Vortex Tracker Guide

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Terminology

Module- set of patterns, playback order which is determined by the list of positions. The module includes all the samples and ornaments used during playback, the number of the note table, the lines with the song title and author's name, the file title and the initial playback speed.

Position list- list of pattern numbers in playback order. The list of positions also includes the cycle position number. The maximum list length is 256 items.

Pattern (pattern)- a set of lines with notes, commands and parameters. The pattern string has a regular structure, described below. When viewed vertically, a pattern is a collection of tracks (tracks).

Pattern length- the number of lines in the pattern.

Sample (sample)- key structurePro Tracker 3. This is a set of parameters that completely determine the sound of a note (amplitude, noise, envelopes and frequency) in time.

Ornament (ornament)- a special case of a sample, defines only the frequency of a note over time. Unlike a sample, the frequency is controlled in semitones. In most cases, it is used to imitate chords.

Tone table, note table (tone table, note table)- a list of values   written to the tone registers of the AY-3-8910/12 chip (or YM2149F, hereinafter AY) for each note. This table defines the frequency of each note used in Pro Tracker 3. Total

one

notes 96 (C-1 to B-8). There are four tone tables (numbered 0 to 3).

File header- a string identifying the module. At present Currently two types of header are known: 'ProTracker 3.x compilation of', where x is the subversion number of Pro Tracker 3, and 'Vortex Tracker II 1.0 module: '.

Vortex Tracker II can determine from the header on boot which interpretation of the 3xxx command to use for a given module.

Loop position- position of the list of positions, to which the transition is performed when the end of the list is reached during playback.

Playback speed (speed, tempo)- number of interrupts to the pattern line. On the ZX Spectrum, interrupts go at a frequency of about 50 Hz (for different models in different ways).

pattern

Figure 1 schematically shows the structure of one line of the pattern.

Figure 1 - Pattern string structure

```
                    Channel A        Channel B        Channel C
00|....|..|--- .... ....|--- .... ....|--- .... ....
01|... .|..|--- .... ....|--- .... ....|--- .... ....

11 2222 33444555566664445556666444555566666
```

The dot represents the number zero (0). Vertical lines separate track columns.

Track marked 'eleven'used for simple line numbering, this track is not edited.

Track '2222' determines the frequency of the envelopes, written here the hexadecimal value is written to registers R11R12 AY (only if there is a corresponding command in position '5555').

Track '33' specifies the noise offset (hexadecimal number from0 to 1F). This number is added to the corresponding value from the sample being played and written to the R6 AY register.

The remaining three tracks are identical to each other, they control the sound in each of the three channels A, B and C AY.

Cell '444' designed to record notes. The note has the following structure:

```
C-1 or C#2
123       123
```

one- the Latin name of the note (in this case, DO).

2- may contain a sharp sign (#), otherwise it is dash (-).

3is the octave number. There are eight octaves with numbers from1 to 8. Octave 1 is a counter octave.

Three dashes (**---**) symbolize the absence of a note in the given cell, in this case the cell '444' does not affect the sound in the channel.

Cell '444' may contain a command to turn off the sound in the channel (R--).

Cells'5555' have the following structure:

```
QF1E
```

'Q'- sample number, used only if there is a note or mute commands in cell '444'. Total available31 samples, numbering starts from 1. Base 32 number system (0-9,A-V) is used.

Zero value (.) means no sample, in this case, if there is a note in the cell '444' will use the sample number, previously defined (in this or in one of the previous position list patterns).

The format allows the use of the so-called '*null*sample' (its can be denoted as W), but so far this feature has not been used in any of the editors.

'F'- this cell is for recording the envelope type. If this number from 1 to E, then this value is written to the register R13 AY, while at the same time the contents of the track ' are written to R11R122222'. The F value is used to turn off the envelopes, and 0 means no command in this cell. The presence of a note in cell '444' is not necessary for the command to work.

'one'- ornament number (from0 to F). Includes a new ornament. Zero ornament is included on the condition that in the previous cell 'F' a non-zero value is written (that is, either the type of the envelope, or the envelope is off). And, accordingly, ornaments from 1 to 15 are included regardless of the envelope cell (this is a new standard starting from version PT 3.69).

