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This is the Internals Reference (IR) for version 2.21.1 of LilyPond, the GNU music typesetter.
1 Music definitions

1.1 Music expressions

1.1.1 AbsoluteDynamicEvent
Create a dynamic mark.

Syntax: note'\x', where \x is a dynamic mark like \ppp or \sfz. A complete list is in file ly/dynamic-scripts-init.ly.

Event classes: Section 1.2.1 [absolute-dynamic-event], page 42, Section 1.2.20 [dynamic-event], page 44, Section 1.2.42 [music-event], page 47, and Section 1.2.66 [StreamEvent], page 50.

Accepted by: Section 2.2.33 [Dynamic_ engraver], page 327, and Section 2.2.34 [Dynamic_performer], page 327.

Properties:

name (symbol):
'AbsoluteDynamicEvent
Name of this music object.

types (list):
'(post-event
event
dynamic-event
absolute-dynamic-event)
The types of this music object; determines by what engraver this music expression is processed.

1.1.2 AlternativeEvent
Create an alternative event.

Event classes: Section 1.2.2 [alternative-event], page 42, Section 1.2.42 [music-event], page 47, and Section 1.2.66 [StreamEvent], page 50.

Accepted by: Section 2.2.8 [Bar_number_ engraver], page 317.

Properties:

name (symbol):
'AlternativeEvent
Name of this music object.

types (list):
'(event alternative-event)
The types of this music object; determines by what engraver this music expression is processed.

1.1.3 AnnotateOutputEvent
Print an annotation of an output element.

Event classes: Section 1.2.3 [annotate-output-event], page 43, Section 1.2.42 [music-event], page 47, and Section 1.2.66 [StreamEvent], page 50.

Accepted by: Section 2.2.6 [Balloon_ engraver], page 316.

Properties:

name (symbol):
'AnnotateOutputEvent
Name of this music object.

types (list):
  '(event annotate-output-event post-event)
The types of this music object; determines by what engraver this music expression is processed.

1.1.4 ApplyContext

Call the argument with the current context during interpreting phase.

Properties:

iterator-ctor (procedure):
  ly:apply-context-iterator::constructor
  Function to construct a music-event-iterator object for this music.

name (symbol):
  'ApplyContext
  Name of this music object.

types (list):
  '(apply-context)
The types of this music object; determines by what engraver this music expression is processed.

1.1.5 ApplyOutputEvent

Call the argument with all current grobs during interpreting phase.

Syntax: \applyOutput #'context func

Arguments to func are 1. the grob, 2. the originating context, and 3. the context where func is called.

Event classes: Section 1.2.4 [apply-output-event], page 43, Section 1.2.31 [layout-instruction-event], page 46, Section 1.2.42 [music-event], page 47, and Section 1.2.66 [StreamEvent], page 50.

Accepted by: Section 2.2.83 [Output property engraver], page 344.

Properties:

name (symbol):
  'ApplyOutputEvent
  Name of this music object.

types (list):
  '(event apply-output-event)
The types of this music object; determines by what engraver this music expression is processed.

1.1.6 ArpeggioEvent

Make an arpeggio on this note.

Syntax: note-\arpeggio

Event classes: Section 1.2.5 [arpeggio-event], page 43, Section 1.2.42 [music-event], page 47, and Section 1.2.66 [StreamEvent], page 50.

Accepted by: Section 2.2.3 [Arpeggio engraver], page 315.

Properties:

name (symbol):
  'ArpeggioEvent
Name of this music object.

types (list):
   '(post-event arpeggio-event event)
   The types of this music object; determines by what engraver this music expression is processed.

1.1.7 ArticulationEvent
Add an articulation marking to a note.

Syntax: notexy, where x is a direction (^ for up or _ for down), or LilyPond’s choice (no direction specified), and where y is an articulation (such as \text{-}, \text{-}>, \text{tenuto}, \text{downbow}). See the Notation Reference for details.

Event classes: Section 1.2.6 [articulation-event], page 43, Section 1.2.42 [music-event], page 47, Section 1.2.56 [script-event], page 49, and Section 1.2.66 [StreamEvent], page 50.

Accepted by: Section 2.2.80 [Note_performer], page 344, and Section 2.2.102 [Script_engraver], page 351.

Properties:
   name (symbol):
      'ArticulationEvent
      Name of this music object.

types (list):
   '(post-event
      event
      articulation-event
      script-event)
   The types of this music object; determines by what engraver this music expression is processed.

1.1.8 AutoChangeMusic
Used for making voices that switch between piano staves automatically.

Properties:
   iterator-ctor (procedure):
      ly:auto-change-iterator::constructor
      Function to construct a music-event-iterator object for this music.

   length-callback (procedure):
      ly:music-wrapper::length-callback
      How to compute the duration of this music. This property can only be defined as initializer in scm/define-music-types.scm.

   name (symbol):
      'AutoChangeMusic
      Name of this music object.

   start-callback (procedure):
      ly:music-wrapper::start-callback
      Function to compute the negative length of starting grace notes. This property can only be defined as initializer in scm/define-music-types.scm.
Chapter 1: Music definitions

1.1.9 BarCheck

Check whether this music coincides with the start of the measure.

Properties:

iterator-ctor (procedure):

ly:bar-check-iterator::constructor

Function to construct a music-event-iterator object for this music.

name (symbol):

'BassFigureEvent

Name of this music object.

types (list):

'(bar-check)

The types of this music object; determines by what engraver this music expression is processed.

1.1.10 BassFigureEvent

Print a bass-figure text.

Event classes: Section 1.2.7 [bass-figure-event], page 43, Section 1.2.42 [music-event], page 47, Section 1.2.55 [rhythmic-event], page 49, and Section 1.2.66 [StreamEvent], page 50.

Accepted by: Section 2.2.37 [Figured_bass_engraver], page 328.

Properties:

name (symbol):

'BassFigureEvent

Name of this music object.

types (list):

'(event rhythmic-event bass-figure-event)

The types of this music object; determines by what engraver this music expression is processed.

1.1.11 BeamEvent

Start or stop a beam.

Syntax for manual control: c8- [ c c-] c8

Event classes: Section 1.2.8 [beam-event], page 43, Section 1.2.42 [music-event], page 47, Section 1.2.64 [span-event], page 50, and Section 1.2.66 [StreamEvent], page 50.

Accepted by: Section 2.2.10 [Beam_engraver], page 318, Section 2.2.11 [Beam_performer], page 319, and Section 2.2.47 [Grace_beam_engraver], page 332.

Properties:

name (symbol):

'BeamEvent

Name of this music object.
Chapter 1: Music definitions

1.1.12 BeamForbidEvent
Specify that a note may not auto-beamed.

Event classes: Section 1.2.9 [beam-forbid-event], page 43, Section 1.2.42 [music-event], page 47, and Section 1.2.66 [StreamEvent], page 50.

Accepted by: Section 2.2.4 [Auto_beam_engraver], page 315, and Section 2.2.46 [Grace_auto_beam_engraver], page 332.

Properties:

name (symbol):
  'BeamForbidEvent
  Name of this music object.

types (list):
  ' (post-event event beam-forbid-event)
  The types of this music object; determines by what engraver this music expression is processed.

1.1.13 BendAfterEvent
A drop/fall/doit jazz articulation.

Event classes: Section 1.2.10 [bend-after-event], page 43, Section 1.2.42 [music-event], page 47, and Section 1.2.66 [StreamEvent], page 50.

Accepted by: Section 2.2.12 [Bend_engraver], page 319.

Properties:

name (symbol):
  'BendAfterEvent
  Name of this music object.

types (list):
  ' (post-event event bend-after-event)
  The types of this music object; determines by what engraver this music expression is processed.

1.1.14 BreakDynamicSpanEvent
End an alignment spanner for dynamics here.

Event classes: Section 1.2.11 [break-dynamic-span-event], page 43, Section 1.2.13 [break-span-event], page 44, Section 1.2.42 [music-event], page 47, and Section 1.2.66 [StreamEvent], page 50.

Accepted by: Section 2.2.33 [Dynamic_engraver], page 327.

Properties:

name (symbol):
  'BreakDynamicSpanEvent
  Name of this music object.
1.1.15 **BreathingEvent**

Create a ‘breath mark’ or ‘comma’.

Syntax: `note\breathe`

Event classes: Section 1.2.14 [breathing-event], page 44, Section 1.2.42 [music-event], page 47, and Section 1.2.66 [StreamEvent], page 50.

Accepted by: Section 2.2.14 [Breathing_sign_engraver], page 320, and Section 2.2.80 [Note_performer], page 344.

Properties:

- **midi-length** (procedure):
  - `breathe::midi-length`
    - Function to determine how long to play a note in MIDI. It should take a moment (the written length of the note) and a context, and return a moment (the length to play the note).

- **name** (symbol):
  - `'BreathingEvent`
    - Name of this music object.

- **types** (list):
  - `'(event breathing-event)`
    - The types of this music object; determines by what engraver this music expression is processed.

1.1.16 **ClusterNoteEvent**

A note that is part of a cluster.

Event classes: Section 1.2.15 [cluster-note-event], page 44, Section 1.2.38 [melodic-event], page 46, Section 1.2.42 [music-event], page 47, Section 1.2.55 [rhythmic-event], page 49, and Section 1.2.66 [StreamEvent], page 50.

Accepted by: Section 2.2.18 [Cluster_spanner_engraver], page 321.

Properties:

- **iterator-ctor** (procedure):
  - `ly:rhythmic-music-iterator::constructor`
    - Function to construct a `music-event-iterator` object for this music.

- **name** (symbol):
  - `'ClusterNoteEvent`
    - Name of this music object.

- **types** (list):
  - `'(cluster-note-event melodic-event rhythmic-event)`
The types of this music object; determines by what engraver this music expression is processed.

### 1.1.17 CompletizeExtenderEvent

Used internally to signal the end of a lyrics block to ensure extenders are completed correctly when a Lyrics context ends before its associated Voice context.

Event classes: Section 1.2.16 [completize-extender-event], page 44, Section 1.2.42 [music-event], page 47, and Section 1.2.66 [StreamEvent], page 50.

Accepted by: Section 2.2.36 [Extender_engraver], page 328.

Properties:

- **name** (symbol): `CompletizeExtenderEvent`
  Name of this music object.
- **types** (list): `[completize-extender-event event]
  The types of this music object; determines by what engraver this music expression is processed.

### 1.1.18 ContextChange

Change staves in Piano staff.

Syntax: \change Staff = new-id

Properties:

- **iterator-ctor** (procedure):
  `ly:change-iterator::constructor`
  Function to construct a music-event-iterator object for this music.
- **name** (symbol): `ContextChange`
  Name of this music object.
- **types** (list):
  `[translator-change-instruction]
  The types of this music object; determines by what engraver this music expression is processed.

### 1.1.19 ContextSpeccedMusic

Interpret the argument music within a specific context.

Properties:

- **iterator-ctor** (procedure):
  `ly:context-specced-music-iterator::constructor`
  Function to construct a music-event-iterator object for this music.
- **length-callback** (procedure):
  `ly:music-wrapper::length-callback`
  How to compute the duration of this music. This property can only be defined as initializer in scm/define-music-types.scm.
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name (symbol):
  'ContextSpeccedMusic
  Name of this music object.

start-callback (procedure):
  ly:music-wrapper::start-callback
  Function to compute the negative length of starting grace notes. This property can only be defined as initializer in scm/define-music-types.scm.

types (list):
  '(context-specification music-wrapper-music)
  The types of this music object; determines by what engraver this music expression is processed.

1.1.20 CrescendoEvent

Begin or end a crescendo.

