Beppigames Sequencer User Guide

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Contents

1 Introduction

The Beppigames Sequencer is a toy-like unassuming sequencer for composing music. The result may be a complete song or a preliminary version which is then to be refined in a regular DAW. The primary goal is to keep things simple, distractions at minimum and not harm intuition.

The sequencer is completely PC keyboard driven. There is no mouse support but an external midi keyboard is supported. The sequencer has some issues (some on purpose) which you should be aware of and which are listed in section 3.20.

Beppigames Sequencer utilizes the libraries libfluidsynth (`https://github.com/FluidSynth/fluidsynth`) and rtmidi (`https://github.com/thestk/rtmidi`).

The sequencer uses the zita-rev1 reverb (`https://github.com/SpotlightKid/dfzitarev1`).

About notation: Keyboard commands are described in square brackets []. If there are multiple keys inside brackets, these must be pressed together (key combination). E.g. [F10] means function key F10 which displays help in the sequencer. [CTRL SHIFT Q] means pressing CTRL, SHIFT and Q together which exits the sequencer. [LEFT], [RIGHT], [UP], [DOWN] denote the cursor keys. In other key combinations keys may be pressed together or in twos: E.g. for [CTRL K M], which moves a block, one can press CTRL and K together, then release K, then press M.

Some old screenshots in this document may differ from the current version of the sequencer. When this is the case it will be mentioned in the text.

A word of warning: This sequencer allows you to compose songs just with a PC keyboard. However, playing music enthusiastically on your notebooks internal keyboard may shorten the keyboards lifetime (I know because I damaged one...). Be advised to use an external PC keyboard (by the way with 6KRO or better) which may be more durable and easier to repair or replace.

2 Installation and Configuration

Download the most recent version of the sequencer from
`https://www.beppigames.de/beppigamessequencer`.
Then unzip and untar the the beppigames tgz archive:

```
$ tar zxvf beppigames_sequencer_v090_linux.tgz
```

This expands to the directory "beppigames_sequencer". The sequencer application is BeppigamesSequencer-x86_64.AppImage (info on AppImages in general at `https://appimage.org`).

2.1 Edit soundfonts.dat

The directory "beppigames_sequencer" contains a file soundfonts.dat. Open it in a text editor, remove the one existing line in it and add the soundfonts (.sf2) you are going to use in your songs. For me soundfonts.dat looks like this:

```
1 /home/kermit/Temp/SF/beppigames_gm.sf2
```

I use only one large GM soundfont and therefore this file contains of only one line but you may want to list up to 12 soundfonts in this file. *The first value in each line is GAIN* and determines how loud the soundfont will sound. Its a value between 0 and 10. This allows to achieve roughly the same loudness for different soundfonts. For a start, as in the example, choose 1 as value. In general values between 0.2 and 1 should work. The second value in each line is the path to the soundfont (.sf2) in the file system. Can be a absolute path or path relative to "beppigames_sequencer" directory.

I can recommend the balanced GeneralUser GM soundfont:
(`https://www.schristiancollins.com/generaluser.php`).

2.2 Set Keyboard Mapping

The sequencer is keyboard-only and uses a plethora of keys and combinations. You find all keys in the appendix 4.1. To keep things simple (for you and the author), the application expects a US KEYBOARD layout. If you are not using such a layout, then you must activate one before starting the application. In the shell you do this by

```
$ setxkbmap us
```

There is one exception to this rule: If you are using a German keyboard layout then you do not have to change anything. Instead you can specify the "-g" switch when starting the application and are set (author uses a German keyboard and so made this shortcut).

2.3 Configure Midi Keyboard

You can create music with the sequencer by just using the PC keyboard. You even have access to 4 octaves at once. However with PC keyboard keys you will use only fixed velocities per track in live recordings (but easily configurable for each track). To use a midi keyboard make it known to the application as follows: Connect the midi keyboard, then start the sequencer with no parameters.

```
$ ./BeppigamesSequencer-x86_64.AppImage
BEPPIGAMES SEQUENCER VERSION 0.91
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All rights reserved.
www.beppigames.de

Midi inputs (use a substring as identifier):
midi through:midi through port-0 14:0
circuit:circuit midi 1 24:0
q mini:q mini midi 1 28:0

Midi outputs (use a substring a identifier):
midi through:midi through port-0 14:0
circuit:circuit midi 1 24:0

q mini:q mini midi 1 28:0

Usage: BeppigamesSequencer [-i <midi-input>] [-o <midi-output>]
[-p <midi-output2>] [-s <gui-scale>] [-b <audio-buffer-size>]
[-c <background-color>] [-w <wallpaper-number>] [-m <max-velocity-midi-input>]
[-x] [-d] [-g] [-l] [-q] [-k] <project-prefix>
Example: BeppigamesSequencer -i 'q mini' -o 'circuit' -s 1.5 -g my_song
-g assumes a german keyboard layout, else us keyboard layout
-d selects a default instrument if instrument missing
```

```
-b sets audio buffer size (default is 128)
-c selects background color as rrggbbaa hex digits (default 212121ff)
-l activates launchpad mode
-k activates midi keyboard hack (black keys become transport controls
   when using scale)
-q activates qmini mode (a hack)
-w selects a wallpaper (wallpaper number is 1, 2, 3 or 4, 5, 6)
-m sets maximum achievable velocity of midi input (and scales it to
   full range)
-x loads a LinuxVST into fx chain (a hack). Requires file fx.dat in
   appimage directory.
Missing <project-prefix>
```

The midi sequencer lists all midi inputs. From these select your midi keyboard and choose a substring of its name. In the above case I want to use my Alesis Qmini and I choose 'q mini' as substring of "q mini:q mini midi 1 28:0". The sequencer primarily renders soundfonts but notes can also be sent to two designated midi outputs. On the mixer subpage (see section 3.6) you select for a track with the output (OUT) setting if notes are sent to soundfont renderer, midi output 1 or midi output 2.

2.4 Install midicomp for Midi Binary Conversion

The sequencer exports midi files in the midicomp human readable (and editable) format. You need the midicomp application to convert the exported files to midi binary format. Midicomp (to build from sources) is available from https://github.com/markc/midicomp. By philosophy all files written by the sequencer are human readable and can be viewed and edited in a text editor.

2.5 Starting the Sequencer

Now we can finally startup the sequencer, in my case using a german keyboard layout, my "q mini" midi keyboard and a project prefix name, I choose "my_song":

```
$ ./BeppigamesSequencer-x86_64.AppImage -g -i "q mini" my_song
```

Next further command line parameters: The command line parameter "-s <scale>" scales the sequencer gui (window) by given scale factor. The default window size is 800x600 pixels. A "-s 1.5" would result in 1200x900. In the application you can enlarge the window by dragging borders or maximize the window to fill the screen. When you then unmaximize it, its size is again the scaled default size.

Commandline parameter "-b <audio-buffer-size>" sets the fluidsynth audio buffer size. Values are 64..8192. The (safe) default is 128. You may want to try 64 for even lower latencies.

If command line parameter "-d" is used, whenever the sequencer cannot find an instrument, more precisely, it cannot find an instrument under the referenced bank and program in the soundfont entry number in soundfonts.dat, it applies the first available instrument as default. If you use GM soundfonts, this will be the first soundfont, bank 0, program 0 (usually a piano). If "-d" is not specified, then the sequencer aborts if it cannot find an instrument with according error message. Please note that the sequencer project files depend on the order of entries in soundfonts.dat. If you need to add a soundfont, add it at the end of soundfonts.dat. Also note that the sequencer will abort with an error if it cannot find any of the soundfonts listed in soundfonts.dat. And of course you must list at least one soundfont.

Commandline parameter "-c <background-color>" sets the background color. The color must be in rrggbbaa hex string format, default is 212121ff (dark gray). If you want e.g. a blueish background try 101071ff.

If one gets tired looking at a single-colored background, use one of three wallpapers: Commandline parameter "-m <wallpaper-number>" sets a (fixed) wallpaper. <wallpaper-number> must be 1 (blue orchestra theme), 2 (brown opera hall theme) or 3 (green nature theme). When using a wallpaper the vertical scale lines disappear and some transparencies/colors are changed. Alternatively wallpapers 4, 5, 6 can be used, which is same images as 1, 2, 3 but are displayed as background only in "pitch black" mode.

There is experimental support to invoke functions of the sequencer from the midi input device: Parameter "-l" activates a "launchpad" mode, parameter "-q" activates a mode for the Alesis Qmini, "-k" activates using black keys as transport controls. Read more about it in sections 3.19.2, 3.19.3, 3.19.4.

Option "-x" loads a VST2 effect (a Linux- or e.g. LinVST'ed Windows one) into the fx chain. This requires a configuration file fx.dat in the appimage directory. Read about it in section 3.19.5. Finally, parameter "-m <max-velocity-midi-input>" specifies a maxium velocity achievable for midi input and scales it to full range. E.g. one of my midi keyboards cannot produce velocities over 120 so I use "-m 120" which then scales velocities to 0..127 (before applying a velocity curve).

3   Working with the Sequencer

The sequencer edits one project at a time. There are no save/load/export dialogs. You can reload [F5] and save [F1] the current project but if you want to edit a different project you have to exit the sequencer [CTRL SHIFT Q] and restart it with the different project prefix. If you want to rename or backup files you have to do that all "by hand" and rename them in your file manager or copy project files to backup directories. The sequencer stores a project in file <project-prefix>.dat in the sequencer directory. The project file contents are simple and human readable and are described in the appendix 4.2.

When you want to work with your song in a DAW, you can export your song to midi format with keys [F7] or [F8] (both export to midicomp format). In

section 3.16 you find further instructions, the differences between both exports and some tips for using LMMS.

Note that the sequencer does not provide a rendering to audio file: Instead I just play a song in the sequencer and live record the audio with Audacity.

The sequencer is a single-page application which, in the main page area, always shows notes and steps of the current track. The lower fourth of the screen shows one of eight subpages where you e.g. assemble a song, select instruments or a scale. Depending which subpage is active, keys may have different effects, in particular the cursor keys. The eight subpages can be cycled through by [TAB] or [SHIFT TAB] or selected directly by [CTRL 1] to [CTRL 8]. In the appendix 4.1 all available commands for a subpage (some commands available on all pages) are listed.

Important: The sequencer and this manual assume a keyboard with numpad. If a keyboard with no numpad is used, the sequencer still works but some alternative key combinations have to be used. These are listed in the appendix 4.1.10.

3.1 Main Page and Keyboard
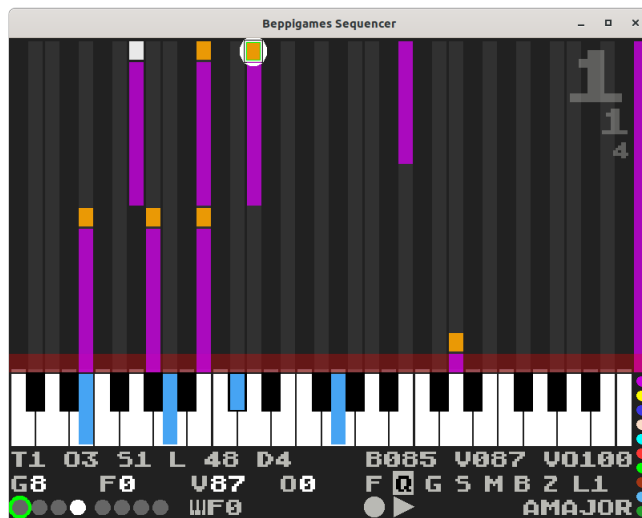
In the upper 75% of screen you see 16 steps (lines) vertical (1 of up to 16 bars) of the current track of the current session. Note: The screenshots show 8 dots in lower left corner but meanwhile the number of bars per session was raised to 16, so just imagine 16 dots instead of 8.

The sessions are a concept borrowed from the Novation Circuit (the original one). It will be explained in the description of subpage 2: Song and Sessions. The notes of a step are laid out horizontally. Three octaves are displayed at once. To move other octaves into view press [NUMPAD PLUS] and [NUMPAD MINUS] which move one octave up and down.