For the command to have a note in the cell '444' is optional. Note that you can combine an ornament with an envelope, but keep in mind that the ornament only affects the frequency of the tone.

'E'- the volume of the sound in the channel. By analogy, the value of1 to F determines the volume, and 0 to use the previously set volume. For the command to have a note in the cell '444' not necessarily.

Cells'6666'designed to record a special command.

'N'- command number, in this case1. 0 (.) means no command, regardless of other values   in cell '6666'.

'D'- for some commands defines the parameter 'Delay' (the duration of the command).

'Pp'- command parameter (some commands interpret it as two parameter 'P' and 'p').

Special teams

Pro Tracker 3 allows you to use one of the special commands on each line of a channel track.

However, the PT3 format allows for almost any number of commands per line possible. someday this feature will be used in Vortex Tracker II.

Team number 1.

Gradual decrease in the frequency of sound in the channel. The Delay parameter determines the period (in interrupts) of the frequency changes, and the 'Pp' parameter
- the value of each change in units of tone register AY.

Team number 2.

Gradual increase in the frequency of the sound in the channel. Works the same as command 1.

Commands 1 and 2 are also called tone slide (*gliss*,*glissade*,*slide*, *glissando* or *slide*).

The PT 3.7 standard allows commands 1 and 2 with Delay=0. In this case, instead of sliding, there is a single change in the tone frequency by the value of 'Pp'.

Team number 3.

Slide from the frequency of the previous note to the frequency of the note being set on this line. With this command, you can arrange a smooth transition from one note to another.

This is the main purpose of the command, all other possibilities are not documented (for example, if the previous note is either missing or has already been played).

If the previous note is in a different pattern, this leads to uncertainty when the standard player plays compiled modules from Pro Tracker versions 3.5 and older on the ZX Spectrum, since there is an error in the module file format that can only be minimized.

Players from PT 3.6 handle this situation with fewer bugs, but they don't play older modules correctly.

In any case, when playing directly in Pro Tracker 3 editors of any version or Vortex Tracker II, in all players built into the Vortex Tracker II exporter, as well as in Ay_Emul, the command always works correctly. Command parameters are similar to commands 1 and 2.

This command is also called *portamento*.

Musicians expect command 3 to be more flexible. Common sense dictates that sliding should not start from the frequency of the previous note, but from the current frequency, which could have been shifted before by the previous commands 1,2 and 3. For example, in such a situation

```
        D-5 1F.F ....
        - - - . . . . 11.1
        D-5 .... 31.1
```

the first line sets the D-5 note, the second line starts the frequency reduction command, and the third line sets the D-5 note again; by setting command 3 at the same time, the musician hopes that the frequency will gradually straighten out, but this does not happen in Pro Tracker 3.5 and older.

Regardless of the presence or absence of command 3, these versions of Pro Tracker 3 immediately (without any gradual transition) start playing the D-5 note.

Pro Tracker 3.6 and above handles this situation correctly, but it cannot compile it correctly: such a portamento command is simply removed (the corresponding error in the standard player is masked).

By analogy with ASM, I would like to expect from the 3xxx command and such behavior

```
        D-5 1F.F ....
        - - - . . . . 11.1
        - - - . . . . 31.1
```

here, first the frequency of the D-5 note starts to decrease, and then the command 31.1 gradually returns the frequency back to D-5.

Unfortunately, PT 3.6 still ignores command 3 without a note, so when using portamento without a note, play the module on the ZX Spectrum only with a special ZX player built into VT II,   or in programs that use this player.

Unfortunately, this behavior of the command cannot be fixed without interfering with the player codes, which means that even if you fix this error in the editor itself, you also need to redo the player. Pro Tracker 3.6 author Alone Coder made these fixes both in the editor and (partially) in the player.

Vortex Tracker II provides two ways to interpret command 3 - the old one (Pro Tracker 3.5) and the new one (Vortex Tracker II).

