MintySynth Software Manual v. 4.2

mintysynth.com

Contents

Introduction

The MintySynth software uses two basic modes, Live Mode and Program Mode. Program Mode is where you will create your own loops, setting up the sound for each of the four voices and adding notes for each voice. In Live Mode, voices 1-3 will play exactly as you programmed them, but you will be able to control voice 4 as the loop is playing to "jam" along with the other three voices. If you switch on MintySynth normally it will start in Program Mode (ready to program voice 1), but if you play the Demo Song by holding down button 1 (see below), MintySynth will go directly to Live Mode.

The key to using the software is to be aware of whether you're in Live mode or Program Mode because different functions are available in each mode. **If you're in Live Mode the yellow LED will be flashing, and if you're in Program Mode the red LED will be flashing.**

I.   Demo Song and Live Mode

a.   Demo Song

The numbering system for the five thumbwheels and five buttons is shown in Fig. 1. If you hold down button 1 while you turn on the power switch, you will enter Live Mode with the Demo Song playing, which is a great way to get comfortable with the basic controls. Every song can have up to four different voices (instruments), and in Live Mode, voices 1-3 are unchanging, but voice 4 can be changed in real-time so you can "jam" along with the other three voices. In Live Mode, the yellow LED will light brightly on the first note in each 16-note sequence, and will flash briefly on notes 5, 9, and 13. The Demo Song is actually made up of two 16-note sequences, so you will see this pattern repeat twice for each loop of the song.
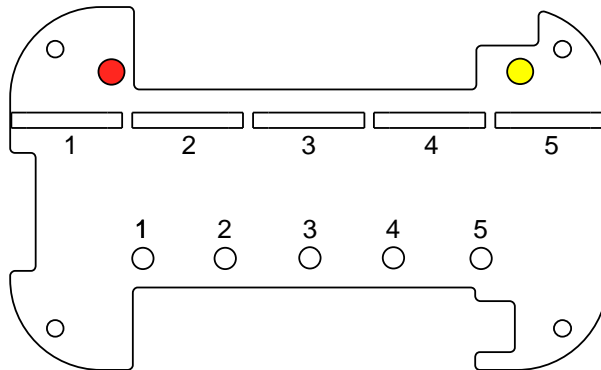

Fig. 1. The layout of the thumbwheels, buttons, and LEDs

b. Tempo

Wheel 1 controls the tempo.

Note: You will sometimes notice that you have to turn the wheels slightly before they will "register" that they are being turned. This is intentional; because we use the wheel for different functions in different modes, they become "locked" when we switch from one mode to another, waiting for you to turn them. Otherwise settings like tempo would jump to a new value if you had used that wheel for something else in a previous mode.

c. Swing

Wheel 5 controls swing, or the amount of syncopation in the rhythm. If you turn it all the way down there will be no swing and all the notes will be the same length. Turning it up increases the duration of even-numbered notes (starting with note 0) and decreases the duration of odd-numbered notes by the same amount.

d. Waveform

The five buttons are used to select the waveform, which determines the voice (timbre) of the instrument. Appendix A shows the shape of the 15 available waveforms. Pressing and releasing a button quickly will change the waveform. Buttons 1-4 can also be set to different waveforms than the default ones. Button 5 is permanently set to a sine wave. If you hold down one of the first four buttons and turn wheel 1 at the same time, you can choose one of 15 different waveforms to set to that button. **Note: you must be in Live Mode (which you already are if you're playing the Demo Song) to reprogram the buttons. Because there are a limited number of buttons and wheels, we maximize their functionality by making some functions available on in certain modes.** You'll notice that the LEDs display a pattern to help you tell which waveform you're choosing. This is a binary pattern that counts from 0-3 and then repeats. It is used in some other functions as well, as we'll see later. Fig. 2 shows the patterns. You don't really need to worry about the number, but the changing LEDs serve as a good visual indicator. If you wait for 1 ½ seconds after initially turning the wheel, the music will pause and you will hear examples of the waveforms as you turn the wheel. This delay before playing the sample sounds is so that you don't need to interrupt the music if you're okay with just using the LEDs to get an idea of which waveform you're choosing. Currently, the waveforms programmed to each button are reset to the defaults when you restart the device.
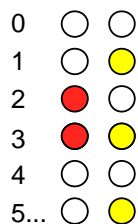
```
0   ○ ○
1   ○ ●
2   ● ○
3   ● ●
4   ○ ○
5... ○ ●
```

Fig. 2. The binary LED indicator pattern

e. Pitch

Wheel 2 controls the pitch of the notes that are being played. In Live Mode, we are controlling the pitch of voice 4. Only notes in the currently selected scale will be played. We'll cover selecting scales later, in the "Sequencing Notes" section. With the Demo song loaded, the scale has been preset to C blues hexatonic, which makes it easy to select notes that sound good with the other three voices.

f. Duration

Wheel 3 controls the duration of each note this is played. You will hear that the notes can be either shorter or longer than the "steps" or "beats". If they are longer than the steps they will slur together.