The notes are the yellow or white squares. These are denoted note heads.

Yellow means a note is in current selected scale, white if not. Each of the 10 tracks has its own color which you can see all in the lower right column as 12 colored circles. The screenshots show 10 circles but meanwhile the number of tracks was raised to 12, so just imagine 12 circles instead of 10.

You find a column at the right of the screen which is colored in the current track color. If a note has a duration longer than 1 step it has a tail which is also drawn in the tracks color. Its important to note that the tails are just visual cues. A note for example cannot be moved by grabbing and moving its tail. Instead one moves the white cursor over a note head with CURSOR KEYS and then moving the note around by pressing [CTRL] and CURSOR KEYS.

Note the intensity of note and tail colors depends on the velocity of the note. Darker colors mean lower velocities.

In the upper right corner you see three numbers stacked on each other. The upmost number is the current session, the middle number is the current track and the lowest number is the current page (bar).

There is a virtual keyboard showing 37 keys: 3 octaves plus a C. When you play notes live on the PC or midi keyboard they are highlighted on the virtual keyboard. The PC keyboard has a 4 octave range which always correspond to the visual octave range (the fourth octave is not visible except for its C). In contrast the external midi keyboard always plays notes corresponding to its internally set current octave range. The keyboard functionality is further described in Subpage 4: Scale and Basenote.

The following depicts the PC keyboard octave layout with 12 keys per octave (chromatic scale), 7 keys per octave (e.g. major or minor scales) and 6 keys per octave (e.g. blues or minor pentatonic scales).
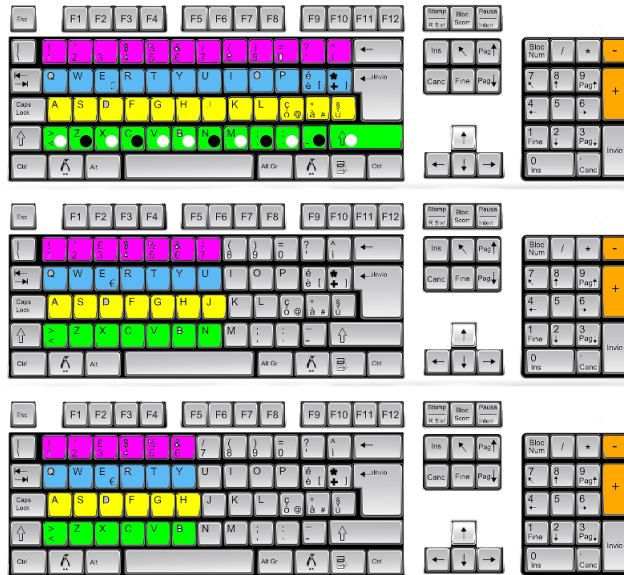
Octaves 1 to 4 are colored in green, yellow, blue, purple respectively. In the first image, the chromatic layout, you see black and white keys are BESIDE

each other. This is due to space limitations. Becomes less of an issue if you are using a scale (and locking keyboard to scale with [ALT Z]): Then you only play keys which are in scale. That is why only 7 or 6 keys per octave were displayed in the lower two images for e.g. minor scale or blues respectively. The orange color plus and minus keys shift the octaves up and down.
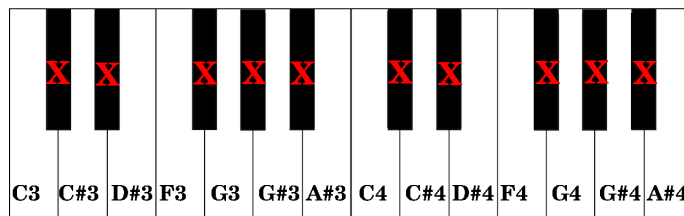
When locking keyboard to a scale with [ALT Z], this also locks an external midi keyboard: In case of a non-chromatic scale the black keys are deactivated and you only play the white keys. E.g. if you have chosen "F MINOR" as scale and lock the keyboards to it, the key layout on a midi keyboard is as follows (assuming lowest key is C3 in this example):

Midi Keyboard locked to F Minor

You move around a note or step at a time using the CURSOR KEYS. By pressing [SHIFT] and CURSOR KEYS you move around by octaves or 4 steps respectively. Pressing [CTRL SHIFT] and CURSOR KEYS moves, if existing, to the next/previous note in current row or column. Note that all cursor movement is within the current 16 steps by 37 note window and wraps around. Moving around the cursor does not leave the current bar or note range. You move between the 16 bars by [NUMPAD PGUP] and [NUMPAD PGDOWN] or select the bars directly with [ALT 1] to [ALT 8] or [ALTGR 1] to [ALTGR 8] for the bars 1..8 and [ALTGR Q], [ALTGR W], .., [ALTGR I] for the bars 9..16.

You change the displayed note range by octaves with [NUMPAD PLUS] and [NUMPAD MINUS].

To play the session starting from its first step, press [SPACE]. To play starting from cursor position press [RETURN]. To stop playing press [SPACE] or [RETURN]. To continue playing at the current playhead position (the playhead is the white horizontal bar), press [SHIFT SPACE]. You toggle following the playhead during playing and automatically turn pages (bars) in sessions with [ALT F].

Not displayed in the above image are yellow triangles: These appear left and or right when there are notes left or right to the currently visible octaves.

You add a note at current cursor position with [CTRL N], you remove it with [CTRL X]. Notes can be dragged with [CTRL] and CURSOR KEYS. They can also be copied to clipboard with [CTRL C] and pasted with [CTRL V]. Further editing methods are described in sections 3.2 and 3.13.

The length of a track in a session is selected as follows: First select the track ([SHIFT 1] to [SHIFT 0] for tracks 1 to 10 and [SHIFT Q], [SHIFT W] for tracks

11 and 12). Then move cursor to desired first step and press [CTRL SHIFT B], then move it to desired last step and press [CTRL SHIFT E]. The start step of a track is marked with a green, the end step with a red horizontal bar.

3.2 Subpage 1: Step Edit

```
T1 O3 S1 L 48 D4    B085 V087 VO100
G8    F0    V87    O0    F Q G S M B Z L1
●●●●● ●●●●● ⌶⌶F0        ●  ▶       AMAJOR
```

This is the subpage where you do the work. Next I describe all contents seen in the picture above and how to change values:

"T1": The current selected track. You select tracks 1-12 with [SHIFT 1] to [SHIFT 0] and [SHIFT Q], [SHIFT W].

"O3": This denotes the lowest octave currently displayed, in this case the octave starting with note C3. To change the octaves displayed use [NUMPAD PLUS] and [NUMPAD MINUS].

"S1": The current selected session. You select the current session on subpage 2: Song and Sessions.

"L 48": Current row (step) of the cursor. Range is from 0..255. You move to next/previous line with [DOWN]/[UP]. You move to next/previous bar with [NUMPAD PGDOWN]/[NUMPAD PGUP],

"D4": Current column (note) of the cursor. Range is from C-1 to G9.

If there is a note under the cursor, following fields contain values:

"G8": The gate of the note. A multiple of 1/16 note duration. Range is 0..127. Adjustable with [ALT UP] and [ALT DOWN].

"F0": The gate fraction of the note. A substep of 1/16 note duration. Range is substeps 0..127. Adjustable with [ALT LEFT] and [ALT RIGHT]. Example: You want a note to sound as long as three times a 1/16 note plus a 1/64 note. Then you choose gate=3, gate fraction=32 (1/64 = 1/16 * 1/4 -> 128 * 1/4 = 32).

"V87": (Attack-)Velocity of the note. Range is 0..127. Adjustable with [ALT SHIFT LEFT] and [ALT SHIFT RIGHT].

"O0": Offset of the note. A substep of 1/16 note duration. Range is substeps 0..127. This denotes where the note starts within the step. The resolution is the same as for gate fraction. E.g. if you want to start the note in the middle of a step choose offset=64. Adjustable with [ALT SHIFT UP] and [ALT SHIFT DOWN].

Section 3.13.1 describes an alternative for direct editing of the attributes.

"Green circle in lower left": Denotes at which bar the playhead is. The sixteen dots correspond to the sixteen bars of the session.

"White circle in lower left": Denotes the current bar.

"<piano symbol>F0": This is present when a midi keyboard was connected and recognized. The "F" is displayed when a fixed velocity applies to notes from midi keyboard (toggled by [ALT Y]). The "0" denotes the velocity curve utilized. There are 9 velocity curves (toggled by [ALT C]).

They are defined as follows:

Curve 0 : identity curve, meaning, velocity = midi_velocity

Curve i=1..5: linear curves

a[1..5]={16, 32, 48, 64, 76}

b[1..5]={101, 95, 79, 63, 47}

Curve i: velocity = floor((midi_velocity/127.)*b[i]+a[i]+0.5)

Curves 6,7,8: convex (expanding) curves. You may want to try those if your keyboard has low velocities.

"B085": Speed of all sessions in BPM. Range is 1..255. Editable by [ALT B], then [UP] and [DOWN], finish editing with [RETURN].

"V087": Fixed velocity of the current track (for new notes to be added by PC keyboard or by midi keyboard if fixed velocity is toggled ON with [ALT Y]). Range is 0..127. This is shared by all sessions. Editable by [ALT V], then [UP] and [DOWN], finish editing with [RETURN]. Another option: The current track can be locked to the track velocity, toggled with [ALT T]. Then, for all sessions, all existing and live played notes on the track are played with the (constant) track velocity. If turned on, the "V" is displayed inverted.

"VO100": Volume of the current track. Range is 0..127. This is shared by all sessions. Editable by [ALT O], then [UP] and [DOWN], finish editing with [RETURN].

"F Q G S M B Z L1": These are various flags. If enabled, a flag is shown inverted. Some of these flags are track- and session specific.

Flag "F": Follow playhead. Toggled with [ALT F]. If turned on, when sequencer is playing, the 16 pages (16 bars) of a session are automatically turned so playhead (white horizontal bar) is always in view. If playback is then stopped, the current visible page is the one where the playhead is. If playhead was not followed, the playback stopped and you then want to go to the page where the playhead is, just press [ALT 0] (=go to playhead page). Note that because tracks in a session can have different length, the playhead page may be different for each track.

Flag "Q": Quantize offset of a note in live recording. Toggled with [ALT Q]. If turned on, recorded notes are assigned offset=0.

Flag "G": Quantize gate of a note in live recording. Toggled with [ALT G]. If turned on, recorded notes are assigned gate fraction=0.

Flag "S": Singles current track (track and session specific). Toggled with [ALT S].

Flag "M": Mutes current track (track and session specific). Toggled with [ALT M].

Flag "B": Enabled when a block was selected (and not yet deselected). Block operations are described in section 3.13.3.

Flag "Z": Lock PC keyboard and midi keyboard to scale. Toggled with [ALT Z]. If turned on, all keyboards play in scale.

Flag "L": Enabled when a loop is active. Looping is described in section 3.13.2.

3.3   Subpage 2: Song and Sessions

The concept of sessions is borrowed from the Novation Circuit. Each session is 12 melodic tracks (this sequencer makes no distinction between drum and melodic tracks). Each track in a session can have a different length of 1 to 256 steps which are organized in pages of 16 bars, 16 steps each. As described before, the length for each track is specified on subpage 1 by placing start (green horizontal bar) and end markers (red horizontal bar) in it (with [CTRL SHIFT B] and [CTRL SHIFT E] respectively). Initially all tracks in a session have a length of 1 bar (16 steps). A song is just a list of sessions. This list is played in loop from first to last element. The longest track of a session denotes the length of a session. When playing the session, shorter tracks in the session loop accordingly. This allows to quickly string together e.g. a 4 bar lead, 2 bar bass and 1 bar drum track. In contrast to the Circuit, here no program change takes place when switching between sessions. Reason is, here, instruments do not change when switching sessions. The instrument is associated with the track, not the session and is constant throughout all sessions.