However, some old modules are not played correctly with the new interpretation of command 3 (the musicians adjusted the sound to what is, for example, the Das Verbaten La Fuego Ver Chuta! by Miguel from Dreadful Band of CPU module), so the old modules must be played on the ZX Spectrum old players, or my universal player built into the VT II exporter.

I want to note right away that the old interpretation of command 3 is erroneous, but this is not a bug in Pro Tracker 3 (and also in Pro Tracker 2), but simply a misunderstanding by its authors of the purpose of this command. I suppose those who wrote music in ASC Sound Master, and then tried Pro Tracker 3, will understand me.

Slide commands like '1...' immediately stop any frequency slip started earlier. Sliding is also stopped by setting a new note or a mute command.

All slide commands will automatically override command 6 if it was previously executed.

Team number 4.

Sets the sample to play from the position specified by the parameter 'Pp'. When setting a note, the sample is played from zero positions (from the beginning).

Command 4 can make the sample play from anywhere. It should be noted that the sample is not initialized by this command, i.e. any accumulation will continue.

Team number 5.

Same as command 4, but for decoration.

Team number 6.

Periodically turn on / off the sound in the channel. Parameter 'P' determines the number of interruptions during which the sound is on (1..F), and the parameter 'p' - the number of interruptions during which the sound off (1..F).

Command 6 automatically stops the tone sliding, if any. If parameter 'P' is zero, then the command does not make sense, although it can be used to turn off slip (commands 1-3). If parameter 'p' is0, then the command will simply turn off the sound after 'P' interrupts.

Team number 9.

Command to reduce the frequency of the envelopes. The parameters are the same as those of command 1.

Team number A.

Command to increase the frequency of the envelopes. The parameters are the same as those of command 2.

Parameter 'Pp' commands9 and A is specified in units of the AY envelope period register. You can stop the sliding of envelopes only by setting the command to enable envelopes in any of the channels, or you can explicitly specify a special command like "9..." (with zero parameters).

Team number B.

Sets the playback speed (parameter 'Pp'). Basically, speed can be any, but keep in mind that the standard Spectrum Pro Tracker 3 module player cannot play faster than speed 3 (that is, it is recommended to use values from 3 to FF).

Alone Coder's new ZX players (Pro Tracker 3.6 and above) allow speed 2. In the Pro Tracker 3 editor itself, as well as a special player from Alco, you can use speed 1. In my
universal player for ZX restrictions on tempo was not originally.

Sample

A sample determines the sound of a note in time. Similar to patterns, a sample is a collection of strings with parameters. The strings are played at the interrupt frequency (about 50 Hz). In PT3, the maximum sample length is 64 lines (ticks).

A sample in PT3 is always looped. In Vortex Tracker II, line numbering is done in hexadecimal so that these numbers can be used as parameters of the Sample offset command (special command 4). Let's consider one line of a sample.

Figure 2 - Sample string structure

1F|tne +000_ +00(00)_ F_ **************

11 234 56667 899 AA B CD EEEEEEEEEEEEEE

Speaker 'eleven'used for line numbering. Use number in this column as a parameter of special command 4 (if necessary).

Speaker '2'contains the tone mask.**'T'**means that the tone in the given line is allowed, and**'t'**- prohibited.

Speaker '3'contains the noise mask.**'N'**means that the noise in the given line is allowed, and**'n'**- prohibited.

Speaker '4'contains an envelope mask.**'E'**means that envelopes in this line are allowed, and**'e'**- prohibited.

Speaker '5'contains the sign of the tone deviation from the base value.

Speaker '666'contains the tone deviation from the base value in hexadecimal notation. Thus, the deviation range is -FFF.. +FFF. Since the tone registers are 12-bit, this range is more than enough.

Speaker '7'contains the tone deviation accumulation sign.**'^'** means that the accumulation is enabled, and**'_'**- turned off.

Fields'56667'together form a single structure for management tone deviation. In PT3, the base tone value is set by setting a note in the pattern in one of the channels in the note table.

If the accumulation in the sample is disabled, then the base value of the sample does not change, however, the "base value" is written to the tone registers + deviation from the field**'5666'**".

