Sound Trakker

Version 1.1

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SOUNDTRAKKER USER'S MANUAL

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1. Introduction

The SOUNDTRAKKER is a music program for building your own pieces of music and connecting them to your programs. With the song compiler you are able to transform these pieces into running programs.

Start the SOUNDTRAKKER with RUN "DISC". After some seconds the title screen appears, and now you may load the editor itself (key 1) or the song compiler (key 2). First you should load the editor (the main program).

Every song consists of a "song list" and this itself of 96 positions. A pattern number and a transposition for this pattern stands on each of these positions. The patterns (number between 18 and 92) are divided in 3 sound tracks (one for every sound channel). These tracks are separated in particular positions and each position in note, octave, instrument and effect command. You can choose from 16 instruments and 16 so-called Arpeggios. More information about pattern-editor, song list, instruments and Arpeggios will follow later.

Of course operating with the program and this manual don't expect knowledge about sound programming, but it could be of help. In every case you have to work with the program.

Notes in the SOUNDTRAKKER have English specifications: C,C#,D,D#,E,F,F#,G,G#,A,A# and B. The English note "B" accords to the German "H".

1.1. Screen structure

Screen outputs and the option names from particular menus are written in quotation marks (e.g. "EDIT"). The screen in SOUNDTRAKKER is divided in four different levels:

On the top of the screen is the main state line and the two menu lines (I), where particular menu items can be chosen and which are only changed by the options "DISKOP." and "OTHER". Under that is the state window (II), where all parameters belonging to the song, the current octave, the current instrument with its name and at the right margin the so-called "Frequency Analyzer" are shown. The state window is shown everytime. In the operating window (III) normally one of the three help pages is shown. Then it is used as output window from all options except "RECORD", "PATTERN", "SONG" and "EDIT". The last one is the pattern window (IV), in which particular patterns are shown and edited.

I) ------- Main state line -------
DISKOP. CLEAR RECORD PATTERN SONG
INS.ED ARPEG.ED SETUP OTHER EDIT

II) A Sngpos:xx Length:xx Octave:x <--- octave
B Pattrn:xx LoopTo:xx Instr.:x <--- instrument
C Height:xx Delay:xx XXXXXXXX <--- and name

III) Help pages, instrument- and Arpeggio-editor, file selection, songlist-editor, "SETUP" and "OTHER"- output window.

IV) Pattern window. In the left upper corner stands the current pattern number for "EDIT", "RECORD" and "PATTERN".

The main state line contents (except in the disc menu) the name of the current songs and the version number of SOUNDTRAKKER.

With the "Frequency Analyzer" the spectrum of frequency is shown (also Spectrum Analyzer). For this the spectrum of tones is separated in beams, and each beam corresponds to half an octave. For the functioning of SOUNDTRAKKER the "Frequency Analyzer" is not important, but maybe it is quite interesting to know, how a song "looks like".

1.2. Operation in the choose mode

In the choose mode (in main menu, at "DISKOP: and "OTHER") particular sub menus can be chosen with the cursor keys. Special keys as e.g. <SPACE> or <ESC> are here always shown with '<' and '>', what means that exactly this key is meant. The cursor keys are named <UP>, <DOWN>, <LEFT> and <RIGHT>. Controlling the program is only managed by cursor keys, <ENTER> and <SPACE>. All options can be interrupted or quitted by <ESC>. The big Enter key (Return on CPC 6128) is named <ENTER> and the small Enter key beside the number keys is <enter>.

The keys <TAB>, <CLR> and <COPY> and also some of the function keys have different functions in some options. (This depends on the selected option and will be explained in the belonging part of the manual.)

The repeat function is switched off for all keys except the cursor keys, <COPY> and <DEL>. If e.g. a cursor key is pressed for a certain time, the cursor begins to run fast.

1.3. Piano- and function keys

In order to make constructing songs easier, the notes are laid on the keyboard in that way that it corresponds to a normal piano keyboard with two manuals.

The lower manual begins here with <Z> for the note C, <S> for C#, <X> for D and continues up to E of the next octave. The upper manual begins with <Q> (or <A> on French keyboards) and ends with <P> (note E of next octave). The keys <S>, <D>, <G>, <H>, <J> and <L> are in that way the black keys of the lower manual.

If for example octave 3 is selected, then the note C-3 lays on the <Z> key and the note C-4 on <Q>. The same note lays also on the <,> key. So the keys <,>, <L>, <.>, <:> and </> are connected to the same notes as the keys <Q>, <2>, <W>, <3> and <E>.

octave n	**octave n+1**
S D G H J L :	2 3 5 6 7 9 0
Z X C V B N M , . /	Q W E R T Y U I O P

With the number keys (from now on named function keys or just F-keys) the following functions may be called: (These functions remain in the whole program, if there's not mentioned anything else.)

- <f1> to <f3> switch the respective tone channel on or off. The tone channels will be shown at the left margin in the state window by the letters A-C. If any letter is written in bright big letters, the correspondent channel is switched on. A switched off channel is written in dark small letters.

- <f7> switches to the next pattern (the number stands on the left top of the pattern window). After the last pattern the pattern number 0 will appear again. With SHIFT you can jump 8 patterns. This pattern number just refers to "EDIT", "PATTERN" and "RECORD".

- <f4> switches one pattern back. After pattern 0 the last pattern appears. Corresponds to <f7>.

- <f8> and <f5> switch one instrument ahead or back. After 0 follows 15 and vice versa. The name of the instrument, if present, is shown directly under the number.

- <f9> and <f6> switch one octave up and down. The octaves reach from 1 to 7 for the lower manual resp. 2 to 8 for the upper manual.

2. Selection of particular options

In the main menu an inverse beam can be steered with the cursor keys to all directions and over the particular options. With <SPACE> and <ENTER> the inversely (front- and backcolour are changed) written menu item is activated. You recognize an active menu item by the somewhat changed inverse representation (the script has not the backcolour). With <ESC> one can leave every sub menu to the main menu.

