

Using TextMidiFormEdit

The textmidicgm form editor

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Table of Contents

1	Overview	2
1.1	What is TextMidiFormEdit?	2
2	Downloading TextMidiFormEdit	3
3	Invoking TextMidiFormEdit	4
4	Musical Form Window	5
4.1	Name	5
4.2	Copyright	6
4.3	Len	6
4.4	Min/Max Note Len	6
4.5	Pulse/Sec	6
4.6	Ticks per Quarter	6
4.7	Beat Size	7
4.8	Meter	7
4.9	Tempo per Beat	7
4.10	Melodic Probabilities	7
4.11	Arrangements	7
4.12	Scale Transpose and From Keyboard	8
4.13	Pitch Form	8
4.14	Rhythm Form	9
4.15	Dynamic Form	9
4.16	Texture Form	9
5	Instrumental Voices Window	10
5.1	Number of Voices	10
5.2	Voice	10
5.3	Low Pitch	10
5.4	High Pitch	13
5.5	Channel	14
5.6	Program	14
5.7	Walking	14
5.8	Pan	14
5.9	Follow/Leader	14
5.10	Interval Type/Interval	14
5.11	Follower Delay	14
5.12	Follower Inversion	15
5.13	Follower Retrograde	15

6	Form Plot Window	16
6.1	Open	16
6.2	Save	16
6.3	Redraw	16
6.4	Save Postscript	16
6.5	About	17
6.6	Quit	17
7	Keyboard Window	18
7.1	Clear	18
7.2	All	18
7.3	Complement	18
7.4	Octave Repeat	18
8	GNU Free Documentation License	19
8.1	PREAMBLE	19
8.2	APPLICABILITY AND DEFINITIONS	19
8.3	VERBATIM COPYING	21
8.4	COPYING IN QUANTITY	21
8.5	MODIFICATIONS	22
8.6	COMBINING DOCUMENTS	23
8.7	COLLECTIONS OF DOCUMENTS	24
8.8	AGGREGATION WITH INDEPENDENT WORKS	24
8.9	TRANSLATION	24
8.10	TERMINATION	25
8.11	FUTURE REVISIONS OF THIS LICENSE	25
8.12	RELICENSING	26
8.13	How to use this License for your documents	26
9	Bibliography	27
10	Concept Index	28

1 Overview

The `TextMidiFormEdit` program can be used interactively to edit new or pre-existing musical form files used by `textmidicgm`, which generates works of music in `textmidi` language, which can then be converted by `textmidi` into standard MIDI 1.1 file formats. Using `TextMidiFormEdit`, it is possible to edit musical forms as defined by `textmidicgm` rather than hand-edit the XML form file.

The model of musical form defined by `textmidicgm` is described in the `info` file for `textmidicgm`. This manual only describes the user interface for `TextMidiFormEdit.py`.

1.1 What is TextMidiFormEdit?

The program `TextMidiFormEdit` can be used interactively to create new musical form files, or edit previously-existing musical form files, as used by `textmidicgm`.

2 Downloading TextMidiFormEdit

If you have downloaded TextMidiFormEdit.py and its support *.py files, then you can run it as described below. You can also download TextMidiFormEdit from pypi.org.

```
python3 -m pip install --no-deps TextMidiFormEdit
```

3 Invoking TextMidiFormEdit

`TextMidiFormEdit.py` has no options. To run it, go to the directory where it is found (after unpacking the archive for TextMIDITools) and invoke it:

```
./TextMidiFormEdit.py
```

You may specify a form file to be edited on the command line:

```
./TextMidiFormEdit.py symphony.xml
```

or open a form file using the menus.