If accumulation is enabled (**'^'**in a collumn**'7'**), then the base value is changed to the one specified in '5666' value. Changing the base values resemble an accumulation of deviations.

As an example, consider how the values   of the tone registers for note C-4 are calculated (according to note plate #2, the frequency of this note is 1A2). Further, only the '56667' columns of the sample are displayed.

56667	Base Value tone register	Comment
+000_1A2	1A2	
+001_1A2	1A3	The base has not changed, but the frequency has changed
+000_1A2	1A2	Returned to what it was (to the frequency of the note C-4)
+ 002^ 1A4	1A4	Changed the frequency while changing the base
+ 002^ 1A6	1A6	
- 004_1A6	1A2	The frequency is back, but the base is still off.
- 004^ 1A2	1A2	Returned the base and frequency to their original position

It is easy to see that using tone accumulation (*base change*) it is possible to implement tone sliding (*gliss*) using proper looping. For example, if you loop the following line:

```
00|Tne +100^ +00(00)_ F- ***************
```

we get something like a drum (with just one sample line!).

Speaker 'eight'contains the sign of the noise/envelope frequency deviation.

Speaker '99'contains hexadecimal frequency deviation noise/ envelopes from the base.

Speaker 'AA'contains an absolute (unsigned) representation numbers from the column**'99'**.

Speaker 'B'contains the sign of accumulation of noise frequency deviation/ envelopes (similar to tone).

Fields'899 AA B'together form a single structure for management noise/ envelope frequency deviation from the base value. If the noise mask is on**'N'**, then the frequency of the noise is adjusted, otherwise the frequency of the envelopes is adjusted (even if the envelope mask is off). Control is similar to tone control.

Deviation range -10..+0F. This range is sufficient for noise, but not always for envelopes. In the latter case, we can recommend using 2-3 samples in different channels at the same time (all envelope deviations are summed up).

When managing noise, it may be more convenient to consider the noise deviation as an absolute value. To do this, the equivalent 5-bit value (00..1F) is given in brackets (fields 'AA').

Unfortunately, the accumulation of envelope frequency deviations in Pro Tracker 3 is performed in a byte, that is, the maximum displacement of the base frequency of the envelope by a sample cannot exceed -128..+127. This means that it is impossible to make a full-fledged analogue of special commands 9 and A with a sample.

Field 'C' contains the absolute value of the amplitude for the given sample lines.

Field 'D' may contain sample volume up signs on one ('+'), decrease the volume by one ('-'), or a sign ('_'), which means "leave the volume of the sample at the same level".

Fields 'E' contain a graphical representation of the field 'C' (number '*' is equal to field value 'C').

Field value 'C' minus the current volume of the sample sent to the corresponding amplitude register AY. The current sample volume is relative and initially equals +0.

Commands in column 'D' you can increase or decrease the volume sample. Loudness -15 will eventually drown out any amplitude in the column 'C' and +15 will set the maximum amplitude regardless of the contents of the column 'C'.

If you loop the following line, then after 14 interrupts the sound will disappear (something like staccato):

```
00|Tne +000_ +00(00)_ F- **************
```

and due to the fact that the decrease in volume starts from the very first line of the sample, the first amplitude displayed on AY will be 14, not 15 (be careful).

If you loop the next line, there will be a gradual increase in amplitude. For the same reason, the increase will not start from zero, but from one:

```
00|Tne +000_ +00(00)_ 0+
```

To organize a smoother fading, loop not one, but several lines. For example:

```
00|Tne +000_ +00(00)_ F_ *************** 01|Tne
+000_ +00(00)_ F_ ********** **** 02|Tne +000_
+00(00)_ F_ ************** 03|Tne +000_ +00(00)_
F_ ****** *********
```

will decay four times slower than the first example.

In Vortex Tracker II, the looped part of the sample is marked with a selection color. According to the PT3 ideology, everything that is after the looped part is not a sample, therefore, it is impossible to use an offset greater than the last tick of the sample in command 4 (although it is not explicitly prohibited). Be careful.

Ornament

The ornament is a sequence of signed integers, each of which specifies the deviation of the note's frequency from the base in semitones. Like the sample, the ornament plays at the interrupt frequency.