Syntax: note< ... note!

An alternative syntax is note\cr ... note\endcr.

Event classes: Section 1.2.17 [crescendo-event], page 44, Section 1.2.42 [music-event], page 47, Section 1.2.63 [span-dynamic-event], page 50, Section 1.2.64 [span-event], page 50, and Section 1.2.66 [StreamEvent], page 50.

Accepted by: Section 2.2.33 [Dynamic_ engraver], page 327, and Section 2.2.34 [Dynamic_performer], page 327.

Properties:

name (symbol):
  'CrescendoEvent
  Name of this music object.

types (list):
  '(post-event
    span-event
    span-dynamic-event
    crescendo-event
    event)

  The types of this music object; determines by what engraver this music expression is processed.

1.1.21 DecrescendoEvent

Begin or end a decrescendo.

Syntax: note> ... note!

An alternative syntax is note\decr ... note\enddecr.

Event classes: Section 1.2.18 [decrescendo-event], page 44, Section 1.2.42 [music-event], page 47, Section 1.2.63 [span-dynamic-event], page 50, Section 1.2.64 [span-event], page 50, and Section 1.2.66 [StreamEvent], page 50.

Accepted by: Section 2.2.33 [Dynamic_ engraver], page 327, and Section 2.2.34 [Dynamic_performer], page 327.

Properties:

name (symbol):
  'DecrescendoEvent
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Name of this music object.

types (list):
   '(post-event
      span-event
      span-dynamic-event
      decrescendo-event
      event)

   The types of this music object; determines by what engraver this music expression is processed.

1.1.22 DoublePercentEvent

Used internally to signal double percent repeats.

Event classes: Section 1.2.19 [double-percent-event], page 44, Section 1.2.42 [music-event], page 47, Section 1.2.55 [rhythmic-event], page 49, and Section 1.2.66 [StreamEvent], page 50.

Accepted by: Section 2.2.29 [Double_percent_repeat_ engraver], page 326.

Properties:

   name (symbol):
      'DoublePercentEvent

   Name of this music object.

types (list):
   '(event double-percent-event rhythmic-event)

   The types of this music object; determines by what engraver this music expression is processed.

1.1.23 EpisemaEvent

Begin or end an episema.

Event classes: Section 1.2.21 [episema-event], page 45, Section 1.2.42 [music-event], page 47, Section 1.2.64 [span-event], page 50, and Section 1.2.66 [StreamEvent], page 50.

Accepted by: Section 2.2.35 [Episema_ engraver], page 328.

Properties:

   name (symbol):
      'EpisemaEvent

   Name of this music object.

types (list):
   ' (post-event span-event event episema-event)

   The types of this music object; determines by what engraver this music expression is processed.

1.1.24 Event

Atomic music event.

Properties:

   name (symbol):
      'Event

   Name of this music object.
types (list):
  '(event)
  The types of this music object; determines by what engraver this music expression is processed.

1.1.25 EventChord
Explicitly entered chords.

When iterated, elements are converted to events at the current timestep, followed by any articulations. Per-chord postevents attached by the parser just follow any rhythmic events in elements instead of utilizing articulations.

An unexpanded chord repetition 'q' is recognizable by having its duration stored in duration.

Properties:
iterator-ctor (procedure):
  ly:event-chord-iterator::constructor
  Function to construct a music-event-iterator object for this music.

length-callback (procedure):
  ly:music-sequence::event-chord-length-callback
  How to compute the duration of this music. This property can only be defined as initializer in scm/define-music-types.scm.

name (symbol):
  'EventChord
  Name of this music object.

to-relative-callback (procedure):
  ly:music-sequence::event-chord-relative-callback
  How to transform a piece of music to relative pitches.

types (list):
  '(event-chord simultaneous-music)
  The types of this music object; determines by what engraver this music expression is processed.

1.1.26 ExtenderEvent
Extend lyrics.

Event classes: Section 1.2.22 [extender-event], page 45, Section 1.2.42 [music-event], page 47, and Section 1.2.66 [StreamEvent], page 50.

Accepted by: Section 2.2.36 [Extender engraver], page 328.

Properties:
name (symbol):
  'ExtenderEvent
  Name of this music object.

types (list):
  '(post-event extender-event event)
  The types of this music object; determines by what engraver this music expression is processed.
1.1.27 **FingeringEvent**

Specify what finger to use for this note.

Event classes: Section 1.2.23 [fingering-event], page 45, Section 1.2.42 [music-event], page 47, and Section 1.2.66 [StreamEvent], page 50.

Accepted by: Section 2.2.40 [Fingering_engraver], page 329, Section 2.2.44 [Fretboard_engraver], page 331, and Section 2.2.121 [Tab_note_heads_engraver], page 356.

Properties:

- **name** (symbol):
  
  'FingeringEvent
  
  Name of this music object.

- **types** (list):
  
  '(post-event fingering-event event)
  
  The types of this music object; determines by what engraver this music expression is processed.

1.1.28 **FootnoteEvent**

Footnote a grob.

Event classes: Section 1.2.24 [footnote-event], page 45, Section 1.2.42 [music-event], page 47, and Section 1.2.66 [StreamEvent], page 50.

Not accepted by any engraver or performer.

Properties:

- **name** (symbol):
  
  'FootnoteEvent
  
  Name of this music object.

- **types** (list):
  
  '(event footnote-event)
  
  The types of this music object; determines by what engraver this music expression is processed.

1.1.29 **GlissandoEvent**

Start a glissando on this note.

Event classes: Section 1.2.25 [glissando-event], page 45, Section 1.2.42 [music-event], page 47, and Section 1.2.66 [StreamEvent], page 50.

Accepted by: Section 2.2.45 [Glissando_engraver], page 331.

Properties:

- **name** (symbol):
  
  'GlissandoEvent
  
  Name of this music object.

- **types** (list):
  
  '(post-event glissando-event event)
  
  The types of this music object; determines by what engraver this music expression is processed.
1.1.30 GraceMusic
Interpret the argument as grace notes.

Properties:

- **iterator-ctor** (procedure):
  - `ly:grace-iterator::constructor`
  - Function to construct a music-event-iterator object for this music.
- **length** (moment):
  - `<Mom 0>`
  - The duration of this music.
- **name** (symbol):
  - 'GraceMusic
  - Name of this music object.
- **start-callback** (procedure):
  - `ly:grace-music::start-callback`
  - Function to compute the negative length of starting grace notes. This property can only be defined as initializer in `scm/define-music-types.scm`.
- **types** (list):
  - '(grace-music music-wrapper-music)
  - The types of this music object; determines by what engraver this music expression is processed.

1.1.31 HarmonicEvent
Mark a note as harmonic.

Event classes: Section 1.2.26 [harmonic-event], page 45, Section 1.2.42 [music-event], page 47, and Section 1.2.66 [StreamEvent], page 50.

Not accepted by any engraver or performer.

Properties:

- **name** (symbol):
  - 'HarmonicEvent
  - Name of this music object.
- **types** (list):
  - '(post-event event harmonic-event)
  - The types of this music object; determines by what engraver this music expression is processed.

1.1.32 HyphenEvent
A hyphen between lyric syllables.

Event classes: Section 1.2.27 [hyphen-event], page 45, Section 1.2.42 [music-event], page 47, and Section 1.2.66 [StreamEvent], page 50.

Accepted by: Section 2.2.54 [Hyphen engraver], page 334.

Properties:

- **name** (symbol):
  - 'HyphenEvent
  - Name of this music object.
1.1.33 KeyChangeEvent

Change the key signature.

Syntax: \key name scale

Event classes: Section 1.2.28 [key-change-event], page 45, Section 1.2.42 [music-event], page 47, and Section 1.2.66 [StreamEvent], page 50.

Accepted by: Section 2.2.58 [Key_engraver], page 335, and Section 2.2.59 [Key_performer], page 337.

Properties:

name (symbol):

'ReKeyChangeEvent

Name of this music object.

to-relative-callback (procedure):

#:procedure #f (x p)

How to transform a piece of music to relative pitches.

types (list):

'(key-change-event event)

The types of this music object; determines by what engraver this music expression is processed.

1.1.34 LabelEvent

Place a bookmarking label.

Event classes: Section 1.2.29 [label-event], page 45, Section 1.2.42 [music-event], page 47, and Section 1.2.66 [StreamEvent], page 50.

Accepted by: Section 2.2.85 [Paper_column_engraver], page 345.

Properties:

name (symbol):

'ReLabelEvent

Name of this music object.

types (list):

'(label-event event)

The types of this music object; determines by what engraver this music expression is processed.

1.1.35 LaissezVibrerEvent

Don’t damp this chord.

Syntax: note\laissezVibrer

Event classes: Section 1.2.30 [laissez-vibrer-event], page 45, Section 1.2.42 [music-event], page 47, and Section 1.2.66 [StreamEvent], page 50.

Accepted by: Section 2.2.61 [Laissez_vibrer_engraver], page 337.
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Properties:

name (symbol):
'LaissezVibrerEvent
Name of this music object.

types (list):
'(post-event event laissez-vibrer-event)
The types of this music object; determines by what engraver this music expression is processed.

1.1.36 LigatureEvent
Start or end a ligature.

Event classes: Section 1.2.32 [ligature-event], page 46, Section 1.2.42 [music-event], page 47, Section 1.2.64 [span-event], page 50, and Section 1.2.66 [StreamEvent], page 50.

Accepted by: Section 2.2.60 [Kievan_ligature_engraver], page 337, Section 2.2.63 [Ligature_bracket_engraver], page 337, Section 2.2.71 [Mensural_ligature_engraver], page 340, and Section 2.2.135 [Vaticana_ligature_engraver], page 361.

Properties:

name (symbol):
'LigatureEvent
Name of this music object.

types (list):
'(span-event ligature-event event)
The types of this music object; determines by what engraver this music expression is processed.

1.1.37 LineBreakEvent
Allow, forbid or force a line break.

Event classes: Section 1.2.12 [break-event], page 44, Section 1.2.33 [line-break-event], page 46, Section 1.2.42 [music-event], page 47, and Section 1.2.66 [StreamEvent], page 50.

Accepted by: Section 2.2.84 [Page_turn_engraver], page 345, and Section 2.2.85 [Paper_column_engraver], page 345.

Properties:

name (symbol):
'LineBreakEvent
Name of this music object.

types (list):
'(line-break-event break-event event)
The types of this music object; determines by what engraver this music expression is processed.

1.1.38 LyricCombineMusic
Align lyrics to the start of notes.

Syntax: \\lyricsto voicename lyrics

Properties:

iterator-ctor (procedure):
ly:lyric-combine-music-iterator::constructor
Function to construct a music-event-iterator object for this music.
length (moment):
  #<Mom 0>
  The duration of this music.

name (symbol):
  'LyricCombineMusic
  Name of this music object.

types (list):
  '(lyric-combine-music)
  The types of this music object; determines by what engraver this music
  expression is processed.

1.1.39 LyricEvent

A lyric syllable. Must be entered in lyrics mode, i.e., \lyrics { twinkle4 twinkle4 }.

Event classes: Section 1.2.34 [lyric-event], page 46, Section 1.2.42 [music-event], page 47,
Section 1.2.55 [rhythmic-event], page 49, and Section 1.2.66 [StreamEvent], page 50.

Accepted by: Section 2.2.64 [Lyric engraver], page 338, and Section 2.2.65 [Lyric performer],
page 338.

Properties:

iterator-ctor (procedure):
  ly:rhythmic-music-iterator::constructor
  Function to construct a music-event-iterator object for this music.

name (symbol):
  'LyricEvent
  Name of this music object.

types (list):
  '(rhythmic-event lyric-event event)
  The types of this music object; determines by what engraver this music
  expression is processed.