If you downloaded TextMidiFormEdit from pypi.org, or installed it in an equivalent way, you can use it as a python package:

```
python3
>>> from TextMidiFormEdit import *
>>> TextMidiFormEdit()
```

When you quit the application, just exit from python with control-D or

```
>>> exit()
```

4 Musical Form Window

The Musical Form window is a software interface for configuring musical parameters. It is divided into several sections:

- General Information:**
 - Name: music_time
 - Copyright: This form was generated
 - Ticks Per Second: 1440
 - Len: 1800.0
 - beat size: 3/8
 - Min Note Len: 0.4725142095535763
 - Max Note Len: 1.8546276359329459
 - meter: 6/8
 - Pulse/Sec: 2.6820373529600756
 - tempo per beat: 72.0
- ARRANGEMENTS:**
 - Algorithm: LexicographicForward
 - Period: 6.04944023680638399e4
- MELODY PROBABILITIES:**
 - Down/Same/Up: 0.125, 0.3483993998388648, 0.7766006001611352
- Scale:**
 - Chromatic
 - From Keyboard
 - Transpose: 0
- PITCH:**
 - Mean Period: 137.53785783818228, Amplitude: 0.5, Phase: [slider], Offset: [slider]
 - Range Period: 124.31264018743404, Amplitude: 0.5, Phase: [slider], Offset: [slider]
- RHYTHM:**
 - Mean Period: 134.53787028637663, Amplitude: 0.5, Phase: [slider], Offset: [slider]
 - Range Period: 260.9408313304564, Amplitude: 0.5, Phase: [slider], Offset: [slider]
- DYNAMIC:**
 - Mean Period: 121.94573585050142, Amplitude: 0.5, Phase: [slider], Offset: [slider]
 - Range Period: 207.59567396928094, Amplitude: 0.5, Phase: [slider], Offset: [slider]
- Texture:**
 - Texture Period: 230.6286251980852, Amplitude: 0.5, Phase: [slider], Offset: [slider]

The Musical Form window allows the setting of global form qualities except for the instrumental attributes of individual voices, which is done on the Voices window. The Musical Form Window has several items.

4.1 Name

The name string can be typed in; it is meant to be the title of the musical work to be created by textmidicgm.

4.2 Copyright

The copyright string can be typed in. It is not copied to the MIDI file that is created from the form file by `textmidicgm`.

4.3 Len

The len text field is the duration of the musical work in seconds. Entering 600 will tell `textmidicgm` to generate 10 minutes of music.

4.4 Min/Max Note Len

The minimum and maximum note lengths specifies the duration range for all note events. When the rhythm curve is very low and the range curve narrow, the min note length is used; when the rhythm curve is high with a narrow range, the maximum note length is used.

4.5 Pulse/Sec

Pulse per second is used optionally to force `textmidicgm` to generate rhythms that line up on a pulse. Such music is likely to be easier to notate in scoring program such that human players could play it. Note, however, that `textmidicgm` has no model of meter, that is, the grouping of beats and accents. The original concept for this model of form (developed in 1976 for manual composition) was connected to very fluid, conversational, ametrical rhythms. On the other hand, setting a pulse can make works produced by `textmidicgm` sound more dance-like, for example, with a pulse of about 5 or so per second.

4.6 Ticks per Quarter

The musical time values of ticks/quarter, beat size, meter and tempo per beat are conveniences that specify how the `textmidi` language file is to be written. They do not, in principle, add to the capability of `textmidicgm`. Ticks per quarter is required by the MIDI spec and may be a convenient value. It could be as low as 24, is often 240, but can be a higher value such as 720. It may be helpful to have a factor-rich value for ticks/quarter so that divisions such as triplets, quintuplets, and the usual divisions of 2 can be exact. For example, 720 is the product of $2*2*2*2*3*3*5$. A quarter note is already $1/(2*2)$ of a whole note, so that 720 ticks per quarter can exact represent 64th notes as well as 1/8 triplets and quintuplets down to 1/16ths. A value of ticks per quarter that results in higher resolution than your MIDI playing software's timing offers is probably not meaningful.

4.7 Beat Size

The beat size is the musical ratio for the size of a beat. In 6/8 meter, for example, you could specify a beat size of 3/8.

4.8 Meter

meter is written as you give it, but with separate number of beats and beat size, into the `textmidi` file as a `TIME.SIGNATURE` command, along with ticks per quarter.