2.1. The Manual-mode

You are always in the manual mode, if you are in the main menu (see above), if you can move the choose beam and if no option is active. All manual keys and the F-keys may be used here. The manual mode suits for testing instruments or just for struming on the keyboard without changing any patterns. Then the songlist editor can only be called from the manual mode. For this press the <TAB>-key. And then it can switched between three help pages with the angular parentheses (left beside the <ENTER>-key. The help pages can only be switched in the manual mode and in the pattern-editor.

3. Setup adjustments

With the option "SETUP" some important setups can be made. With <ESC> the "SETUP" is left. The transpose-value and the pattern length are saved with the song and will be re-adjusted automatically while loading. The adjustment of the particular values is managed with function keys. In the output window you see the three following lines (standard adjustment):

```
"TRANSPOSE     : +00   f7 to dec   f8 to inc"
"PATTERN LEN.: 64    f4 to dec   f5 to inc"
"PALETTE       : 00    f1 to dec   f2 to inc"
```

3.1. Transposing songs

If you want to transpose a complete song in another key, use "Transpose". The transpose-values are counted in half-tone-steps and reach from -12 to +12, so a song can be transposed by one octave (in both directions) maximum. Even the note-values on the keyboard are changed by transposing. E.g. If you transpose +4, the tone on <Z> (note C) will be 4 half-tone-steps higher (note E). The names of the notes themselves don't change. By transposing the values for hardware-envelopes (see 6.4) are changed, too.

With <f7> the song will be transposed down by one half-tone-step and with <f8> one half-tone-step up. The transpose-value will appear immediately at "TRANSPOSE:".

3.2. Adjusting length of patterns

The pattern length shows the number of positions of a pattern. It can be 16 minimum and 80 maximum. The normal pattern length is 64. These are 4 whole notes, because one position represents 1/16 note. The pattern length can be changed by eight positions at a time (16, 24, 32 and so on).

With <f4> the patterns are shorted by 8 positions and with <f5> they are expanded by 8 positions. Since always the same memory for patterns is reserved, the number of patterns is dependent on their length. At a length of 16 there are 92 patterns (0-91) and at a length of 80 there are 18 patterns (0-17). The current pattern length is always shown at "PATTERN LEN.:".

Attention: When expanding pattern length it is possible that the song list has to be changed by the program. You should fix the pattern length at the latest before installing the song list, because that list could be brought in confusion by changing the pattern length. The new pattern length will only activated if "SETUP" is left with <ESC>. So while being in "SETUP" you may switch pattern length to and fro without changing the song list.

3.3. Colour palettes

The screen colours (BORDER and INKs) can be chosen to make representation of the script according to the used monitor (and to the user). There are 7 palettes (0-6), at which the palettes 0-2 are especially good suitable for green monitors. After loading the SOUNDTRAKKER palette 0 is adjusted, that allows a good representation on both monitor types.

With the keys <f1> and <f2> you can switch between the colour palettes. The new palette is visible immediately. The number of the current palette is always shown at "PALETTE:".

4. Instrument-editor ("INS.ED")

The instruments in SOUNDTRAKKER consist of three so-called envelopes, at which every envelope fix a certain quality of the instrument. These three envelopes are the loudness-envelope, the rustle-envelope and the tone-envelope. In this way you can fix the stroke and the end of the instrument. And with the tone-envelope vibratos or portamentos can be produced.

When calling the instrument-editor, first an instrument has to be selected. To select an instrument, enter simply its number (0 to F).

Be sure that the instrument that you edit is adjusted (in the state window), because this is not done automatically, and otherwise you would hear another instrument than the edited one.

4.1. Keys in the instrument-editor

On principle the instrument editor is controlled by cursor keys, at which those have in connection to <SHIFT> and <CTRL> different functions in particular envelope-editors. The small arrow in the loudness- and rustle-envelope-editor is also named cursor from now on.

The instrument-editor is divided in two pages: One for the loudness- and rustle-envelope, and the other for tone-envelopes. Between these can be switched by <enter>. On page 1 (loudness- and rustle-envelope) in the bottom line of the window (from left to right) the number of the edited instrument, the position for repeat function "REPEAT", the length of repetition "REPLEN" and the current value are shown below the cursor (in parentheses). "REPEAT" and "REPLEN" are explained in 4.5.

The following keys have the same function in all three editors:

- With <TAB> the value, on which the cursor stands, is stored and put into the next position of the envelope (the cursor jumps on that position).

With <CLR> the value, on which the cursor stands, is erased.

The <DEL>-key has the same function as <CLR>, but here it is jumped by one position automatically.

With <enter> you can switch between the two pages of the instrument-editor.

With <ENTER> a new instrument can be chosen. From the tone-envelope-editor it is switched back to the first page of the instrument-editor.

With <ESC> you may leave the instrument-editor and jump back to main menu.

4.2. Loudness-envelope

The loudness-envelope fixes the stroke, the end and some other specifications of an instrument. This envelope is called ADSR-envelope (Attack, Decay, Sustain, Release). Try yourself once how the sound of an instrument is changing if loudness doesn't begin with 15 but increases slowly. In this way you will get a feeling for the way how a certain instrument could be simulated. The loudness-envelope is the only one that is obligatory in every case in order to listen to the instrument. On the other hand rustle- and tone-envelopes can be left empty.

With <LEFT> and <RIGHT> the cursor is moved through particular positions of the envelope.

The particular values of loudness-envelope are changed with <UP> and <DOWN>. The values lay between 0 and 15, where 0 means no and 15 full loudness.

With the <SPACE>-key you can switch between loudness- and rustle-envelope, at which the cursor jumps to the beginning of that envelope.

With <COPY> the current value is masked. This effects that it will be ignored when playing the instrument. Masked values are shown stroked and in another colour than normal values. The cursor jumps ahead after masking a position. <COPY> also deletes the mask of a masked value.

With <SHIFT+UP> resp. <SHIFT+DOWN> all values of the envelope are set up or down by one. A 15 isn't changed by <SHIFT+UP>, and even a 0 not by <SHIFT+DOWN>.

With <SHIFT+LEFT> and <SHIFT+RIGHT> the whole envelope is rotated to the left or right. Values "falling out" at the margin are connected to the other end of the envelope.

4.3. Rustle-envelope

With the rustle-envelope effects as e.g. drums or explosions can be simulated. The values of the rustle-envelope lay between 0 and 31, at which 0 means no rustle and rustle increases from 1 to 31 (1 is very clear rustle and 31 very dark).