1.1.40 MarkEvent

Insert a rehearsal mark.

Syntax: \mark marker

Example: \mark "A"

Event classes: Section 1.2.35 [mark-event], page 46, Section 1.2.42 [music-event], page 47,
and Section 1.2.66 [StreamEvent], page 50.

Accepted by: Section 2.2.66 [Mark engraver], page 338.

Properties:

name (symbol):
  'MarkEvent
  Name of this music object.

types (list):
  '(mark-event event)
  The types of this music object; determines by what engraver this music
  expression is processed.
1.1.41 MeasureCounterEvent

Used to signal the start and end of a measure count.

Event classes: Section 1.2.36 [measure-counter-event], page 46, Section 1.2.42 [music-event], page 47, Section 1.2.64 [span-event], page 50, and Section 1.2.66 [StreamEvent], page 50.

Accepted by: Section 2.2.67 [Measure_counter_engraver], page 339.

Properties:

name (symbol):
  'MeasureCounterEvent
  Name of this music object.

types (list):
  '(measure-counter-event span-event event)
  The types of this music object; determines by what engraver this music expression is processed.

1.1.42 MeasureSpannerEvent

Used to signal the start and end of a measure spanner.

Event classes: Section 1.2.37 [measure-spanner-event], page 46, Section 1.2.42 [music-event], page 47, Section 1.2.64 [span-event], page 50, and Section 1.2.66 [StreamEvent], page 50.

Accepted by: Section 2.2.69 [Measure_spanner_engraver], page 339.

Properties:

name (symbol):
  'MeasureSpannerEvent
  Name of this music object.

types (list):
  '(measure-spanner-event span-event event)
  The types of this music object; determines by what engraver this music expression is processed.

1.1.43 MultiMeasureArticulationEvent

Articulations on multi-measure rests.

Event classes: Section 1.2.39 [multi-measure-articulation-event], page 46, Section 1.2.42 [music-event], page 47, and Section 1.2.66 [StreamEvent], page 50.

Accepted by: Section 2.2.75 [Multi_measure_rest_engraver], page 341.

Properties:

name (symbol):
  'MultiMeasureArticulationEvent
  Name of this music object.

types (list):
  '(post-event event multi-measure-articulation-event)
  The types of this music object; determines by what engraver this music expression is processed.
1.1.44 MultiMeasureRestEvent

Used internally by MultiMeasureRestMusic to signal rests.

Event classes: Section 1.2.40 [multi-measure-rest-event], page 46, Section 1.2.42 [music-event], page 47, Section 1.2.55 [rhythmic-event], page 49, and Section 1.2.66 [StreamEvent], page 50.

Accepted by: Section 2.2.75 [Multi_measure_rest_engraver], page 341.

Properties:

- iterator-ctor (procedure):
  
  ly:rhythmic-music-iterator::constructor

  Function to construct a music-event-iterator object for this music.

- name (symbol):
  
  'MultiMeasureRestEvent

  Name of this music object.

- types (list):
  
  '(event rhythmic-event multi-measure-rest-event)

  The types of this music object; determines by what engraver this music expression is processed.

1.1.45 MultiMeasureRestMusic

Rests that may be compressed into multi-measure rests.

Syntax: \text{R2.*4} for 4 measures in 3/4 time.

Properties:

- elements-callback (procedure):
  
  mm-rest-child-list

  Return a list of children, for use by a sequential iterator. Takes a single music parameter.

- iterator-ctor (procedure):
  
  ly:sequential-iterator::constructor

  Function to construct a music-event-iterator object for this music.

- name (symbol):
  
  'MultiMeasureRestMusic

  Name of this music object.

- types (list):
  
  '(multi-measure-rest)

  The types of this music object; determines by what engraver this music expression is processed.

1.1.46 MultiMeasureTextEvent

Texts on multi-measure rests.

Syntax: \text{R-\texttt{\textbackslash markup} \{ \texttt{\textbackslash roman "bla" } \}}

Note the explicit font switch.

Event classes: Section 1.2.41 [multi-measure-text-event], page 47, Section 1.2.42 [music-event], page 47, and Section 1.2.66 [StreamEvent], page 50.

Accepted by: Section 2.2.75 [Multi_measure_rest_engraver], page 341.
Properties:

name (symbol):

'MultiMeasureTextEvent
Name of this music object.

types (list):

'(post-event event multi-measure-text-event)
The types of this music object; determines by what engraver this music expression is processed.

1.1.47 Music
Generic type for music expressions.

Properties:

name (symbol):

'Music
Name of this music object.

types (list):

'()
The types of this music object; determines by what engraver this music expression is processed.

1.1.48 NoteEvent
A note.

Outside of chords, any events in articulations with a listener are broadcast like chord articulations, the others are retained.

For iteration inside of chords, See Section 1.1.25 [EventChord], page 11.

Event classes: Section 1.2.38 [melodic-event], page 46, Section 1.2.42 [music-event], page 47, Section 1.2.43 [note-event], page 47, Section 1.2.55 [rhythmic-event], page 49, and Section 1.2.66 [StreamEvent], page 50.

Accepted by: Section 2.2.15 [Chord_name_engraver], page 320, Section 2.2.20 [Completion_heads_engraver], page 322, Section 2.2.30 [Drum_note_performer], page 326, Section 2.2.31 [Drum_notes_engraver], page 326, Section 2.2.44 [Fretboard_engraver], page 331, Section 2.2.78 [Note_heads_engraver], page 343, Section 2.2.79 [Note_name_engraver], page 343, Section 2.2.80 [Note_performer], page 344, Section 2.2.87 [Part_combine_engraver], page 346, Section 2.2.89 [Phrasing_slur_engraver], page 347, Section 2.2.106 [Slur_engraver], page 352, and Section 2.2.121 [Tab_note_heads_engraver], page 356.

Properties:

iterator-ctor (procedure):

ly:rhythmic-music-iterator::constructor
Function to construct a music-event-iterator object for this music.

name (symbol):

'NoteEvent
Name of this music object.

types (list):

'(event note-event rhythmic-event melodic-event)
The types of this music object; determines by what engraver this music expression is processed.
1.1.49 NoteGroupingEvent
Start or stop grouping brackets.

Event classes: Section 1.2.42 [music-event], page 47, Section 1.2.44 [note-grouping-event], page 48, and Section 1.2.66 [StreamEvent], page 50.

Accepted by: Section 2.2.53 [Horizontal_bracket_engraver], page 334.
Properties:

- **name (symbol):**
  - 'NoteGroupingEvent
    Name of this music object.

- **types (list):**
  - '(post-event event note-grouping-event)
    The types of this music object; determines by what engraver this music expression is processed.

1.1.50 OttavaMusic
Start or stop an ottava bracket.

Properties:

- **elements-callback (procedure):**
  - make-ottava-set
    Return a list of children, for use by a sequential iterator. Takes a single music parameter.

- **iterator-ctor (procedure):**
  - ly:sequential-iterator::constructor
    Function to construct a music-event-iterator object for this music.

- **name (symbol):**
  - 'OttavaMusic
    Name of this music object.

- **types (list):**
  - '(ottava-music)
    The types of this music object; determines by what engraver this music expression is processed.

1.1.51 OverrideProperty
Extend the definition of a graphical object.

Syntax: \override [ context . ] object property = value

Properties:

- **iterator-ctor (procedure):**
  - ly:push-property-iterator::constructor
    Function to construct a music-event-iterator object for this music.

- **name (symbol):**
  - 'OverrideProperty
    Name of this music object.
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1.1.52 PageBreakEvent

Allow, forbid or force a page break.

Event classes: Section 1.2.12 [break-event], page 44, Section 1.2.42 [music-event], page 47, Section 1.2.45 [page-break-event], page 48, and Section 1.2.66 [StreamEvent], page 50.

Accepted by: Section 2.2.84 [Page_turn_engraver], page 345, and Section 2.2.85 [Paper_column_engraver], page 345.

Properties:

name (symbol):

'PageBreakEvent

Name of this music object.

types (list):

'(break-event page-break-event event)

The types of this music object; determines by what engraver this music expression is processed.

1.1.53 PageTurnEvent

Allow, forbid or force a page turn.

Event classes: Section 1.2.12 [break-event], page 44, Section 1.2.42 [music-event], page 47, Section 1.2.46 [page-turn-event], page 48, and Section 1.2.66 [StreamEvent], page 50.

Accepted by: Section 2.2.84 [Page_turn_engraver], page 345, and Section 2.2.85 [Paper_column_engraver], page 345.

Properties:

name (symbol):

'PageTurnEvent

Name of this music object.

types (list):

'(break-event page-turn-event event)

The types of this music object; determines by what engraver this music expression is processed.

1.1.54 PartCombineMusic

Combine two parts on a staff, either merged or as separate voices.

Properties:

iterator_ctor (procedure):

ly:part-combine-iterator::constructor

Function to construct a music-event-iterator object for this music.
length-callback (procedure):
   ly:music-sequence::maximum-length-callback
   How to compute the duration of this music. This property can only be
defined as initializer in scm/define-music-types.scm.

name (symbol):
   'PartCombineMusic
   Name of this music object.

start-callback (procedure):
   ly:music-sequence::minimum-start-callback
   Function to compute the negative length of starting grace notes. This
property can only be defined as initializer in scm/define-music-
types.scm.

types (list):
   '(part-combine-music)
   The types of this music object; determines by what engraver this music
expression is processed.

1.1.55 PartCombinePartMusic
A part to be combined with other parts on a staff.
   Properties:

iterator-ctor (procedure):
   ly:part-combine-part-iterator::constructor
   Function to construct a music-event-iterator object for this music.

length-callback (procedure):
   ly:music-wrapper::length-callback
   How to compute the duration of this music. This property can only be
defined as initializer in scm/define-music-types.scm.

name (symbol):
   'PartCombinePartMusic
   Name of this music object.

start-callback (procedure):
   ly:music-wrapper::start-callback
   Function to compute the negative length of starting grace notes. This
property can only be defined as initializer in scm/define-music-
types.scm.

types (list):
   '(part-combine-part-music music-wrapper-music)
   The types of this music object; determines by what engraver this music
expression is processed.

1.1.56 PartialSet
Create an anacrusis or upbeat (partial measure).
   Properties:

iterator-ctor (procedure):
   ly:partial-iterator::constructor
   Function to construct a music-event-iterator object for this music.
length-callback (procedure):
  ly:music-sequence::cumulative-length-callback
  How to compute the duration of this music. This property can only be
defined as initializer in scm/define-music-types.scm.

name (symbol):
  'PartialSet
  Name of this music object.

types (list):
  '(partial-set)
  The types of this music object; determines by what engraver this music
  expression is processed.

1.1.57 PercentEvent

Used internally to signal percent repeats.

  Event classes: Section 1.2.42 [music-event], page 47, Section 1.2.49 [percent-event], page 48,
  and Section 1.2.66 [StreamEvent], page 50.

  Accepted by: Section 2.2.88 [Percent repeat engraver], page 346.

  Properties:

  name (symbol):
    'PercentEvent
    Name of this music object.

  types (list):
    '(event percent-event rhythmic-event)
    The types of this music object; determines by what engraver this music
    expression is processed.

1.1.58 PercentRepeatedMusic

Repeats encoded by percents and slashes.

