NAME

tz mel − generate sound fragments from plain text

SYNOPSIS

tz mel [[[*wavefile* ...] *infile*] *outfile*]

DESCRIPTION

Interpret ASCII input in *infile* as audio and save it to*outfile* in the W AVE format, optionally using samples provided in *wavefile*s. The syntax for *infile* is given below. Filenames default to **/dev/stdin** or **/dev/stdout**. The dash (**-**) is a shorthand for the default value. Try **stdin** if **/dev/stdin** is not available.

SYNTAX

infile shall contain words *w* (sequences of lowercase letters **a** to **z** and hashes #), numbers *n* (sequences of digits **0** to **9**, decimal points **.**, and a dividing colon **:**), and commands (other single ASCII characters). Commands are followed by words and/or numbers as arguments, as listed below. The input is processed linearly, whereby unexpected characters, including whitespace, act as separators and are otherwise ignored. Reference values imply initial values, and initial values imply current values.

~*w*[*n*] Choose wave sample of shape*w* and dur ation *n* in seconds. This is the building block for sound at arbitrary frequency and amplitude. Predefined values for *w* are listed below. The corresponding spectra are shown by the command **tz harmonics** *w*. If*w* reads #, the first channel of the*n*th *w avefile* given on the command line is loaded instead. *n* defaults to **1**. The preset value is a **circular** wave that lasts **1** second.

harmonic
sin(x) for x in (0, 2π]

power $\sin^3(x)$ for x in (0, 2π]

major sin(x) for x in (0, 2π]

constant
sgn(sin(x)) for x in (0, 2π]

linear $2/\pi \arcsin(\sin(x))$ for x in (0, 2π]

quadratic
$\mathrm{sgn}(x)\ (2|x| - x^2)$ for x in (−2, 2]

circular
$\mathrm{sgn}(x)\ \mathrm{sqrt}(2|x| - x^2)$ for x in (−2, 2]

cubic $3/2\ \mathrm{sqrt}(3)\ (x^3 - x)$ for x in (−1, 1]

water $3/2\ \mathrm{sqrt}(3)\ (x^3 - x) + 1/2$ for x in (0, 1]

random
White noise if followed by @ without argument.

S*w*[*n*] Choose attack envelope. Arguments as above. Predefined values for *w* are listed below. The preset value is a **circular** envelope that lasts **0.1** seconds.

harmonic
sin(x) for x in (0, π/2)

smooth
$\sin^2(x)$ for x in (0, π/2)

power $\sin^3(x)$ for x in (0, π/2)

major sin(x) for x in (0, π/2)

linear x for x in (0, 1)

quadratic
1 − x² for x in (−1, 0)

circular
sqrt(1 − x²) for x in (−1, 0)

cubic 3x² − 2x² for x in (0, 1)

Z*w*[*n*] Choose release envelope. Arguments as above.

N*w*[*n*] Choose attack and release envelope at once. Arguments as above.

***** Start/end a comment.

$*n* Set a sample rate of*n* samples per second. The preset v alue is **44100** samples per second. This setting holds globally and is ignored after first note played.

O*n* Set number of channels to*n*. Allo wed values are **1** (mono) and **2** (stereo). If absent, the number of channels is determined automatically.

|*n* Set duration of a beat to*n* seconds . The preset value is **0.5** seconds.

T*w* Choose tuning from the below options. The preset value is **equal**.

equal Equal temperament.

pyth Pythagorean tuning. All notes are reached combining fifths and octaves.

just Just intonation. All notes are reached combining thirds, −1 to 2 fifths from keynote, and octaves.

close Five-limit tuning closest to twelve-tone equal temperament.

H*n* Divide one octave into*n* halftones/steps of equal frequency r atio. The preset value is **12** halftones (twelve-tone equal temperament).

@[*n*] Set reference frequency and concert pitch **A4** to *n* Hz. *n* defaults to the inverse length of the current wave sample. This allows for playing this sample at its original speed. The preset value is **440** Hz.

&*n* Set reference amplitude sqrt(L² + R²) to*n* arb . units. The preset value is **1** arb. unit.

%*n* Set reference amplitude ratio R:L between right and left channel to*n*. The preset v alue is **1**.

C D E F G A B[*w*][*n*[*n'*]]
Set reference frequency via note name. *w* marks accidentals and can be **#**, **x**, **b**, **bb**, and so on. To raise and lower the frequency by a diatonic (septimal) [eleven] {Pythagorean} comma 81:80 (64:63) [33:32] {531441:524288}, use **u** and **v** (**s** and **z**) [**i** and **j**] {**p** and **d**}, respectively. Please note that the note name already implies a certain number of diatonic commas for the tunings **just** and **close**. *n* is the octave number and defaults to the integer that minimizes the interval from the current frequency. If omitted, also set the keynote. The preset keynote is **C**. *n'* is an optional microtonal accidental as used in the Functional Just System (FJS) by misotanni (*https://misotanni.github.io/fjs*). Here, compound accidentals must be written as a product and otonal and utonal accidentals are separated by a colon (**:**). **A4** is the concert pitch.