Tip: If you turn down duration all the way, it will turn the voice off completely. This can be useful if you want to silence a voice temporarily.

g. Envelope

The envelope determines how the volume of the note changes over time. For example some instruments like certain drums may be immediately loud but will decay very quickly. Other instruments like violins or wind instruments typically sustain their volume for a longer period of time. Appendix B shows the shape of the 5 available envelopes. By trying different combinations of waveforms and envelopes you'll find that you can imitate a variety of instruments, as well as inventing new ones! You'll see that the binary LED indicator shows the number of the envelope you have selected. Fig. 3 shows the functions of the wheels in Live Mode with no buttons held.
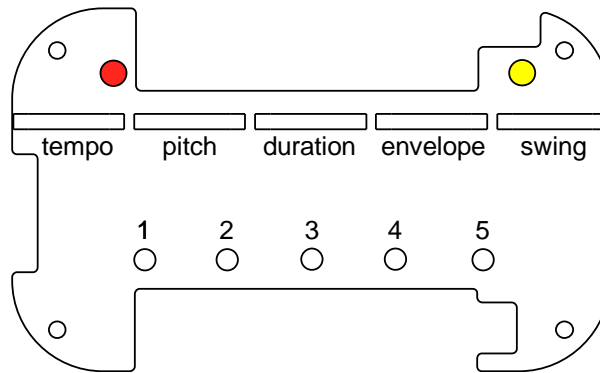

Fig. 3. Controls in Live Mode with no buttons held

II.   Photocell Mode (Added for MintySynth2.0, available only in Live Mode)

a. Transferring pitch control to the photocell

Pressing buttons 2 and 3 (it doesn't matter what order you press them in) will transfer control of the pitch of voice 4 from wheel 2 to the photocell, so you can improvise by blocking the light with your hand, by closing the lid of the tin partway, etc. The photocell will be calibrated to the ambient light level when you enter this mode, so try not to cover the photocell when you press buttons 2 and 3. You can recalibrate the photocell at any time by pressing the

buttons again. If the calibration doesn't seem right or the light level changes, try recalibrating to improve performance. Turning wheel 2 will exit photocell mode, returning pitch control to the wheel.

III.   Tripwire Mode (Added for MintySynth2.0, available only in Live Mode)

This one is just for fun, because everybody loves spy gear! When in Tripwire Mode, blocking a beam of light will trigger a single 16-step loop of music. It works great with a laser pointer, but you can use any light source, even light from a window. To enter Tripwire Mode, press buttons 3 and 4 (it doesn't matter what order you press them in). The music will stop, the red LED will flash three times, and then during the next five seconds the photocell will be calibrated. You should have your light beam set up ahead of time, and during these five seconds block the beam a few times with your hand to give the device examples of the light level from the beam as well as the light level when the beam is blocked. After five seconds the yellow light will flash three times to indicate that the calibration period has ended. Now blocking the light beam again should trigger whatever loop was playing before you entered tripwire mode. You can recalibrate at any time by pressing buttons 3 and 4 again. Turning any wheel will exit tripwire mode.

Tip: Laser pointers work great for this because they reach a long ways. The "dot" of light from the laser should be pointed at the photocell, or closer to it. It may take a little trial and error to get it well positioned.

IV.   Mixer Mode (Fig. 4) (available at any time, i.e. in Live Mode or Program Mode)

a.   Volume Control

If you hold down button 5, you can use wheels 1-4 to adjust the volume of voices 1-4. They are turned all the way up by default, and you may want to leave them turned up much of the time; because the device does not have an onboard amplifier, we typically want to have maximum volume.

b.   Modulation

With button 5 held down, you can also use wheel 5 to access one more voice parameter (if we're in Live Mode we're controlling voice 4 only. If we're in Program Mode we're affecting whichever voice we're programming). Modulation is a rise or fall in the pitch of the note as it is played. It's more of a novelty rather than sounding particularly musical, but used sparingly it can add some interest. If the wheel is in the middle there's no modulation. If you begin to turn it down modulation takes on a negative value (the pitch of each note drops as it's being played, and if you turn the wheel up past midway then modulation becomes positive. To turn modulation off again completely, you can turn the wheel all the way down (it's difficult to turn off by trying to position the wheel precisely in the middle).
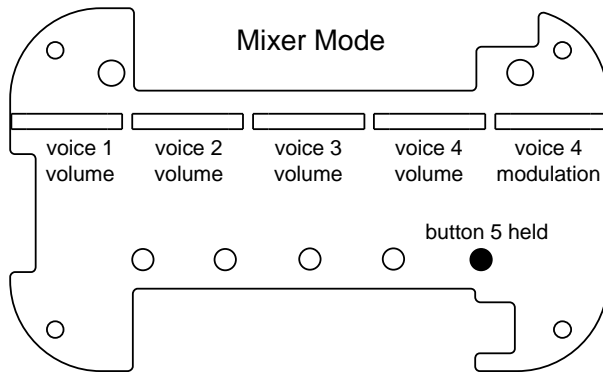
Fig. 4. Controls in Mixer Mode

V.   Program Mode

Once you're comfortable with the controls in Live Mode, you're ready to begin sequencing your own loops. Program Mode is where we set up the sound of the 4 voices and sequence notes.

a.   Entering Program Mode

If you hold down button 5 and press (and release) button 1, 2, 3, or 4, you will enter program mode for the voice corresponding to the button number. Now the red LED will light strongly on note 1, and briefly on notes 5, 9, and 13. If you haven't already created a loop or loaded a song from memory (we'll cover this below), you'll hear four ascending tones. These are being played by the four voices, and serve as reference notes so we can hear what the voices sound like as we set them up. You can return to Live Mode at any time by holding button 1 and pressing (and releasing) button 5.