On subpage 2 you see a matrix of 2x6 blue and purple rectangles. These are the available sessions for a song. Blue denotes a empty session and purple a non-empty one. The white rectangle is just a cursor. The CURRENT session is the one with the play and record icons drawn over it. This is the session you edit on subpage 1: Step edit and its also always the session the playhead is currently in. The current session is selected with [RETURN]. If session or song is playing, the play icon is green. If currently recording is on, the record icon is red.

Right beside the 12 session rectangles you see the track lengths of the current session, line by line. They are colored in the tracks color if the track is non-empty, gray else. The image depicts 10 numbers but meanwhile the number of tracks was raised to 12, so just assume 12 numbers.

Left beside the 12 session rectangles you see the sessions making up the song. Its just a list of session numbers, line by line.

In the above example, the song consists of four sessions which are played in a loop in the order 2,3,1,4. The first "2" is yellow which signals the position in the song where playback was stopped last time. If currently playing (which is not) the yellow number would indicate the current session played in the song.

One adds a session at the end of the song by placing the cursor over one of the 12 sessions and then pressing [INSERT]. One deletes the session from the end of the song with [DELETE]. Maximum song length is 15 sessions. With 4/4 at 120 BPM and sessions of 16 bar length this gives a maximum song length in seconds of 32*15 = 480 (8 minutes). If sessions are all 8 bar its 240 seconds (4 minutes), if sessions are all 4 bar its 120 seconds (2 minutes).

There are two play modes: Session- and song play. First is started with [SPACE] and loops the current session, second is started with [SHIFT RETURN]

and loops the song.

On subpage 2 there are some functions operating on session level: [CTRL C] copies the session under the cursor to clipboard. It also memorizes which was the current track at that time. [CTRL V] pastes the session (notes and session track lengths) in clipboard to the session under cursor, overwriting it. [CTRL Y] deletes the session under cursor while [CTRL X] deletes only the current track. Note that the lengths of the tracks in session are unaffected by these delete operations. Only when copying a session they get updated. [CTRL T] is like [CTRL V] but pastes the (memorized) current track (notes and length) at time of [CTRL C] to the now current track.

Note that [CTRL T] erases the contents of the destination track before copying over the source track. If you want overdubbing use the block copy mechanism described in section 3.13.3.

[CTRL M] pastes only the mute and single flags of the clipboard session to the session under cursor. [CTRL A] pastes the whole clipboard session, meaning, the notes, the session track lengths and the mute- and single flags.

[CTRL L] copies only the length (start and end step) of the source track to the destination track. [CTRL SHIFT L] copies the length (start and end step) of the source track of the source session to ALL tracks of the target session. The latter allows for e.g. a pause in a song. Example: Choose an empty session. Initially all tracks have length 16 steps. Assume you want a pause of 8 steps. Select a track, e.g. the first. Go to first page and set end step to 7 (place cursor on line 7 and press [CTRL SHIFT E]). Now go to subpage 2. Set cursor over current session and copy source track with [CTRL C], then apply [CTRL SHIFT L]. Voila, now all tracks in the session have length 8 (steps). Now use the session as a pause between other sessions with content. Setting just one track to 8 steps length would not have been sufficient because session length would still have been 16 steps because the longest track determines the length of a session.

3.4   Subpage 3: Instruments

This lists three columns: The first column is the soundfonts. The numbering and order matches the one in soundfonts.dat. The second column is the bank of the soundfont selected in the first column. The third column is the program of the bank selected in the second column. You move between columns and inside columns with the cursor keys. For vertical scrolling you can also use [NUMPAD PGUP], [NUMPAD PGDOWN], then the third column scrolls by +-10 elements.

In the above example there is only one soundfont used (beppigames_gm.sf2) but remember, you can use up to 12 soundfonts. These can be single instruments or e.g. GM soundfonts. Just list them in the soundfonts.dat file.

To clarify, if you list only one (GM) soundfont (line) in soundfonts.dat,

you can select instruments for all tracks from it and the benefit is maximum performance. I use only one GM soundfont.

3.5   Subpage 4: Scale and Basenote

The concept of scale and basenote is borrowed from the Novation Circuit. There are 16 scales supported and they are the same as on the Circuit: Chromatic, Major, Minor, Dorian, Phrygian, Mixolydian, Melodic Minor, Harmonic Minor, Bebop Dorian, Blues, Minor Pentatonic, Hungarian Minor, Ukranian Dorian, Marva, Todi, Whole Tone. The first column lists the scales, the second the basenote. You move between columns and inside columns with the cursor keys.

The scale and basenote is a global setting and applies to all tracks in all sessions.

When you select a scale, one effect is that note columns which are in scale are drawn as grey, else in black. Another effect is, notes which are not in scale get white noteheads, else yellow. Just choosing a scale does not change the notes played/recorded when you hit a note key on midi keyboard or PC keyboard: You are still be able to play notes which are not in scale. To change that, requires LOCKING the midi and PC keyboard to the current scale. [ALT Z] toggles it. If locked the "Z" flag in Subpage 1 becomes inverted.

Note that if you selected a drumkit from a soundfont for a track, to be able to reach all instruments (kicks, snares etc.) in it you either have to select "Chromatic" (as long as you have to live play notes for the track) or, much simpler, just temporarily turn off the locking as described above.

3.6   Subpage 5: Mixer
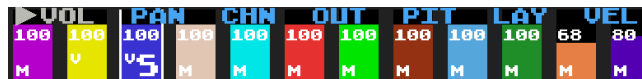
On this subpage you set volume, pan, channel, output, pitch, layering (unison) and velocity for each of the 12 tracks. All the values are shared by all sessions except the track mute and single flags which are session specific. There is one bar for each track and its in the tracks color. You move between the bars with cursor left and right. You adjust value of the current bar with cursor up and down. You switch between setting/displaying volume, pan, channel, output, layering and velocity of tracks by [ALT O], [ALT P], [ALT C], [ALT U], [ALT I], [ALT L] and [ALT V]. Volume and pan are midi values 0..127. The default volume is 100, the default pan is 64, which is middle. 0 is left, 127 is right. The volume is CC7, pan is CC10.

Channel and output apply to the midi output selected on commandline (-o and -p switches for the 2 midi outputs): Channel is midi channel 1..16 (values displayed are 0..15). The track will output on this channel of the midi output.

Default value is 0. Output is values 0,1 or 2 and specifies where notes are sent to: 0 to soundfont renderer, 1 to midi output 1 and 2 to midi output 2. Default is 0. If output is chosen as 1 or 2, then the soundfont renderer will not receive notes, regardless if a midi output was specified.

The pitch of a track, denoted PIT, is the amount of semitones added when playing notes of the track: Default value is 64 and means no change is applied. To apply a change of N semitones, set 64+N as value. E.g. you want to play a track one semitone lower (e.g. to sound more like a baroque piece), set 64-1 = 63, if you want to play the track one octave higher (e.g. an instument was tuned one octave too low), set 64+12 = 76. IMPORTANT: These pitch changes are NOT applied in the midi file export [F7] but they are applied in "extended" midi file export [F8]. Read about the differences of export methods [F7] and [F8] in section 3.16. If you want pitch changes to appear for [F7] export, you must change the notes themselves permanently before export as follows: Go to mixer page. Play and recording must be off for this operation, so verify this. Select pitches display with [ALT I]. Next, with the cursor left/right keys move to the bar of the track for which you want to make the pitch changes permanent in all sessions. Finally press [CTRL SHIFT I]. A green message appears signalling success, else a red message appears ("NOT ALLOWED"). Failure occurs if there are notes which would leave the valid note range after shifting. If successful the track pitch was also reset to 64.

The velocity of a track, denoted VEL, is the velocity which is always applied to notes in live playing with PC keyboard. Its is also applied to notes live played with midi keyboard ONLY IF if the midi keyboard has been locked to the track velocity (toggled with [ALT Y]). Also a track can be "locked" to its track velocity, which is toggled with [ALT T]: When locked, this is indicated with a little "v" on the track bar and then all recorded notes on track and all live played notes are played with the (constant) track velocity. If you want to change the notes velocities of a track all to the track velocity, select VEL (with [ALT V]), then move to bar of track and apply [CTRL SHIFT V]. When exporting notes, [F7] ignores track velocities while [F8] obeys them, meaning, if a track is locked to its track velocity, indicated by the "v" on the bar, all exported notes of this track have its track velocity. The track velocity locking applies to a track in all sessions.

[ALT M] mutes and [ALT S] singles the track corresponding to the currently selected bar in the current session. If a track is muted then a "M" is displayed on the bar, if singled a large "S". Note that on all other subpages these keys mute and single the current track. [ALT SHIFT M] propagates the mute flag of the track corresponding to current mixer column to all other tracks of the session. Example: If you want to mute/unmute all tracks of a session, select a arbitrary mixer column, set it to muted/unmuted with toggling by [ALT M], then press [ALT SHIFT M].

In contrast to the other mixer settings, mute and single status of a track is saved with the session and can be different for each session.

If you have huge differences in loudness of imported soundfonts, instead of adjusting these with the mixer you may want to change the GAIN value for

each soundfont in the soundfonts.dat.

Tracks can be layered so their instruments sound in unison. To accomplish this a track can receive its notes (to be played) from another track. Then the receiving track no longer play the notes on its own track. The notes are played with their velocity in the sending track but e.g. with the pitch change from the receiving track. Exception: If you locked the velocity of the receiving track (little "v" on bar), then the receiving track plays its locked velocity.

Layering affects only tracks rendered through the internal soundfont renderer. Notes sent to midi outputs are not affected in any way by layering. Also when a track receives its notes from another track it is silent in live playing with its track selected as current track. The layering info is saved in the project file but, as in the case for pitch changes, it is obeyed in "extended" midi file export [F8] but ignored in midi file export [F7]. To have the notes in latter export method, the sending tracks notes must be duplicated in the receiving tracks. This can be accomplished e.g. by copying tracks on subpage 2 with selecting source track ([SHIFT 1] to [SHIFT 0] and [SHIFT Q], [SHIFT W]), copying ([CTRL C]), selecting destination track ([SHIFT 1] to [SHIFT 0] and [SHIFT Q], [SHIFT W]) and pasting track contents ([CTRL T]). Example (numbering of tracks starts with 0): Track 0 is piano and you want to hear its notes layered with strings instrument on track 1 and a pad instrument on track 2. Then after selecting layering in mixer dialog with [ALT L] you set first three bars to 0,0,0. If track i has value i it is not layered, meaning, it does not receive its notes from another track. Else the value states the track it receives from. In our example tracks 1 and 2 receive notes from track 0. Another example: If you want e.g. track 6 and 7 receive from track 3, you set the bars to: 0,1,2,3,4,5,3,3,8,9,10,11.

3.7   Subpage 6: Reverb and Chorus

This subpage sets the fluidsynth internal reverb and chorus for the soundfonts.

The reverb default parameters are (range, default, description): Room (0-99, 3, "reverb length"), damp (0-100, 0, "reduce high frequency"), width (0-100, 50, "add lower frequency"), level (0-100, 90, "loudness").

The chorus default parameters are (range, default, description): Voice count (0-99, 3, "voice count"), level (0-100, 20, "output amplitude"), speed (1-50, 3, "HZ 0.1-5"), depth (0-21, 8, "modulation depth"), type (0|1, 0, "sine|triangle").

The reverb and chorus setting, if its active or not and the parameters, applies to a synth instance in fluidsynth. In the Beppigames Sequencer you get a synth instance per imported soundfont in soundfonts.dat. If you import only one soundfont, then there is one synth and hence one reverb and chorus. If you import 12 soundfonts (may even be all the same (GM) soundfont), then there are 12 synths, each with its own reverb and and chorus. The GUI may give you the wrong impression reverb and chorus is per track which it is not, its

per soundfont ! Another source of confusion: In the internals of a soundfont, for each instrument it is specified how much it "participates" in the reverb and chorus of the soundfont. If there is no value or 0, then the instrument is not affected at all by reverb and chorus ! In contrast, if there is e.g. 15% specified for the instruments reverb, it means the instrument is affected by the reverb by 15%. When you compile a single large soundfont from multiple sources with polyphone (`https://www.polyphone-soundfonts.com`), it may therefore happen some instruments are affected by reverb and chorus, some not.