4.9 Tempo per Beat

The tempo per beat is the metronomic tempo of beats per minute for the beat size specified in the *beat size* field. It is converted into a tempo of quarters per minute for the `textmidicgm` language output because that is how MIDI (1) uses tempo. `textmidicgm` will compute rhythms based on beat size, meter, and tempo per beat, but must write the equivalent tempo for a quarter note (for example, a meter of 60 for a beat size of 3/8 and with 1440 ticks/quarter will be written as a command `TEMPO 90 1440` because MIDI tempo is always for a quarter note).

4.10 Melodic Probabilities

Melodic Probabilities are cumulative probabilities that apply only when a voice is in walking mode: they determine how often a voice moves up, or moves down, repeats a note, or is resting. A random variable used to select melodic movement varies in (0..<1.0). When the random variable is:

- Below the "Down" probability, the voice will move down a step in the scale; when ;
- At or above Down and below the Same probability, it will repeat the previous key;
- At or above the Up probability, it will step up the scale.
- At or above the Up probability, it will be silent.

Because these are cumulative probabilities, the following inequalities must hold: $0.0 \leq \text{Down} \leq \text{Same} \leq \text{Up} \leq 1.0$. If you don't want the voice to drift off down or up, then the probabilities for up and down should be equal, but by differences: $(\text{Up} - \text{Same}) == (\text{Same} - \text{Down})$. These probabilities apply only if a voice is in walking mode.

4.11 Arrangements

Arrangements, if set, can change the priority of voices under the texture curve. Each arrangement algorithm permutes the voice priorities in a different way. Some of the algorithms do not produce all possible permutations, but others do. These algorithms are described in the documentation for `textmidicgm`. The settable items for Arrangements are:

- Algorithm
 - Undefined

- Identity
- LexicographicForward
- LexicographicBackward
- RotateRight
- RotateLeft
- Reverse
- SwapPairs
- Skip
- Shuffle
- Heaps
- Period The period of time before going to the next permutation.

4.12 Scale Transpose and From Keyboard

Scales can be entered the following ways:

- Loaded from a form file
- Set from the scale menu selections
- Loaded from the keyboard window, by using the "From Keyboard" push button.

Once a scale has been loaded, it may be transposed by using the transpose spin button. Note that if the scale loaded from a file was already transposed, then that version of the scale will be the transposition of zero (0) in the Musical Form window for that scale.

Pushing the From Keyboard button will copy the scale that is set in the keyboard window to be the scale in the musical form.

4.13 Pitch Form

The Form curves are the core concept of the textmidicgm model for musical form. The curves are always sinusoidal (wave-like), but they are biased to sit above zero and range from 0 to 1. Pitch, Rhythm, and Dynamic curves have two sinusoids: mean and range. The controls for each sinusoid include a period (in seconds) and a phase slider in radians. There are two π radians (about 6.28) in a full circle. The slider ranges from $-\pi$ to $+\pi$. For example, to get 90 degrees, set the slider about 3/4 of the way across between 0 and $+\pi$. The mean sinusoid is roughly the average or center value of the parameter (in which parameter refers to pitch, rhythm, and dynamic) and the sinusoid for range gives the range from low value to high value. Only a range sinusoid is used for texture. The seven sinusoids are all independent in phase and period. After adjusting form curve values, you should select the Redraw item on the Form Plot window's menu to see how you have changed the form. The result of these curves is to cause the music generated by textmidicgm to change in character over time. Ordinarily the periods used are around 120 to 360 seconds (2 to 6 minutes). However, to make a parameter's mean or range stay static, merely make the period very long, such as 1000000 seconds. Unless a voice is in walking mode, the Pitch mean curve generally causes the pitches played to be higher when the curve is higher and lower when the curve is low; the Pitch range curve causes a wider range of notes in the scale when the curve is higher and fewer (even just repeating a pitch). In walking mode, a

voice ignores the pitch curves and follows the melodic probabilities on how to walk up and down.

4.14 Rhythm Form

A high rhythm mean curve generally tells textmidicgm to make longer duration (slower) note events. When the rhythm mean curve is at a low point in the wave, it tends to make shorter durations (faster notes). A high rhythm range curve tends to make a wider range of durations and sound more syncopated, even with a pulse-per-second set; a low rhythm range curve tends to make more monotonous and repetitive durations.