Note: If you turn on the MintySynth without holding down button 1, you enter directly into Program Mode for voice 1.
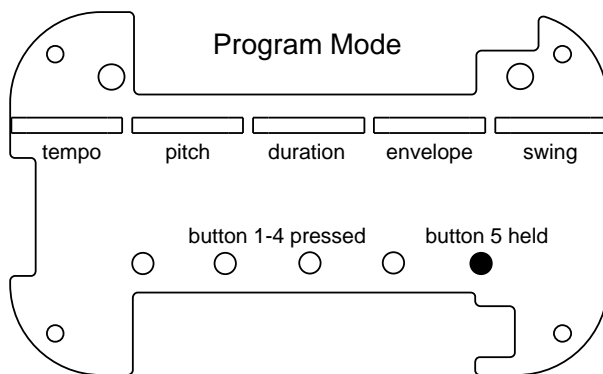

Fig. 5. Hold button 5 and then press and button 1-4 (then release both) to enter program mode for the voice corresponding to that button. Now you can set up the voice using the same controls as you used in Live Mode. To return to live mode, hold button 1 and then press and release button 5.

6

b. Setting up the Voice

Assuming you entered Program Mode for voice 1, you can now use the controls to set up the voice, just as you did in Live Mode. You will hear the note that is being played by voice 1 (the first note) change. When we sequence notes for this voice we can choose a pitch for every note, but we can also choose a pitch for the reference note now if we want. Later when we're sequencing we can quickly set multiple notes to this pitch if desired. This is useful for percussion instruments where we don't want the pitch to vary.

VI. Sequencing Notes (must be in Program Mode)

a. Selecting a Scale

To make it easy to choose notes that sound good together or to compose melodies, you can select a scale to use as your "palette" when sequencing (you can also select it before setting up the voice in Program Mode if you'd like). Holding down button 1, 2, 3, or 4, (it doesn't matter which) you turn wheel 5 to select a scale. When you turn the wheel, the music will pause and you will hear the scale play. The LED binary pattern will also show you which scale you've chosen. When you release the button, the music will start again. All the sample scales are played in the key of C. The scales are listed below.

1. Chromatic
2. Major
3. Natural minor
4. Major triad
5. Minor triad
6. Major pentatonic
7. Minor pentatonic
8. Blues hexatonic
9. Harmonic minor

Note: When you turn on MintySynth the chromatic scale will be selected by default (unless you're playing the Demo Song).

b. Shifting the Scale

Once we've chosen a scale, it's possible to shift it up or down to play in a difference key. Holding button 3 and pressing button 4 will shift the scale up a semitone, and holding button 4 and pressing button 3 will shift it down a semitone. You can shift the scale up or down a maximum of 15 semitones. The binary LED indicator will light to help you count how many times you've shifted the scale.

Once you chosen a scale and/or shifted it up or down, only the notes in that scale will be available to you for sequencing, or for "jamming" if you return to Live Mode. You can go back and choose a new scale or shift it up or down at any time.

C. Sequencing Notes

Now it's time for the fun part!! We'll use a combination of buttons and wheels (surprise!) to sequence the notes for each voice. If we're in Program Mode for voice 1, for example, holding down button 1, 2, 3, or 4 and turning wheels 1, 2, 3, or 4 will add notes for voice 1 into the repeating loop. Holding down button 1 and turning wheels 1-4 adds notes and sets the pitch for steps (notes) 1-4. Holding button 2 and turning wheels 1-4 adds notes and sets the pitch for steps 5-8. Holding button 3 and turning wheels 1-4 adds notes and sets the pitch for steps 9-12, and holding button 3 and turning wheels 1-4 adds notes and sets the pitch for steps 13-16. It's easier to do than it is to explain. To set a note to the same pitch as the reference note for the voice, turn the wheel all the way up. To turn off a note again entirely, turn the wheel all the way down. That's all there is to sequencing. Once you've sequenced one voice you can proceed to the next (if you'd like) by holding down button 5 and pressing another button 1-4 as described above for entering Program Mode.

Tip: It's often helpful to use the Mixer to turn down the volume for the voices you're not currently sequencing, so it's easier to hear what you're doing.
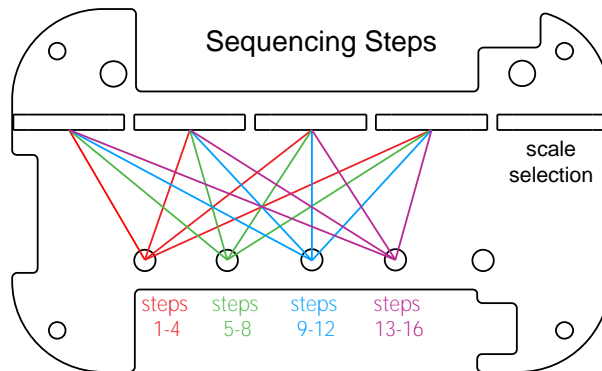

Fig. 6. The combinations of buttons and wheels used for sequencing. Thanks to Moshang for the inspiration for this diagram.

d. Shifting the Song

Once you've created a 16-step loop, it's possible to shift the whole thing up or down, as we did when shifting the scale. To shift the whole song up, hold button 1 and press button 2. To shift it down, hold button 2 and press button 1. Again, you can shift a maximum of 15 semitones. The binary LED indicator will light to help you count how many times you've shifted the song. Shifting the song is useful if you want to change the key after writing it, or if you plan to create and append several loops that are similar but are shifted up or down to produce chord progressions. You can save a loop, then shift it up or down and save it again to a new location, and then load both back in and have them loop in sequence (see below).

Note: You must be in Program Mode (for any voice) to select a scale, shift a scale, or shift a song.

VII.   Saving Songs (must be in Live Mode)

To save a song, first you must return to Live Mode by holding button 1 and pressing button 5.

There are locations in memory for four different 16-step loops. To save the current loop, (while in Live Mode) hold down button 1-4 (corresponding to the location you'd like to use) and then press button 5 and keep them both held for three seconds. The red LED will flash 4 times to indicate that the loop was saved.