  Properties:

  iterator-ctor (procedure):
    ly:percent-repeat-iterator::constructor
    Function to construct a music-event-iterator object for this music.

  length-callback (procedure):
    ly:repeated-music::unfolded-music-length
    How to compute the duration of this music. This property can only be
defined as initializer in scm/define-music-types.scm.

  name (symbol):
    'PercentRepeatedMusic
    Name of this music object.

  start-callback (procedure):
    ly:repeated-music::first-start
    Function to compute the negative length of starting grace notes. This
    property can only be defined as initializer in scm/define-music-types.scm.
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1.1.59 PesOrFlexaEvent

Within a ligature, mark the previous and the following note to form a pes (if melody goes up) or a flexa (if melody goes down).

Event classes: Section 1.2.42 [music-event], page 47, Section 1.2.50 [pes-or-flexa-event], page 48, and Section 1.2.66 [StreamEvent], page 50.

Accepted by: Section 2.2.135 [Vaticana_ligature_engraver], page 361.

Properties:

- **name (symbol):**
  - 'PesOrFlexaEvent
    Name of this music object.

- **types (list):**
  - '(pes-or-flexa-event event)
    The types of this music object; determines by what engraver this music expression is processed.

1.1.60 PhrasingSlurEvent

Start or end phrasing slur.

Syntax: note\( and \)note\(\)

Event classes: Section 1.2.42 [music-event], page 47, Section 1.2.51 [phrasing-slur-event], page 48, Section 1.2.64 [span-event], page 50, and Section 1.2.66 [StreamEvent], page 50.

Accepted by: Section 2.2.89 [Phrasing_slur_engraver], page 347.

Properties:

- **name (symbol):**
  - 'PhrasingSlurEvent
    Name of this music object.

- **types (list):**
  - '(post-event span-event event phrasing-slur-event)
    The types of this music object; determines by what engraver this music expression is processed.

1.1.61 PostEvents

Container for several postevents.

This can be used to package several events into a single one. Should not be seen outside of the parser.

Properties:

- **name (symbol):**
  - 'PostEvents
    Name of this music object.

- **types (list):**
  - '(post-event post-event-wrapper)
    The types of this music object; determines by what engraver this music expression is processed.
1.1.62 PropertySet
Set a context property.

Syntax: `\set context.prop = scheme-val`

Properties:

- `iterator-ctor` (procedure):
  - `ly:property-iterator::constructor`
    - Function to construct a `music-event-iterator` object for this music.

- `name` (symbol):
  - `'PropertySet`
    - Name of this music object.

- `types` (list):
  - `'(layout-instruction-event)`
    - The types of this music object; determines by what engraver this music expression is processed.

- `untransposable` (boolean):
  - `#t`
    - If set, this music is not transposed.

1.1.63 PropertyUnset
Restore the default setting for a context property. See Section 1.1.62 [PropertySet], page 25.

Syntax: `\unset context.prop`

Properties:

- `iterator-ctor` (procedure):
  - `ly:property-unset-iterator::constructor`
    - Function to construct a `music-event-iterator` object for this music.

- `name` (symbol):
  - `'PropertyUnset`
    - Name of this music object.

- `types` (list):
  - `'(layout-instruction-event)`
    - The types of this music object; determines by what engraver this music expression is processed.

1.1.64 QuoteMusic
Quote preprocessed snippets of music.

Properties:

- `iterator-ctor` (procedure):
  - `ly:music-wrapper-iterator::constructor`
    - Function to construct a `music-event-iterator` object for this music.

- `length-callback` (procedure):
  - `ly:music-wrapper::length-callback`
    - How to compute the duration of this music. This property can only be defined as initializer in `scm/define-music-types.scm`. 
name (symbol):
    'QuoteMusic
    Name of this music object.

start-callback (procedure):
    ly:music-wrapper::start-callback
    Function to compute the negative length of starting grace notes. This property can only be defined as initializer in scm/define-music-types.scm.

types (list):
    '(music-wrapper-music)
    The types of this music object; determines by what engraver this music expression is processed.

1.1.65 RelativeOctaveCheck
Check if a pitch is in the correct octave.
Properties:

name (symbol):
    'RelativeOctaveCheck
    Name of this music object.

to-relative-callback (procedure):
    ly:relative-octave-check::relative-callback
    How to transform a piece of music to relative pitches.

types (list):
    '(relative-octave-check)
    The types of this music object; determines by what engraver this music expression is processed.

1.1.66 RelativeOctaveMusic
Music in which the assignment of octaves is complete.
Properties:

iterator-ctor (procedure):
    ly:music-wrapper-iterator::constructor
    Function to construct a music-event-iterator object for this music.

length-callback (procedure):
    ly:music-wrapper::length-callback
    How to compute the duration of this music. This property can only be defined as initializer in scm/define-music-types.scm.

name (symbol):
    'RelativeOctaveMusic
    Name of this music object.

start-callback (procedure):
    ly:music-wrapper::start-callback
    Function to compute the negative length of starting grace notes. This property can only be defined as initializer in scm/define-music-types.scm.
to-relative-callback (procedure):
  ly: relative-octave-music::relative-callback
How to transform a piece of music to relative pitches.

types (list):
  '(music-wrapper-music relative-octave-music)
The types of this music object; determines by what engraver this music expression is processed.

1.1.67 RepeatSlashEvent
Used internally to signal beat repeats.
  Event classes: Section 1.2.42 [music-event], page 47, Section 1.2.52 [repeat-slash-event], page 48, Section 1.2.55 [rhythmic-event], page 49, and Section 1.2.66 [StreamEvent], page 50.
  Accepted by: Section 2.2.105 [Slash repeat engraver], page 352.
Properties:
  name (symbol):
    'RepeatSlashEvent
    Name of this music object.
  types (list):
    '(event repeat-slash-event rhythmic-event)
The types of this music object; determines by what engraver this music expression is processed.

1.1.68 RepeatTieEvent
Ties for starting a second volta bracket.
  Event classes: Section 1.2.42 [music-event], page 47, Section 1.2.53 [repeat-tie-event], page 48, and Section 1.2.66 [StreamEvent], page 50.
  Accepted by: Section 2.2.97 [Repeat tie engraver], page 350.
Properties:
  name (symbol):
    'RepeatTieEvent
    Name of this music object.
  types (list):
    '(post-event event repeat-tie-event)
The types of this music object; determines by what engraver this music expression is processed.

1.1.69 RepeatedMusic
Repeat music in different ways.
  Properties:
  name (symbol):
    'RepeatedMusic
    Name of this music object.
  types (list):
    '(repeated-music)
The types of this music object; determines by what engraver this music expression is processed.
### 1.1.70 RestEvent

A Rest.

**Syntax:** `r4` for a quarter rest.

**Event classes:** Section 1.2.42 [music-event], page 47, Section 1.2.54 [rest-event], page 49, Section 1.2.55 [rhythmic-event], page 49, and Section 1.2.66 [StreamEvent], page 50.

**Accepted by:** Section 2.2.15 [Chord_name_engraver], page 320, Section 2.2.21 [Completion_rest_engraver], page 323, Section 2.2.37 [Figured_bass_engraver], page 328, and Section 2.2.99 [Rest_engraver], page 350.

**Properties:**

- **iterator-ctor (procedure):**
  
  ```lisp
  ly:rhythmic-music-iterator::constructor
  ```

  Function to construct a `music-event-iterator` object for this music.

- **name (symbol):**
  
  `'RestEvent

  Name of this music object.

- **types (list):**
  
  `'(event rhythmic-event rest-event)

  The types of this music object; determines by what engraver this music expression is processed.

### 1.1.71 RevertProperty

The opposite of Section 1.1.51 [OverrideProperty], page 20: remove a previously added property from a graphical object definition.

**Properties:**

- **iterator-ctor (procedure):**
  
  ```lisp
  ly:pop-property-iterator::constructor
  ```

  Function to construct a `music-event-iterator` object for this music.

- **name (symbol):**
  
  `'RevertProperty

  Name of this music object.

- **types (list):**
  
  `'(layout-instruction-event)

  The types of this music object; determines by what engraver this music expression is processed.

### 1.1.72 ScriptEvent

Add an articulation mark to a note.

**Event classes:** Section 1.2.42 [music-event], page 47, Section 1.2.56 [script-event], page 49, and Section 1.2.66 [StreamEvent], page 50.

**Not accepted by any engraver or performer.**

**Properties:**

- **name (symbol):**
  
  `'ScriptEvent

  Name of this music object.
types (list):
   '(event)
   The types of this music object; determines by what engraver this music expression is processed.

1.1.73 SequentialMusic
Music expressions concatenated.
Syntax: \sequential { ... } or simply { ... }
Properties:
elements-callback (procedure):
   #<procedure #f (m)>
   Return a list of children, for use by a sequential iterator. Takes a single music parameter.
iterator-ctor (procedure):
   ly:sequential-iterator::constructor
   Function to construct a music-event-iterator object for this music.
length-callback (procedure):
   ly:music-sequence::cumulative-length-callback
   How to compute the duration of this music. This property can only be defined as initializer in scm/define-music-types.scm.
name (symbol):
   'SequentialMusic
   Name of this music object.
start-callback (procedure):
   ly:music-sequence::first-start-callback
   Function to compute the negative length of starting grace notes. This property can only be defined as initializer in scm/define-music-types.scm.
types (list):
   '(sequential-music)
   The types of this music object; determines by what engraver this music expression is processed.

1.1.74 SimultaneousMusic
Music playing together.
Syntax: \simultaneous { ... } or <<< ... >>>
Properties:
iterator-ctor (procedure):
   ly:simultaneous-music-iterator::constructor
   Function to construct a music-event-iterator object for this music.
length-callback (procedure):
   ly:music-sequence::maximum-length-callback
   How to compute the duration of this music. This property can only be defined as initializer in scm/define-music-types.scm.
name (symbol):
  'SimultaneousMusic
  Name of this music object.

start-callback (procedure):
  ly:music-sequence::minimum-start-callback
  Function to compute the negative length of starting grace notes. This
  property can only be defined as initializer in scm/define-music-
  types.scm.

to-relative-callback (procedure):
  ly:music-sequence::simultaneous-relative-callback
  How to transform a piece of music to relative pitches.

types (list):
  'simultaneous-music
  The types of this music object; determines by what engraver this music
  expression is processed.

1.1.75 SkipEvent
Filler that takes up duration, but does not print anything.
Syntax: \s4 for a skip equivalent to a quarter rest.
Event classes: Section 1.2.42 [music-event], page 47, Section 1.2.55 [rhythmic-event], page 49, Section 1.2.57 [skip-event], page 49, and Section 1.2.66 [StreamEvent], page 50.
Not accepted by any engraver or performer.
Properties:
  iterator-ctor (procedure):
    ly:rhythmic-music-iterator::constructor
    Function to construct a music-event-iterator object for this music.

name (symbol):
  'SkipEvent
  Name of this music object.

types (list):
  'event rhythmic-event skip-event
  The types of this music object; determines by what engraver this music
  expression is processed.

1.1.76 SkipMusic
Filler that takes up duration, does not print anything, and also does not create staves or voices implicitly.
Syntax: \skip duration
Properties:
  iterator-ctor (procedure):
    ly:simple-music-iterator::constructor
    Function to construct a music-event-iterator object for this music.

length-callback (procedure):
  ly:music-duration-length
  How to compute the duration of this music. This property can only be
  defined as initializer in scm/define-music-types.scm.
name (symbol):
  'SkipMusic
  Name of this music object.

types (list):
  '(event skip-event)
  The types of this music object; determines by what engraver this music
  expression is processed.

1.1.77 SlurEvent
Start or end slur.

Syntax: note( and note)

Event classes: Section 1.2.42 [music-event], page 47, Section 1.2.58 [slur-event], page 49,
Section 1.2.64 [span-event], page 50, and Section 1.2.66 [StreamEvent], page 50.