Ornamentation is the only way in Pro Tracker 3 to organize a uniform (logarithmic) slide, albeit with a fairly rough step (halftone).

Basically, ornaments are used to imitate chords, although their main purpose corresponds to their name (a musical term).

ProTracker 3.6x introduces a standard that you can use in Vortex Tracker II: if a note is less than C-1 after ornamentation, it becomes C-1.

That is, by applying large negative deviations in the ornament (for example, -96), the note C-1 is guaranteed to be obtained, which can be used in the sample, for example, the pitch of the drum can be made independent of the note. The SNA+.pt3 module will help you understand the idea.

Also, as in the sample, you cannot use the parameter of the special command 5 (Ornament offset) outside the body of the ornament, although it does not lead to a failure.

Note tables

Pro Tracker 3 has four tonemaps. Almost all plates are not made correctly (does not correspond to the ideal scale of 1750000 and 1773400).

More or less correctly made plate 1 (SoundTracker), traditional for the ZX Spectrum - it is suitable for importing almost all existing music editors on the ZX.

Compared to the ideal scale for 1773400 Hz, it is shifted almost exactly one tone down. In addition, the 24th note is out of tune (marked as B-2 in the editor, due to a one-tone shift it should sound like A-2). But, unfortunately, this is the only plate that fits under 1773400 Hz (proprietary Spectrum 128).

Plate number 2 almost perfectly matches the frequency of AY 1750000 Hz, all notes sound exactly as they are displayed in the editor.

Unfortunately, the note tables of different versions of Pro Tracker 3 are quite different (especially table 2, which used to have every right to be called ASM or PSC and ideally suited the frequency of 1773400 Hz). Plate 1 is unique in this sense - it is the same in all versions of Pro Tracker 3.

Plates 0 and 3 are not recommended.

General remarks

In PT3, a not very rational way of volume control is used: with the help of a large plate of experimental loudness values   for each of the 16 amplitudes.

Firstly, music coprocessors on different computers are connected differently, and therefore they sound differently, secondly, AY-3-8910/12 and YM2149F also sound differently, and thirdly, 16 levels in any case, the volume is not enough, and you can't squeeze more out of these microcircuits.

It's sad that PT3 doesn't have volume level 0 (commandR-- for this is not always suitable), although in the player itself in the volume label 16 bytes are reserved (it turns out not used) for zero volume. By the way, Alone Coder found a use for these 16 bytes;), and I also used them in my player for ZX.

Also, it is extremely inconvenient that all calculations in PT3 occur in units of the corresponding registers (tone and envelopes), and not in fractions of a tone. In this regard, it is impossible to organize uniform sliding, uniform portamento, ensure the same tone fluctuation in the sample with any note in the range, change the note table without recalculating the envelopes and parameters of the sliding commands, etc.

For the same reason, it is a pity that notes cannot be written in the envelope track (in the PT3 format, envelopes are specified by type and period at the same time).

It is extremely annoying that the numbers written in the envelope track are not written directly to the R11R12 AY registers, unless there is an envelope initialization (type) command in one of the channels.

Also, it's annoying that you always have to specify the envelope type when you need to turn on the envelopes or change their period, because this leads to the re-initialization of the envelope algorithm, and this is not always necessary.

There are players that track the output of the same values   to the R13 register and exclude reinitialization altogether, but this is different.

extreme, since the musician may need reinitialization.

It is sad that the portamento command is set not by the transition time to the final note, but by the speed, which affects the different alternation of patterns in which portamento is indicated with the first note.

In general, sadly, PT3 gives the impression of an extremely raw product, although through the efforts of third-party developers (MMCM, AlCo) it acquired a human face ;) and got rid of numerous errors.

Frankly, if not for its huge popularity, Vortex Tracker II was not based on the PT3 format, but on ASC, PSC or FTC (the latter is the best of the listed, at least in terms of the format's capabilities).