Note: Tempo and Swing are not saved with a song, but all other values are.

VIII.   Loading Songs (must be in Live Mode)

a.   Loading a Single Song

To load a single loop from memory, while in Live Mode hold down button 1-4 (corresponding to the location in memory) for three seconds. The yellow LED will flash four times and you will hear the loop playing. To hear the song exactly as you wrote it, you may want to enter Program Mode. Otherwise the pitch of voice 4 will be controlled by wheel 2.

Note: Because you are in Live Mode when you load a song, voice 4 will not sound exactly as you programmed it. To hear it as you programmed it, just enter Program Mode (for any voice) after loading the song.

b.   Loading and Appending up to four Songs

You also have the option of loading up to four loops and having them play in sequence. The sequence in which the loops will play corresponds to their order in memory. To load and append songs from locations 1 and 2 by holding buttons 1 and 2 for three seconds (the yellow LED will flash). To load and append songs from locations 1, 2, and 3, hold buttons 1 and 3 for three seconds. To load all four songs, hold buttons 1 and 4 for three seconds. You will hear the loops repeating in order.

Note: If you have loaded more than one song and then enter Program Mode, only the song from memory location 1 will be editable in Program Mode. To edit one of the other songs, load it by itself and then enter Program Mode. To move a song from one memory location to another, you can load it and then resave it in another location. Saving a song always overwrites whatever else was in the same memory location.

IX.   Battery Monitor

MintySynth checks the battery level when first turned on and then once per minute thereafter. If the battery is low, the music will stop and both LEDs will flash 6 times. This is a good time to charge the batteries. Once the device has warned you that the batteries are low, it will not do so again unless you turn it off and turn it on again.

X.   MIDI Output

MIDI (Musical Instrument Digital Interface) signals can be sent to a computer via an FTDI cable, or sent to a MIDI breakout board and other MIDI devices using the Tx pin on the 3-pin "MIDI" header. Please see the "hardware" page on the web site for details.

MIDI output is turned off by default. There are three MIDI modes: Off, baud rate of 31250 (the standard MIDI rate), and baud rate of 115200 (used by Hairless MIDI when connecting to a computer). To toggle between the three states, hold down button 2 while powering on the device. Three flashes of the yellow LED indicates that MIDI is turned off, three flashes of the red LED indicate a baud rate of 31250, and three flashes of both LEDs indicate a baud rate of 115200. The MIDI mode will remain the same until you change it again.

When we use MIDI we can choose from a large number of instruments, and we're no longer limited to the 8-bit sounds that MintySynth can produce on its own. To make using MIDI as straightforward as possible, it mirrors the standard controls closely (it's assumed that you're comfortable with those by now). Currently, the envelope and modulation settings are not used in the MIDI output.

In addition to being mapped to a waveform, each of the first four buttons is mapped to a MIDI instrument. When you push a button, it's actually selecting both a waveform and a MIDI instrument for whichever voice you're programming. The buttons can be programmed in the same way that you program them for waveforms, but you turn wheel 2 instead of wheel 1 while holding the desired button. The LED indicators will light, but there are 128 instruments available, so the counter is not very useful other than as an indicator of when you move from one instrument to the next. When you begin turning wheel 2 you immediately begin hearing samples of each instrument. Button 5 is permanently programmed to a grand piano (MIDI instrument 1).