The key placing in rustle-envelope accords exactly to the loudness-editor, except that the limit for values is not 15 but 31. Masked values are ignored here, too.

4.4. Tone-envelope

The tone-envelope is divided in 4 columns with 8 numbers at a time, and it is passed through from top left to bottom right. The cursor is here controlled by all four cursor keys, at which with <UP> and <DOWN> it will be jumped forward resp. backward by one position and with <LEFT> and <RIGHT> by eight positions (one column to the left or right).

The values at tone-envelope lay between -4095 and +4095. A zero accords to the played tone. Negative values mean tone becomes higher and positive values tone becomes lower.

With <SHIFT+UP> one at a time is added to the value and <CTRL+UP> effects that 16 is added to the value.

With <SHIFT+DOWN> one at a time is subtracted from the value and with <CTRL+DOWN> 16. If the keys are pressed for a certain time, values are going to change fast.

With <COPY> the sign is inverted, i.e. negative values become positive and vice versa. Even here cursor is not moved.

With <enter> you can jump to the first page of instrument-editor.

The keys <CLR>, <DEL>, <TAB> and <ENTER> mean the same as in 4.1.

4.5. Repeat function for instruments

Every instrument is separated in 32 positions, which are numbered from 0 to 31. When playing an instrument the particular positions are run through. When the instrument has played position 31 the last values for loudness and rustle are retained.

With "Repeat" and "RepLen" you now can jump at the end of the instrument back to a by "Repeat" fixed position of the instrument. "Replen" fixes how much positions should be repeated. If "RepLen" stands on 0, the instrument has no repeat. In the other cases all 32 positions of the instrument are played first and then the area, that is fixed by "Repeat" and "RepLen", is repeated until a new note is played. E.g. if you always want to repeat the whole instrument, set "Repeat" to 0 (first position of the instrument) and "RepLen" to 32 (number of the positions to repeat).

The repeat function refers to all three envelopes of the instrument, i.e., if "Repeat" stands e.g. on 12, then it will be jumped in all three envelopes after position 31 again to position 12. If an Arpeggio is switched on, "Repeat" and "RepLen"-positions are valid for the Arpeggio (see 5.2).

The setting of "Repeat" and "RepLen" only works on the first page of the instrument-editor. For this the F-keys are used:

With <f4> one is subtracted from "Repeat" and with <f7> "Repeat" is increased by one. The "Repeat"-value lays between 0 and 31.

With <f6> one is subtracted from "RepLen" and with <f9> one is added. The "RepLen"-value lays between 1 and 32 and says how much positions of the instrument are to be repeated.

If "Repeat" stands e.g. on 8, then "RepLen" couldn't become higher than 24, because both values mustn't exceed 32, what accords to the number of positions of an instrument.

Also make sure that there are no too big gaps in the loudness-envelope in that area, that is repeated.

5. The Arpeggio-editor ("ARPEG.ED")

In the Arpeggio-editor one of the 16 Arpeggios can be changed. Each Arpeggio consists of 32 positions and each of these positions may contain values between -48 and +48. On the screen an Arpeggio consists of 4 columns with 8 lines at a time. If Arpeggio-editor is called, first the number of the Arpeggio has to be entered (0-F).

5.1. Keys in the Arpeggio-editor

The function keys and the manual keys are functioning in the Arpeggio-editor in the same way as in the manual mode. So you may select instruments, switch the octave etc. In order to listen to the current Arpeggio, you just have to play the expected note on the manual keys.

The cursor is moved here by the cursor keys, too. The current value is always the value at the cursor position.

With <LEFT> and <RIGHT> cursor is moved by one column (=8 positions) at a time and with <DOWN> and <UP> cursor is moved by one line (=1 position) forward and backward. If <UP> and <DOWN> is kept, cursor runs through all positions of the Arpeggio. With <SHIFT+UP> 1 is added to the current value and with <SHIFT+DOWN> 1 is subtracted. The values lay between -48 and +48.

With <DEL> the value at the cursor position is deleted and it is jumped ahead by one position.

With <COPY> the sign is inverted, i.e. negative values become positive and vice versa.

With <TAB> the current value is stored, the cursor is set to the next position and the stored value is put in at the new position.

With <enter> the Arpeggio is filled with those values, which are standing between the first position in the Arpeggio and the cursor. If <enter> is pressed now, then from the position behind the cursor there will be always again the same values as between position 0 and the cursor position. In this way an Arpeggio can be quickly filled with a certain triad.

With <ENTER> a new Arpeggio can be selected by entering the number (0-F).

For all functions, at which the cursor is moved by one position, is valid, that the cursor jumps behind the last position (bottom right) again to the first position (top left).

5.2. The way of functioning of arpeggios

Arpeggios could be best compared with the tone-envelopes, because they are functioning in the same way, except that values in the Arpeggio are not entered in note values but in half-tone-steps and therefore they're not as dependent on the tone height as the tone-envelopes. (A tone-envelope sounding in low octaves like a slight vibrato could produce a nasty howling in very high octaves).

If an Arpeggio consists of zeros, the played tone won't be changed. If an Arpeggio consists of the sequence 0, +4 and +7, the played tone will be played like a major chord (the keynote itself and the tones laying 4 resp. 7 half-tone-steps higher). An octave is subdivided in 12 half-tone-steps, so that a tone is played exactly one octave higher by an Arpeggio, which only consists of +12.

Example: The note C-5 is played with an Arpeggio, which only consists of a sequence of 0, +4 and +7. So now the notes C (0 half-tone-steps), E (4 hts. higher than C) and G (7 hts. higher than C) are played fast one after another, and this sounds like a C major chord. Arpeggio-values are added together not before the tone-envelope, so that an Arpeggio and a tone-envelope could cancel each other out. If an instrument in the tone-envelope has a strong vibrato, this is even transmitted to the Arpeggio.

The repeat function of the instrument played with the Arpeggio is even valid for the Arpeggio. Therefore you should attend, that the position for repetition accords to the Arpeggio. E.g. at a triad position 8 would be suitable as position for "REPEAT", because then the Arpeggio would be repeated

without gaps. For example if an Arpeggio consists of 0, +3 and +7, then '+3' will stand at the last position (at the very bottom right). '+7' stands at position 8. If "REPEAT" is on 8 and "REPLEN" on 24, the Arpeggio will restart after '+3' at the end at '+7' at position 8.