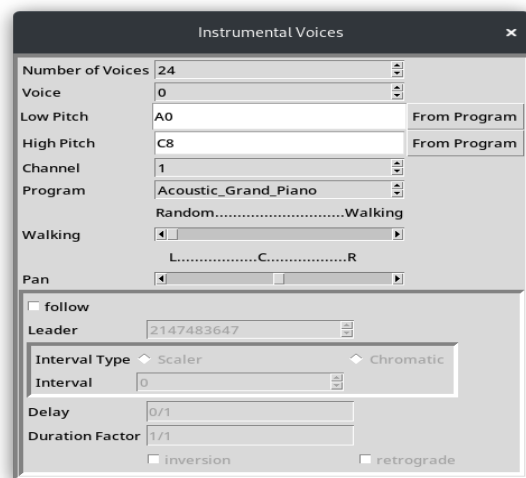
4.15 Dynamic Form

A high dynamic mean curve generally tells textmidicgm to make louder note events. When the dynamic mean curve is at a low point in the wave, it tends to make quieter notes. A high dynamic range curve tends to make a wider range of loudnesses and sound more natural; a low dynamic range curve tends to make more evenly loud notes.

4.16 Texture Form

A high texture range curve makes more voices playe (a larger complement); a low texture range curve makes fewer voices play. As the texture curve rises, the voices are added in voice number order. To suggest a solist, the solo voice should probably be in voice 0 position in the voice window.

5 Instrumental Voices Window



The Instrumental Voices Window has several items.

5.1 Number of Voices

The number of voices is the total number of voices that can play when the form's texture curve is high. This model of musical form is basically counterpuntal and made of solo voices. There is no real limit for number of voices, but the form editor only offers 23 voices.

5.2 Voice

Voice is the index (in 0..Number of Voices - 1) of the voice to be currently edited in the voice window.

5.3 Low Pitch

The low pitch is the low pitch for the voice. If the Form Pitch curve goes below this low pitch, then the low pitch will be played. This can be monotonous; textmidicgm has an option on the command that trims the scale to the range for all the instruments together to help with this, but this is not a perfect fix. The "From Program" push button will set the Low Pitch suitable for the patch. The instrument ranges were taken from textbooks or from en.wikipedia.org.

Patch	Low Pitch	High Pitch
Acoustic_Grand_Piano	A0	C8
Bright_Acoustic_Piano	A0	C8
Electric_Grand_Piano	E1	E7
Honky-tonk_Piano	A0	C8
Electric_Piano_1(Fender_Rhodes)	A0	C8
Electric_Piano_2(DX-7_EP)	A0	C8
Harpsichord	F1	F6

Clavi	F1	F6
Chromatic Percussion		
Celesta	C4	C8
Glockenspiel	F5	C8
Music_Box	F6	C8
Vibraphone	F3	F6
Marimba	C2	C7
Xylophone	C3	C7
Tubular	15	C4 G5
Dulcimer	C3	C5
Organ		
Drawbar_Organ	A0	C8
Percussive_Organ	A0	C8
Rock_Organ	A0	C8
Church_Organ	A0	C8
Reed_Organ	C2	C6
Accordion	E1	D6
Harmonica	C3	G5
Tango	24	E1 D6
Guitar		
Acoustic_Guitar_(nylon)	E3	D6
Acoustic_Guitar_(steel)	E3	D6
Electric_Guitar_(jazz)	E3	D6
Electric_Guitar_(clean)	E3	D6
Electric_Guitar_(muted)	E3	D6
Overdriven_Guitar	E3	D6
Distortion_Guitar	E3	D6
Guitar_Harmonics	E4	D7
Bass		
Acoustic_Bass	E1	E4
Electric_Bass_(finger)	E1	E4
Electric_Bass_(pick)	E1	E4
Fretless_Bass	E1	E4
Slap_Bass_1	E1	E4
Slap_Bass_2	E1	E4
Synth_Bass_1	E1	E4
Synth_Bass_2	E1	E4
Strings		
Violin	G3	C7
Viola	C3	D7
Cello	C2	A5
Contrabass	E1	G4
Tremolo_Strings	E1	C7
Pizzicato_Strings	E1	C7
Orchestral_Harp	B0	G#7
Timpani	C2	D4
Ensemble		