[ALT R] toggles the reverb, [ALT C] the chorus. Left and right cursor keys switch between params, values are changed with up and down cursor keys.

I use only one large soundfont, so I only have one global reverb and chorus setting. So its kind of master effects for me. Note that in my sketches I turn off the fluidsynth internal reverb and chorus (both are off by default).

3.8   Subpage 7: External Reverb (dfzitarev1)

The fluidsynth internal reverb sounds ok with the default settings. However, when cranking it up, it no longer sounds nice to my ears. Fluidsynth provides a ladspa interface for external effects, so I added the dfzitarev1 reverb ladspa plugin (`https://github.com/SpotlightKid/dfzitarev1`). I made some small changes to have a C++ version with no dependencies (except ladspa header) and a bypass option. Its included in the appimage and turned on by default.

On this subpage every bar corresponds to a parameter of the reverb plugin. As on the previous subpage [ALT R] toggles the reverb, left and right cursor keys switch between params and values are changed with up and down cursor keys.

To reset a param to a default press [ALT X]. To reset all params to defaults press [ALT SHIFT X]. Left white text is min value, right is max value, yellow text is current value.

3.9   Subpage 8: External Equalizer

This is a 10-band equalizer. I put the code from `https://www.earlevel.com/main/2012/11/26/biquad-c-source-code/` to use. Its included in the appimage and turned off by default. It can be toggled on/off with [ALT E]. In addition to editing the frequencies one can also choose from equalizer presets. This selection is started with [ALT P], changing is with up and down cursor keys and finished with [RETURN]: The first entry "—-" of the presets list in the upper right (yellow font) denotes the current setting. If selected, nothing is changed. The other settings are FLAT (all bands zero), LOWP (a lowpass which

fixed some problems in testing), ACOU (acoustic), PIAN (piano and classic), POP, ROCK, LATI, ELEC (electronica) and BASS (bass boost).

Frequency bands are selected with left and right cursor keys. Up and down cursor keys raise respective lower frequencies in range -12 to 12 dB (while not selecting a preset).

To reset a band to zero press [ALT X]. To reset all bands to zero press [ALT SHIFT X]. Or select the FLAT preset.

While switching through the EQ presets one can e.g. change the current subpage, start a song or change the session, however the current track cannot be changed until the selection was made with [RETURN].

3.10   Pitch Black
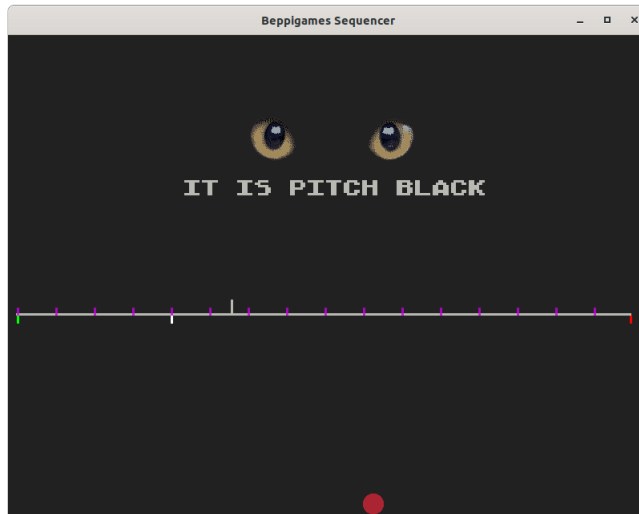
This is probably the most important feature of the sequencer: Regardless which subpage you are on, press [ALT RETURN] or [F9] and you are in the dark: Most visual distractions are removed and you can focus on listening. Press same key again to revert to normal view.

Below the cat eyes and text are the 16 bars of the current session. The upper grey spike is the playhead. The lower white spike is the cursor position. The lower green and red spikes are the first and last step (playing) of the current track of the current session. If recording is on you can see the record icon at the lower border. If being on subpage 1 you can, as usual, start playing the session with [SPACE], from current cursor position with [RETURN] or continue with [SHIFT SPACE]. You can move the cursor position page (bar) wise with [NUMPAD PGDOWN] and [NUMPAD PGUP] and by single steps within a page with [CURSOR DOWN] and [CURSOR UP].

The upper spikes mark the start of each bar and are colored in the tracks color.

Note that when "Pitch Black" is active you wont receive any messages. All

the keyboard commands are usable but e.g. when saving the project with [F1] or loading with [F5] no according messages are displayed. There is also no indication which subpage is current.

If you start the sequencer with -w 4, -w 5 or -w 6 the pitch black shows the wallpaper instead of the cat eyes and text. E.g. with -w 6 you get following pitch black page:
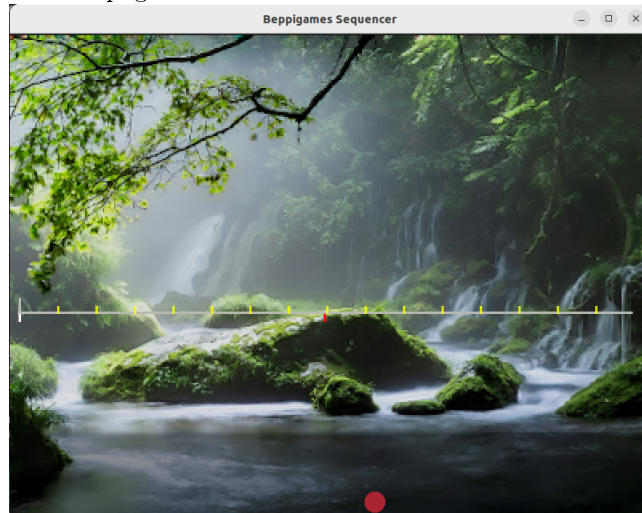
3.11 FX Chain

The FX chain we set up per soundfont (=(fluid)synth instance) is in order: Equalizer, reverb (zita) and (hard)limiter. Equalizer and reverb can be toggled on/off on their subpage with [ALT E] and [ALT R] respectively. The limiter is always on and cannot be disabled. I recommend using the equalizer only if you have a particular reason to do so, e.g. removing unwanted frequencies (which is also the reason its before and not after the reverb).

3.12 Per Track-, Per Session- and Per Synth- Settings

Some of the settings are per track, per session or per synth. Which may be the source of confusion. To clarify:

For every soundfont listed in soundfonts.dat a synth instance is created. If you choose an instrument of a soundfont it plays on the respective synth on the respective channel. There are 12 tracks, i=0..11. Track i always plays on channel i on a synth (exception at risk of creating confusion: Actually tracks i=9,10,11 play on channel 10,11,12 to avoid specific drum track issues).

The reverb and chorus are per synth. The mute and single settings are per session. Everying else is per track. E.g. volume, pan and pitch change applies to a track. Settings applying to a track are shared by all sessions.

If you import only one soundfont (this is what I do and recommend) and select instruments from it, then there is only one synth instance with its reverb

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an chorus in existance.

If you import several soundfonts and, for a track, switch a instrument from one soundfont to another, just keep in mind that the chorus and reverb also switches to the new synth ones.

Next a summary:

Attribute	Applies
Track Mute	Per Session
Track Single	Per Session
Track Default Velocity	Same for Track in all Sessions
Track Default Velocity Lock	Same for Track in all Sessions
Track Volume	Same for Track in all Sessions
Track Pan	Same for Track in all Sessions
Track Pitch Change	Same for Track in all Sessions
Track Layering	Same for Track in all Sessions
Track Midi Channel	Same for Track in all Sessions
Track Midi Out (Device)	Same for Track in all Sessions
Fluidsynth Reverb	Per Synth Instance (=Soundfont)
Fluidsynth Chorus	Per Synth Instance (=Soundfont)
External Equalizer	Per Synth Instance (=Soundfont)
External Reverb (Zita)	Per Synth Instance (=Soundfont)
External LinuxVST FX	Only First Synth Instance (=Soundfont)
Limiter	Per Synth Instance (=Soundfont)

3.13 Advanced Editing of Steps

3.13.1 Editing Note Attributes Directly
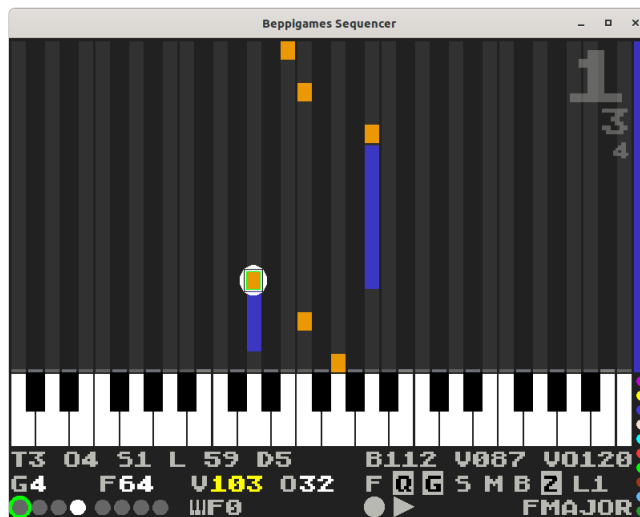
As previously described, the attributes gate, gate fraction, velocity and off-set of a note can be changed using [ALT] and [ALT SHIFT] plus cursor keys.

Alternatively they can just be typed in directly: The according edit modus is entered by pressing [CTRL RETURN] or [DELETE] when the cursor is on the note head on subpage 1. It can only be entered if playback is currently stopped. The value of the current attribute to be edited is drawn in yellow, white else. To choose another attribute for editing just press cursor left and right keys. To change the attribute value just type in the new value. Please note that all four attributes have value ranges 0..127. If you type a out of range value, it will be replaced by the original value. You can delete the last typed digit with [BACKSPACE].

When finished with editing an attribute, again, another attribute can be selected for with the left and right cursor keys. The edit modus is exited by pressing [RETURN] or [DELETE] again. When entering the edit mode always the last edited attribute is preselected for editing.

To fix the timing (offset and/or gate fraction) of a note and make a first guess use [SHIFT O] and [SHIFT F] when cursor placed on the note on the first subpage. These cycle through values 0,32,64,96 for offset and gate fraction respectively (1/64 notes).

3.13.2   Looping
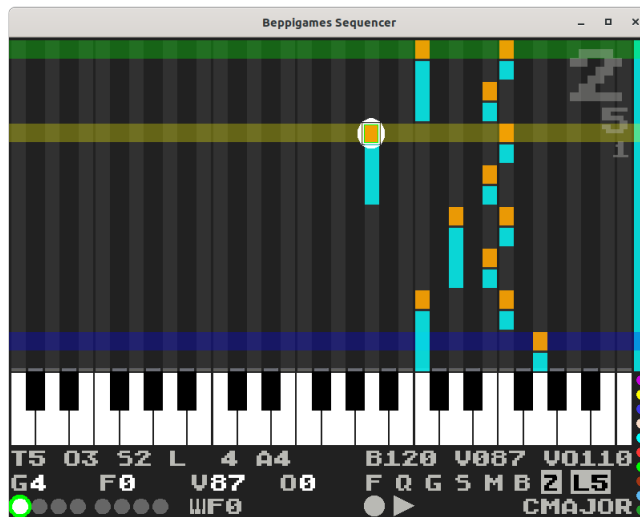
Sometimes you may want to loop over an arbitrary section of a session while recording to or moving around notes in a track. For that purpose, on subpage 1, you first toggle the loop ON with [ALT L]. Then you set start step of the loop with [CTRL B] and end step with [CTRL E]. Those steps are marked with a yellow and blue bar. Finally you start playing the loop (on subpage 1) with [SHIFT RETURN]. You stop playing the loop as usual with [SPACE], [RETURN] or [SHIFT RETURN]. When looping is ON the "L" flag is inverted and followed by the number of the track in which the loop points were set. You can disable the loop points with [ALT L] and recall them again with [ALT L].

