

# welcome to linotune

version 1.5, 29 Feb 2012

## strobe display

- divided into a number of horizontal bands, each tuned to a particular frequency (pitch)
- initial setup: fundamental ('1x' the → *base frequency*), octave ('2x'), and compound 5th ('3x', an octave and a perfect fifth)
- can be changed at will: → *strobe band editing*
- when frequencies near that pitch are detected in the input, a pattern of vertical bars appears
- bar contrast indicates strength of that signal
- bar movement indicates pitch deviation - pattern moves left: input is flat (pitch too low) pattern moves right: input is sharp (too high)
- bar sharpness indicates stability of pitch

**pitch measurement:** when a partial near a strobe band is detected, its mean deviation from the target pitch is shown on the right in Hz or cents, as chosen via the → *map* button if that value is within the chosen → *tolerance* of the target, the strobe band will turn green

**tip:** clicking on the displayed deviation will zero it by adjusting the → *cents offset*

## pitch pipe

- click on the left side of a band to hear its pitch as a continuous tone
- click again for *beep mode*: responds to sounds with a brief tone
- click a third time to turn the tone off
- click on another band to switch to it

when **display performance** drops below 40 frames per second (fps) it is shown here. try reducing linotune's window size, and close other graphics-intensive applications.

a reminder that a non-standard **sensitivity** has been set from the → *rear panel controls*

**signal level** indicator lights up green when signal present; red when clipping (too loud)

the active **scale/temperament**; click to view or change → *scale/temperament files*

the **pitch dial** sets the current note, octave, and transpose. see next page for details

the **base frequency** that the '1x' strobe band is tuned to, in Hertz. determined by → *scale/temperament*, → *pitch dial*, → *cents offset*, and → *reference frequency* settings.

**tip:** click here for the → *rear panel controls*

**cents offset** shifts base frequency by cents (1/100<sup>ths</sup> of an equal-tempered semitone)

**reference frequency** in Hz. in Western music this is typically the pitch of the "concert A" (A<sub>4</sub>)

**tip:** the last two controls are "rocker switches" - click at top right to increment, bottom left to decrement; press & hold to scroll through values at a speed controlled by the mouse position



## control buttons

**peaks:** display the → *peak spectrum*

**auto pitch** detection: on detecting a sound, set → *pitch dial* to the closest musical pitch

**tip:** press the above buttons once for single-shot detection (blinking), again for continuous mode

**Hz:** show strobe band offsets and pitch deviations as frequencies (in Hertz), rather than in cents, as note names, or just intonation frequency ratios.

**map** the frequency each strobe band is tuned to to the nearest note of the → *scale/temperament*

# the pitch dial

**transpose** the note that the tonic (first note) of the scale (here: C) is transposed to lights up green.  
**press&hold** any note on the dial to transpose to it

the current **note** lights up red, and is also shown on the octave switch

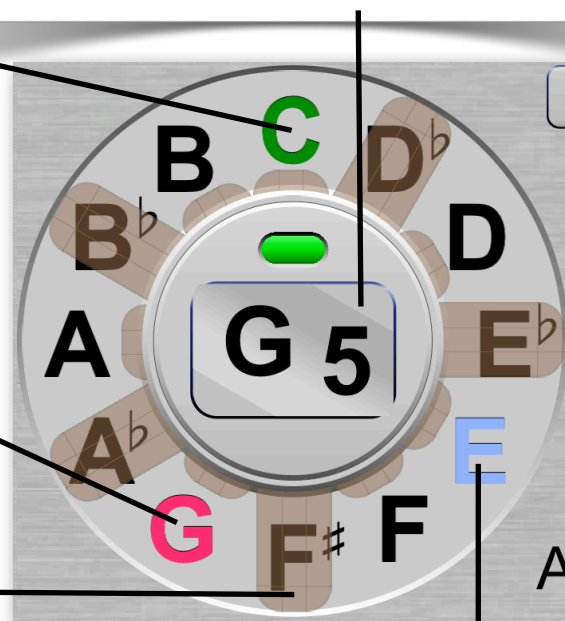
- **click** on any note on the dial to change to it while remaining in the same octave
- **drag** the current note around the dial clockwise resp. counter-clockwise to increment or decrement it, possibly changing octave

**mode wheel** of retractable transparent blades allows selective disabling of notes to enforce tonal modes

- **double-click** on a note/blade to disable/re-enable it
  - **drag** on a blade to transpose the modal pattern
- disabled notes can't be clicked on, and are skipped by pitch detection and note up/down → *keyboard controls*