String_Ensemble_1	C0	C8
String_Ensemble_2	C0	C8
Synth.Strings_1	C0	C8
Synth.Strings_2	C0	C8
Choir_Aahs	D2	C6
Voice_Oohs	D2	C6
Synth_Voice	D2	C6
Orchestra_Hit	C0	C8
Brass		
Trumpet	F#3	C6
Trombone	C2	C5
Tuba	Eb2	A4
Muted_Trumpet	F#3	C6
French_Horn	C2	C6
Brass_Section	C2	C6
Synth_Brass_1	C2	C6
Synth_Brass_2	C2	C6
Reed		
Soprano_Sax	Ab3	Eb6
Alto_Sax	Db3	Ab5
Tenor_Sax	Ab2	Eb5
Baritone_Sax	Db2	Ab4
Oboe	Bb3	G6
English_Horn	E3	A5
Bassoon	Bb1	E5
Clarinet	D3	Bb6
Pipe		
Piccolo	D5	C8
Flute	C4	C7
Recorder	C-1	G9
Pan_Flute	C-1	G9
Blown_bottle	C-1	G9
Shakuhachi	C-1	G9
Whistle	C-1	G9
Ocarina	C-1	G9
Synth_Lead		
Lead_1_(square)	C0	C8
Lead_2_(sawtooth)	C0	C8
Lead_3_(calliope)	C0	C8
Lead_4_(chiff)	C0	C8
Lead_5_(charang)	C0	C8
Lead_6_(voice)	C0	C8
Lead_7_(fifths)	C0	C8
Lead_8_(bass_+_lead)	C0	C8
Synth_Pad		
Pad_1_(new_age)	C0	C8
Pad_2_(warm)	C0	C8

Pad_3_(polysynth)	C0	C8
Pad_4_(choir)	C2	G5
Pad_5_(bowed)	C0	C8
Pad_6_(metallic)	C0	C8
Pad_7_(halo)	C0	C8
Pad_8_(sweep)	C0	C8
Synth Effects		
FX_1_(rain)	C0	C8
FX_2_(soundtrack)	C0	C8
FX_3_(crystal)	C0	C8
FX_4_(atmosphere)	C0	C8
FX_5_(brightness)	C0	C8
FX_6_(goblins)	C0	C8
FX_7_(echoes)	C0	C8
FX_8_(sci-fi)	C0	C8
Ethnic		
Sitar	C2	C6
Banjo	D3	C6
Shamisen	E3	C6
Koto	C2	C6
Kalimba	G3	G6
Bag	110	C3 C6
Fiddle	G3	C7
Shanai	Bb3	G6
Percussive		
Tinkle	C-1	G9
Agogô	C-1	G9
Steel_Drums	C-1	G9
Woodblock	C-1	G9
Taiko_Drum	C-1	G9
Melodic_Tom	C-1	G9
Synth_Drum	C-1	G9
Reverse_Cymbal	C-1	G9
Sound Effects		
Guitar_Fret_Noise	C-1	G9
Breath_Noise	C-1	G9
Seashore	C-1	G9
Bird_Tweet	C-1	G9
Telephone_Ring	C-1	G9
Helicopter	C-1	G9
Applause	C-1	G9
Gunshot	C-1	G9

5.4 High Pitch

The high pitch is the high pitch for the voice. If the Form Pitch curve goes above this high pitch, then the high pitch will be played. This can be monotonous; textmidicgm has an

option on the command that trims the scale to the range for all the instruments together to help with this, but this is not a perfect fix. The “From Program” push button will set the High Pitch suitable for the patch.

5.5 Channel

The channel is the MIDI Channel (1..16) for the voice.

5.6 Program

The Program is the MIDI program name from General MIDI used for the current voice.