The loop bars apply to one track at a time and in all sessions. Note the looping functionality is only accessible on subpage 1.

Hint: In practice I found I rarely use this feature. Instead I do this: On subpage 1, for session play, I place the cursor at the start of the loop and toggle follow playhead off with [ALT F]. Then I start play from cursor position with [RETURN]. When the loop nears its end (from hearing) I press [RETURN] twice to stop and start play again. Most of the time I do not want to see the notes or turning of pages but just listen.

3.13.3   Block Operations
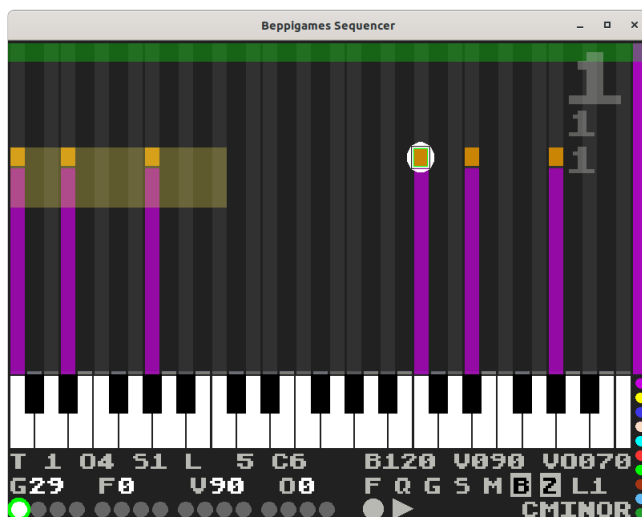
Subpage 1 allows to copy/paste one note from a track into clipboard. From there it can be pasted anywhere, into different tracks and sessions (current session is selected on subpage 2).

Subpage 2 allows to copy/paste a whole session or a whole track into clipboard. From there it can be pasted anywhere, into different tracks and sessions.

Block copy allows to copy/paste an arbitrary rectangular area (columns are notes, rows are steps) into clipboard. From there it can be pasted anywhere.

Block copy works only on subpage 1. First you move the cursor to the upper left of the rectangular area and press [CTRL K B]. Then you move the cursor to the lower right of the rectangular area and press [CTRL K K]. Both selections can be used repeatedly. Now the area of the block is shaded gold and the B flag is drawn inverted indicating there is a block in the clipboard. Now move the cursor to the destination. Can be anywhere, e.g. different track, different session. The destination position is the upper left of the to be inserted block. Next, finally, paste the block with [CTRL K C]. To undo the paste operation press [CTRL K U]. You turn off the block with [CTRL K H]. When the block is turned on (shaded area), you can delete it with [CTRL K Y]. You can move a block with [CTRL K M], requiring source and target to be in same track and

session. The delete or move operation can also be undone with [CTRL K U]. Note that while a block is turned on you can repeatedly e.g. move or copy it around.

All notes of a track in current session can be selected to block with [CTRL K A]. [CTRL K B] and [CTRL K K] can be used to further shrink the selection. [CTRL K S] applies the current track velocity to all notes in the block. See more of this topic in session 3.13.7. [CTRL K Q] quantitzes the offset of all notes in the block (=sets note offset to zero).

In general, when applying a operation to a block, the block must be in current session and current track.

3.13.4   Line Operations

On subpage 1 there are several functions operating on lines (all notes of a step). These are: [CTRL I] to insert a blank line, [CTRL Y] to delete a line (following lines move down a step), [CTRL J] to erase a line, [CTRL L] to copy a line to clipboard, [CTRL P] to paste a line from clipboard. [CTRL NUMPAD PLUS] and [CTRL NUMPAD MINUS] to shift line one octave up and down. [CTRL SHIFT NUMPAD PLUS] and [CTRL SHIFT NUMPAD MINUS] to shift line one note up and down.

3.13.5   Bar Operations

On subpage 1 there are some functions operating on all notes in a bar (page). These are: [ALT SHIFT X] erases all notes in current bar, [ALT NUMPAD PLUS] and [ALT NUMPAD MINUS] move all notes in the current bar one octave up and down, [ALT SHIFT NUMPAD PLUS] and [ALT SHIFT NUMPAD MINUS] moves all notes in the current bar one note (semitone) up and down.

3.13.6   Selectively Copy Note Attributes

On subpage 1, to copy specific attributes of a note, e.g. its velocity to other notes: First copy the template note to clipboard with [CTRL C]. Then move cursor over a target note (head) and paste velocity [CTRL S], gate [CTRL G], gate fraction [CTRL F] or offset [CTRL O]. Note that the pasting can be done repeatedly.

3.13.7   Bulk Velocity Changes

You can assign a velocity to all notes in a block.

Example: Assume, on subpage 1, you set a tracks velocity with [ALT V], then recorded notes with PC keyboard or with midi keyboard (with fixed velocity [ALT Y]). Then you change the instrument of the track and find the fixed velocity no longer works and a different velocity (which accesses a different sampled layer) sounds better.

You can change the velocity for all notes of a track in a session as follows: Set the new desired track velocity with [ALT V]. Then select all notes of track

of session into a block with [CTRL K A]. Then possibly shrink the block with [CTRL K B] and [CTRL K K]. Then apply [CTRL K S] which applies the current track velocity to all notes in the block. Finally deactivate the block with [CTRL K H].

3.13.8 Harmonic Transpose

Notes of a line, e.g. a chord, can be moved up or down one note with [CTRL SHIFT UP] and [CTRL SHIFT DOWN]. This does not preserve a scale: If notes were all in cale, after the shift (some) notes may no longer be in scale. To preserve the scale, use harmonic transpose with [SHIFT NUMPAD PLUS] and [SHIFT NUMPAD MINUS]. If a block was selected, the block is shifted instead of the current line. Note when shifting a block, the width of the block is updated to lowest and highest note in the block (=excess space in block selection is removed). Also note that shifting a block requires no other notes in the way. If there are, a "NOTE COLLISION" message is displayed. To be able to apply harmonic transpose, all notes in line or block must be in scale, else a "NOT IN SCALE" message is displayed. A further requirement is, notes are not leaving the valid range of notes. Else a "NOTE LEAVING RANGE" message is displayed.

3.14 Recording

Recording is toggled with the right control key ([RIGHTCTRL]). If ON, a red recording icon is shown.

3.14.1 Live Recording

This is recording notes from live playing while sequencer is playing, indicated by a green triangle, the moving playhead bar (if in sight) and automatic page turns (if follow playhead selected). Live recording works for one session (session play) and across multiple sessions (song play, see section 3.14.3).

A topic of interest here is the undo functionality: When recording is turned on with [RIGHTCTRL], the sequencer internally makes a backup of all tracks in all sessions. When recording is turned off with [RIGHTCTRL] (again), this backup is discarded and all changes from recording are made permanent. If [ESC] is pressed BEFORE turning off recording, then the backup is restored, undoing all changes made in recording. The recording is automatically turned off after the undo and playing continues.

3.14.2 Step Recording

This live records notes to a step. Move the cursor to the step you want to record notes to. Make sure play is off. Turn on recording with [RIGHTCTRL]. Next play notes. These are added to the current step (or overwrite notes in current step). The undo functionality is same as described in previous section on live

recording: BEFORE you turn off recording with [RIGHTCTRL], you can press [ESC] which undoes all changes made in recording.

3.14.3   Live Recording in Song Mode

The default workflow assumes you work on sessions of up to 16 bars length each and finally concatenate them to a song. First of all, notes are not cut at end of a session, instead they can sound on into the next session. So even the song is broken down into sessions everything is seamless. Nevertheless the need may arise to have a continuous timeline and e.g. just play along for several minutes while recording your play and if something interesting turned up, copy it out later.

Here is how to do it:

I assume the sequencer was started with a new project. First session is selected and first track. Go to steps page [CTRL 1]. Move onto last step (line 255). Press [CTRL SHIFT E]. Now the first track of the session has 256 steps (16 bars). Press [CTRL 2] to go on sessions page. There copy the first session to the other 5 sessions of the first line of sessions ([CTRL C], [CTRL V]). Then move cursor over first session, press [INSERT], move over second, press [INSERT] and so on for all 6 sessions. You now have a song containing 6 empty sessions of length 16 bars each. Press [F1] to save the project.

Now turn on recording with [RIGHTCTRL]. Next play song with [SHIFT RETURN]. Now play along and your playing is recorded. When finished, stop playing song with [SPACE]. If you like what you have played press [RIGHTC-TRL] to keep it, else [ESC] to discard your recording. If you want to copy out portions use block copying (section 3.13.3) to the lower row of sessions. If you want to erase contents of a session, just move the cursor on the session and press [CTRL Y]. To erase contents of only the current track of session [CTRL X].

To be quicker in future I would recommend to save the project (.dat) as a template and copy it over for new projects.

3.15   Playing instruments hosted in a DAW

The Beppigames Sequencer can play instruments hosted in a DAW. In the following I use LMMS as example. It may work the same way in other DAWs: On the commandline of the sequencer two midi outputs can be specified with '-o' and '-p' params respectively. On Linux, when starting the sequencer without params, among the midi outputs you find

```
midi through:midi through port-0 14:0
```

listed (port number my vary). Now start the sequencer selecting this output:

```
$ ./BeppigamesSequencer-x86_64.AppImage -o "through" my_song
```

Next, in LMMS add a track with e.g. Vestige and add a VST instrument. In Vestige GUI select the "14: 0 Midi Through:Midi Through Port-0 14:0" as midi input and select channel 1.

Next, in the Beppigames Sequencer go to the mixer page [CTRL 5] and select the output of the current track as "1" ([ALT O] to select outputs). Then set channel as "0" ([ALT C] to select channels). Voila, now you can play the VST instrument from the Beppigames Sequencer. If you set output to "0" then the notes are sent to internal soundfont renderer instead, if set to "2" to the second midi output (-p option).

Nice thing is, if you save projects in LMMS and the Beppigames Sequencer respectively and reload them, all settings will have been memorized and everything (should) work as you left it.

3.16 Midi Export

There are two midi exports available, the old with [F7] and the new and recommended, labelled with "extended", with [F8]. Both export the current song in midicomp human readable format. The file is <project-prefix>.asc. If you forgot to create a song you will be notified ("NOSONG").

If successful convert to midi binary format with

```
$ midicomp -c <project-prefix>.mid < <project-prefix>.asc
```

The difference of exports is as follows: [F7] ignores track pitch changes, layering and track velocity locking (all are settings in mixer, the track velocity locking can be toggled on any subpage with [ALT T]). Further, overlaps of notes are exported exactly as they appear in the tracks. In contrast [F8] obeys track pitch changes, layering, track velocity locking and also removes overlaps.

Example of the overlap problem and cleanup: Assume on a track a note C4 extending from (startstep, endstep) = (3,6) followed by another C4 (5,8). The two notes overlap. From midi spec overlap is legal and how it sounds depends entirely on the synth. Here we are concerned how it sounds with fluidsynth and we want imported notes in LMMS to sound the same (with SF2Player) as in the Beppigames Sequencer. We "clean" this case to (3,5) and (5,8). With respect to fluidsynth these cases sound identical but for the non-cleaned case LMMS midi import resulted in (3,6) and (5,6). A further test of importing the non-cleaned case with MidiEditor resulted in (3,8) and (5,6) (!). So use [F8] unless you want to apply your own cleanups later or retain the overlaps for whatever reason.

3.16.1 Importing songs in LMMS

When exporting to midi the Beppigames Sequencer adds bank switching cc0/cc32 info. However, when importing the midi in LMMS, the bank switches in midi file seem to be ignored or the fluidsynth SF2Player ignores them because of synth.midi-bank-select being configured as "gm" (a guess). The program changes in midi file work correctly.

So if a track used an instrument not from the first bank, the instrument has to be set "by hand" in SF2Player gui after import. Also either update the bank automation or deactivate/remove it (first blue bar below the notes). Note that in LMMS midi import setting the 10th track instrument will usually fail and

you have to set it by hand. Seems the SF2Player thinks 10th track is drum track and tries to set program in bank 128 (?). If this fails, the first available patch is selected.

