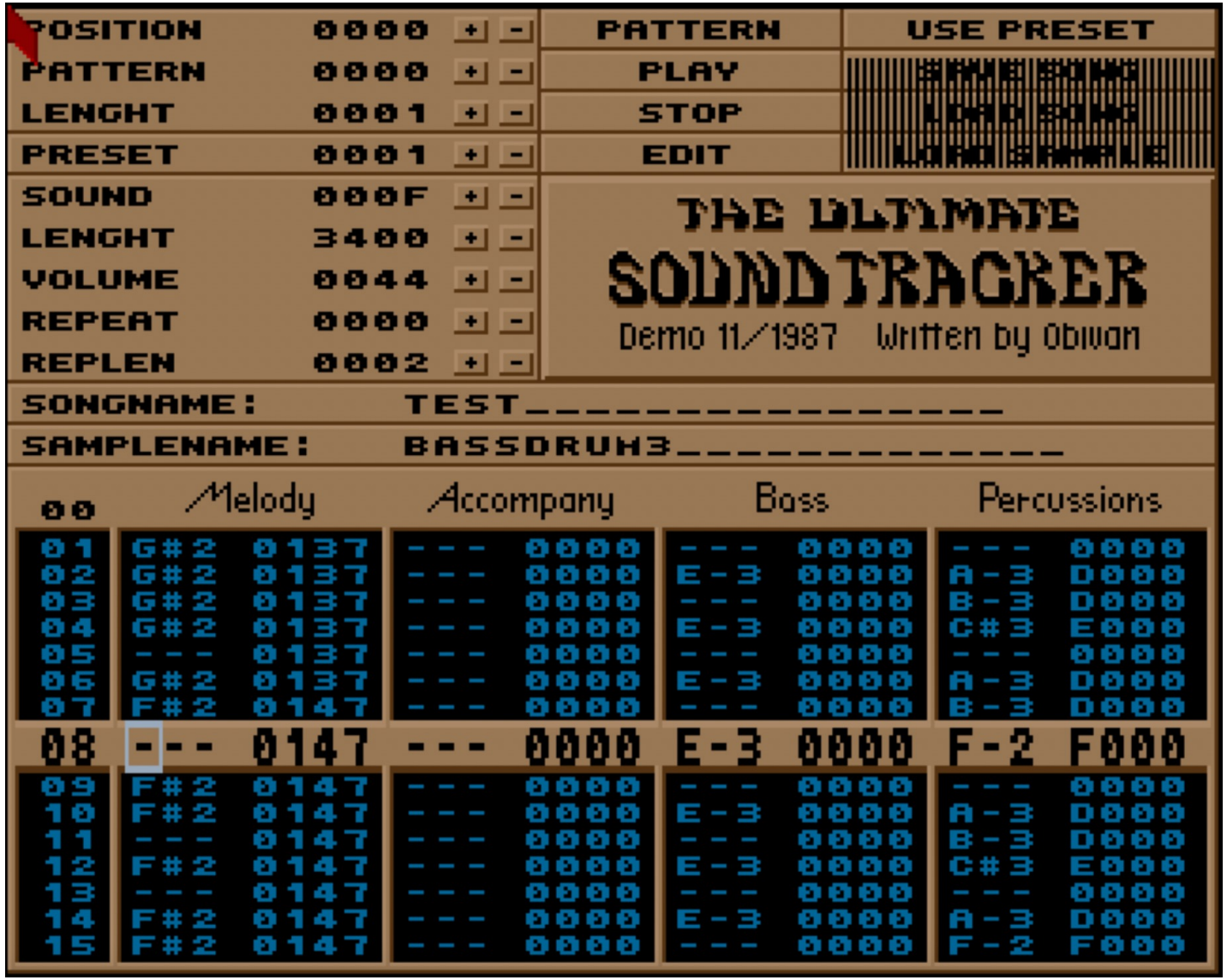
TRACKERS AND TIMING

Brian Arne

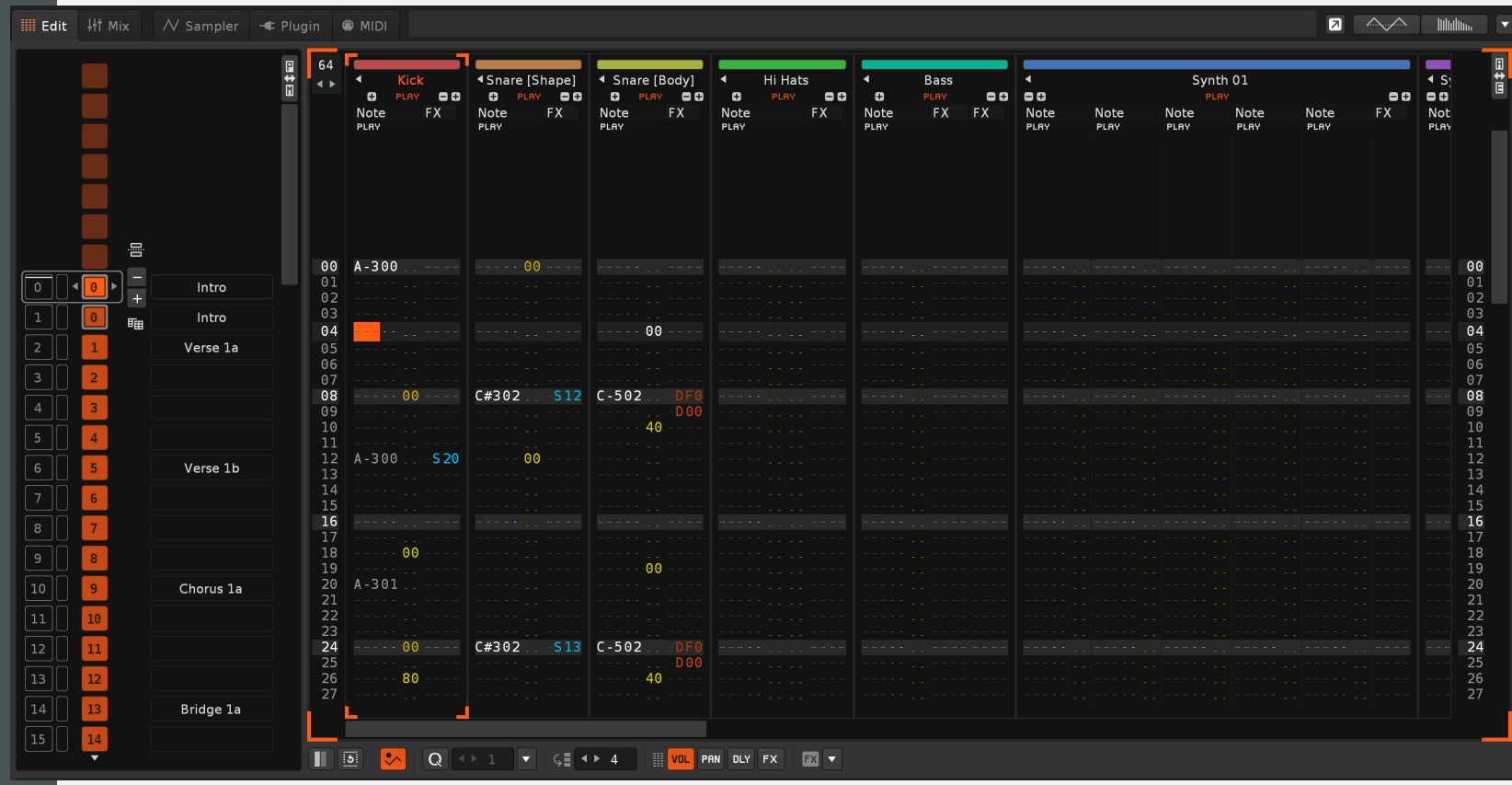
WHAT IS A TRACKER?



https://xavier.borderie.net/blog/2021/09/22/soundtracker-origins-part-1-where-in-the-world-is-karsten-obarski/