Accepted by: Section 2.2.106 [Slur_engraver], page 352, and Section 2.2.107 [Slur_performer],
page 353.

Properties:

name (symbol):
  'SlurEvent
  Name of this music object.

types (list):
  '(post-event span-event event slur-event)
  The types of this music object; determines by what engraver this music
  expression is processed.

1.1.78 SoloOneEvent

Print 'Solo 1'.

Event classes: Section 1.2.42 [music-event], page 47, Section 1.2.47 [part-combine-event],
page 48, Section 1.2.59 [solo-one-event], page 49, and Section 1.2.66 [StreamEvent], page 50.

Accepted by: Section 2.2.87 [Part_combine_engraver], page 346.

Properties:

name (symbol):
  'SoloOneEvent
  Name of this music object.

part-combine-status (symbol):
  'solo1
  Change to what kind of state? Options are solo1, solo2 and unisono.

types (list):
  '(event part-combine-event solo-one-event)
  The types of this music object; determines by what engraver this music
  expression is processed.

1.1.79 SoloTwoEvent

Print 'Solo 2'.

Event classes: Section 1.2.42 [music-event], page 47, Section 1.2.47 [part-combine-event],
page 48, Section 1.2.60 [solo-two-event], page 49, and Section 1.2.66 [StreamEvent], page 50.
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Accepted by: Section 2.2.87 [Part_combine_ engraver], page 346.

Properties:

name (symbol):
'SoloTwoEvent
Name of this music object.

part-combine-status (symbol):
'solo2
Change to what kind of state? Options are solo1, solo2 and unisono.

types (list):
'(event part-combine-event solo-two-event)
The types of this music object; determines by what engraver this music expression is processed.

1.1.80 SostenutoEvent
Depress or release sostenuto pedal.

Event classes: Section 1.2.42 [music-event], page 47, Section 1.2.48 [pedal-event], page 48, Section 1.2.61 [sostenuto-event], page 49, Section 1.2.64 [span-event], page 50, and Section 1.2.66 [StreamEvent], page 50.

Accepted by: Section 2.2.91 [Piano_petal_ engraver], page 347, and Section 2.2.92 [Piano_petal_performer], page 348.

Properties:

name (symbol):
'SostenutoEvent
Name of this music object.

types (list):
'(post-event event pedal-event sostenuto-event)
The types of this music object; determines by what engraver this music expression is processed.

1.1.81 SpacingSectionEvent
Start a new spacing section.

Event classes: Section 1.2.42 [music-event], page 47, Section 1.2.62 [spacing-section-event], page 49, and Section 1.2.66 [StreamEvent], page 50.

Accepted by: Section 2.2.108 [Spacing_ engraver], page 353.

Properties:

name (symbol):
'SpacingSectionEvent
Name of this music object.

types (list):
'(event spacing-section-event)
The types of this music object; determines by what engraver this music expression is processed.
1.1.82 **SpanEvent**

Event for anything that is started at a different time than stopped.

Event classes: Section 1.2.42 [music-event], page 47, Section 1.2.64 [span-event], page 50, and Section 1.2.66 [StreamEvent], page 50.

Not accepted by any engraver or performer.

Properties:

name (symbol):

'SpanEvent
Name of this music object.

types (list):

'(event)

The types of this music object; determines by what engraver this music expression is processed.

1.1.83 **StaffSpanEvent**

Start or stop a staff symbol.

Event classes: Section 1.2.42 [music-event], page 47, Section 1.2.64 [span-event], page 50, Section 1.2.65 [staff-span-event], page 50, and Section 1.2.66 [StreamEvent], page 50.

Accepted by: Section 2.2.116 [Staff_symbol_engraver], page 354.

Properties:

name (symbol):

'StaffSpanEvent
Name of this music object.

types (list):

'(event span-event staff-span-event)

The types of this music object; determines by what engraver this music expression is processed.

1.1.84 **StringNumberEvent**

Specify on which string to play this note.

Syntax: \number

Event classes: Section 1.2.42 [music-event], page 47, Section 1.2.66 [StreamEvent], page 50, and Section 1.2.67 [string-number-event], page 51.

Accepted by: Section 2.2.44 [Fretboard_engraver], page 331, and Section 2.2.121 [Tab_note_heads_engraver], page 356.

Properties:

name (symbol):

'StringNumberEvent
Name of this music object.

types (list):

'(post-event string-number-event event)

The types of this music object; determines by what engraver this music expression is processed.
1.1.85 StrokeFingerEvent

Specify with which finger to pluck a string.

Syntax: \rightHandFinger text

Event classes: Section 1.2.42 [music-event], page 47, Section 1.2.66 [StreamEvent], page 50, and Section 1.2.68 [stroke-finger-event], page 51.

Not accepted by any engraver or performer.

Properties:

name (symbol):
'StrokeFingerEvent
Name of this music object.

types (list):
'(post-event stroke-finger-event event)
The types of this music object; determines by what engraver this music expression is processed.

1.1.86 SustainEvent

Depress or release sustain pedal.

Event classes: Section 1.2.42 [music-event], page 47, Section 1.2.48 [pedal-event], page 48, Section 1.2.64 [span-event], page 50, Section 1.2.66 [StreamEvent], page 50, and Section 1.2.69 [sustain-event], page 51.

Accepted by: Section 2.2.91 [Piano pedal engraver], page 347, and Section 2.2.92 [Piano pedal performer], page 348.

Properties:

name (symbol):
'SustainEvent
Name of this music object.

types (list):
'(post-event event pedal-event sustain-event)
The types of this music object; determines by what engraver this music expression is processed.

1.1.87 TempoChangeEvent

A metronome mark or tempo indication.

Event classes: Section 1.2.42 [music-event], page 47, Section 1.2.66 [StreamEvent], page 50, and Section 1.2.70 [tempo-change-event], page 51.

Accepted by: Section 2.2.73 [Metronome mark engraver], page 340.

Properties:

name (symbol):
'TempoChangeEvent
Name of this music object.

types (list):
'(event tempo-change-event)
The types of this music object; determines by what engraver this music expression is processed.
1.1.88 TextScriptEvent
Print text.

Event classes: Section 1.2.42 [music-event], page 47, Section 1.2.56 [script-event], page 49, Section 1.2.66 [StreamEvent], page 50, and Section 1.2.71 [text-script-event], page 51.

Accepted by: Section 2.2.125 [Text engraver], page 357.

Properties:

name (symbol):
  'TextScriptEvent
  Name of this music object.

types (list):
  '(post-event script-event text-script-event event)
  The types of this music object; determines by what engraver this music expression is processed.

1.1.89 TextSpanEvent
Start a text spanner, for example, an octavation.

Event classes: Section 1.2.42 [music-event], page 47, Section 1.2.64 [span-event], page 50, Section 1.2.66 [StreamEvent], page 50, and Section 1.2.72 [text-span-event], page 51.

Accepted by: Section 2.2.126 [Text spanner engraver], page 358.

Properties:

name (symbol):
  'TextSpanEvent
  Name of this music object.

types (list):
  '(post-event span-event event text-span-event)
  The types of this music object; determines by what engraver this music expression is processed.

1.1.90 TieEvent
A tie.

Syntax: note-~

Event classes: Section 1.2.42 [music-event], page 47, Section 1.2.66 [StreamEvent], page 50, and Section 1.2.73 [tie-event], page 51.

Accepted by: Section 2.2.80 [Note performer], page 344, Section 2.2.127 [Tie engraver], page 358, and Section 2.2.128 [Tie performer], page 359.

Properties:

name (symbol):
  'TieEvent
  Name of this music object.

types (list):
  '(post-event tie-event event)
  The types of this music object; determines by what engraver this music expression is processed.
1.1.91 **TimeScaledMusic**

Multiply durations, as in tuplets.

Syntax: \times \text{fraction} \text{music}, e.g., \times \frac{2}{3} \{ \ldots \} for triplets.

Properties:

- **iterator-ctor** (procedure):
  - \texttt{ly:tuplet-iterator::constructor}
  - Function to construct a \texttt{music-event-iterator} object for this music.

- **length-callback** (procedure):
  - \texttt{ly:music-wrapper::length-callback}
  - How to compute the duration of this music. This property can only be defined as initializer in \texttt{scm/define-music-types.scm}.

- **name** (symbol):
  - 'TimeScaledMusic
  - Name of this music object.

- **start-callback** (procedure):
  - \texttt{ly:music-wrapper::start-callback}
  - Function to compute the negative length of starting grace notes. This property can only be defined as initializer in \texttt{scm/define-music-types.scm}.

- **types** (list):
  - '(time-scaled-music)
  - The types of this music object; determines by what engraver this music expression is processed.

1.1.92 **TimeSignatureEvent**

An event created when setting a new time signature

- Event classes: Section 1.2.42 [music-event], page 47, Section 1.2.66 [StreamEvent], page 50, and Section 1.2.74 [time-signature-event], page 51.

- Accepted by: Section 2.2.129 [TimeSignatureEngraver], page 359.

Properties:

- **name** (symbol):
  - 'TimeSignatureEvent
  - Name of this music object.

- **types** (list):
  - '(event time-signature-event)
  - The types of this music object; determines by what engraver this music expression is processed.

1.1.93 **TimeSignatureMusic**

Set a new time signature

Properties:

- **elements-callback** (procedure):
  - \texttt{make-time-signature-set}
  - Return a list of children, for use by a sequential iterator. Takes a single music parameter.
iterator-ctor (procedure):
   ly:sequential-iterator::constructor
   Function to construct a music-event-iterator object for this music.

name (symbol):
   'TimeSignatureMusic
   Name of this music object.

types (list):
   '(time-signature-music)
   The types of this music object; determines by what engraver this music expression is processed.

1.1.94 TransposedMusic
Music that has been transposed.

Properties:

iterator-ctor (procedure):
   ly:music-wrapper-iterator::constructor
   Function to construct a music-event-iterator object for this music.

length-callback (procedure):
   ly:music-wrapper::length-callback
   How to compute the duration of this music. This property can only be defined as initializer in scm/define-music-types.scm.

name (symbol):
   'TransposedMusic
   Name of this music object.

start-callback (procedure):
   ly:music-wrapper::start-callback
   Function to compute the negative length of starting grace notes. This property can only be defined as initializer in scm/define-music-types.scm.

to-relative-callback (procedure):
   ly:relative-octave-music::no-relative-callback
   How to transform a piece of music to relative pitches.

types (list):
   '(music-wrapper-music transposed-music)
   The types of this music object; determines by what engraver this music expression is processed.

1.1.95 TremoloEvent
Unmeasured tremolo.

Event classes: Section 1.2.42 [music-event], page 47, Section 1.2.66 [StreamEvent], page 50, and Section 1.2.75 [tremolo-event], page 52.

Accepted by: Section 2.2.119 [Stem engraver], page 355.

Properties:

name (symbol):
   'TremoloEvent
   Name of this music object.
types (list):
  '(post-event event tremolo-event)

The types of this music object; determines by what engraver this music expression is processed.

1.1.96 TremoloRepeatedMusic
Repeated notes denoted by tremolo beams.

Properties:

  iterator-ctor (procedure):
  ly:chord-tremolo-iterator::constructor
  Function to construct a music-event-iterator object for this music.

  length-callback (procedure):
  ly:repeated-music::unfolded-music-length
  How to compute the duration of this music. This property can only be defined as initializer in scm/define-music-types.scm.

  name (symbol):
  'TremoloRepeatedMusic
  Name of this music object.

  start-callback (procedure):
  ly:repeated-music::first-start
  Function to compute the negative length of starting grace notes. This property can only be defined as initializer in scm/define-music-types.scm.

  types (list):
  '(repeated-music tremolo-repeated-music)
  The types of this music object; determines by what engraver this music expression is processed.