For instrument-editor and Arpeggio-editor it is very simply good to try again and again.

6. The Pattern-editor ("EDIT")

The pattern-editor seems to be the most important option in SOUNDTRAKKER, because all songs are constructed on patterns. Even the pattern-editor is mainly controlled by the cursor keys. You may steer a cursor through the refering pattern and its particular voices and enter notes, instrument numbers or effects. Entering notes is done by the manual (see 1.3); so always this note is entered, which key you press. Notes could only be put in, if the cursor is at the beginning of the respective voice. If a note is played, current octave and current instrument are automatically entered with it. The switching of instruments or patterns here also works by the function keys.

Moreover the octave ("OCTAVE") and the current instrument ("INSTR."), which are standing left beside the "Frequency Analyzer", are important for the pattern-editor. The values standing there are valid for all options ("EDIT", "RECORD", "INS.ED", "ARPEG.ED") and may be changed almost everytime by the function keys.

6.1. Keys in the Pattern-editor

With <UP> and <DOWN> the pattern is scrolled up resp. down, at which the cursor remains at the middle, bright line. With <SHIFT> you can jump by 8 positions up or down at a time.

With <LEFT> and <RIGHT> cursor can be moved to and fro between the particular channels and the positions for note values, octave, instrument number and effects. With <SHIFT> you can jump forward by a whole channel.

With the keys of the two manuals you may play notes in the pattern everytime. For this cursor has to be at the first position of a channel. The current octave and the instrument are always entered with it (the 9th octave can only be reached, if "OCTAVE" stands on seven and if you play notes by upper manual). After every input current cursor position is played and possibly it is jumped forward (see Edit-Skip).

With <TAB> the Edit-Skip can be switched on and off. If Edit-Skip is switched on, it will be jumped forward by one position after every valid input (note, instrument, effect or stopper) and after deleting with <DEL>. If Edit-Skip is switched off, cursor remains at its position. The Edit-Skip-adjustment is represented by a small arrow at the left side of pattern-window. An arrow to the bottom means Edit-Skip is switched on and an arrow to the right means it is switched off.

With <DEL> the line, on which the cursor is, is deleted (-- 0000). If cursor is at the number for instrument and effect-commands, just the three numbers for effects will be deleted. Note value and instrument are kept here. Dependent on adjustment of "Edit-Skip" it is jumped to the next line.

With <CLR> a 'stopper' is put in (The X-position of cursor doesn't matter). A stopper is respresented by a R (R- 0000) and switches off when playing the channel, on which it is. This makes sense, if you have instruments with repeat function, which you want to switch off at certain positions in the pattern, or if you want to stop a tone with a hardward-envelope.

With <COPY> the current position of pattern is played and it is jumped to the next position (Singlestep-mode). This function remains uninfluenced by Edit-Skip, i.e. with <COPY> it is jumped in every case by one position. Switched off channels are ignored when playing in the Singlestep-mode.

With <f0> all positions between cursor (inclusive) and end of the voice are pushed down by one and a blank (-- 0000) is put in at the cursor. Lines laying behind the end of the voice are going to lose.

With <f-Dot> (decimal point beside number keys) all positions between cursor (exclusive) and end of the voice are pulled up by one and a blank is added at the end of the voice. The position under the cursor will be overwritten by the up-pulled line.

With the keys <1> to <6> and <SHIFT> some buffer functions can be called.

- <SHIFT 1>: The channel is copied to the buffer and then deleted.

- <SHIFT 2>: The channel is copied to the buffer without deleting.

- <SHIFT 3>: The contents of the buffer are copied to the channel. Always this channel is used, in which the cursor is.

- <SHIFT 4>: The whole pattern is copied to the buffer and then deleted.

- <SHIFT 5>: The whole pattern is copied to the buffer without deleting.

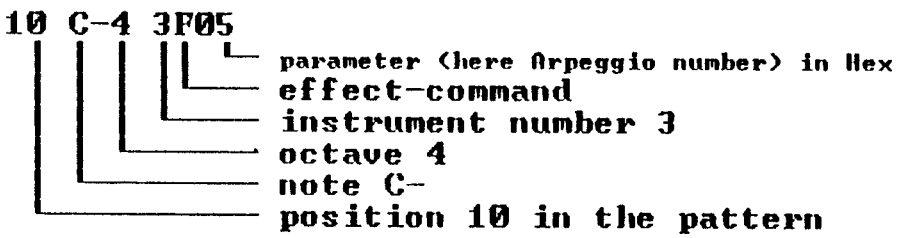
- <SHIFT 6>: The contents of the buffer are copied to the pattern.

Separated buffers for channel- and pattern functions are existing, so that you may cut out a pattern without overwriting a channel, that you've cut out before. Moreover the contents of the buffer will remain existing, if you load a new song or if the whole song is erased with "CLEAR". So the buffers are just influenced by the according keys in the pattern-editor.

6.2. Structure of pattern positions

A pattern position consists of four particular components: note, octave, instrument number and effect command. The column at the very right of the pattern window contains the numbers of the represented positions. In the three small windows seven positions of the three voices of the current pattern are respresented at a time, at which the bright line in the middle is the current pattern position.

Example:



The octave, the instrument and the effect commands can always be changed by entering a number. For this cursor has to be at the respective position for octave, instrument or effect. The values for octave lay between 1 and 8, for instrument numbers between 1 and F. Parameters for effect commands stand at the last two places of every position.

All parameter values and the instrument number are represented and entered in hexadecimal form. Therefore you should be used to work in hexadecimal style.

6.3. Effect commands

With effect commands certain effects or functions can be called while playing. A zero means that no effect is used. Moreover the numbers 2-7 and 9 are unused (yet). Effect commands behind empty positions (---) are ignored. The particular command values look like this:

'1': An Arpeggio switched on before (F) or a hardware-envelope (8, A, C or E) is switched off. This function doesn't need parameters.