If you turn wheel 2 all the way down while programming a button, you will select the bank of percussion instruments (MIDI channel 10). MIDI percussion is different from other MIDI instruments because each note represents a different percussion instrument. Once you program a button to percussion and then use it to set a voice to percussion, you can choose from many percussion instruments by changing the note that is being played. This is useful in our case because it allows us to use only one of our four voices to play many different percussion instruments. Also, in Live Mode, we can switch between percussion instruments rapidly by turning wheel 2.
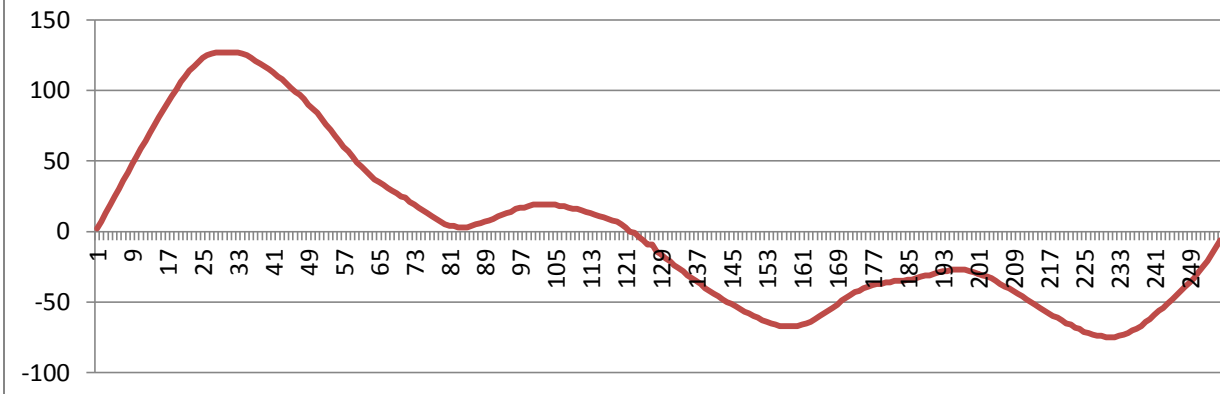
Appendix A. The waveforms, with time represented by the X axis and amplitude by the Y axis.
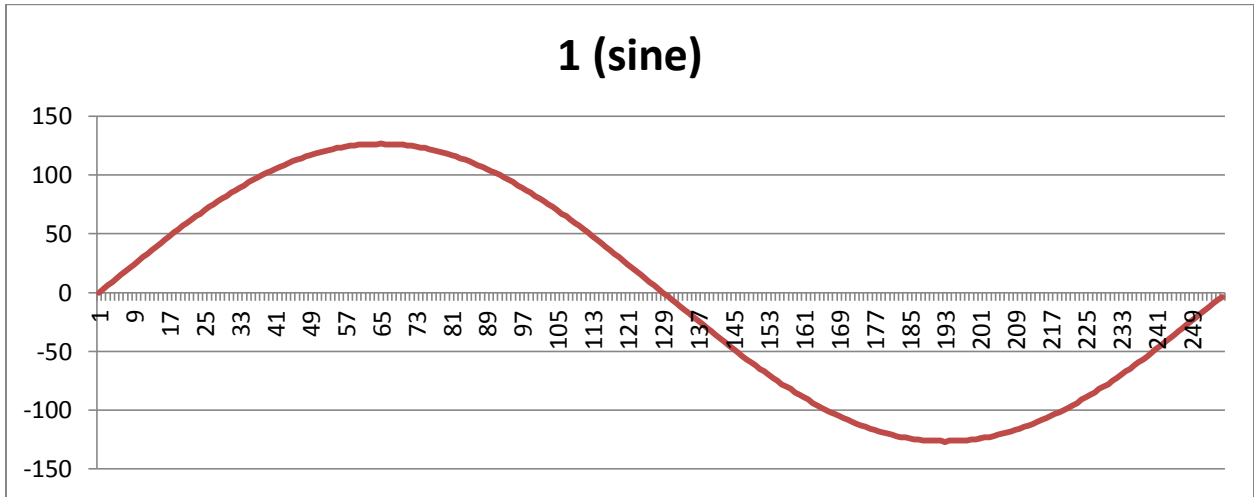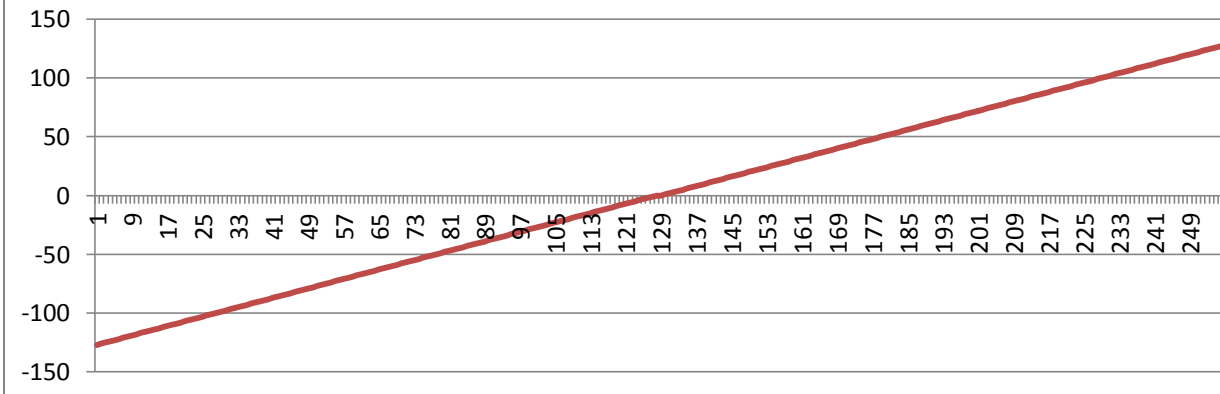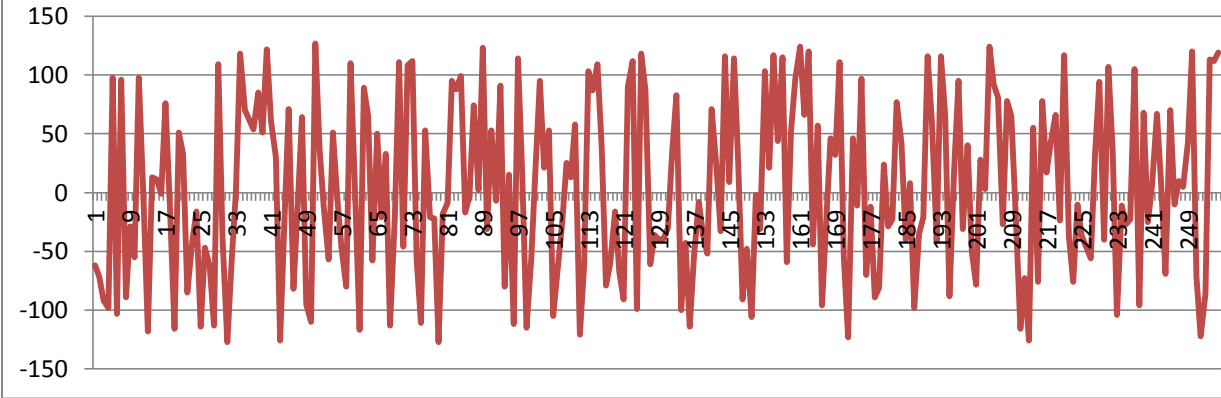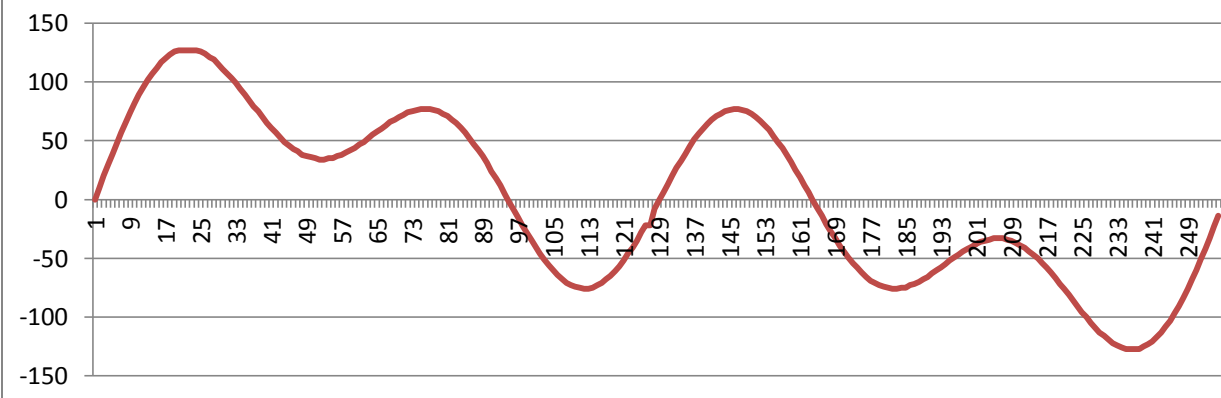
3 (square)
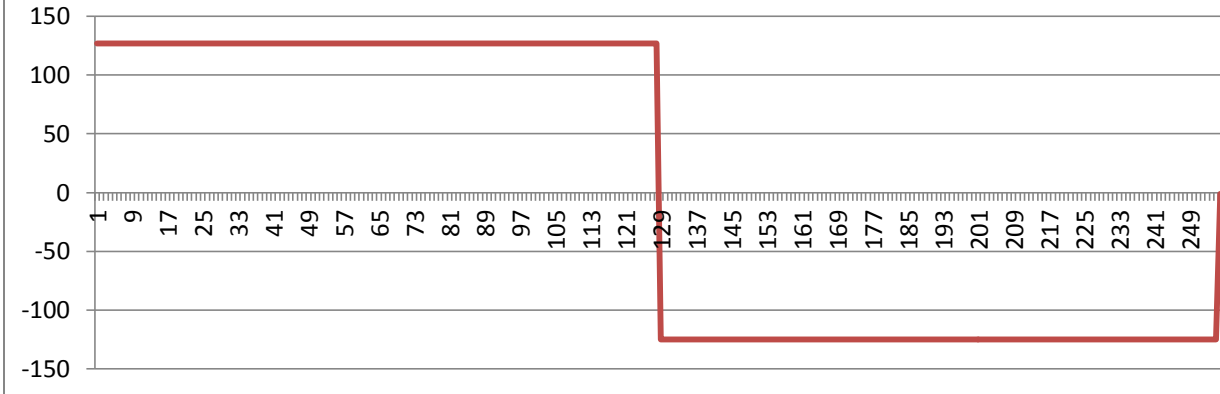
4