R Set reference frequency, amplitude, and amplitude ratio to current values. E.g., as a prefix to **−** or **+**, this allows for relative frequency shifts.

'[*n*] Play sound for a duration of*n* beats . *n* defaults to **1**.

"[*n*] Pause for a duration of*n* beats . *n* defaults to **1**.

`[*n*] Rewind by *n* beats. *n* defaults to **1**. (Negative pause.)

Q*n* Set initial frequency to*n* times the ref erence frequency.

V U[*w*]*n*
Set initial frequency to*n* chromatic steps belo w/above the reference. You can use the same commas*w* as with note names . The 12-tone scale is made of the −5 to 6th fifths from the keynote.

− +*n* Set initial frequency to*n* halftones belo w/above the reference.

\ /*n* Continuously lower/raise current frequency by *n* halftones during the next play period (').

_ ^*n* Continuously lower/raise current frequency by *n* halftones per beat from now on.

? !*n* Set initial amplitude to*n* dB belo w/above the reference.

< >*n* Continuously lower/raise current amplitude by *n* dB during the next play period (').

, ;*n* Continuously lower/raise current amplitude by *n* dB per beat from now on.

[ ]*n* Set initial amplitude ratio to*n* dB belo w/above the reference.

( )*n* Continuously lower/raise current amplitude ratio by *n* dB during the next play period (').

{ }*n* Continuously lower/raise current amplitude ratio by *n* dB per beat from now on.

= Introduce discontinuity. (Play the same note again.)

P[*n*] Set phase, i.e., the time integral of the frequency, to*n*. It is only defined modulo one .

M[*n*] Set *n*th time mark. *n* m ust be an integer between **0** and **99** and defaults to **0**.

W[*n*] Wind back to*n*th time mark, if set. *n* def aults to **0**.

Y*n n'*[*n''*]
Yank sound between *n*th and*n'*th time mark and insert it*n''* times , if marks have been set. *n''* defaults to **1**.

I[*n*] Set *n*th text mark. *n* m ust be an integer between **0** and **99** and defaults to **0**.

J[*n*[*n'*]]
Jump back to*n*th te xt mark, if set. This works *n'* times in a row. *n* and *n'* default to **0** and **1**, respectively. If*n'* is **0**, it is set to the maxim um allowed value (**32767**).

K L[*n* ...]
Skip/only consider subsequent command if the number of the current iteration matches any of the integers*n* ...

X*w* [...] Do something special.

loudness*n*
Switch loudness on (*n* nonzero) and off again (*n* zero). Loudness boosts low notes by scaling the amplitude with the inverse frequency (in units of **A4**). This keeps the acoustic-pressure rather than the particle-displacement amplitude constant. *n* defaults to **1**.

synth*n*
Switch synthesizer on (*n* nonzero) and off again (*n* zero). See Karplus and Strong, Comput. Music J. 7, 43 (1983). *n* def aults to **1**.

blend*n*
Set blend factor (*b*) of synthesizer. *n* ranges from **0** to **1**. Values of **0**, **0.5**, and **1** yield plucked-bottle, drum, and plucked-string timbres, respectively. *n* defaults to **1**.

decay*n*
Set inverse decay-stretch factor (1/*S*) of synthesizer. *n* ranges from **0** to **1**. A value of **1** yields the fastest decay. *n* defaults to **1**.

tuned*n*
Switch optimized tuning of synthesizer on (*n* nonzero) and off again (*n* zero). Switching it off yields the original algorithm. *n* def aults to **1**.

status Print current time, frequency, amplitude, balance, and phase.

report Print note counts (since last report) to standard error stream. Only notes defined via the commands **C D E F G A B** and **U V** are counted. This is useful to, e.g., to determine the keynote of a piece of music.

detune*n*
Randomly detune reference frequency and concert pitch **A4**, by up to*n* halftones . In combination with text and time marks, this is useful to generate non-white noise.

delete*n n'*
Delete sound between *n*th and*n'*th time mark, if marks ha ve been set.

reverse*n n'*
Reverse sound between *n*th and*n'*th time mark, if marks ha ve been set.

vibrato*n n' m m'*
Apply vibrato to sound between *n*th and*n'*th time mark, if marks ha ve been set. The sample is periodically delayed (and advanced) with an amplitude of*m* seconds and a frequency of*m'* per sample length, using the current w ave sample.

flanger*n n' m m'*
Apply flanger to sound between *n*th and*n'*th time mark, if marks ha ve been set. The sample is periodically delayed (and advanced) with an amplitude of*m* seconds and a frequency of*m'* per sample length, using the current w ave sample, and superimposed with itself.