When exporting to midi all reverb and chorus settings are lost. LMMS uses one synth instance per track and reverb and chorus have to be activated "by hand" for every track in the SF2Player GUI (note I never use the fluidsynth reverb and chorus). It seems LMMS works with the same fluidsynth default parameters (as the Beppigames Sequencer).

3.17 Audio Export (None)

This sequencer has no audio export, meaning, no rendering to a wav file. If you want to make a audio recording in the beppigames sequencer, you can just record the system audio. I use audacity for this purpose.

In the old days I just pressed the record button in audadcity, started the song and recorded. Unfortunately, now, for me on my system, there are more steps required. Next is what I have to do:

1. Connect headphones (bizarrely I have to do this, else point 4 will fail).

2. Play back the song in the beppigames sequencer ([SHIFT RETURN] on subpage 2).

3. In audacity select "pulse" as recording device. Press record. The Beppigames sequencer uses ALSA but behind that its pulseaudio anyway.

4. Start "pavucontrol". On the recording page select "Monitor Builtin Audio Analog Stereo".

3.18 Key and Scale Changes

There are no special functions for basenote or scale changes of existing notes but with a bit of thinking we can manage. Following table states in each line a major and a minor scale which are identical. Every step between consecutive notes (also circular) in the left column is 1 step which is one semitone.

Major	Minor
C	A
C#	A#
D	B
D#	C
E	C#
F	D
F#	D#
G	E
G#	F
A	F#
A#	G
B	G#

Example: You started making a song in A Major. You added notes to a track. Now you are interested how it would sound in D Minor. So you want to convert the notes of the track in current session from A Major to D Minor. From the table above you see D Minor equates F Major. To go from A Major to F Major therefore requires subtracting 4 (or adding 8) semintones to each note. It is useful to impose a rule here: If target base note is left in octave from source basenote, go left (subtract), else go right (add). The benefit of following this rule is, we achieve transitivity and reversability of changes. E.g. assume you changed basenote first from C to B and later from B to D. Finally you decide you want to change again from D to C. With the above rule you arrive back at the starting point (=every note is in its original octave).

Now back to example: Mark all the track contents (in session) as block with [CTRL K A]. Set cursor to lower left of the green marking rectangle. Now step the cursor 4 times to the left and move block to cursor position with [CTRL K M]. Turn off block with [CTRL K H] or move it again to listen to another scale, e.g. E Minor (=G Major) is two steps to the right. Note that you can move notes in a block one octave higher (or lower) by setting the cursor at the upper left of the green area and pressing [SHIFT CURSOR RIGHT] (or [SHIFT CURSOR LEFT]) and [CTRL K M].

3.19   Experimental Stuff

Experiments on note humanization and trying to get better integration of a launchpad mini mk3 and a Alesi Qmini keyboard. Also a hack for adding a LinuxVST effect plugin to the fx chain.

3.19.1   Humanization of Notes

I made some expirements with humanization of notes:

When a block was selected, e.g. through [CTRL K A], the velocities of all the notes in the block can be randomized with [CTRL K R]. A random value in range from -10 to 10 is applied to each velocity.

When a block was selected, the offsets of all notes in the block can be randomized with [CTRL K T]. A random value in range from -8 to 8 is applied to each offset. In effect of this, notes may move to a different step (previous or next) but it is secured notes stay within the block.

Hint: Instead of applying offset "humanization" I recommend live recording with turned off offset- and gate quantization (toggled with [ALT Q] and [ALT G] on subpage 1). Note when starting a new project these quantizations are turned on by default.

3.19.2   Launchpad/Controller Support

I got a launchpad mini mk3 and just mapped some note keys from the midi input to sequencer functions. To activate this mapping the sequencer must be started with "-l" option.

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Note	Function
C0	Start/stop session play
C#0	Start/stop loop play (if loop active)
D0	Toggle record
D#0	Undo recording
E0	Single current track
F0	Mute current track
F#0	Toggle displaying notes on Launchpad (playing current track)
G0	Select track

These keys also function to select tracks 1-8. In addition follwing notes are used when selecting tracks 9-12:

Note	Selection
C1	Select track 9
D1	Select track 10
E1	Select track 11
F1	Select Track 12

Examples: If the midi input sends a G0 note followed by a C#0 note, the second track is selected. If a G0 note is sent, then a C1, the 9-th track is selected. If a C0 note is sent, the session playback starts or stops.

Only the F#0 mapping actually requires a launchpad: In order to see notes played by sequencer on current track on the launchpad, the launchpad must be specified as first midi output on commandline.

Some hints on the custom modes on the launchpad. For the launchpad mini mk3 there are only 3. Custom Mode 2 (chromatic keyboard) I keep unchanged. Custom Mode 1 I choose as drum grid with following start notes: Lower left D#1, lower right G2, upper left B3, upper right D#5. That way you can access all sounds in a drumkit in the soundfont (D#1 to D#6). As Custom Mode 3 I use 8 midi notes in the upmost row (C0,C#0,..,G0). Below I use 7 keyboard blocks (lines), all in scale C Major and in octaves 7,6,..,1. Remember when a scale is locked to keyboard in the Beppigames sequencer, the notes are played using only the white keys. The Custom Mode 3 described allows to play the scale selected in the beppigames sequencer, you have access to 7 octaves (in scale) at once and you can execute the commands of the table above from the topmost row.

Note that the Launchpad Components Software I used had the bug of e.g. displaying octave "4" in menu but afterwards playing in octave "5". So I had to fix this with choosing one octave lower in menus.

So summarizing, for a controller, e.g. a launchpad mini mk3, to have the above mappings active:

```
$ ./BeppigamesSequencer-x86_64.AppImage -i "mk3 midi 1" -l my_song
```

To have notes playing on current track displayed on a launchpad mini mk3, additionally add param:

```
-o "mk3 midi 1"
```

Last param might work for a launchpad x or pro as well (cannot test). Note that while being excited about the launchpad at first and implementing this, now I just use no features midi keyboards.

3.19.3 Hack: Alesis Qmini Keyboard Controls

I have a Alesis Qmini (probably identical to M-Audio Keystation Mini 32 Mk3) which I carry around and use quite often. Works ok only with a short usb cable, else it malfunctioned. I wanted to trigger some functions of the sequencer from it so I did the following in the sequencer:

1. Mapped the Qmini sustain button to toggle recording.

2. Mapped the Qmini pitchbend right button (pitchbend left button achieves the same) UP key to toggle playback.

3. Mapped the Qmini modwheel button to undo a recording (ESC).

The pitchbend button starts/stops session play. Unless a loop is active (toggle with [ALT L], set start and end of loop with [CTRL B] and [CTRL E]), then it starts/stops loop play.

This functionality can be activated on the command line with the "-q" switch.

Do not know if there are midi keyboards which can send user assigned midi commands. In any case, here the respective midi commands:

The sustain button is midi bytes 176, 64, 0 (or 127). The pitchbend (left or right) up button is midi bytes 224, 0, 64. The modwheel button is midi bytes 176, 1, 0.

3.19.4 Hack: Using Black Keys for Transport Control (any Midi Keyboard)

I have a Korg MicroKey 2 which has zero controls (except pitch and mod wheel) for invoking sequencer functions. However, when using a scale (other than chromatic) and locking the keyboard to the scale, the black keys are unused. Therefore I did the following:

1. Mapped note C# (noteon) to start stop session/loop play.

2. Mapped note D# (noteon) to undo a recording (ESC).

3. Mapped note F# (noteon) to toggle single current track.

4. Mapped note G# (noteon) to toggle mute current track.

5. Mapped note A# (noteon) to toggle recording.

This functionality can be enabled with the "-k" switch. Again, it is only active if a scale other than chromatic was selected and keyboard was locked to scale (toggled by [ALT+Z]). This works with any Midi keyboard and in any octave, e.g. C#0 to C#9 and A#0 to A#8.

Regarding C#, if a loop is active, the loop plays, else the session plays.

3.19.5 Hack: Add LinuxVST effect plugin to fx chain

The sequencer can use one (windows) vst effect plugin, e.g. a reverb, in the chain. To use it I applied a hack: I wrote a ladspa plugin, which I insert in the fluidsynth fx chain, which loads a arbitrary LinuxVST effect plugin. The LinuxVST plugin is inserted in the fx chain after zita reverb and before limiter (remember you can disable zita reverb and the equalizer) by specifying "-x" on commandline. You can convert your windows vst plugin to a LinuxVST one with linvst (`https://github.com/osxmidi/LinVst`). Then copy the .so and .dll to the sequencer AppImage directory. Additionally a configuration file "fx.dat" must be placed in the directory of the AppImage. Its contents are text and as follows (line by line):

```
<effect .so file>
<preset to select>
<N:=number of parameters>
<param1 index> <param1 value>
:
<paramN index> <paramN value>
```

If no preset to select use -1 as preset. If no params to set (change) use 0 as number of parameters.

Next an example: I like to use e.g. the DReverb.dll reverb plugin. I converted it to a LinuxVST with linvst and put the DReverb.dll and DReverb.so in the AppImage directory. In this directory I created a file "fx.dat" with following contents (line by line):

```
DReverb.so
14
1
9 0.42
```

Then I started the sequencer with -x option: The sequencer loads DReverb.so. It selects the preset 14 (which is "Mellow") and then changes 1 parameter: It changes parameter 9 (which is "Decay Time") to value 0.42 (which is approx. 1.8 seconds for this param for this plugin). Note that vst2 parameter values are in range [0..1]. First preset is index 0, first parameter index is 0.

Using this hack requires some knowledge about the plugin you are going to use, you need to inspect it for its presets and parameters. One way to get this info is to load the plugin in Audacity (put the .so and .dll of the vst in ~/.vst directory) and select "Manage", "Options..." and "Disable graphical interface". The length of the respective slider [0..1] is your param value. Presets are under "Manage", "Factory Presets". As further help, when loading the plugin in the Beppigames Sequencer information about presets and parameters is logged to the console.

One limitation: In the Beppigames sequencer, the effect is only inserted in the FX chain of the first soundfont ! Reason is, inserting in multiple chains caused crackling sound.

Just two things I noticed when utilizing wine (from linvst): First, I found that a recent installation (and deinstallation) under wine (a Fruity Loops Demo)

caused wine processes still running when exiting the sequencer. The problem was MS Edge update crap (in process list C:\Program Files (x86)\Microsoft\ EdgeUpdate\MicrosoftEdgeUpdate.exe /c). Deleted the Microsoft folder (ok, later read deleting MicrosoftEdgeUpdate.exe would suffice also). Peace again. In any case those wine processes can be killed with "wineserver -k". Second, running plugins through wine creates "fixme" debug messages in the console. To get rid of them add line "export WINEDEBUG=-all" in .bashrc (its a MINUS before "all").

The hack works nice for me with Wine version 6. With Wine version 5 it segfaults. My assumption is the LinVST versions I have used so far all required Wine version 6 at minimum.

I made successful tests with DReverb, epicPLATE and Freeverb3_Hibiki (all Linvst'ed VST2).

On the beppigames sequencer page you also find the Hibiki reverb (great for classic !) as a LinuxVST for download which you build yourself and just list the resulting ReverbHibiki.so in fx.dat. No linvst and wine is required for it. I modified the original Hibiki sources (slimmed down) and replaced the VST2 sdk with the vestige LMMS header and made some adaptions for it.

3.20   Issues

Some limitations of the sequencer. Some deliberately.

- The sequencer uses a fixed 1/16 grid for VISUAL representation. There is no zooming. If the start of note falls within a step this is denoted by a non-zero note offset value 1..127: E.g. note offset=64 means note starts at middle of step. If the gate of a note is a non-multiple of grid steps this is denoted by a non-zero note gate fraction value 1..127. E.g. gate=3 and gate fraction=16 means the note sounds for 3+(1/8) steps (16/128 = 1/8).