Hotkeys

ctrl+`	**Pattern editor.**
ctrl+one	**Sample Editor**.
ctrl+2	**Ornament Editor**.
ctrl+HOME	**To the very top**channel.
ctrl+END	**To the very bottom**channel.
ctrl+⬆	**To the very top**channel.
ctrl+⬇	**To the very bottom**channel.
ctrl+PGUP	**Transition to the middle of the pattern**(channel) 32nd position.
ctrl+PGDOWN	**Change to 3/4 pattern**(channel)48th position.
Tab	**Skip to next channel**in pattern (pattern editor).
Shift+Tab	**Go to previous channel**in pattern (pattern editor).
NUM[0]	**Auto envelope**on off.
NUM[+]	**Next pattern.**
NUM[-]	**Previous pattern.**

CTRL+NUM[+]	**Next position pattern**, next position.
CTRL+NUM[-]	**Previous position pattern**, previous position.
SHIFT+NUM[+]	**transposition** by a semitone.
SHIFT+NUM[-]	**transposition** by a semitone.
CTRL+SHIFT+NUM[+]	**transposition** per octave.
CTRL+SHIFT + NUM[-]	**transposition** per octave.
NUM[*] caps lock	**MUTE to all channels except the current one**. On channels with Envelope and Noise – enable/disable Envelope/Noise on all channels.
CTRL+SHIFT+[/] CTRL+SHIFT+[*]	**Sliding / sliding** pattern
Shift+[0..9A..C]	**Envelope digital value**.

sample editor

Shift+⬆ Shift+⬇	**Fragment selection** sample for copying.
ctrl+INSERT	**copying**.
Shift+INSERT	**Insert**.

ctrl+HOME **ctrl+END**	**To the begining**or**the end**sample.
Ctr+PgDOWN **ctrl+PgUP**	**To the begining**or**the end**sample.
INS	**duplication**the current position of the sample with sliding.
DEL	**Removal**the current position of the sample shift.
Shift+HOME	**Position setting**on which is happening loop
Shift+END	**Setting the last position**(length)
ctrl+INS	**Copy to current position**sample loop-limited positions - Loop / length.
ctrl+[+] [+] on numbers. clav.	**Next sample**(ornament).
ctrl+[-] [-] on numbers. clav.	**Previous sample**(ornament).
ctrl+HOME **ctrl+PgUP**	**To the beginning of the sample**(ornament).
ctrl+END **ctrl+PGDOWN**	**To the end of the sample**(ornament).
ctrl+A	**Everyone's Choice**sample (ornament) positions.

ctrl+INS	**Copying selected items**sample (ornament) to clipboard. "Looped" positions are considered to be selected.
Shift+INS	**Inserting sample positions**(ornament) from buffer to the current position.
Shift+Note	**Play current sample**for a certain notes.

Implemented input of offsets as notes in ornament mode:

When you press the Z button, which corresponds to the note C (to), a zero offset will be entered. pressing the X button that corresponds to D (D) will enter an offset of +2, and so on.

Volume transposition:

Select only position with volume (**SHIFT + CURSOR**) then press**SHIFT+ [+]**or**SHIFT+[-]**to shift the volume selection up or down.

Or click**CTRL+SHIFT+[+]**or**CTRL+SHIFT+[-]**for displacement volume of the selected fragment up or down, but only for each odd volume to simplify the creation of an echo effect.

I.e**SHIFT+HOME**,**SHIFT+END**is still a start/ end of loop.