1.1.97 TremoloSpanEvent
Tremolo over two stems.

Event classes: Section 1.2.42 [music-event], page 47, Section 1.2.64 [span-event], page 50, Section 1.2.66 [StreamEvent], page 50, and Section 1.2.76 [tremolo-span-event], page 52.

Accepted by: Section 2.2.16 [Chord_tremolo_engraver], page 321.

Properties:

  name (symbol):
  'TremoloSpanEvent
  Name of this music object.

  types (list):
  '(event span-event tremolo-span-event)
  The types of this music object; determines by what engraver this music expression is processed.
1.1.98 TrillSpanEvent
Start a trill spanner.

Event classes: Section 1.2.42 [music-event], page 47, Section 1.2.64 [span-event], page 50, Section 1.2.66 [StreamEvent], page 50, and Section 1.2.77 [trill-span-event], page 52.

Accepted by: Section 2.2.132 [Trill_spanner_engraver], page 360.

Properties:
- **name** (symbol): `'TrillSpanEvent`
  Name of this music object.
- **types** (list):
  `'(post-event span-event event trill-span-event)`
  The types of this music object; determines by what engraver this music expression is processed.

1.1.99 TupletSpanEvent
Used internally to signal where tuplet brackets start and stop.

Event classes: Section 1.2.42 [music-event], page 47, Section 1.2.64 [span-event], page 50, Section 1.2.66 [StreamEvent], page 50, and Section 1.2.78 [tuplet-span-event], page 52.

Accepted by: Section 2.2.119 [Stem_engraver], page 355, and Section 2.2.133 [Tuplet_engraver], page 361.

Properties:
- **name** (symbol): `'TupletSpanEvent`
  Name of this music object.
- **types** (list):
  `'(tuplet-span-event span-event event post-event)`
  The types of this music object; determines by what engraver this music expression is processed.

1.1.100 UnaCordaEvent
Depress or release una-corda pedal.

Event classes: Section 1.2.42 [music-event], page 47, Section 1.2.48 [pedal-event], page 48, Section 1.2.64 [span-event], page 50, Section 1.2.66 [StreamEvent], page 50, and Section 1.2.79 [una-corda-event], page 52.

Accepted by: Section 2.2.91 [Piano_pedal_engraver], page 347, and Section 2.2.92 [Piano_pedal_performer], page 348.

Properties:
- **name** (symbol): `'UnaCordaEvent`
  Name of this music object.
- **types** (list):
  `'(post-event event pedal-event una-corda-event)`
  The types of this music object; determines by what engraver this music expression is processed.
1.1.101 UnfoldedRepeatedMusic
Repeated music which is fully written (and played) out.

Properties:

- `elements-callback` (procedure):
  
  ```make-unfolded-set```

  Return a list of children, for use by a sequential iterator. Takes a single music parameter.

- `iterator-ctor` (procedure):
  
  ```ly:sequential-iterator::constructor```

  Function to construct a `music-event-iterator` object for this music.

- `length-callback` (procedure):
  
  ```ly:repeated-music::unfolded-music-length```

  How to compute the duration of this music. This property can only be defined as initializer in `scm(define-music-types.scm)`.

- `name` (symbol):
  
  `'UnfoldedRepeatedMusic`

  Name of this music object.

- `start-callback` (procedure):
  
  ```ly:repeated-music::first-start```

  Function to compute the negative length of starting grace notes. This property can only be defined as initializer in `scm(define-music-types.scm)`.

- `types` (list):
  
  `'(repeated-music unfolded-repeated-music)``

  The types of this music object; determines by what engraver this music expression is processed.

1.1.102 UnisonoEvent
Print ‘a 2’.

Event classes: Section 1.2.42 [music-event], page 47, Section 1.2.47 [part-combine-event], page 48, Section 1.2.66 [StreamEvent], page 50, and Section 1.2.80 [unisono-event], page 52.

Accepted by: Section 2.2.87 [Part_combine_engraver], page 346.

Properties:

- `name` (symbol):
  
  `'UnisonoEvent`

  Name of this music object.

- `part-combine-status` (symbol):
  
  `'unisono`

  Change to what kind of state? Options are solo1, solo2 and unisono.

- `types` (list):
  
  `'(event part-combine-event unisono-event)``

  The types of this music object; determines by what engraver this music expression is processed.
1.1.103 UnrelativableMusic

Music that cannot be converted from relative to absolute notation. For example, transposed music.

Properties:

iterator-ctor (procedure):
    ly:music-wrapper-iterator::constructor
    Function to construct a music-event-iterator object for this music.

length-callback (procedure):
    ly:music-wrapper::length-callback
    How to compute the duration of this music. This property can only be defined as initializer in scm/define-music-types.scm.

name (symbol):
    'UnrelativableMusic
    Name of this music object.

start-callback (procedure):
    ly:music-wrapper::start-callback
    Function to compute the negative length of starting grace notes. This property can only be defined as initializer in scm/define-music-types.scm.

to-relative-callback (procedure):
    ly:relative-octave-music::no-relative-callback
    How to transform a piece of music to relative pitches.

types (list):
    '(music-wrapper-music unrelativable-music)
    The types of this music object; determines by what engraver this music expression is processed.

1.1.104 VoiceSeparator

Separate polyphonic voices in simultaneous music.

Syntax: \\n
Properties:

name (symbol):
    'VoiceSeparator
    Name of this music object.

types (list):
    '(separator)
    The types of this music object; determines by what engraver this music expression is processed.

1.1.105 VoltaRepeatedMusic

Repeats with alternatives placed sequentially.

Properties:

elements-callback (procedure):
    make-volta-set
    Return a list of children, for use by a sequential iterator. Takes a single music parameter.
iterator-ctor (procedure):
    ly:volta-repeat-iterator::constructor
    Function to construct a music-event-iterator object for this music.

length-callback (procedure):
    ly:repeated-music::volta-music-length
    How to compute the duration of this music. This property can only be defined as initializer in scm/define-music-types.scm.

name (symbol):
    'VoltaRepeatedMusic
    Name of this music object.

start-callback (procedure):
    ly:repeated-music::first-start
    Function to compute the negative length of starting grace notes. This property can only be defined as initializer in scm/define-music-types.scm.

types (list):
    '(repeated-music volta-repeated-music)
    The types of this music object; determines by what engraver this music expression is processed.

1.1.106 VowelTransitionEvent
A vowel transition between lyric syllables.
    Event classes: Section 1.2.42 [music-event], page 47, Section 1.2.66 [StreamEvent], page 50, and Section 1.2.81 [vowel-transition-event], page 52.
    Accepted by: Section 2.2.54 [Hyphen engraver], page 334.
    Properties:
    name (symbol):
        'VowelTransitionEvent
        Name of this music object.
    types (list):
        '(post-event vowel-transition-event event)
        The types of this music object; determines by what engraver this music expression is processed.

1.2 Music classes

1.2.1 absolute-dynamic-event
Music event type absolute-dynamic-event is in music objects of type Section 1.1.1 [AbsoluteDynamicEvent], page 2.
    Accepted by: Section 2.2.33 [Dynamic engraver], page 327, and Section 2.2.34 [Dynamic Performer], page 327.

1.2.2 alternative-event
Music event type alternative-event is in music objects of type Section 1.1.2 [AlternativeEvent], page 2.
    Accepted by: Section 2.2.8 [Bar number engraver], page 317.
1.2.3 annotate-output-event
Music event type annotate-output-event is in music objects of type Section 1.1.3 [AnnotateOutputEvent], page 2.

Accepted by: Section 2.2.6 [Balloon_engraver], page 316.

1.2.4 apply-output-event
Music event type apply-output-event is in music objects of type Section 1.1.5 [ApplyOutputEvent], page 3.

Accepted by: Section 2.2.83 [Output_property_engraver], page 344.

1.2.5 arpeggio-event
Music event type arpeggio-event is in music objects of type Section 1.1.6 [ArpeggioEvent], page 3.

Accepted by: Section 2.2.3 [Arpeggio_engraver], page 315.

1.2.6 articulation-event
Music event type articulation-event is in music objects of type Section 1.1.7 [ArticulationEvent], page 4.

Accepted by: Section 2.2.80 [Note_performer], page 344, and Section 2.2.102 [Script_engraver], page 351.

1.2.7 bass-figure-event
Music event type bass-figure-event is in music objects of type Section 1.1.10 [BassFigureEvent], page 5.

Accepted by: Section 2.2.37 [Figured_bass_engraver], page 328.

1.2.8 beam-event
Music event type beam-event is in music objects of type Section 1.1.11 [BeamEvent], page 5.

Accepted by: Section 2.2.10 [Beam_engraver], page 318, Section 2.2.11 [Beam_performer], page 319, and Section 2.2.47 [Grace_beam_engraver], page 332.

1.2.9 beam-forbid-event
Music event type beam-forbid-event is in music objects of type Section 1.1.12 [BeamForbidEvent], page 6.

Accepted by: Section 2.2.4 [Auto_beam_engraver], page 315, and Section 2.2.46 [Grace_auto_beam_engraver], page 332.

1.2.10 bend-after-event
Music event type bend-after-event is in music objects of type Section 1.1.13 [BendAfterEvent], page 6.

Accepted by: Section 2.2.12 [Bend_engraver], page 319.

1.2.11 break-dynamic-span-event
Music event type break-dynamic-span-event is in music objects of type Section 1.1.14 [BreakDynamicSpanEvent], page 6.

Not accepted by any engraver or performer.
1.2.12 break-event
Music event type `break-event` is in music objects of type Section 1.1.37 [LineBreakEvent], page 15, Section 1.1.52 [PageBreakEvent], page 21, and Section 1.1.53 [PageTurnEvent], page 21.

Accepted by: Section 2.2.84 [Page_turn_engraver], page 345, and Section 2.2.85 [Paper_column_engraver], page 345.

1.2.13 break-span-event
Music event type `break-span-event` is in music objects of type Section 1.1.14 [BreakDynamic-SpanEvent], page 6.

Accepted by: Section 2.2.33 [Dynamic_engraver], page 327.

1.2.14 breathing-event
Music event type `breathing-event` is in music objects of type Section 1.1.15 [BreathingEvent], page 7.

Accepted by: Section 2.2.14 [Breathing_sign_engraver], page 320, and Section 2.2.80 [Note_performer], page 344.

1.2.15 cluster-note-event
Music event type `cluster-note-event` is in music objects of type Section 1.1.16 [Cluster-NoteEvent], page 7.

Accepted by: Section 2.2.18 [Cluster_spanner_engraver], page 321.

1.2.16 completize-extender-event
Music event type `completize-extender-event` is in music objects of type Section 1.1.17 [CompletizeExtenderEvent], page 8.

Accepted by: Section 2.2.36 [Extender_engraver], page 328.

1.2.17 crescendo-event
Music event type `crescendo-event` is in music objects of type Section 1.1.20 [CrescendoEvent], page 9.

Accepted by: Section 2.2.34 [Dynamic_performer], page 327.

1.2.18 decrescendo-event
Music event type `decrescendo-event` is in music objects of type Section 1.1.21 [DecrescendoEvent], page 9.

Accepted by: Section 2.2.34 [Dynamic_performer], page 327.

1.2.19 double-percent-event
Music event type `double-percent-event` is in music objects of type Section 1.1.22 [DoublePercentEvent], page 10.

Accepted by: Section 2.2.29 [Double_percent_repeat_engraver], page 326.