- Repeating the first point: Although notes may have a nonzero offset and/or gate fraction, the visual impression given is always as if both had been quantized. This is intentional. To know about offset and gate fraction one has to look at the note attributes (O and F). Note, again, the visual representation is only a approximation. You verify by ear, not by visual inspection.

- From implementation the timing precision of this sequencer for playing and recording is one millisecond. But the notes are stored with a lower precision: Gate fraction and offset values are stored as values 0..127. The resulting PPQ of this sequencer is PPQ=512: Each grid step (1/16 note) in it has 128 substeps. This should be sufficient and therefore a non-issue. Of course the PPQ is theoretical and depends on kernel, load and performance settings (there is a usleep() in the code...). The author tested with stock kernels ubuntu (20.04), mint (20.2) and debian (11.1.0) and fast playing with midi keyboards seemed to be properly recorded. Playing on

midi keyboard had higher accuracy than on PC keyboard. All judged by ear. Regarding PC keyboard usage: I created my song "Long Ride To Home" (on www.beppigames.de) entirely with the PC keyboard. So it should be possible to compose whole songs e.g. on train rides with just a notebook and no midi keyboard available. Another observation from tests: A low latency kernel from ubuntu studio resulted in high cpu load (also observed in other applications e.g. LMMS). So stick to stock kernels.

- Because of the fixed 1/16 grid, the SAME NOTE CAN ONLY START ONCE IN A STEP IN A TRACK. In a line (step) one can start as many different notes as polyphony allows at any of the 128 substeps each, but the same note cannot be started twice in a step (in a track) ! To fix this I would need a zoom which displays the 128 substeps of a step in the grid for editing. During testing I noticed midi files where on a track the same note starts multiple times in a 1/16 step, e.g. in a Saint-Saens Aquarium midi. Also this limitation became obvious when trying to create timpani rolls. One solution might have been to use two tracks for a roll. Instead I recorded different rolls in LMMS and added these as instruments to my soundfont.

- A block can be moved only in steps, not substeps. Of course individual notes can be moved with substep accuracy by changing the note offset.

- In recording the sequencer always overdubs. If you record a note to a step where already the same note starts the old one gets removed. But in all other cases the old note persists and overlappings of same note may be created. When using [F8] the exported (midicomp) file has these overlappings removed, when using [F7] the overlappings are retained.

- To me, when using fluidsynth, high notes seem to play louder than low notes (of same velocity). Do not know if this is desired normal behavior or the difference is already in samples or if its result of pitching (distance or method). Just want to note that when I sent high and low notes (of same velocity) to a sound module for test they seemed to have roughly the same loudness to me. Strange. Probably this was a feature of the sound module. Might be also affected by how sampling and normalization in creation of an instrument is applied: To each sample individually or to a octave or to all notes (=all notes sampled to one .wav which is then normalized). Or on my Ubuntu a undetected non-flat equalizer is at work.

- On an old AMD A8-4500M ubuntu 20.04 there was crackling sound. Had to fix it with a larger audio buffer (64->128, fluid_settings_setint(mpSettings, "audio.period-size", 128). On a Ryzen 3 3200U ubuntu 20.04 there were no issues.

- The sample rate is not configurable. The sequencer uses 44100 Hz sample rate (which is also fluidsynths default). The audio driver used is ALSA.

- There is a (hardware) issue depending on PC which may spoil playing chords on the PC keyboard: I currently have two notebooks, a Lenovo Ryzen 3 and a Acer Ryzen 5, both running ubuntu 20.04. On the Lenovo, registering 3 to 5 keys works most of the time but there are groups of keys for which I can only register two keys at once ! On the Acer I can register more keys at a time but its still not the desired n-key rollover (NKRO) property. I assume gamer keyboards have this property. Update: I purchased a gamer keyboard with guaranteed NKRO and found it has only 6KRO on Linux :-(So my advice is, check your exisiting PC keyboards. Chances are one of them has 6KRO property which is ok to play chords.

- There is intentionally no recording of automations because its a major distraction. If required, do these in a DAW as post processing. Even using velocities may be distracting. For that reason you can set/change current track velocity (Subpage 1, [ALT V]) and lock a midi keyboard to these track velocities ([ALT Y]). In addition you can lock a track to its track velocity (toggled with [ALT T]). Then all notes of the track (live and already recorded) play with the track velocity.

- There are US keyboard layouts and "compact" keyboards for e.g. gaming which go from left to right: Left shift, Z, X etc. The $<>$ key left of Z is missing ! Which gives the lowest octave only 11 instead of the required 12 PC keys. Consequence: The lowest C in chromatic play or the lowest key in scale play cannot be typed in with such a keyboard.

- Most recent fluidsynth releases evaluate fluidsynth internal reverb and chorus AFTER the fx chain is processed. Versions 2.2.9 and prior evaluated them BEFORE. There is no fluidsynth setting to revert to the old behavior. For now I ignore this issue: The sequencer (v0.82) is using fluidsynth 2.3.3. In my sketches I always turn off the fluidsynth internal reverb and chorus anyway. Note those are initially turned off for new projects.

- The sequencer either uses no quantization or quantizes to 1/16 notes. So if you need notes on a 1/64 grid use note offsets 0,32,64 and 96. Hint: You can cycle through values 0,32,64,96 for offset and gate fraction with [SHIFT O] and [SHIFT F] when on first subpage and cursor is placed on a note.

- The seqencer has no metronome. If you need one use drums on a track.

3.21   Display-Related Functionality

The keyboard commands help overlay is toggled with [F10] and scrolled page wise using [NUMPAD PGUP] and [NUMPAD PGDOWN].

[F11] toggles if all notes are displayed. If ON all notes of all tracks are displayed simultaneously for a session. Notes from tracks other than the current track are displayed with their note heads in track color. All notes which are not on current track cannot be interacted with, they are just visual cues. Also

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notes are not "expanded": If you have a session of a drum 1 bar track and 8 bar lead track displayed together, the drum track will show up only in the first bar. This is in contrast to what happens when playing the session: When the 8 bar lead was played once the 1 bar drum track had been looping 8 times.

4   Appendix

4.1   Summary of keyboard commands

4.1.1   All Subpages

F1	SAVE PROJECT
F5	LOAD PROJECT
F7	EXPORT MIDI
F8	EXPORT MIDI EXTENDED
F9 OR ALT RETURN	PITCH BLACK
F10	TOGGLE HELP
F11	DISPLAY ALL TRACKS
CTRL SHIFT Q	QUIT PROGRAM
TAB	CYCLE SUBPAGES RIGHT
SHIFT TAB	CYCLE SUBPAGES LEFT
SPACE	PLAY SESSION OR STOP
SHIFT SPACE	PLAY FROM PLAYHEAD POSITION OR STOP
ALT Z	TOGGLE LOCK KEYS TO SCALE
ALT S	TOGGLE SINGLE CURRENT TRACK
ALT M	TOGGLE MUTE CURRENT TRACK
ALT T	TOGGLE TRACK VELOCITY CURRENT TRACK
NUMPAD MINUS	ONE OCTAVE DOWN
NUMPAD PLUS	ONE OCTAVE UP
RIGHTCTRL	TOGGLE RECORDING
NUMPAD PGDOWN	GO TO NEXT BAR
NUMPAD PGUP	GO TO PREVIOUS BAR
ESC	UNDO -ONLY FEW CASES SUPPORTED-
ALT F	TOGGLE FOLLOW PLAYHEAD
ALT Q	TOGGLE OFFSET QUANTIZATION
ALT G	TOGGLE GATE QUANTIZATION
SHIFT 1-9,0,Q,W	SET TRACK 1-12 AS CURRENT TRACK
ALT 1-8	GO TO BAR 1-8
ALT 0	GO TO BAR WHERE PLAYHEAD IS
ALTGR 1-8,Q,W,..,I	GO TO BAR 1-16
CTRL 1-8	GO TO SUBPAGE 1-8
ALT Y	TOGGLE EXT MIDI INPUT FIXED VELOCITY
ALT C	SET EXT MIDI INPUT VEL CURVE

4.1.2 Subpage 1: Step Edit

CURSOR KEYS	MOVE NOTE AND STEP CURSOR
RETURN	PLAY SESSION FROM CURSOR POSITION
CTRL K K	END OF BLOCK
CTRL K B	BEGIN OF BLOCK
CTRL K H	TURN OFF BLOCK
CTRL K C	COPY BLOCK
CTRL K Y	ERASE BLOCK
CTRL K U	UNDO LAST BLOCK OPERATION
CTRL K M	MOVE BLOCK IF SAME SESSION TRACK
CTRL K A	MARK ALL NOTES OF TRACK IN SESSION AS BLOCK
CTRL K S	APPLY TRACK VELOCITY TO ALL NOTES IN BLOCK
CTRL K R	RANDOMIZE VELOCITY OF ALL NOTES IN BLOCK
CTRL K T	RANDOMIZE OFFSET OF ALL NOTES IN BLOCK
CTRL K Q	QUANTIZE OFFSET OF ALL NOTES IN BLOCK
SHIFT NUMPAD MINUS	HARMONIC TRANSPOSE DOWN LINE OR BLOCK
SHIFT NUMPAD PLUS	HARMONIC TRANSPOSE UP LINE OR BLOCK
CTRL N	ADD DEFAULT NOTE AT CURSOR POS
CTRL X	ERASE NOTE AT CURSOR POS
ALT DOWN	INCREMENT GATE OF NOTE
ALT UP	DECREMENT GATE OF NOTE
ALT LEFT	DECREMENT GATE FRACTION OF NOTE
ALT RIGHT	INCREMENT GATE FRACTION OF NOTE
ALT SHIFT LEFT	DECREMENT VELOCITY OF NOTE
ALT SHIFT RIGHT	INCREMENT VELOCITY OF NOTE
ALT SHIFT UP	DECREMENT OFFSET OF NOTE
ALT SHIFT DOWN	INCREMENT OFFSET OF NOTE
SHIFT O	CYCLE OFFSET OF NOTE THROUGH 0,32,64,96
SHIFT F	CYCLE FRACTION OF NOTE THROUGH 0,32,64,96
SHIFT LEFT	POSITION CURSOR COLUMN - OCTAVE
SHIFT RIGHT	POSITION CURSOR COLUMN + OCTAVE
SHIFT UP	POSITION CURSOR ROW - 4 STEPS
SHIFT DOWN	POSITION CURSOR ROW + 4 STEPS
CTRL SHIFT LEFT	MOVE CURSOR TO NEXT NOTE TO LEFT
CTRL SHIFT RIGHT	MOVE CURSOR TO NEXT NOTE TO RIGHT
CTRL SHIFT UP	MOVE CURSOR TO NEXT NOTE ABOVE
CTRL SHIFT DOWN	MOVE CURSOR TO NEXT NOTE BELOW
CTRL LEFT	DRAG NOTE LEFT
CTRL RIGHT	DRAG NOTE RIGHT
CTRL UP	DRAG NOTE UP
CTRL DOWN	DRAG NOTE DOWN
CTRL C	COPY NOTE TO CLIPBOARD
CTRL V	PASTE NOTE FROM CLIPBOARD
CTRL M	MOVE NOTE COPIED TO CLIPBOARD