BUILDING SONGS

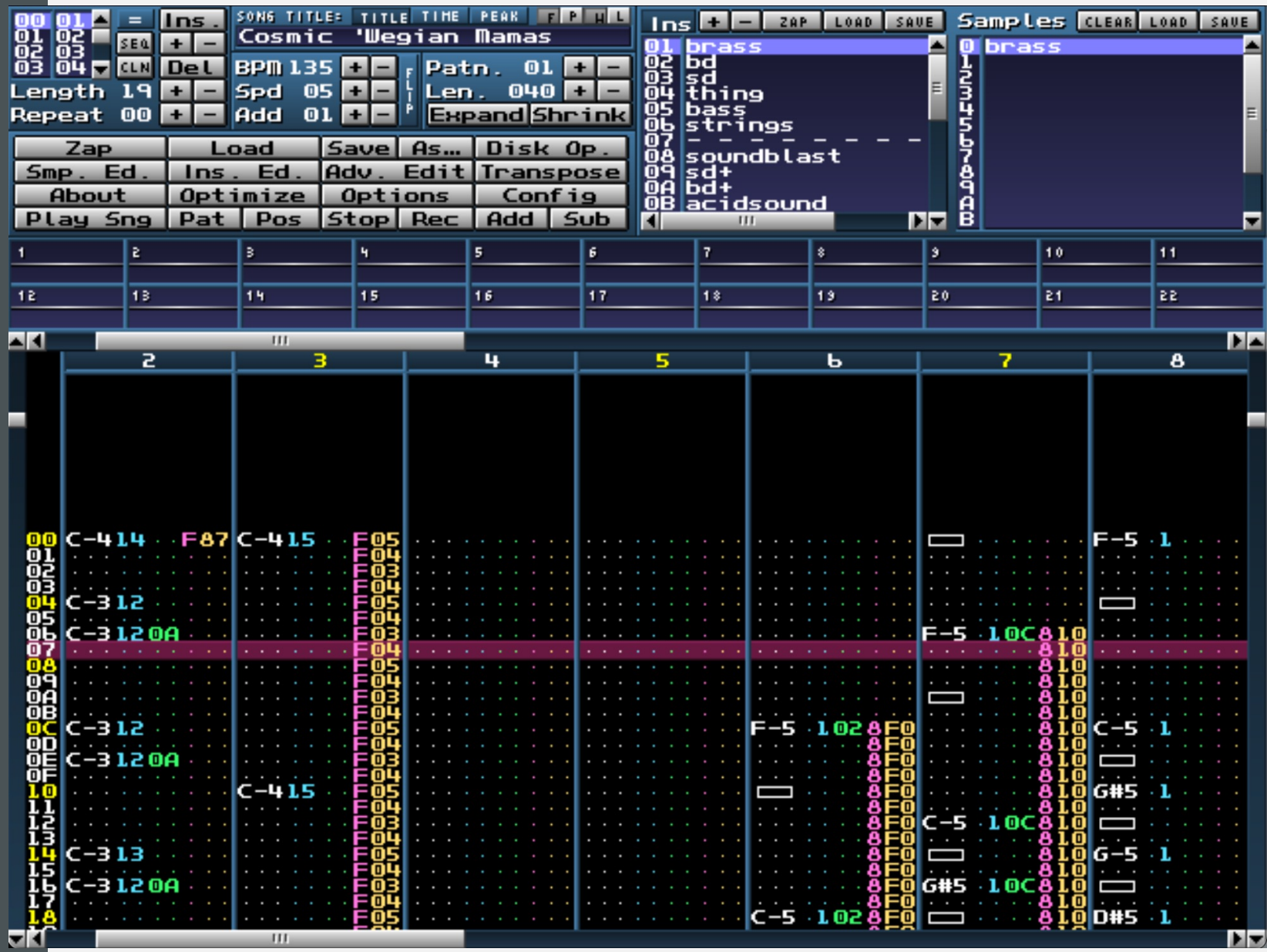
- Build songs by sequencing patterns
- Patterns are typically 64 rows in length
- 1 shot, repeat, jump



Picture from Renoise

CHANNEL COLUMNS

- White: Note
- Blue: Instrument
- Green :Volume
- Pink: Effect
- Yellow: Effect Value