'8' or 'C': The entered tone is moduled by a sawlike tone, i.e. a loudness-envelope looking like a saw is produced by the envelope-generator. The periode duration of this envelope is changed by adjusting the parameter value (00-FF). Because of the envelope the tone doesn't sound like a normal rectangle tone but like a mixture of rectangle and sawlike tone. Since the parameter value of the envelope depends on the played note, one must find it out by trying. Nevertheless a table for parameter values is printed in 6.4.

'A' or 'E': For this function the same is valid than for '8' or 'C', just that no sawlike tone is used, but a triangle tone.

'B': With the check value 'B' the maximum loudness for the played instrument is fixed. Standard value is 15 (Hex F), what means that the loudness of the instrument follows exactly the loudness-envelope. A maximum value of 10 (Hex A) means, that loudness values in the instrument are set down by 5 (15 minus 10). At this parameter value is only of one place. As soon as a new instrument is played or a new pattern begins, maximum loudness is set back to standard value (15).

'D': Fixes the duration of 1/16 notes (one pattern position). The duration of the notes is measured in 1/50 seconds, what means that a 1/16 note with a delay of e.g. 25 (Hex 19) has a length of 1/2 second. Parameter values can lay between 2 and 63 (Hex 3F). Delay will only be changed, if a pattern or a song is played.

'F': An Arpeggio is switched on on the channel. The Arpeggio is switched on, until a '1', a hardware-envelope or another Arpeggio in this voice is switched on. Parameter value is of one place. Parameters of one place (also at 'B') should always be entered with a zero before.

Envelopes and Arpeggios switch them off mutually, i.e. that, if one has had a envelope on channel C, and then switches on an Arpeggio, then the envelope will be switched off, and vice versa.

Further more the loudness of hardware-envelope-tones could be influenced neither by the loudness-envelope of the instrument nor by the effect command 'B', because the loudness is logically fixed by the hardware-envelope. The average loudness of these tones lay therefore always between 7 and 8.

6.4. Value table for hardware envelopes

(All values in hexadecimal form):

Note:	C-	C#	D-	D#	E-	F-	F#	G-	G#	A-	A#	B-
OKT 2+3	78	70	6A	64	60	5A	54	50	4C	48	44	40
OKT 3+4	3C	38	35	32	30	2D	2A	28	26	24	22	20
OKT 4+5	1E	1C	1B	19	18	16	15	14	13	12	11	10

Values between 78-40 are for octave 2, from 3C-20 for octave 3 and 4 and values 1E-10 for octave 4 to 5. Values between 1E and 10 can also be used on octave 2 or 3. Of course values smaller than 10 may be used (for very high tones), but at tones on octave 2 and 3 values are the best suitable.

These values are only valid, if the song hasn't been transposed. Values become smaller by transposing upwards and bigger by transposing downwards.

6.5. Particularities

The notes C#9 to E-9 have no tone if they are played, and normally they are assigned for effects, in which no tone is required. So if only a noise or pure hardware-envelope-tones shall be produced, then the notes C#9 to E-9 could be used for this. These note values are only valid, if the song is not to transpose. If you transpose your song up or down, note values will get out of place by the same number of half-tone-steps up resp. down at a time (So at a transposition of -4 it is the tones A-9 to C-9). Notes on the other side of the last of these tones (E-9 resp. C-9) are invalid and should not be used.

The envelope-generator in the sound-chip is actually assigned for producing different loudness-envelopes, without that you must take care yourself about that. Since the periode duration of envelopes is freely programmable, you can produce tones, which follow the course of one of these envelopes, by corresponding short periode durations (1 to ca.200). Unfortunately only one envelope-generator has been installed, which can be laid alternatively on particular channels.

Thus there is also a limitation when using the envelope-tones: It's impossible that envelope-tones of different height run on different channels at the same time. I.e. if you choose a periode time of e.g. 50, then this value is valid for all channels, on which hardware-envelopes are used. This is because of the structure of the sound-chip and can't be bypassed. In order to avoid errors in the songs through that, the channels have been given priority levels. At this channel A has the lowest and channel C the highest priority.

It is the same thing at rustle-envelopes of particular instruments. Since there is only one rustle-generator, which could be switched to particular channels, for tones with rustle are valid the same priority levels as for hardware-envelopes. This means in detail (if for example on channel A and on channel C one instrument at a time is played with rustle), that rustle-envelope of the instrument on channel A is ignored and instead of it rustle-envelope of channel C is used. Therefore rhythm-sequencies should lay, if possible, on channel C.

7. Record mode ("RECORD")

In the record mode the current pattern is played automatically with the adjusted delay ("DELAY") and can be edited at the same time. All notes and effect commands (also 'D') are played immediately. Entered notes, instruments and effect commands are entered immediately and are played, too. You should, before recording on a channel with "RECORD", enter a rhythm-sequency on another channel, because you can then orient yourself at the given measure.

Recording is started not before a key is pressed (not the key, with that you call the option). If this key is a valid note or another input, it will be entered immediately. In every case recording is started by pressing a key.

7.1. Keys in the record mode

Since the record mode accords to the pattern-editor in most things, key placing is almost the same. However, not all functions of the pattern-editor are available.

With <LEFT> and <RIGHT> cursor can be positioned in particular channels.

The function keys are engaged the same as in pattern-editor. Notes, played with manual keys when the cursor is at the according position, are taken over in the pattern immediately. Deleting notes or effect commands works here also by <DEL>. Buffer functions on keys <1> to <6> together with <SHIFT> are not available here. Recording can be stopped everytime by <ESC>.

8. Play a pattern ("PATTERN")

This option simply plays infinitely the current pattern (the number stands in the pattern window) with the at "DELAY" shown delay. All effect commands (also 'D') work absolutely normal here.

8.1. Keys when playing a pattern

With <ESC> playing is interrupted and all tones are stopped. At "DELAY" the last adjusted value is kept.

Function keys have the same engagement as in the pattern-editor. All other keys have no function. If you switch in the middle of the pattern with <f4> or <f7> to another pattern, then it will be possible, that a hardware-envelope or an Arpeggio from the pattern before remains on. Therefore you should, if you switch while playing, switch always not before the end of a pattern.