**Example:** mode wheel shown here supports *C major* mode; dragging it 90° clockwise would yield *E<sup>b</sup> major*

**octave** click to change the current octave (range -1 to 9); also indicates the current note. an octave normally is a doubling of frequency, though this can be set differently in → *scale/temperament files*



any **pitch detected** by linotune momentarily lights up in blue here. use → *auto pitch* to automatically change pitch in response

## keyboard/mouse controls

**keyboard control** for front & rear panels:

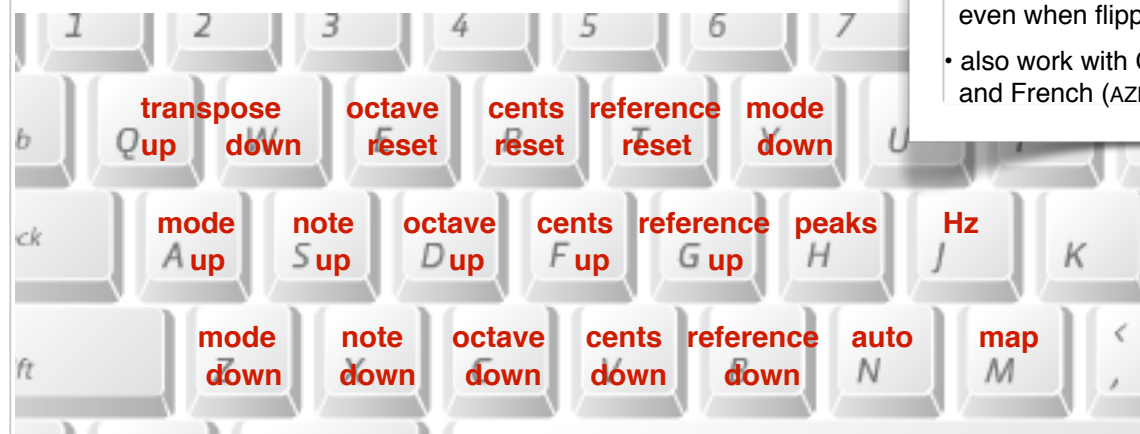
- use **left/right** arrow keys to highlight a control
- use **up/down** arrow keys to adjust its value
- use **enter/return** key to set default value (where defined), operate push buttons, or (when no control highlighted) flip the panel

**mouse actions** that linotune understands:

- **click:** press & release left mouse button
- **double click:** 2 clicks in quick succession
- **press&hold:** keep left button depressed
- **hover:** hold the mouse still over a control
- **drag:** move mouse with left button pressed

linotune does not respond to center or right mouse buttons, scroll wheels, and so on.

**direct keyboard shortcuts** for front panel controls:



- these shortcuts are accessible even when flipped to rear panel
- also work with German (QWERTZ) and French (AZERTY) key layout

## online activation

this screen appears whenever linotune doesn't know whether you are authorized to run; it can also be called up via the *info* button.

if you have purchased or subscribed to linotune, make sure that you are online, enter your license key here, then click *activate*.

if you want to move linotune to another computer, you can deactivate your installation by entering the key 9999-9999-9999.

**tip:** the key 0000-0000-0000 will activate a free trial period if available. linotune's operation is cpu-intensive - use the free trial to confirm performance on the target machine before purchase.



# linotune

harmonic strobe tuner

<http://linotune.com/>

### online activation

Can't contact our server to verify your subscription. Please make sure you're connected to the Internet, then click 'activate'. Retry later if problem persists.

key:

## rear panel controls

press the enter/return key or click on the  $\rightarrow$  *base frequency* to access these additional controls. press enter/return again or click on a text label ("Tone", "Input", "Notes") to return to the front panel

**tip:** hover mouse over any control to receive a hint

**audio i/o** click on the cylinders to change audio output (for the  $\rightarrow$  *pitch pipe*) and input.

**tip:** on start-up linotune uses your computer's *default* audio input and output, which can be changed via your operating system's utilities