5 (ramp)

6 (noise)

7

8

9

10

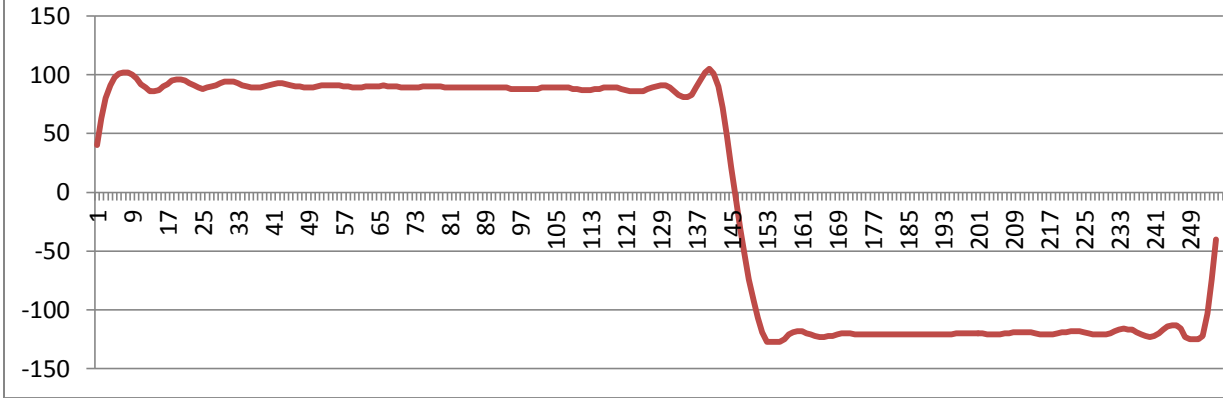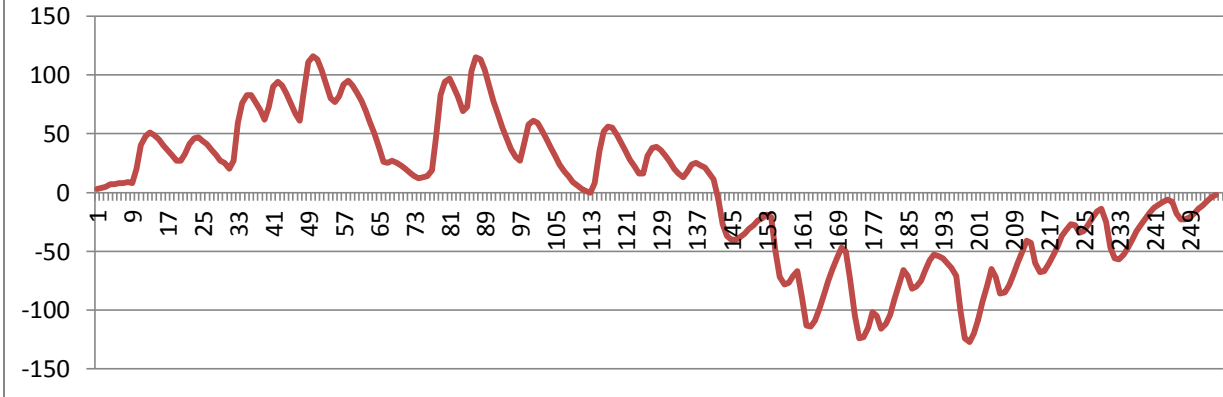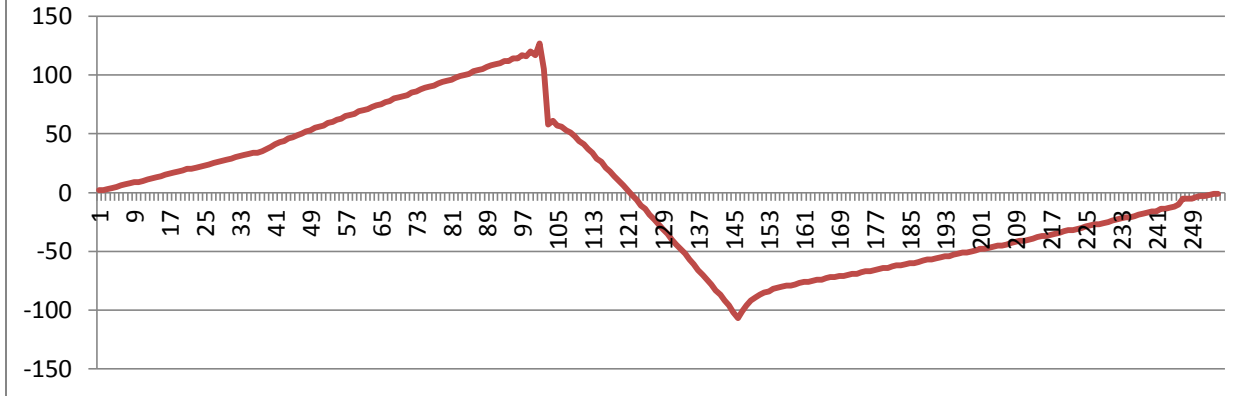

