily produced by the MIDster Punch System if the punch machine you build is capable of punching them. Formats with equidistant holes or formats with holes of differing spaces are easily set up. In the set-up file (Editini.exe) simply specify the number of notes, their MIDI numbers and their positions relative to the edge of the paper, in terms of motor steps.



The following table shows the different scales set up in the default settings of the MIDster PUNCH software.

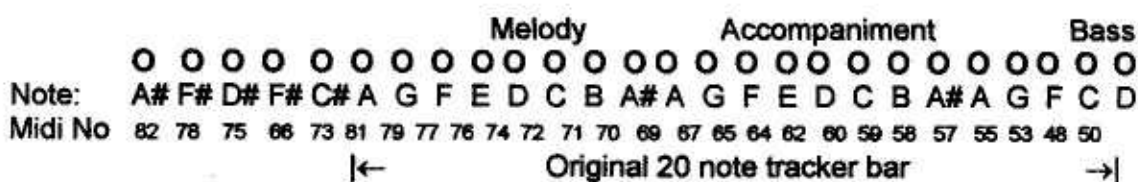
Note	Midi No.	31 note	26 note	jsmith 20note
C	84	●		
B	83	●		
A#	82	●	●	
A	81	●	●	●
G	79	●	●	●
F#	78	●	●	
F	77	●	●	●
E	76	●	●	●
D#	75	●	●	
D	74	●	●	●
C#	73	●	●	
C	72	●	●	●
B	71	●	●	●
A#	70	●	●	●
A	69	●	●	●
G	67	●	●	●
F#	66	●	●	
F	65	●	●	●
E	64	●	●	●
D	62	●	●	●
C#	61	●		
C	60	●	●	●
B	59	●	●	●
A#	58	●	●	●
A	57	●	●	●
G	55	●	●	●
F	53	●	●	●
D	50	●	●	
C	48	●	●	●
A	45	●		
G	43	●		
Bm*	41	●		

* A spare hole which operates the bandmaster or other device.

6.4. 20/26 NOTE TRACKER BAR

The 20/26 note tracker bar is non sequential. It looks like this:

↑ Paper
Direction



6.5. MUSIC ARRANGEMENT IN MIDI FILES

It is rather beyond the scope of this booklet to give more than a passing mention to the way MIDI files are arranged so that they can be used for punching roll music. Arranging music is an art and the finished results will show clearly whether you have the aptitude or not. If the answer is "not", do not give up. As more people produce MIDI files for punching there is bound to be someone who can help. Just to start you off, ready-to-punch 20note versions of Dixie, Ashgrove, Minstrel Boy, Cock-o-the-North and Life on the Ocean Wave are included on the diskette in both 26note and jsmith directories. There is also a small selection of parlour songs in the 31 note directory. This should encourage Americans, the Welsh, Irish and Scottish among us, not to mention the sailors! These can be enhanced into any other format if you wish.

The tools you will need are to be found in a suitable sequencer software program. This should be able to load MIDI files and save them in MIDI '0' format (single merged track). Not all sequencers do this, but software programs are available for free download on the Internet to enable you to convert MIDI "1" files to MIDI "0".

Sequencer software will also allow you to record MIDI direct from a keyboard, if you can play one. It can also transpose the music into any key signature so that you can make the best use of the notes available in the music scale.

MIDI files can be obtained in abundance over the Internet. Use a search engine such as Yahoo; type in MIDI MUSIC and search the sites it produces. The MIDI files can then be downloaded to disk. I had good results, for example, with searches for GERMAN MIDI MUSIC and found many suitable German street organ type tunes.

The beauty of readymade MIDI tunes is that they are already arranged for you. The timing of the notes and their lengths, not to mention grace notes, trills and "twiddly bits" are all there. The artistic work is already done.

Very briefly, the method is something like this: First select a suitable piece of MIDI music and open it in Cakewalk, or other sequencer program. If there are several tracks, select those which give the melody and accompaniment. Delete unwanted tracks such as drums, etc. Change the tracks you selected to send on channel 1. View the music in staff-view before transposing into Key C. Then comes the skill of moving and deleting notes until the music fits the 20, 26 or 31note format you wish to punch. Always view afterwards in piano-roll view. This shows if the notes are too legato and need to be shortened, individually or globally. Street organs tend to sound better if the notes are slightly shorter. Don't forget to save the file in MIDI '0' format.

The other way is to enter the tune directly from sheet music, copying each note to stave by hand. Good software will allow you to vary the lengths of the notes so that they do not join up with each other in a legato form. Much of the skill of music arranging is in the length of the notes. Some very acceptable results can be obtained in this way. You can, of course play the file first in your sequencer program, or by using the Windows MIDI player, just to check that it sounds right.

If all else fails I have a list of ready-to-punch non-copyright MIDI music available at very reasonable rates.

7. OPERATION – USING THE PUNCH MACHINE

The punch machine does not have to be connected to the computer when not in use. It simply replaces the printer when you need to punch a music roll. The work of editing and amending MIDI files can be done well beforehand and the completed files transferred to your 26note, 31note or jsmith20 directory.

After connecting the punch to your computer and switching it on at the mains switch, it is a good idea to run the align.mid file to check that the punch is set up to your liking. It will punch a line of holes corresponding to your tracker bar holes. This file is resident in the directory you choose, (1, 2 or 3). Use the arrow keys until you see align.mid. (or align 31.mid in the case of 31 note rolls). Then press enter (↵) to start the punch. Punch it on a spare bit of paper, then compare it with a known bit of punching. (I keep a punched template card with all the note names and numbers written against each hole, then I can check the music as I go along.)

When you know the punch is performing well, select the MIDI file to be punched and press enter (↵) to start punching. It is a fairly long job, depending on the speed of your punch machine, to punch a single tune of about 30 bars. Time to make coffee or take the dog for a walk!

I make up several spools of blank paper beforehand and add songs to them, building up types and themes as I see fit. The spool can be rewound on the machine, using a little plug-in handle something like a hexagon key, and then played on the organ immediately to see what it sounds like. Then further songs can be added.

Punch-your-own certainly produces an extended variety of song types which commercial punched music suppliers would regard as not economically viable to produce for sale. For example, if you like to sing-along, then the instrumental accompaniment does not always have the melody line in with it. This music sounds odd if you play it without singing. You can now make your own instrumental accompaniments for songs with as many verses as you like.

There is a learning curve to producing good roll music for the organ. The skill is all in the arranging and the timing. But acceptable results can be achieved fairly quickly.

Finally, have fun building and using the MIDster PUNCH machine. If you run into difficulty, or have questions, contact me on bobessex@aol.com