### strobe band offset

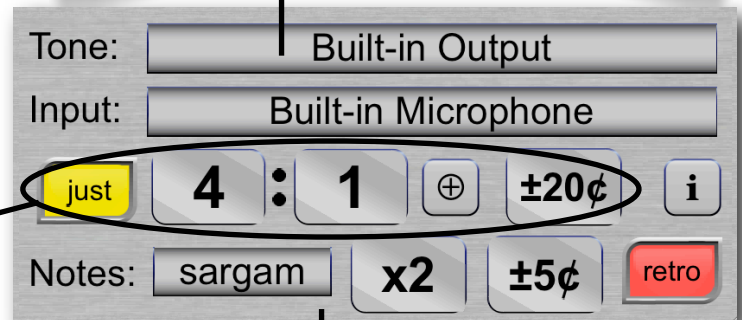
- the two rocker switches specify an offset from the  $\rightarrow$  *base frequency*, either in semitones and cents, or as a just intonation frequency ratio
- yellow button selects mode; click to convert the current value between the two modes
- conversion to just intonation gives simplest frequency ratio close enough to given offset
- rocker switch determines what's close enough

**tip:** repeatedly cycling to & from just intonation can yield a sequence of increasingly simple but distant (from the original offset) approximations

### strobe band editing

- to **add** a strobe band, set the desired offset then click the  $\oplus$  button
- to **select** a band for editing or deletion, click on it in the center; click again to deselect. a frame is drawn around the selected band; the peak spectrum (if shown) is zoomed onto it.
- to **edit** a band, select it then edit as desired
- to **delete** a band, select it & click the  $\otimes$  button

**tip:** linotune inserts new bands according to their frequency, but this can be overridden by editing. to move an edited band to its proper (sorted) location, select it and click the  $\otimes$  button twice.



**notes** click for English, German, solfège, sargam (Hindustani), Byzantine, Russian, Japanese, or numeric default note names for 12-tone scales.

note names specified in  $\rightarrow$  *scale/temperament files* take precedence; scales with more or fewer than 12 pitches have numeric default note names.

**roll speed** set sensitivity of the strobe bands to pitch deviations, relative to a conventional strobe

**tolerance** pitch deviation (in cents) below which the strobe band turns green

**retro mode** shows the spinning disk of a conventional strobe; more cpu-intensive. temporarily disabled when a  $\rightarrow$  *peak spectrum* is displayed.

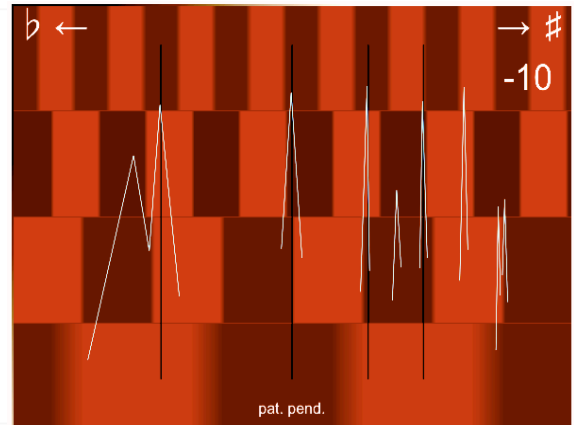
**info button** displays the program version, serial number, days left on subscription, plus (optionally) license agreement and  $\rightarrow$  *online activation* screen

## peak spectrum

calculates and shows the *exact* (not interpolated) location of all significant partials, overlaid on the strobe display. useful to find additional partials and problems such as doubled peaks

the noise floor is suppressed to improve clarity & efficiency; black vertical lines indicate strobe band frequencies.

- hover the mouse to see frequency (in multiples of the base) and amplitude (in dB relative to the maximum) at any point
- to reset the maximum amplitude, cycle the → *peaks* button
- click the middle of a strobe band to zoom spectrum onto it



## scale/temperament files

linotune handles a wide variety of scales and temperaments via the *scala* open file format; the active scale/temperament can be viewed or changed by clicking on it in the front panel

a collection of about 30 temperaments and a couple of alternative scales comes bundled with linotune. in addition, over 4000 (!) scales and temperaments in *scala* format are freely available at <http://www.huygens-fokker.org/scala/downloads.html#scales>

**tip:** use the included *scala* files as templates for your own additions. they are found in the *scala* folder, which on Windows resides in the linotune folder. on the Mac, right-click on the linotune application icon, pick *Show Package Contents*, then *Contents*, then *Resources*

### scala file format

defined at [http://www.huygens-fokker.org/scala/scl\\_format.html](http://www.huygens-fokker.org/scala/scl_format.html); here is a brief summary:

- *scala* files are text files that can be edited with ordinary text editors; they have the suffix *.scl*
- lines starting with '!' are ignored as comments
- the first non-comment line describes the scale
- the next one non-comment line gives the total number of pitches to follow, one per line
- each pitch is given relative to the *tonic* (first pitch), either as a frequency ratio, or in cents
- the tonic with pitch 1/1 (or 0.0 cents) is not shown explicitly. instead it is listed last, one octave higher: its pitch thus determines the size of an octave - normally 2/1 or 1200.0¢
- the rest of the line following a pitch value is ignored (but used by → *linotune extensions*)

### linotune extensions

linotune extends the *scala* format in two ways:

**custom note names** if the next word after a pitch value starts with ':', linotune interprets the remainder as a note name, which overrides the default name (→ *rear panel controls: notes*).

suffixes can be used to specify *accidentals*:

suffix	^B	^b	^d	^+	^#	^x
yields	♭	♭	♮	♯	♯	♯
meaning	dbl. flat	flat	semi flat	semi sharp	sharp	dbl. sharp

(for any other character *c*, '^c' is rendered as °)

**reference specification** if a pitch value or name is followed by the keyword '!!reference', that pitch corresponds to to the → *reference frequency*

- at most one pitch may be marked in this way
- by default, linotune uses pitch 10 ('A') as the reference for 12-tone scales, the tonic otherwise
- '!!reference' is optionally followed by an integer specifying the reference's octave (default: 4)
- this in turn is optionally followed by a frequency in Hertz. if present, the → *reference frequency* is set to that value upon loading the scale

### ! scala file example

```
! Golden Gate (just).scl
hexatonic scale for Pantheon Steel's "Halo" handpan
6
! this is a comment
  9/8 :D   the first pitch specification
  5/4 :E   another one
45/32 :F^# a note name with an accidental
701.955 :G pitches can also be given in cents
15/8 :B   next line fixes C3=131.2Hz as reference:
2/1 :C !!reference 3 131.2 (corresponds to A4=440)
```

## multi-strobe mode

**an optional add-on that can also be explored in the free trial period**

Lets you run several coupled linotune strobos simultaneously, limited only by the processing power of your computer. To use it, simply launch the linotune application multiple times. Each strobe adopts its configuration remembered from the previous session, according to the order in which it was launched.

The strobos communicate with each other through shared memory; they can but do not have to share the same audio input and/or output, as chosen by the user (→ *audio i/o*).

The first strobe launched - the master - works as always. In all other strobos, the *auto* pitch recognition button is replaced by a *slave* button. When it is lit, any change in note, octave, transpose, cents offset, or reference frequency of the master will be mirrored in the slave, but *not* vice versa.

This facilitates very flexible multi-strobe arrangements. For instance, the dual strobe set-up favored by some pan tuners can be obtained by configuring both master and slave to show a “stack of octaves”, then setting the slave’s pitch a 5<sup>th</sup> above that of the master. The *slave* function maintains the interval between the two, even when *auto* pitch recognition is used.

## common just intonation ratios

### complement

semi-tones	interval name	freq. ratio	cents	comments	cents	freq. ratio	interval name	semi-tones
0	unison	1/1	0.0		1200.0	2/1	octave	12
1	minor 2 <sup>nd</sup>	16/15	111.7	semitone	1088.3	15/8	major 7 <sup>th</sup>	11
2	major 2 <sup>nd</sup>	10/9	182.4	lesser tone	1017.6	9/5	minor 7 <sup>th</sup>	10
		9/8	203.9	greater tone	996.1	16/9		
		8/7	231.2	harmonic 7 <sup>th</sup>	968.8	7/4		
3	minor 3 <sup>rd</sup>	6/5	315.6		884.4	5/3	major 6 <sup>th</sup>	9
4	major 3 <sup>rd</sup>	5/4	386.3		813.7	8/5	minor 6 <sup>th</sup>	8
5	perfect 4 <sup>th</sup>	4/3	498.0		702.0	3/2	perfect 5 <sup>th</sup>	7
6	augmented 4 <sup>th</sup>	25/18	568.7	7-limit tuning	631.3	36/25	diminished 5 <sup>th</sup>	6
		7/5	582.5		617.5	10/7		
		45/32	590.2		609.8	64/45		
		17/12	603.0	597.0	24/17	17-limit tuning		

These frequency ratios are commonly used in just intonation. They are combined by multiplication: a *compound fifth* (an octave and a 5<sup>th</sup>) for instance is  $2/1 \times 3/2 = 3/1$  times the base frequency.

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