1.2.20 dynamic-event
Music event type `dynamic-event` is in music objects of type Section 1.1.1 [AbsoluteDynamicEvent], page 2.

Not accepted by any engraver or performer.
1.2.21 episema-event
Music event type \texttt{episema-event} is in music objects of type Section 1.1.23 [EpisemaEvent], page 10.
   Accepted by: Section 2.2.35 [Episema_engraver], page 328.

1.2.22 extender-event
Music event type \texttt{extender-event} is in music objects of type Section 1.1.26 [ExtenderEvent], page 11.
   Accepted by: Section 2.2.36 [Extender_engraver], page 328.

1.2.23 fingering-event
Music event type \texttt{fingering-event} is in music objects of type Section 1.1.27 [FingeringEvent], page 12.
   Accepted by: Section 2.2.40 [Fingering_engraver], page 329, Section 2.2.44 [Fretboard_engraver], page 331, and Section 2.2.121 [Tab_note_heads_engraver], page 356.

1.2.24 footnote-event
Music event type \texttt{footnote-event} is in music objects of type Section 1.1.28 [FootnoteEvent], page 12.
   Not accepted by any engraver or performer.

1.2.25 glissando-event
Music event type \texttt{glissando-event} is in music objects of type Section 1.1.29 [GlissandoEvent], page 12.
   Accepted by: Section 2.2.45 [Glissando_engraver], page 331.

1.2.26 harmonic-event
Music event type \texttt{harmonic-event} is in music objects of type Section 1.1.31 [HarmonicEvent], page 13.
   Not accepted by any engraver or performer.

1.2.27 hyphen-event
Music event type \texttt{hyphen-event} is in music objects of type Section 1.1.32 [HyphenEvent], page 13.
   Accepted by: Section 2.2.54 [Hyphen_engraver], page 334.

1.2.28 key-change-event
Music event type \texttt{key-change-event} is in music objects of type Section 1.1.33 [KeyChangeEvent], page 14.
   Accepted by: Section 2.2.58 [Key_engraver], page 335, and Section 2.2.59 [Key_performer], page 337.

1.2.29 label-event
Music event type \texttt{label-event} is in music objects of type Section 1.1.34 [LabelEvent], page 14.
   Accepted by: Section 2.2.85 [Paper_column_engraver], page 345.

1.2.30 laissez-vibrer-event
Music event type \texttt{laissez-vibrer-event} is in music objects of type Section 1.1.35 [LaissezVibrerEvent], page 14.
   Accepted by: Section 2.2.61 [Laissez_vibrer_engraver], page 337.
1.2.31 layout-instruction-event
Music event type layout-instruction-event is in music objects of type Section 1.1.5 [ApplyOutputEvent], page 3.
Not accepted by any engraver or performer.

1.2.32 ligature-event
Music event type ligature-event is in music objects of type Section 1.1.36 [LigatureEvent], page 15.
Accepted by: Section 2.2.60 [Kievan_ligature_engraver], page 337, Section 2.2.63 [Ligature_bracket_engraver], page 337, Section 2.2.71 [Mensural_ligature_engraver], page 340, and Section 2.2.135 [Vaticana_ligature_engraver], page 361.

1.2.33 line-break-event
Music event type line-break-event is in music objects of type Section 1.1.37 [LineBreakEvent], page 15.
Not accepted by any engraver or performer.

1.2.34 lyric-event
Music event type lyric-event is in music objects of type Section 1.1.39 [LyricEvent], page 16.
Accepted by: Section 2.2.64 [Lyric_engraver], page 338, and Section 2.2.65 [Lyric_performer], page 338.

1.2.35 mark-event
Music event type mark-event is in music objects of type Section 1.1.40 [MarkEvent], page 16.
Accepted by: Section 2.2.66 [Mark_engraver], page 338.

1.2.36 measure-counter-event
Music event type measure-counter-event is in music objects of type Section 1.1.41 [MeasureCounterEvent], page 17.
Accepted by: Section 2.2.67 [Measure_counter_engraver], page 339.

1.2.37 measure-spanner-event
Music event type measure-spanner-event is in music objects of type Section 1.1.42 [MeasureSpannerEvent], page 17.
Accepted by: Section 2.2.69 [Measure_spanner_engraver], page 339.

1.2.38 melodic-event
Music event type melodic-event is in music objects of type Section 1.1.16 [ClusterNoteEvent], page 7, and Section 1.1.48 [NoteEvent], page 19.
Not accepted by any engraver or performer.

1.2.39 multi-measure-articulation-event
Music event type multi-measure-articulation-event is in music objects of type Section 1.1.43 [MultiMeasureArticulationEvent], page 17.
Accepted by: Section 2.2.75 [Multi_measure_rest_engraver], page 341.

1.2.40 multi-measure-rest-event
Music event type multi-measure-rest-event is in music objects of type Section 1.1.44 [MultiMeasureRestEvent], page 18.
Accepted by: Section 2.2.75 [Multi_measure_rest_engraver], page 341.
1.2.41 multi-measure-text-event

Music event type multi-measure-text-event is in music objects of type Section 1.1.46 [MultiMeasureTextEvent], page 18.

Accepted by: Section 2.2.75 [Multi_measure_rest_engraver], page 341.

1.2.42 music-event

Music event type music-event is in music objects of type Section 1.1.1 [AbsoluteDynamicEvent], page 2, Section 1.1.2 [AlternativeEvent], page 2, Section 1.1.3 [AnnotateOutputEvent], page 2, Section 1.1.5 [ApplyOutputEvent], page 3, Section 1.1.6 [ArpeggioEvent], page 3, Section 1.1.7 [ArticulationEvent], page 4, Section 1.1.10 [BassFigureEvent], page 5, Section 1.1.11 [BeamEvent], page 5, Section 1.1.12 [BeamForbidEvent], page 6, Section 1.1.13 [BendAfterEvent], page 6, Section 1.1.14 [BreakDynamicSpanEvent], page 6, Section 1.1.15 [BreathingEvent], page 7, Section 1.1.16 [ClusterNoteEvent], page 7, Section 1.1.17 [ComplettizeExtenderEvent], page 8, Section 1.1.20 [CrescendoEvent], page 9, Section 1.1.21 [DecrescendoEvent], page 9, Section 1.1.22 [DoublePercentEvent], page 10, Section 1.1.23 [EpisemaEvent], page 10, Section 1.1.26 [ExtenderEvent], page 11, Section 1.1.27 [FingeringEvent], page 12, Section 1.1.28 [FootnoteEvent], page 12, Section 1.1.29 [GlissandoEvent], page 12, Section 1.1.31 [HarmonicEvent], page 13, Section 1.1.32 [HyphenEvent], page 13, Section 1.1.33 [KeyChangeEvent], page 14, Section 1.1.34 [LabelEvent], page 14, Section 1.1.35 [LaissezVibrerEvent], page 14, Section 1.1.36 [LigatureEvent], page 15, Section 1.1.37 [LineBreakEvent], page 15, Section 1.1.39 [LyricEvent], page 16, Section 1.1.40 [MarkEvent], page 16, Section 1.1.41 [MeasureCounterEvent], page 17, Section 1.1.42 [MeasureSpannerEvent], page 17, Section 1.1.43 [MultiMeasureArticulationEvent], page 17, Section 1.1.44 [MultiMeasureRestEvent], page 18, Section 1.1.46 [MultiMeasureTextEvent], page 18, Section 1.1.48 [NoteEvent], page 19, Section 1.1.49 [NoteGroupingEvent], page 20, Section 1.1.52 [PageBreakEvent], page 21, Section 1.1.53 [PageTurnEvent], page 21, Section 1.1.57 [PercentEvent], page 23, Section 1.1.59 [PesOrFlexaEvent], page 24, Section 1.1.60 [PhrasingSlurEvent], page 24, Section 1.1.67 [RepeatSlashEvent], page 27, Section 1.1.68 [RepeatTieEvent], page 27, Section 1.1.70 [RestEvent], page 28, Section 1.1.72 [ScriptEvent], page 28, Section 1.1.75 [SkipEvent], page 30, Section 1.1.77 [SlurEvent], page 31, Section 1.1.78 [SoloOneEvent], page 31, Section 1.1.79 [SoloTwoEvent], page 31, Section 1.1.80 [SostenutoEvent], page 32, Section 1.1.81 [SpacingSectionEvent], page 32, Section 1.1.82 [SpanEvent], page 33, Section 1.1.83 [StaffSpanEvent], page 33, Section 1.1.84 [StringNumberEvent], page 33, Section 1.1.85 [StrokeFingerEvent], page 34, Section 1.1.86 [SustainEvent], page 34, Section 1.1.87 [TempoChangeEvent], page 34, Section 1.1.88 [TextScriptEvent], page 35, Section 1.1.89 [TextSpanEvent], page 35, Section 1.1.90 [TieEvent], page 35, Section 1.1.92 [TimeSignatureEvent], page 36, Section 1.1.95 [TremoloEvent], page 37, Section 1.1.97 [TremoloSpanEvent], page 38, Section 1.1.98 [TrillSpanEvent], page 39, Section 1.1.99 [TupletSpanEvent], page 39, Section 1.1.100 [UnaCordaEvent], page 39, Section 1.1.102 [UnisonoEvent], page 40, and Section 1.1.106 [VowelTransitionEvent], page 42.

Not accepted by any engraver or performer.

1.2.43 note-event

Music event type note-event is in music objects of type Section 1.1.48 [NoteEvent], page 19.

Accepted by: Section 2.2.15 [Chord_name_engraver], page 320, Section 2.2.20 [Completion_heads_engraver], page 322, Section 2.2.30 [Drum_note_performer], page 326, Section 2.2.31 [Drum_notes_engraver], page 326, Section 2.2.44 [Fretboard_engraver], page 331, Section 2.2.78 [Note_heads_engraver], page 343, Section 2.2.79 [Note_name_engraver], page 343, Section 2.2.80 [Note_performer], page 344, Section 2.2.87 [Part_combine_engraver], page 346, Section 2.2.89 [Phrasing_slur_engraver], page 347, Section 2.2.106 [Slur_engraver], page 352, and Section 2.2.121 [Tab_note_heads_engraver], page 356.
1.2.44 note-grouping-event
Music event type note-grouping-event is in music objects of type Section 1.1.49 [Note-
GroupingEvent], page 20.
    Accepted by: Section 2.2.53 [Horizontal_bracket_engraver], page 334.

1.2.45 page-break-event
Music event type page-break-event is in music objects of type Section 1.1.52 [PageBreakEvent],
page 21.
    Not accepted by any engraver or performer.

1.2.46 page-turn-event
Music event type page-turn-event is in music objects of type Section 1.1.53 [PageTurnEvent],
page 21.
    Not accepted by any engraver or performer.

1.2.47 part-combine-event
Music event type part-combine-event is in music objects of type Section 1.1.78 [SoloOneEvent],
pages 31, Section 1.1.79 [SoloTwoEvent], page 31, and Section 1.1.102 [UnisonoEvent], page 40.
    Accepted by: Section 2.2.87 [Part_combine_engraver], page 346.

1.2.48 pedal-event
Music event type pedal-event is in music objects of type Section 1.1.80 [SostenutoEvent],
pages 32, Section 1.1.86 [SustainEvent], page 34, and Section 1.1.100 [UnaCordaEvent], page 39.
    Not accepted by any engraver or performer.

1.2.49 percent-event
Music event type percent-event is in music objects of type Section 1.1.57 [PercentEvent],
page 23.
    Accepted by: Section 2.2.88 [Percent_repeat_engraver], page 346.