9. The songlist-editor (<TAB>-key)

By the songlist particular patterns are linked to a song. The positions in the song are numbered from 0 to 95 and each position has one field for the pattern number and one field for a possible transposing of that pattern. When calling the songlist-editor it is jumped to the first position (=0) of the song.

In the pattern-field (of two places) stands the number of that pattern, that should be played at this position. This pattern can then be optionally transposed by seven half-tone-steps up or down. This transposition stands right beside the respective pattern number.

9.1. Keys in the songlist-editor

The songlist-editor can only be reached from the manual mode by <TAB>. With <ESC> it is left again. With cursor keys particular positions of the songlist are run through.

With <LEFT> and <RIGHT> cursor jumps between pattern-number and transposition respectively ahead by one position.

With <UP> and <DOWN> cursor jumps by four positions ahead resp. back. If cursor reaches the top line or the bottom line, it will be scrolled, if possible, by 32 positions ahead resp. back. Current position ("SNGPOS") and also its contents ("PATTERN" and "HEIGHT") are shown in the state window.

With <SHIFT+UP> and <SHIFT+DOWN> the value under the cursor is adjusted. The maximum pattern number depends on the length of the patterns and lays between 17 and 91. Transposition of pattern reaches from -7 to +7 (in half-tone-steps).

With <CTRL+UP> and <CTRL+DOWN> pattern number is adjusted in steps of ten at a time. "HEIGHT" can only be adjusted with <SHIFT>.

With <f7> and <f8> song is shortened resp. lengthened by one position (see 9.2, "LENGTH").

With <f4> and <f5> the position for "LOOPTO" is moved ahead or back (see 9.2, "LOOPTO").

With <f1> and <f2> the delay of the song is adjusted. This lay between 2 and 63 (see 6.3, effect command 'D').

With <SHIFT+RIGHT> all positions inclusive that one under the cursor are moved back by one and a blank is inserted under the cursor. If a position exceeds 95, it will be lost.

With <SHIFT+LEFT> all positions behind the cursor are pulled ahead by one and at this the current position is overwritten. At the end of the songlist (position 95) a blank is inserted. The song length isn't changed by inserting/overwriting.

With <ENTER> that position, on which the cursor is, is marked as the last in the song and ("LENGTH") is set accordingly.

9.2. "LENGTH" and "LOOPTO"

The song length ("LENGTH") fixes, how many song positions are played, before song starts again. Minimum length is 1 and maximum length 96. Inside this length any pattern with any transpositions can be played. When saving songs it is only saved up to the biggest pattern number being between position 0 and the last position of the song.

It is normally jumped back, if the last position of the song has been played, to position 0. With the loop-position can now be chosen, at which position the song is to restart. "LOOPTO" can be one smaller at the most than "LENGTH" (so 0-95).

10. Playing a song ("SONG")

The song is played from the current position ("SNGPOS"). If this is bigger than fixed at "LENGTH", the song will be played from the beginning (position 0). When the last position has been played, song is repeated according to the loop-position (see 9.2).

If <SHIFT> is pressed while calling "SONG" with <SPACE> or <ENTER>, then position will be set on 0, so the song is played from the beginning.

If "DELAY" is set on 2 while playing, "Frequency Analyzer" will be switched off, i.e. it is 'freezed' (also at "RECORD" and "PATTERN"). This is no program error, but the reason is, that at a delay of 2 pattern position has to be increased 25 times in a second and therefore there's no time to call the "Analyzer" every 1/50 second. If "DELAY" is set back to a value bigger than 2, Analyzer will work again, too.

10.1. Keys at playing a song

With the function keys <f1> to <f3> particular channels may be switched on and off (see 1.3).

With <ESC> "PLAY" is stopped and all tones are switched off. The current position "SNGPOS" and "DELAY" are kept.

11. Deleting song parts ("CLEAR")

In the option "CLEAR" fixed parts of the memory can be deleted. The output appears in the output window. Here are the particular options: <A> to delete all, <S> to delete the song and <I> to delete the instruments. With <ESC> "CLEAR" is left.

11.1. Deleting all

If <A> is pressed, the whole memory will be deleted. That is: all instruments, all Arpeggios, the song name, the instrument names, the songlist and all patterns.

11.2. Deleting only a song

If <S> is pressed, just the song, i.e. all patterns and the songlist with all belonging parameters (song length, transpose, "LoopTo"-position etc.) will be deleted.

11.3. Deleting only instruments

If <I> is pressed, all instruments with their names and all Arpeggios will be deleted.

If at the security check any other key than <Y> is pressed, "CLEAR" is left without deleting anything.

12. Other functions ("OTHER")

In the option "OTHER" song- and instrument names can be changed and particular instruments and Arpeggios can be deleted or copied. Every operation can be left with <ESC> instead of an input.

With cursor keys the wanted option can be selected (see 1.2). With <ESC> "OTHER" is left again and it's jumped back to main menu. An active option is marked, as in main menu, by a changed inverse representation.

12.1. Changing song name ("NAME SONG")

Here a new name for the song can be entered. For this all characters from A-Z, the numbers from 0-9 and the '-'-character are allowed. With <ENTER> the entered name is taken over and with <ESC> the option is interrupted and the old name is kept. This name is used even for saving the song.

12.2. Changing instrument name ("NAME INS.")

After entering the instrument number (0-F or <ESC>) the new name for the selected instrument may be put in. The key placing is the same as at changing song name. If at the name entering <ENTER> is pressed directly, the song resp. the instrument has no name (=8 blanks).

12.3. Copying instrument ("COPY INS")

First the number of that instrument, that is to copy, must be entered. After entering the number of the destination instrument (COPY TO) it is copied to the destination instrument. At this the old destination instrument is overwritten, but its name is kept.

12.4. Deleting instrument ("CLR INS")

After entering the instrument number the belonging instrument is deleted (all values of the envelopes, "REPEAT" and "REPLEN" are set on 0). The instrument name is unchanged.

12.5. Copying Arpeggio ("COPY ARP.")

As at "Copying instrument" first the source- and destination-numbers of the Arpeggios must be entered.

12.6. Deleting Arpeggio ("CLR ARP.")

The Arpeggio will be deleted after entering the number (all values will be set on 0).