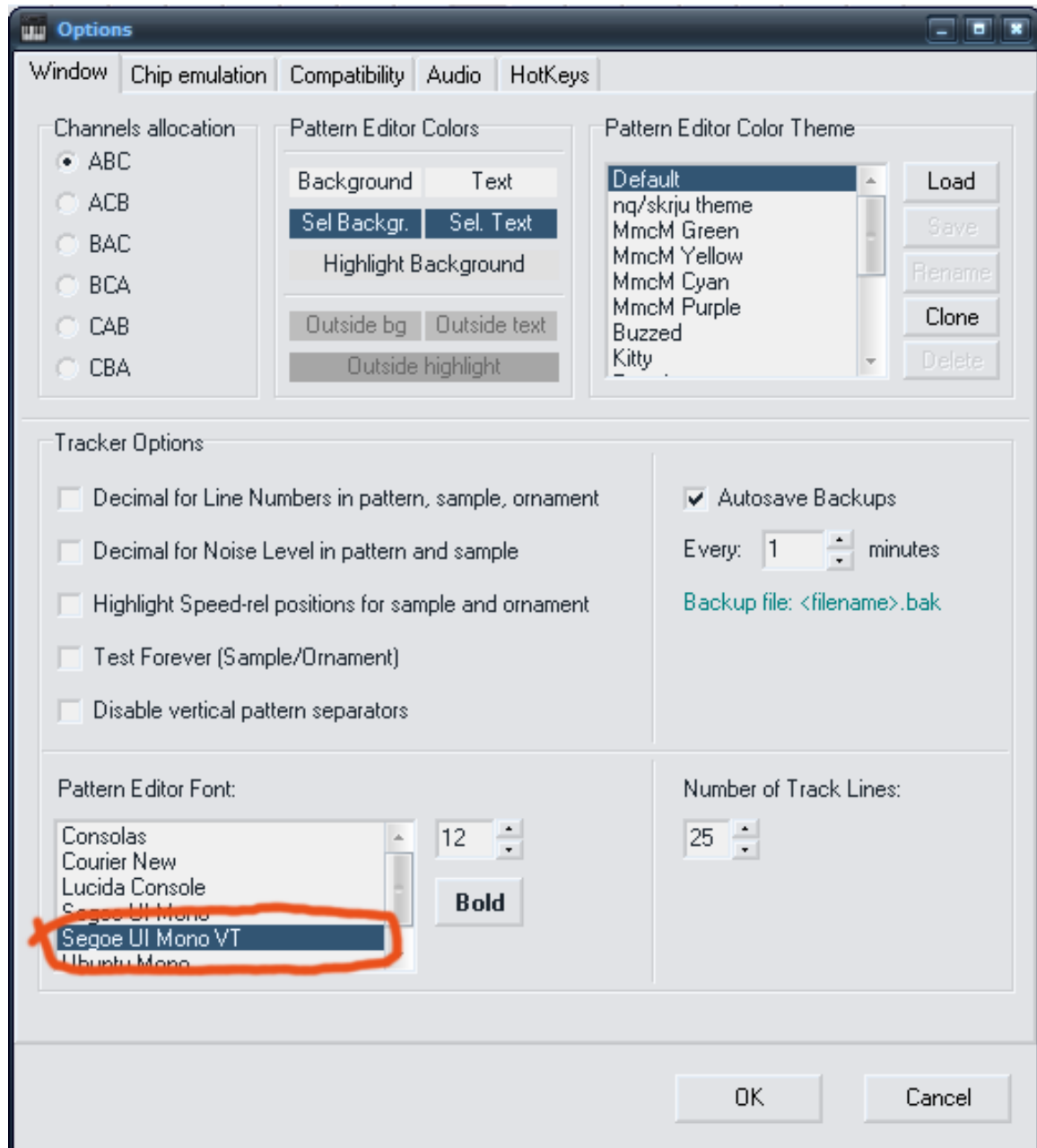The selection is removed when released.**SHIFT**and move the cursor somewhere.

Setting

one.segeo-ui-mono-vt.ttf
In the archive we find this font - right-click "Install".