5.7 Walking

The walking value sets the probability of a voice being in walking mode, note to note. In walking mode, a voice ignores the Form Pitch curve and follows the Melodic Probabilities. The value ranges from 0.0 (random melody) to 1.0 (walking up and down the scale). A value between 0.0 and 1.0 represents the probability of the voice being in walking mode, note to note. This makes it possible for a single voice to randomly be in either walking or random (jumpy) mode.

5.8 Pan

Pan is the MIDI stereo pan for the voice.

5.9 Follow/Leader

The Follower/Leader feature permits you to tell a voice to ignore the Form curves altogether, and instead to follow another voice. Set the follow button to make a voice follow another. Set the Leader to the number of the voice to follow. Select the interval type of following: scaler or chromatic. Scaler intervals will count steps up in the scale (down for a negative interval) being used to select the interval of following; chromatic intervals will count by 1's up (down for a negative interval) in a chromatic scale to find the follower's pitch.

5.10 Interval Type/Interval

The follower's Interval Type defines whether the follower stays in the scale for the form, or if it follows on a chromatic interval. If the interval type is scaler, then the interval is the number of steps up or down the scale that the follower appears. If the interval type is chromatic, then the follower will be "Interval" number of chromatic steps away from the voice it is following.

5.11 Follower Delay

The follower's Delay creates a canon effect in that it delays the start of the following voice for the duration given as an ordinary rational number. It can be set to 1/4 for a quarter note, or 13/17, or 4/1 or 4 for four whole notes delay and so on. It interprets 4 as four whole notes and not as a quarter note the way `textmidi` does in LAZY mode.

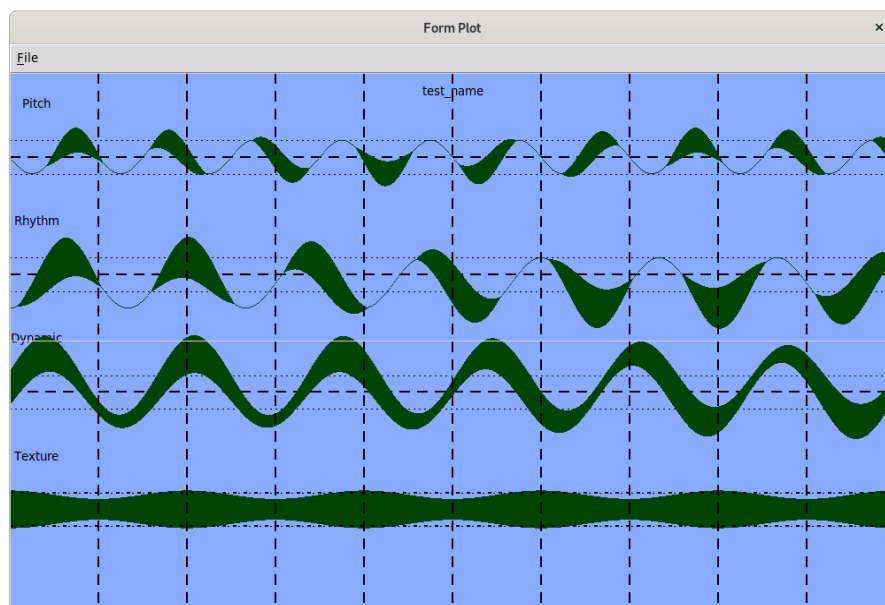
5.12 Follower Inversion

The follower can be an inversion of the leader voice, for the entire duration of the piece. Transposition interval still applies. The selection of either chromatic or scalar following also applies.

5.13 Follower Retrograde

The follower will be a retrograde (that is, a backwards copy) of the leader voice, for the entire duration of the piece. Transposition interval still applies. The selection of either chromatic or scalar following also applies.

6 Form Plot Window



The Form Plot window has a menu. The Form Plot Window shows the sinusoidal curves that act to change the mean and range of pitch, rhythm (duration), dynamic (loudness) and the complement (the number of instruments playing). A vertical line is drawn at each minute of time from the beginning. The Form Plot Window menu has several items.

6.1 Open

The Open menu allows you to load a `boost::serialization` (cf. boost.org) XML archive form file. All of the values of the form file will be distributed throughout the user interface and the plot redrawn.