CTRL S	PASTE VELOCITY FROM NOTE IN CLIPBOARD
CTRL G	PASTE GATE FROM NOTE IN CLIPBOARD
CTRL F	PASTE GATE FRACTION FROM NOTE IN CLIPBOARD
CTRL O	PASTE OFFSET FROM NOTE IN CLIPBOARD
CTRL I	INSERT BLANK LINE
CTRL Y	DELETE LINE
CTRL J	ERASE LINE
CTRL L	COPY LINE
CTRL P	PASTE LINE
CTRL SHIFT B	SET START STEP CURRENT TRACK
CTRL SHIFT E	SET END STEP CURRENT TRACK
CTRL B	SET START OF LOOP
CTRL E	SET END OF LOOP
ALT L	TOGGLE LOOP
SHIFT RETURN	PLAY OR STOP LOOP
INSERT	PLAY NOTE UNDER CURSOR OR IF NONE PLAY STEP
SHIFT INSERT	PLAY STEP
DELETE OR CTRL RETURN	EDIT NOTE ATTRIBS
CTRL NUMPAD PLUS	LINE ONE OCTAVE UP
CTRL NUMPAD MINUS	LINE ONE OCTAVE DOWN
CTRL SHIFT NUMPAD PLUS	LINE ONE NOTE UP
CTRL SHIFT NUMPAD MINUS	LINE ONE NOTE DOWN
ALT NUMPAD PLUS	ALL NOTES IN BAR OCTAVE UP
ALT NUMPAD MINUS	ALL NOTES IN BAR OCTAVE DOWN
ALT SHIFT NUMPAD PLUS	ALL NOTES IN BAR ONE NOTE UP
ALT SHIFT NUMPAD MINUS	ALL NOTES IN BAR ONE NOTE DOWN
ALT B	EDIT BPM
ALT V	EDIT TRACK NOTE DEFAULT VELOCITY
ALT O	EDIT TRACK VOLUME
ALT SHIFT X	ERASE ALL NOTES IN CURRENT BAR

4.1.3 Subpage 2: Sessions and Song

CURSOR KEYS	MOVE SESSION CURSOR
RETURN	SELECT SESSION UNDER CURSOR AS CURRENT
SHIFT RETURN	START OR STOP SONG PLAY
CTRL C	COPY SESSION AND CURRENT TRACK
CTRL V	PASTE SESSION EXCLUDING MUTE AND SINGLE FLAGS
CTRL M	PASTE ONLY MUTE AND SINGLE FLAGS
CTRL A	PASTE WHOLE SESSION
CTRL T	PASTE TRACK
CTRL L	PASTE TRACK LENGTH
CTRL SHIFT L	PASTE TRACK LENGTH TO ALL TRACKS

```
CTRL Y          ERASE SESSION
CTRL X          ERASE CURRENT TRACK
INSERT          APPEND SESSION TO SONG
DELETE          REMOVE LAST SESSION FROM SONG
```

4.1.4 Subpage 3: Instruments

```
CURSOR KEYS     MOVE CURSOR| SELECT SF|BANK|PROG
PAGE UP         MOVE CURSOR PROG +10 ITEMS
PAGE DOWN       MOVE CURSOR PROG -10 ITEMS
```

4.1.5 Subpage 4: Scale and Basenote

```
CURSOR KEYS    MOVE CURSOR| SELECT SCALE|BASENOTE
```

4.1.6 Subpage 5: Mixer

```
LEFT|RIGHT      MOVE BETWEEN TRACKS VALUE BARS
UP|DOWN         INCREASE|DECREASE TRACK VALUE
ALT O           SELECT VOLUME
ALT P           SELECT PAN
ALT C           SELECT CHANNEL (0-15)
ALT U           SELECT OUTPUT (0:INTERNAL 1:OUT1 2:OUT2)
ALT I           SELECT PITCH CHANGE (VALUE-64)
ALT L           SELECT LAYERING
ALT V           SELECT VELOCITY
ALT S           SINGLE TRACK OF SESSION
ALT M           MUTE TRACK OF SESSION
ALT T           LOCK TRACK TO (TRACK) VELOCITY
ALT SHIFT M     PROPAGATE MUTE FLAG OF TRACK TO ALL TRACKS OF SESSION
CTRL SHIFT I    MAKE TRACK PITCH CHANGES PERMANENT ("PIT" SELECTED)
CTRL SHIFT V    MAKE TRACK VELOCITY PERMANENT ("VEL" SELECTED)
ALT X           RESET LAYERING OF TRACK TO DEFAULT ("LAY" SELECTED)
ALT SHIFT X     RESET LAYERING OF ALL TRACKS TO DEFAULTS ("LAY" SELECTED)
```

4.1.7 Subpage 6: Fluidsynth Reverb and Chorus

```
LEFT|RIGHT      MOVE BETWEEN CURRENT TRACK REVERB AND CHORUS PARAMS
UP|DOWN         INCREASE|DECREASE A PARAM
ALT R           TOGGLE REVERB
ALT C           TOGGLE CHORUS
```

4.1.8 Subpage 7: External Reverb

```
LEFT|RIGHT     MOVE BETWEEN CURRENT TRACK REVERB PARAMS
UP|DOWN        INCREASE|DECREASE A PARAM
ALT R          TOGGLE EXTERNAL REVERB
ALT X          RESET CURRENT PARAM TO DEFAULT
ALT SHIFT X    RESET ALL PARAMS TO DEFAULTS
```

4.1.9 Subpage 8: External Equalizer

```
LEFT|RIGHT     MOVE BETWEEN CURRENT TRACK FREQ BANDS
UP|DOWN        INCREASE|DECREASE FREQ BAND OR EQ PRESET
ALT E          TOGGLE EQUALIZER
ALT P          START SELECTING EQ PRESET
RETURN         FINISH SELECTING EQ PRESET
ALT X          RESET CURRENT BAND TO ZERO
ALT SHIFT X    RESET ALL BANDS TO ZERO
```

4.1.10 Alternative Key Combinations

These alternatives must be used if the keyoard has no numpad.

Original Key	Alternative Key
NUMPAD PGUP	PGUP
NUMPAD PGDOWN	PGDOWN
NUMPAD INSERT	INSERT
SHIFT NUMPAD INSERT	SHIFT INSERT or SHIFT RIGHTSHIFT
NUMPAD DELETE	DELETE
NUMPAD PLUS	SHIFT PLUS
NUMPAD MINUS	SHIFT MINUS
SHIFT NUMPAD PLUS	SHIFT PGUP
SHIFT NUMPAD MINUS	SHIFT PGDOWN
CTRL NUMPAD PLUS	CTRL PGUP
CTRL NUMPAD MINUS	CTRL PGDOWN
CTRL SHIFT NUMPAD PLUS	CTRL SHIFT PGUP
CTRL SHIFT NUMPAD MINUS	CTRL SHIFT PGDOWN
ALT NUMPAD PLUS	ALT PGUP
ALT NUMPAD MINUS	ALT PGDOWN
ALT SHIFT NUMPAD PLUS	ALT SHIFT PGUP
ALT SHIFT NUMPAD MINUS	ALT SHIFT PGDOWN

4.2 Beppigames Sequencer Project File Format

The project files of the sequencer are in a very simple human readable format.
This allows to edit projects in a text-editor.

Cautionary note: The project files do NOT reference soundfont files directly. Instead they reference entries in soundfonts.dat and depend on their order ! If you have to add a soundfont to soundfonts.dat, add it at the end. There are soundfont and program names in the project file but these are only comments, they are not evaluated. The sequencer assigns (finds) an instrument by its soundfont index, bank number and program number.

```
// sequencer project file format:
// # p: project, o: song, i: instrument, s: session, t:track, e: step
// # 1 project, 1 song, 12 sessions, each session 12 tracks, each track
// # 256 steps.
// # We only store non-empty fields (session, track, step) !
// # Hierachy is as follows:
// #
// # p ...
// # o ...
// # i 0 ...
// # :
// # i 9 ...
// # s ...
// #  t ...
// #   e ...
// #
// # In a step (of a track of a session), the notes are sorted by offset
// # ascending, then by note value ascending.
// # The song has up to 15 slots for sessions.
// # <sfname> and <programname> are just comments on soundfont and program.
// # <channel> and <output> refer to an external midi output. If none selected
// # they are ignored. channel is midi output channel (values 0..15), output
// # (values 0,1,2) is where notes are sent to: 0 is soundfont renderer,
// # 1 is midi output 1, 2 is midi output 2.
// # <pitch> changes a tracks pitch: Default is 64.  Difference to 64 is change
// # in pitch in semitones, e.g. 63 means the track is played one semitone lower,
// # 76 means track played one octave higher.
// # <layer> defines the tracks layering. This enables for tracks sounding in unison.
// # Values are 0..11. If track i has layering value j,
// # then track j sends notes to track i for playing (and the notes on track i
// # are not played). If i==j then no layering takes place which is the default.
//
// # Current <version> is 9.
// # A sequencer version can only read its respective current and all older file versions.
// # When saving a project the current version is written.
// # Version history:
// # 1 : Initial version.
// # 2 : Added <channel> and <output> to track attributes.
// # 3 : Added <pitch> to track attributes.
```

```
// # 4 : Note attribs gate, gate fraction, velocity and offset are now all values 0..127.
// # 5 : Added <extReverbEnabled> (external reverb) to track attributes.
// #     The enabled flag is followed by 11 parameters (doubles).
// # 6 : Added <layer> to track attributes.
// # 7 : Added <extEqualizerEnabled> (external equalizer) to track attributes.
// #     The enabled flag is followed by 11 parameters (doubles).
// # 8 : Increased number of tracks from 10 to 12.
// # 9 : Added <defaultVelocityEnabled> to track attributes.
//       If enabled, any note on the track is played with the fixed default track velocity
//       instead of the notes individual velocity.
//
// p <version> <bpm> <note-quantization> <gate-quantization> <scale>
//   <basenote>
// o <M=#sessions in song> <song-session1> .. <song-session<M>>
// i <track> <default-velocity> <defaultVelocityEnabled> <default-volume> <pan>
//   <channel> <output> <pitch> <layer>
//   <reverbEnabled> <room> <damp> <width> <level>
//   <chorusEnabled> <voiceCount> <speed> <depthMS> <type>
//   <extReverbEnabled> <param1> .. <param11>
//   <extEqualizerEnabled> <param1> .. <param11>
//   <soundfont-index> <bank> <program> <sfname> <programname>
// s <sessionnumber> <single-track> <muted-status-of-track1> ..
//                                  <muted-status-of-track12>
// t <tracknumber> <firstStep> <lastStep>
// e <stepnumber> <note> <offset> <velocity> <gate> <gateFrac>
```

4.3   Defaults

When the sequencer is started with a new project name, the project is assigned default settings. Which may not be to your liking. Next some of the default settings you most probably want to change. To go to subpage <i> use [CTRL <i>].

Setting	Default	Remark
Fluidsynth Chorus and Reverb	Off	Toggle on subpage 6 with [ALT C] and [ALT R]
Equalizer	Off	Toggle on subpage 8 with [ALT E]
Zita Reverb	On	Toggle on subpage 7 with [ALT R]
Session Track Length (Steps)	16	On subpage 1 use [CTRL SHIFT B]/[CTRL SHIFT E] for track start/end step
Quantize Offset	On	Toggle on subpage 1 with [ALT Q]
Quantize Gate	On	Toggle on subpage 1 with [ALT G]
Basenote And Scale	C Minor	Change on subpage 4, for no scale choose "Chromatic"
Lock Keyboard To Scale	On	Toggle on subpage 1 with [ALT Z]
BPM	120	Change on subpage 1 with [ALT B], then cursor up/down, then return
Midi Keyboard Fixed Current Track Velocity	On	Toggle with [ALT Y] on subpage 1
Midi Keyboard Velocity Curve	0	Select with [ALT C] (repeated) on subpage 1
Current Track Default (Fixed) Velocity	90	Select on subpage 1 with [ALT V], then cursor up/down, then return
Current Track Volume	100	Select on subpage 1 with [ALT O], then cursor up/down, then return
Follow Playhead	Off	Toggle with [ALT F] on subpage 1

4.4   Colors and Wallpapers

The background color of the sequencer can be changed and one of three wallpapers can be selected. Which may give a more relaxing impression. Next some examples. Below each one the according command line options are listed. Note when using a wallpaper, when going fullscreen, the letterboxes are still in solid background color. So one might select a wallpaper and change the background color. Not depicted are the cases -w 4, -w 5 and -w 6. There the three wallpa-

pers are only shown in the pitch black mode as background, replacing the cat eyes and text.

-c 3b1053ff	-c 3b6767ff	-c 5b5e5fff	-c 6c736cff
-c 072a6cff	-c 005232ff	-c 57167aff	-c 101071ff
-c 105577ff	-c 394372ff	-c 634926ff	-c 635747ff
-w 1	-w 2	-w 3	(default)