11

12

13

14

15
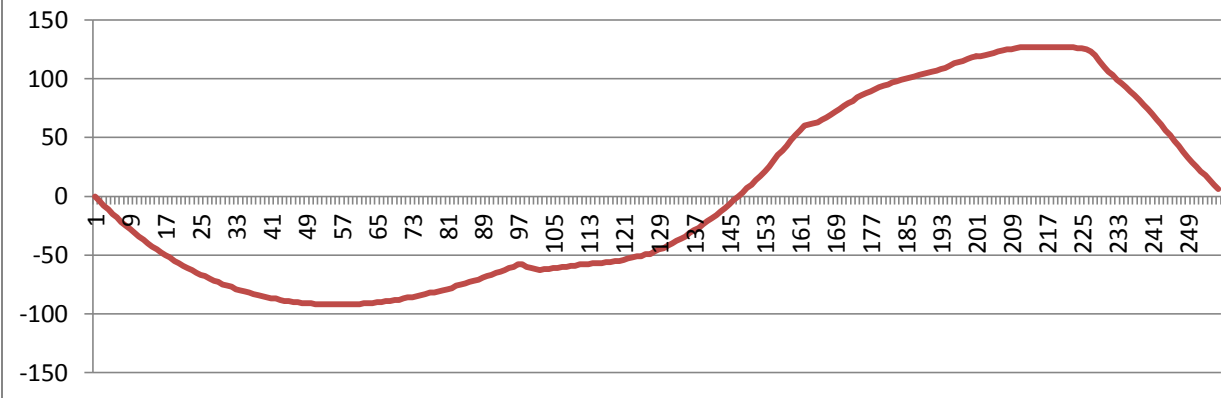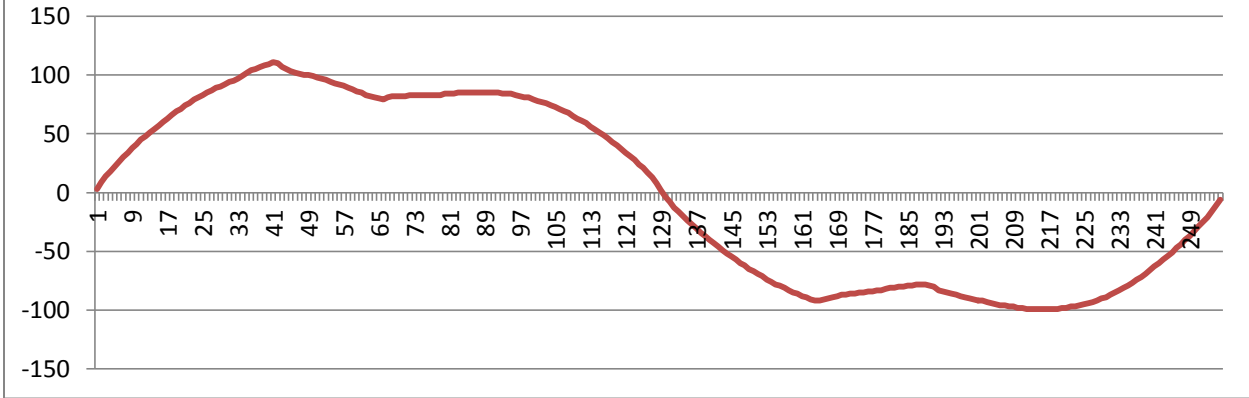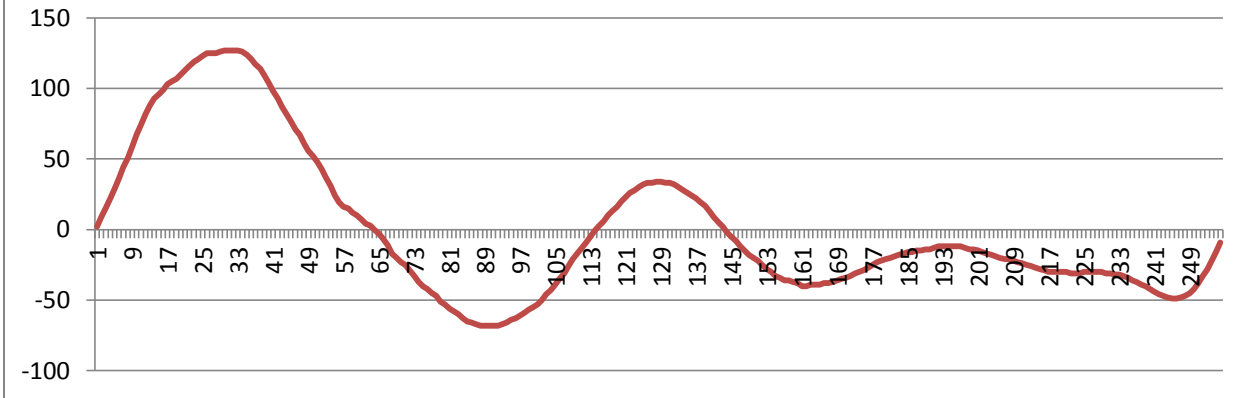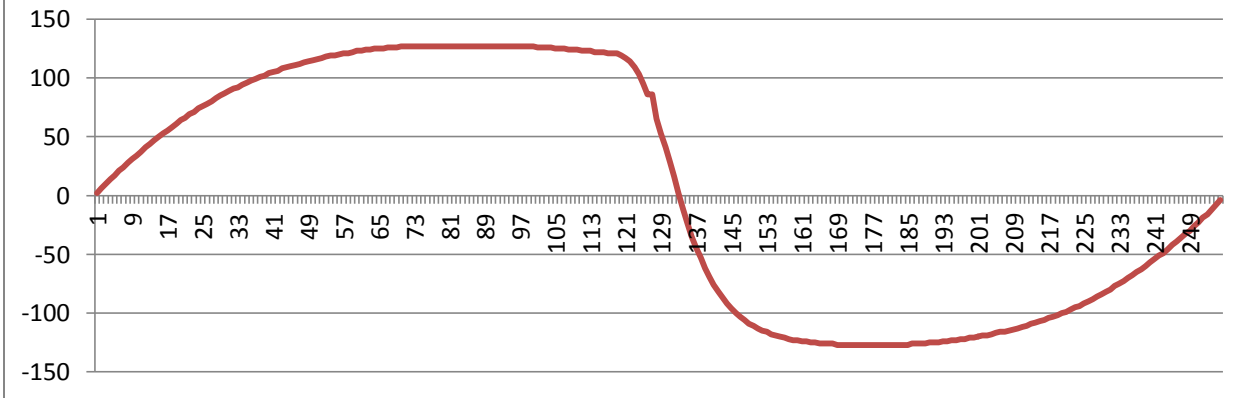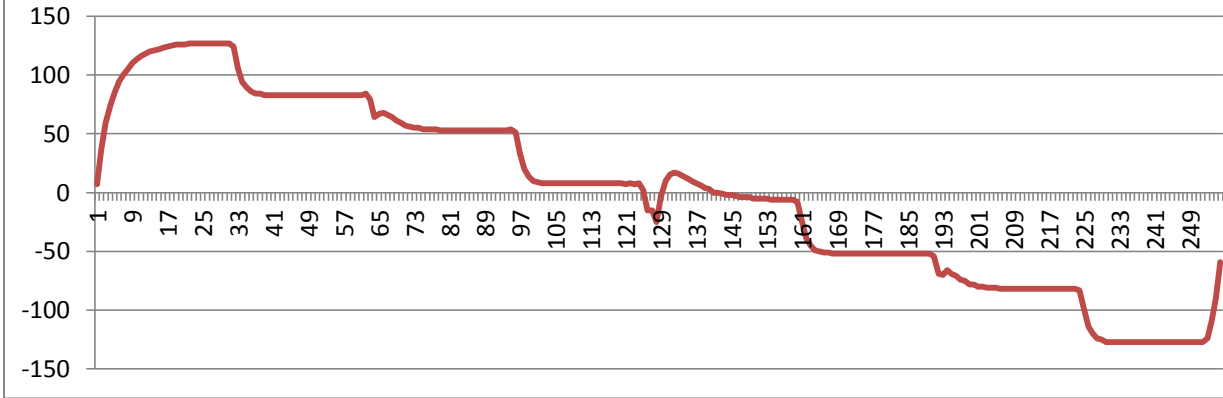
15

Appendix B. The five envelopes, with time represented by the X axis and volume by the Y axis.