6.2 Save

The Save menu allows you to save an XML form file. All of the values of the form in the user interface of `TextMidiFormEdit.py` will be written out to the file. The XML form file is readable by `textmidicgm` using the `-xmlform` option.

6.3 Redraw

The form plot is redrawn; this is called for if the form curves are changed in the Musical Form window.

6.4 Save Postscript

The Save Postscript menu item will save a Postscript image of the Form Plot window.

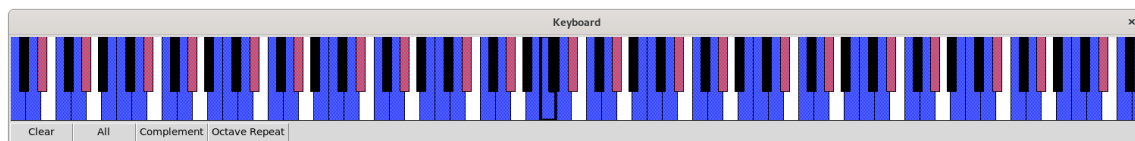
6.5 About

The About item puts up a window with information about the program.

6.6 Quit

The Quit menu item will exit the program. The window close decoration will also do this. Any work done but unsaved is lost; you are not prompted to save work.

7 Keyboard Window



The Keyboard Window has a keyboard in which individual keys can be clicked, and also several buttons. The keyboard presents 128 keys, all of the keys supported by MIDI (C-1 to G9). Middle-C is outlined in a thicker line than other keys. Any key can be clicked to toggle whether it is to be included in a scale. When a key is included in a scale it is drawn with a stipple in blue (if a white key) or red (if a black key). Keys that are not in the scale are white if they are white keys and black if they are black keys. The keyboard will reflect selection of scale made in the Musical Form window, and the scale in the keyboard window can be copied into the form by clicking on the "From Keyboard" button in the Musical Form window. The keyboard does not affect the scale in the Form until you click "From Keyboard". Clicking on a key toggles its inclusion in the scale. If you click on a selected key, it is removed from the scale; if the key is not in the scale, then clicking on it adds it to the scale. Any arbitrary combination of the 128 keys can be clicked to create a scale. To create a scale that repeats each octave, just click the unique keys for one octave, then hit the "Octave Repeat" push button.

7.1 Clear

Clear the scale.

7.2 All

Set all of the keys, that is, the full chromatic MIDI scale.

7.3 Complement

Set the scale to select notes not in the scale and remove notes that were in the scale. For example, select a Diatonic scale in the Musical Form window; this will appear in the keyboard as C Major. Then push the Complement push button on the Keyboard window to select the missing notes instead, and the result will be the black keys only, which is a form of pentatonic scale.

7.4 Octave Repeat

Any notes set in the keyboard are repeated per octave throughout the full scale.

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9 Bibliography

10 Concept Index

A

About	17
All	18
Arrangements	7

B

Beat Size	7
Bibliography	27

C

Channel	14
Clear	18
Complement	18
Copyright	6

D

Downloading TextMidiFormEdit	3
Dynamic Form	9

F

Follow/Leader	14
Follower Delay	14
Follower Inversion	15
Follower Retrograde	15
Form Plot Window	16

H

High Pitch	13
------------------	----

I

Instrumental Voices Window	10
Interval Type/Interval	14
Invoking TextMidiFormEdit	4

K

Keyboard Window	18
-----------------------	----

L

Len	6
Low Pitch	10

M

Melodic Probabilities	7
Meter	7
Min/Max Note Len	6
Musical Form Window	5

N

Name	5
Number of Voices	10

O

Octave Repeat	18
Open	16
overview	2

P

Pan	14
Pitch Form	8
Program	14
Pulse/Sec	6

Q

Quit	17
------------	----

R

Redraw	16
Rhythm Form	9

S

Save	16
Save Postscript	16
Scale Transpose and From Keyboard	8

T

Tempo per Beat	7
TextMidiFormEdit	2
Texture Form	9
Ticks per Quarter	6

V

Voice	10
-------------	----

W

Walking	14
---------------	----