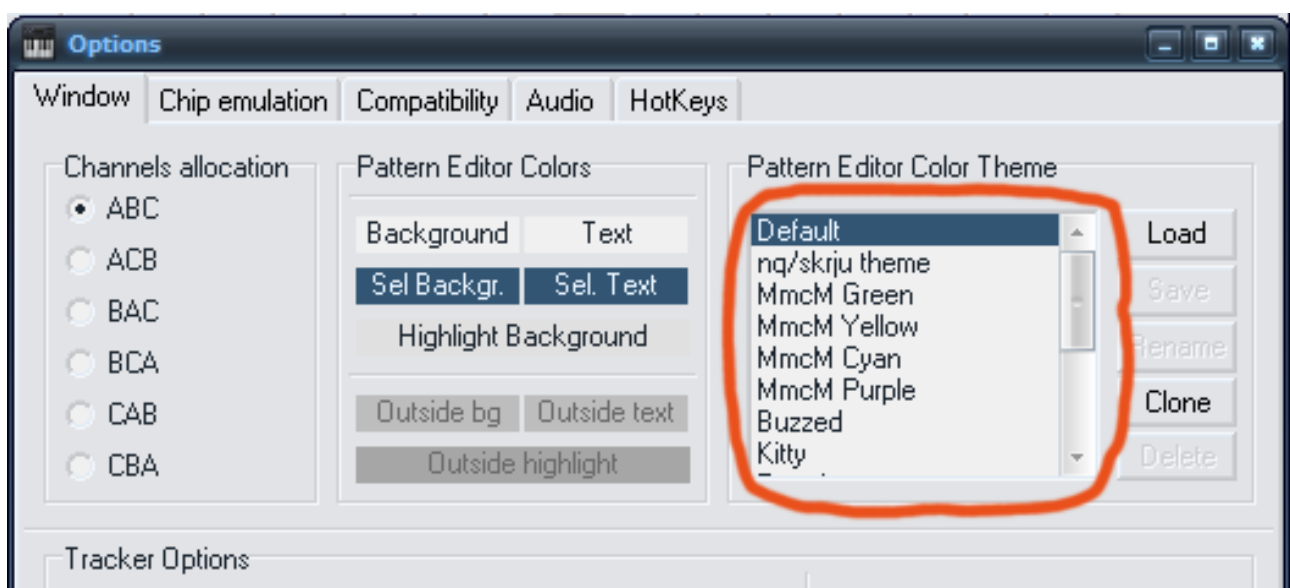**2.**We launch**Vortex Tracker 2.0.exe**and add the font:File-Options
- Window

4.Set the number of rows displayed in the field note editing:
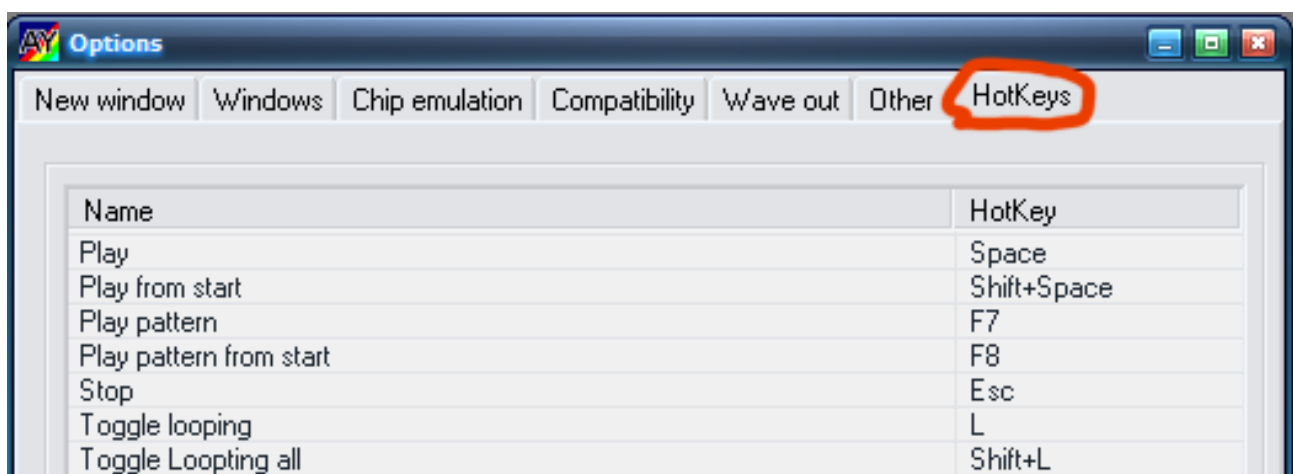
Create a new track, then go to options:
File-**Options**-**Window**-**Number of Track Lines**

And we select the height of the window by changing the number of lines parameter.

5.Choosing colors for the pattern editor:

8. Set up hotkeys as you wish:

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