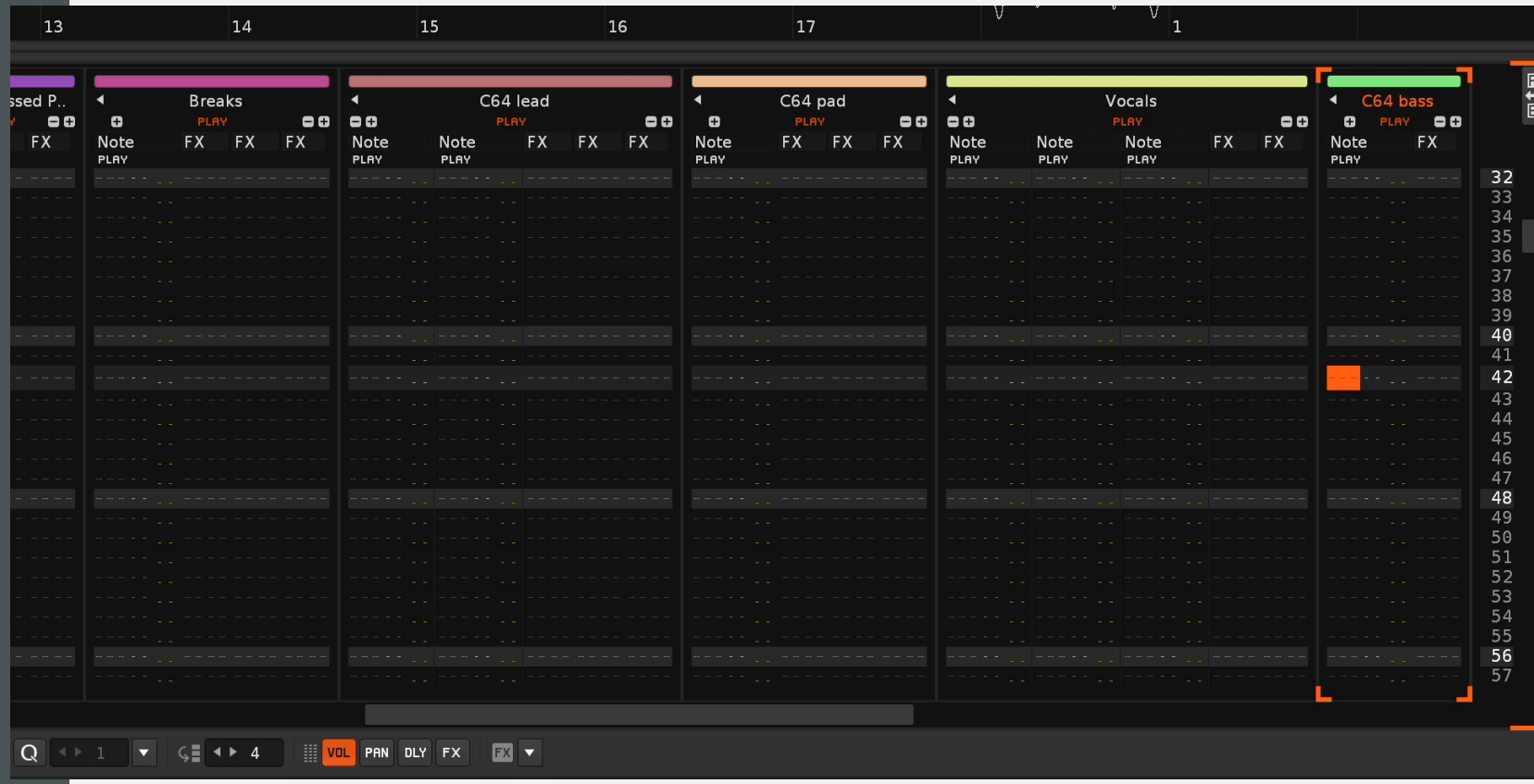


Picture from MilkyTracker

INSTRUMENTS

- An instrument is a single sample along with an optional indication of which portion of the sample can be repeated to hold a sustained note

- Played notes impacts the sample playback speed



EFFECTS

- Newer and newer trackers tend to implement new effects

- Often effects trigger and manipulate on a ‘tick’ based system

COMMAND LIST

```
0 - Normal play or Arpeggio             0xy : x-first halfnote add, y-second
1 - Slide Up                            1xx : upspeed
2 - Slide Down                          2xx : downspeed
3 - Tone Portamento                     3xx : up/down speed
4 - Vibrato                             4xy : x-speed,   y-depth
5 - Tone Portamento + Volume Slide      5xy : x-upspeed, y-downspeed
6 - Vibrato + Volume Slide              6xy : x-upspeed, y-downspeed
7 - Tremolo                             7xy : x-speed,   y-depth
9 - Set SampleOffset                    9xx : offset (23 -> 2300)
A - VolumeSlide                         Axy : x-upspeed, y-downspeed
B - Position Jump                       Bxx : songposition
C - Set Volume                          Cxx : volume, 00-40
D - Pattern Break                       Dxx : break position in next patt
F - Set Speed_____________________________Fxx : speed (00-1F) / tempo (20-FF)

E9- Retrig Note                         E9x : retrig from note + x vblanks

Other Exx commands:

E00/1=filter on/off - E1x/2x=FineSlide Up/Down - E30/1=tonep ctrl off/on
E40/1/2=Vib Waveform sine/rampdown/square, E70/1/2=Tremolo Waveform
E5x=set loop point,E6x=jump to loop+play x times
EAx/EBx=Fine volslide up/down
ECx/EDx=notecut after x vblanks/notedelay by x vblanks
EEx/EFx=PatternDelay by x notes/Invert loop, x=speed
```