At the options 12.3 to 12.6 there's no security check. As soon as the destination number resp. the number of the instrument or Arpeggio to be deleted is entered, the operation is executed. But these options can also be interrupted with <ESC> instead of a number.

12.7. About SOUNDTRAKKER ("ABOUT ST")

Here a copyright information, the version number of SOUNDTRAKKER and your personal serial number is shown.

12.8. Quit program ("QUIT ST")

With this option computer can be reset after a security check, if the reset by <CTRL+SHIFT+ESC> has been blockaded.

13. The disc menu ("DISCOP.")

The disc state line, which contents the following, is in the top line:

- "DRIVE" (A or B) is the current disc drive
- "SONGS" is the number of songs found in the current directory
- "INSTRS" is the number of found instruments
- "K free" shows, how much free space is on the disc yet.

In the disc menu are the following options:

GET DIR LOAD SONG SAVE SONG ERASE
LOAD INS SAVE INS DRIVE A DRIVE B

These options are reached and activated the same way as in main menu. With <ESC> disc menu is left and it is jumped back to main menu.

13.1. Reading the directory ("GET DIR")

With "GET DIR" the directory of the current drive (state line DRIVE) is loaded. That is examined on songs (.SNG) and instruments (.INS), and the number of found songs resp. instruments is shown in the state line (xx SONGS xx INSTR.). Ultimately the free disc space (xxx K free) is shown. Now the directory of the laid-in-disc is as long in the memory, until GET DIR is called again. "GET DIR" has always to be called, if a new disc is put in.

13.2. Loading a song ("LOAD SONG")

Here, as in main menu, an inverse beam for chosing the song to load can be controlled by cursor keys. If there are no songs on the laid-in-disc, "LOAD SONG" will not be activated. If there are more than 32 songs on the disc, then you can switch with <TAB> between the first 32 and the other (up to 32) names.

With <ESC> the option is stopped without loading anything. With the <SPACE>- or the <ENTER>-key the chosen song is loaded. If there is already a song in memory, that song will be totally overwritten by the new loaded song!

13.3. Saving current song ("SAVE SONG")

The song in memory is completely saved (with the name in the main state line). Completely means, that all instruments, all Arpeggios, the songlist and the values for transpose, pattern length, song length, "LoopTo"-position and all to the song belonging patterns are saved.

Only that patterns belong to the song, which are inside of the songlist. If e.g. the biggest pattern number in the song is 7, all patterns from 0 to 7 inclusive will be saved. All the other patterns will not be saved. Therefore only that place on the disc is used that is really needed by the song. If you want to save all patterns, you must enter the biggest pattern number the possible on the last position of the song.

After saving the song GET DIR is called automatically.

13.4. Deleting a file ("ERASE")

With this option the current song or a selected file can be deleted from disc. With <ESC> you can quit anytime. First you have to enter, whether you want to delete the current file from disc, or whether you want to enter a filename. With <S> the .SNG-file with its name is deleted from the state line and with <E> you can enter any filename to delete.

If <Y> is pressed during the security check, file will be erased. With any other key the option is quitted.

13.5. Loading an instrument ("LOAD INS")

The selection of instrument works in the same way as at "LOAD SONG". If there are no instruments on the disc, "LOAD INS" will not be activated. In all other cases the instrument can be selected from disc. When the instrument has been loaded, you must enter that number of the instrument, in which the new loaded instrument is to copy. If instead of a number <ESC> is pressed, the option is quitted. If the selected instrument is occupied yet, it is completely overwritten by the new one.

13.6. Saving an instrument ("SAVE INS")

After putting in the number of the instrument to load instrument is saved with its name. If the name is not correct (beginning with blanks or points) an error message is put out and saving is stopped.

13.7. Switching disc drive ("DRIVE A/B")

With "DRIVE A" or "DRIVE B", the current drive for operations with disc is adjusted. Normally drive A is switched on. If the drive is switched, "GET DIR" has to be called before loading songs or instruments from that drive.

13.8. Disc error

If an error appears at any disc operation, an according error message will be put out ("DRIVE x: Error"). You should know most of the errors from AMSDOS. There are the following error messages:

- "NOT READY": This error appears often, if you have two disc drives, and you take out the disc in drive A while loading or saving on B. The reason is the internal organization in the controller, which has only one common READY-input for both disc drives.

- "DISC MISSING": There's no disc in the drive.

- "WRITE PROTECTED": The laid-in-disc is write-protected.

- "DISC FULL": There is no empty space on the disc yet.

- "DIRECTORY FULL": The directory of the disc can't take up any more entries.

- "FILE NOT FOUND": The selected file hasn't been found. This error appears, if you want to load a file from another disc than that, which has its directory in the memory.

- "DISC CORRUPT": The disc has any write-/read-error. You should save no more files on that disc, but use another one and try to repair the defective disc with any disc monitor.

- "NO ST-FILE!": The file, that is to load, hasn't been saved with SOUNDTRAKKER. This error could appear, if you try to load a file, that even has .SNG or .INS as extension but that is not descended from SOUNDTRAKKER.

You should repair the respective error (delete write-securing, lay in an empty disc etc.), and then either try to repeat the option with <R> (for retry), or to quit the operation with <C> (for cancel). All other keys except <R> and <C> are not allowed (also not <ESC>).

14. The song-compiler

The song-compiler is started from the loader with <2>. You should attend, that you reset the computer totally, before starting the compiler. With the song-compiler it is possible at first to compile SOUNDTRAKKER-songs to independent programs, so-called sound-modules. There are two kinds of sound-modules: the interrupt-controlled and the so-called raw-modules, which are totally independent and which run without operating system.

The screen in the compiler is separated in three windows, which are divided by a line of subtraction-characters. In the upper window the selection of particular options takes place. In the middle window all inputs (names for loading and saving) and the adjustment for the compiler (start adress, kind of module etc.) are made. In the lower window the results of the compiling (length of the module, jump adresses etc.) are shown.

The selection of menu items here also works by cursor keys and <SPACE> or <ENTER>. All options can be stopped by <ESC>. If an option is called, one will recognize that because of the somewhat changed inverse representation (see 1.2). The option "COMPILE SONG" can be activated not before a valid SOUNDTRAKKER-song has been loaded and the option "SAVE MODULE" can be activated not before a song has been compiled.