ProTracker Effect Commands from http://coppershade.org/articles/More!/Topics/Protracker_Effect_Commands/

AIMGA TIMING

- The Vertical Blank AKA ‘tick’
- PAL (Europe) standard 50Hz and NTSC (USA) standard 60Hz

AIMGA TIMING

- A tick of 50 or 60 Hz is simply too fast for most music
- Speed of playback can be set with number of ticks per line

AIMGA TIMING

- Complex Interface Adapter CIA chips and variable interrupt speed
- F01-F1F determine ticks per line while F20-FFF set the ‘BPM’
- BPM is almost never the exact BPM and will vary from implementation to implementation based on CIA interrupt speed, sample speed, and floating-point arithmetic rounding errors

AIMGA TIMING

- * FastTracker II - “The BPM setting defines how fast (ticks/second) the music player will run. … Number of player ticks/second = BPM * 2/5” *
- * Tick Duration (ms) = 2500/BPM

* This whole talk in a single forum post: https://modarchive.org/forums/index.php?topic=2709.0

3RD GENERATION TRACKERS

- Lines per beat
- Ticks per Line
- Effect that can control playback swing as the tracker patterns run
- Tables in LSDJ (1 tick per step)
- You can swing your pants off

Global Commands

Only applies to the Renoise Pattern Editor. These commands control the song during playback.

- **ZTxx** - Set tempo (BPM) (14 - FF, 00 = stop song)
- **ZLxx** - Set Lines Per Beat (LPB) (01 - FF, 00 = stop song).
- **ZKxx** - Set Ticks Per Line (TPL) (01 - 10).
- **ZGxx** - Toggle song Groove on/off (00 = turn off, 01 or higher = turn on).
- **ZBxx** - Break pattern. The current pattern finishes immediately and jumps to next pattern at line xx (remember that although this value is hexadecimal pattern lines are usually displayed as decimals).
- **ZDxx** - Delay (pause) pattern playback by xx lines.

Renoise Global Commands: https://tutorials.renoise.com/wiki/Effect_Commands

BPM	Traditionally Beats Per Minute, but in tracker terminology it defines the speed of ticks.
Effect memory	When an effect command is called with 0 parameters, previous parameters are used.
Row/line	Refers to one line of "text" on a pattern. In playback its duration depends on how many ticks there are per row (Speed) and fast they are (BPM).
Sample fine-tune/volume/panning	Per sample default settings available through the instrument editor (thus also called instrument volume etc). Overrideable with effect commands. .MODs support these as well but with lower precision. (Save module and load back to enforce .MOD precision.)
Tick	The base time unit in traditional trackers like MilkyTracker, originating from Amiga. Notes are triggered on the first tick of a row (unless delayed) and effects are applied on the following ticks.
Semitone	The smallest musical interval in Western music and in MilkyTracker. A C# note is one semitone away from the note C.
Speed (Spd.)	Number of ticks per row.

MilkyTracker Terms Glossary: https://tutorials.renoise.com/wiki/Effect_Commands

SUMMARY AND WORDS OF CAUTION

I am NOT an expert! Things get very complicated, very fast…

Tracker timing is rather unique for historical reason but offers a interesting approach to composition and swing that would be hard to pull off in a more linear DAW workflow, or clip launcher

If you are a VIM wizard you may enjoy the tracker workflow

Trackers might be relatively niche, but there are many open source implemenations and passionate communities

Each tracker can have its own flavor depending on the implementation, version, and platform

THANK YOU :)

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October 08, 2019, 10:03:03 #7

You *almost* got it right... at tempo 125, the tempo is a precise 125 BPM... but at most other tempos there will be rounding errors. You can see the actual BPM by going to Player -> Approximate Real BPM. It's also important to keep in mind that the rounding errors will differ depending on the audio mix rate. However, unless the tempo goes well into the 1000s (which it can't at the moment) this different isn't very obvious.

Yes, tracker tempo is a mess. And there is nothing we can do about that because that's how things were done in the 80s. Use modern tempo if you can, it avoids all of those headaches.

» No support, bug reports, feature requests via private messages - they will not be answered. Use the forums and the issue tracker so that everyone can benefit from your post.