14.1. List of all song files

Here a list of all songfiles on the laid-in-disc is shown. The refering drive is normally A, but can be changed at "LOAD SONG" (see 13.2). For the output of songfiles the two lower windows are used.

If there are no songs on the laid-in-disc, the message 'No songs on this disk' will be given out. Otherwise all song names (without extensions) together with the information, how much free space there is on the disc yet, are given out. After pressing any key this list disappears. So the songs are not selected by a beam, but simply by entering the name.

14.2. Loading a song file

If a song shall be compiled, it will have to be loaded first of course. In the middle window the input line for the songname appears: FILENAME: A: xxxxxxxx.SNG.

A: is the current drive and "xxxxxxxx" is the songname.

Now the name can be entered with the keyboard. Valid characters are all letters, the digits from 0-9 and the subtraction character ('-').

With <DEL> errors can be corrected and with <ENTER> input is completed and the song is loaded. With the <ESC>-key input is quitted.

With <TAB> you can switch between drive A and B. The drive, that is entered here, is also valid for "DIR. OF SONGS" and "SAVE MODULE".

After loading the song the name is given out in the lower window and the option "COMPILE SONG" can be activated.

14.3. Compiling a song

- Selecting module-type

First the kind of module must be entered. Here <I> has to be pressed for a interrupt- and <R> for a raw-module. With <ESC> the process is quitted. All other keys are invalid.

When the module-type has been selected, the start adress (the first adress in memory, which shall be used by the module) of the module can be adjusted. This happens by the cursor keys:

- Adjusting start adress

With <UP> and <DOWN> the start adress is changed in one-steps, with <SHIFT+UP> and <SHIFT+DOWN> the adress is changed in 16-steps (Hex 10) and with <CTRL+UP> and <CTRL+DOWN> adress is changed in 256-steps (Hex 100). Behind &FFFF comes 0 and vice versa.

The current adress is always given out behind "Set startadress:". If a new song is compiled, here will stand first always 4000 resp. 16384 (the lowest adress valid for both module types). While compiling all memory adresses are given out in hexadecimal style. The according decimal adresses are given out in parentheses directly behind the Hex-adress.

When the desired memory adress is adjusted, compiling is started with <ENTER> or is quitted with <ESC>.

Attention ! Interrupt-modules can only lay between &4000 and &A1FF. Interrupt-routines below &4000 and above &BFFF are not possible because of the operating system. Since interrupt-modules are mainly assigned for BASIC-programs, they mustn't begin above &A200, because otherwise important memory space for BASIC could be overwritten. If nevertheless an adress for an interrupt-module outside the allowed area is adjusted, the option will be stopped after <ENTER> with an error message.

If everything is o.k., now the song will be compiled. Below the adjusted start adress "Compiling" is given out. Since the compiler works in several steps, one point is given out after every step behind "Compiling". When six points are given out, the song is compiled.

Since the whole song is run through several times, it's possible that there is a duration of some seconds between particular points. This is no error, but it is based on the fact, that the compiler compares each voice with the other ones in order to recognize equal voices in different patterns and to save memory space in this way. So be a little bit patient please.

- After compiling

After compiling all adresses, which are important for the module, are given out in the lower window. In dependence on the module-type there are:

a) at interrupt-modules:

(N is the start adress of the module and L the length)

- The length of the module in byte (L)
- The last adress used by module (N+L-1)

- The adress to start the song (N+0)
- The adress to stop the song (N+2)

With CALL N the interrupt is started and the song is played from the beginning. If you want to play the song from the beginning again, you must first switch off the interrupt with CALL N+2 and then switch on with CALL N again.

The interrupt-modules are dependent on the operating system. If you have loading- or saving-operations in your program, you should switch off the interrupt by CALL N+2 before !

b) at raw-modules:

- The length of the module in byte (L)
- The last adress used by module (N+L-1)

- The adress to initialize the song (N+0)
- The adress of the "Play loops" (N+3)
- The adress to switch off the tones (N+6)

With CALL N the pointers in the song are reset and the soundchip is pre-initialized. This routine must be called once by all means, before the song is played. With CALL N+3 a piece of the song is played. This routine must be called 50 times a second, in order that the song sounds the same way as in SOUNDTRAKKER. If it is called essentially oftener or rarer, the whole song, the instruments and Arpeggios will run faster resp. slower.

With CALL N+6 registers 7-10 of the soundchip are reset and tone generators are switched off in this way.

The song can be reset everytime with CALL N. If you want to run a song together with your own sound effects, then those have to be called directly after CALL N+3 in order not to be suppressed by the sound.

14.4. Saving sound module

When a song has been compiled, the module can be saved now. For this the input line appears again: FILENAME: A: xxxxxxxx.BIN. However, the extension here is, in contrast to "LOAD SONG", not ".SNG" but ".BIN". With <ESC> option is quitted and with <ENTER> module is saved.

The module is always saved from adress &0100 on. The real loading adress stands in the entry of the song. You should write down the memory adress of the song (=N at 14.3). In order to load the module now from BASIC to the right adress, N must be entered at loading (LOAD"NAME:SNG",N) by all means, because otherwise the computer would try to load the module to &0100, what wouldn't be possible in BASIC.

Example: You have compiled your module to &3000 and it has a length of &0B52 byte. When you have saved this and you give out the header with any program, it will appear:

```
Loading adress: &0100 (or start adress)
Length        : &0B52 (or end adress (=loading adress+length))
Entry         : &8300 (or auto start adress)
```

But the real start adress is not &0100 but &8300.

15. Tips & tricks

Sometimes it is possible, that you have switched off a sound channel without noticing it. You should attend to that when you are using the instrument- or Arpeggio-editor, because the tones in the manual mode are always given out to that channel, that has been used in the pattern-editor the last time.

If a normally compiled song is longer than you like to have it, you should try the following:

Halve the pattern length (from 80 to 40 or from 64 to 32). You have then to write the songlist again. By halving the pattern length the compiler can examine the song in smaller steps on equal voices in the patterns and in this way delete any double voices.

SOUNDTRAKKER has been programmed by Oliver Mayer.