1.2.50 pes-or-flexa-event
Music event type pes-or-flexa-event is in music objects of type Section 1.1.59 [PesOrFlex-
aEvent], page 24.
    Accepted by: Section 2.2.135 [Vaticana_ligature_engraver], page 361.

1.2.51 phrasing-slur-event
Music event type phrasing-slur-event is in music objects of type Section 1.1.60 [Phrasing-
SlurEvent], page 24.
    Accepted by: Section 2.2.89 [Phrasing_slur_engraver], page 347.

1.2.52 repeat-slash-event
Music event type repeat-slash-event is in music objects of type Section 1.1.67 [RepeatSla-
shEvent], page 27.
    Accepted by: Section 2.2.105 [Slash_repeat_engraver], page 352.

1.2.53 repeat-tie-event
Music event type repeat-tie-event is in music objects of type Section 1.1.68 [RepeatTieEvent],
page 27.
    Accepted by: Section 2.2.97 [Repeat_tie_engraver], page 350.
1.2.54 rest-event
Music event type rest-event is in music objects of type Section 1.1.70 [RestEvent], page 28.

Accepted by: Section 2.2.15 [Chord_name engraver], page 320, Section 2.2.21 [Completion_rest engraver], page 323, Section 2.2.37 [Figured_bass engraver], page 328, and Section 2.2.99 [Rest engraver], page 350.

1.2.55 rhythmic-event
Music event type rhythmic-event is in music objects of type Section 1.1.10 [BassFigureEvent], page 5, Section 1.1.16 [ClusterNoteEvent], page 7, Section 1.1.22 [DoublePercentEvent], page 10, Section 1.1.39 [LyricEvent], page 16, Section 1.1.44 [MultiMeasureRestEvent], page 18, Section 1.1.48 [NoteEvent], page 19, Section 1.1.67 [RepeatSlashEvent], page 27, Section 1.1.70 [RestEvent], page 28, and Section 1.1.75 [SkipEvent], page 30.

Not accepted by any engraver or performer.

1.2.56 script-event
Music event type script-event is in music objects of type Section 1.1.7 [ArticulationEvent], page 4, Section 1.1.72 [ScriptEvent], page 28, and Section 1.1.88 [TextScriptEvent], page 35.

Not accepted by any engraver or performer.

1.2.57 skip-event
Music event type skip-event is in music objects of type Section 1.1.75 [SkipEvent], page 30.

Not accepted by any engraver or performer.

1.2.58 slur-event
Music event type slur-event is in music objects of type Section 1.1.77 [SlurEvent], page 31.

Accepted by: Section 2.2.106 [Slur engraver], page 352, and Section 2.2.107 [Slur performer], page 353.

1.2.59 solo-one-event
Music event type solo-one-event is in music objects of type Section 1.1.78 [SoloOneEvent], page 31.

Not accepted by any engraver or performer.

1.2.60 solo-two-event
Music event type solo-two-event is in music objects of type Section 1.1.79 [SoloTwoEvent], page 31.

Not accepted by any engraver or performer.

1.2.61 sostenuto-event
Music event type sostenuto-event is in music objects of type Section 1.1.80 [SostenutoEvent], page 32.

Accepted by: Section 2.2.91 [Piano_pedal engraver], page 347, and Section 2.2.92 [Piano_pedal performer], page 348.

1.2.62 spacing-section-event
Music event type spacing-section-event is in music objects of type Section 1.1.81 [Spacing-SectionEvent], page 32.

Accepted by: Section 2.2.108 [Spacing engraver], page 353.
1.2.63 span-dynamic-event

Music event type span-dynamic-event is in music objects of type Section 1.1.20 [CrescendoEvent], page 9, and Section 1.1.21 [DecrescendoEvent], page 9.

Accepted by: Section 2.2.33 [Dynamic engraver], page 327.

1.2.64 span-event

Music event type span-event is in music objects of type Section 1.1.11 [BeamEvent], page 5, Section 1.1.20 [CrescendoEvent], page 9, Section 1.1.21 [DecrescendoEvent], page 9, Section 1.1.23 [EpisemaEvent], page 10, Section 1.1.36 [LigatureEvent], page 15, Section 1.1.41 [MeasureCounterEvent], page 17, Section 1.1.42 [MeasureSpannerEvent], page 17, Section 1.1.60 [PhrasingSlurEvent], page 24, Section 1.1.77 [SlurEvent], page 31, Section 1.1.80 [SostenutoEvent], page 32, Section 1.1.82 [SpanEvent], page 33, Section 1.1.83 [StaffSpanEvent], page 33, Section 1.1.86 [SustainEvent], page 34, Section 1.1.89 [TextSpanEvent], page 35, Section 1.1.97 [TremoloSpanEvent], page 38, Section 1.1.98 [TrillSpanEvent], page 39, Section 1.1.99 [TupletSpanEvent], page 39, and Section 1.1.100 [UnaCordaEvent], page 39.

Not accepted by any engraver or performer.

1.2.65 staff-span-event

Music event type staff-span-event is in music objects of type Section 1.1.83 [StaffSpanEvent], page 33.

Accepted by: Section 2.2.116 [Staff symbol engraver], page 354.

1.2.66 StreamEvent

Music event type StreamEvent is in music objects of type Section 1.1.1 [AbsoluteDynamicEvent], page 2, Section 1.1.2 [AlternativeEvent], page 2, Section 1.1.3 [AnnotateOutputEvent], page 2, Section 1.1.5 [ApplyOutputEvent], page 3, Section 1.1.6 [ArpeggioEvent], page 3, Section 1.1.7 [ArticulationEvent], page 4, Section 1.1.10 [BassFigureEvent], page 5, Section 1.1.11 [BeamEvent], page 5, Section 1.1.12 [BeamForbidEvent], page 6, Section 1.1.13 [BendAfterEvent], page 6, Section 1.1.14 [BreakDynamicSpanEvent], page 6, Section 1.1.15 [BreathingEvent], page 7, Section 1.1.16 [ClusterNoteEvent], page 7, Section 1.1.17 [CompletizeExtenderEvent], page 8, Section 1.1.20 [CrescendoEvent], page 9, Section 1.1.21 [DecrescendoEvent], page 9, Section 1.1.22 [DoublePercentEvent], page 10, Section 1.1.23 [EpisemaEvent], page 10, Section 1.1.26 [ExtenderEvent], page 11, Section 1.1.27 [FingeringEvent], page 12, Section 1.1.28 [FootnoteEvent], page 12, Section 1.1.29 [GlissandoEvent], page 12, Section 1.1.31 [HarmonicEvent], page 13, Section 1.1.32 [HyphenEvent], page 13, Section 1.1.33 [KeyChangeEvent], page 14, Section 1.1.34 [LabelEvent], page 14, Section 1.1.35 [LaissezVibrerEvent], page 14, Section 1.1.36 [LigatureEvent], page 15, Section 1.1.37 [LineBreakEvent], page 15, Section 1.1.39 [LyricEvent], page 16, Section 1.1.40 [MarkEvent], page 16, Section 1.1.41 [MeasureCounterEvent], page 17, Section 1.1.42 [MeasureSpannerEvent], page 17, Section 1.1.43 [MultiMeasureArticulationEvent], page 17, Section 1.1.44 [MultiMeasureRestEvent], page 18, Section 1.1.46 [MultiMeasureTextEvent], page 18, Section 1.1.48 [NoteEvent], page 19, Section 1.1.49 [NoteGroupingEvent], page 20, Section 1.1.52 [PageBreakEvent], page 21, Section 1.1.53 [PageTurnEvent], page 21, Section 1.1.57 [PercentEvent], page 23, Section 1.1.59 [PesOrFlexaEvent], page 24, Section 1.1.60 [PhrasingSlurEvent], page 24, Section 1.1.67 [RepeatSlashEvent], page 27, Section 1.1.68 [RepeatTieEvent], page 27, Section 1.1.70 [RestEvent], page 28, Section 1.1.72 [ScriptEvent], page 28, Section 1.1.75 [SkipEvent], page 30, Section 1.1.77 [SlurEvent], page 31, Section 1.1.78 [SoloOneEvent], page 31, Section 1.1.79 [SoloTwoEvent], page 31, Section 1.1.80 [SostenutoEvent], page 32, Section 1.1.81 [SpacingSectionEvent], page 32, Section 1.1.82 [SpanEvent], page 33, Section 1.1.83 [StaffSpanEvent], page 33, Section 1.1.84
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[StringNumberEvent], page 33, Section 1.1.85 [StrokeFingerEvent], page 34, Section 1.1.86
[SustainEvent], page 34, Section 1.1.87 [TempoChangeEvent], page 34, Section 1.1.88
[TextScriptEvent], page 35, Section 1.1.89 [TextSpanEvent], page 35, Section 1.1.90 [TieEvent],
page 35, Section 1.1.92 [TimeSignatureEvent], page 36, Section 1.1.95 [TremoloEvent],
page 37, Section 1.1.97 [TremoloSpanEvent], page 38, Section 1.1.98 [TrillSpanEvent], page 39,
Section 1.1.99 [TupletSpanEvent], page 39, Section 1.1.100 [UnaCordaEvent], page 39.
Section 1.1.102 [UnisonoEvent], page 40, and Section 1.1.106 [VowelTransitionEvent], page 42.

Not accepted by any engraver or performer.

1.2.67 string-number-event
Music event type string-number-event is in music objects of type Section 1.1.84 [StringNumber-
Event], page 33.

Accepted by: Section 2.2.44 [Fretboard_engraver], page 331, and Section 2.2.121
[Tab_note_heads_engraver], page 356.

1.2.68 stroke-finger-event
Music event type stroke-finger-event is in music objects of type Section 1.1.85 [StrokeFin-
gerEvent], page 34.

Not accepted by any engraver or performer.

1.2.69 sustain-event
Music event type sustain-event is in music objects of type Section 1.1.86 [SustainEvent],
page 34.

Accepted by: Section 2.2.91 [Piano_pedal_engraver], page 347, and Section 2.2.92 [Pi-
ano_pedal_performer], page 348.

1.2.70 tempo-change-event
Music event type tempo-change-event is in music objects of type Section 1.1.87 [Tempo-
changeEvent], page 34.

Accepted by: Section 2.2.73 [Metronome_mark_engraver], page 340.

1.2.71 text-script-event
Music event type text-script-event is in music objects of type Section 1.1.88 [TextScriptEvent],
page 35.

Accepted by: Section 2.2.125 [Text_engraver], page 357.

1.2.72 text-span-event
Music event type text-span-event is in music objects of type Section 1.1.89 [TextSpanEvent],
page 35.

Accepted by: Section 2.2.126 [Text_spanner_engraver], page 358.

1.2.73 tie-event
Music event type tie-event is in music objects of type Section 1.1.90 [TieEvent], page 35.

Accepted by: Section 2.2.80 [Note_performer], page 344, Section 2.2.127 [Tie_engraver],
page 358, and Section 2.2.128 [Tie_performer], page 359.

1.2.74 time-signature-event
Music event type time-signature-event is in music objects of type Section 1.1.92 [TimeSign-
atureEvent], page 36.

Accepted by: Section 2.2.129 [Time_signature_engraver], page 359.
1.2.75 tremolo-event
Music event type *tremolo-event* is in music objects of type Section 1.1.95 [TremoloEvent], page 37.
   Accepted by: Section 2.2.119 [Stem_engraver], page 355.

1.2.76 tremolo-span-event
Music event type *tremolo-span-event* is in music objects of type Section 1.1.97 [TremoloSpan-Event], page 38.
   Accepted by: Section 2.2.16 [Chord_tremolo_engraver], page 321.

1.2.77 trill-span-event
Music event type *trill-span-event* is in music objects of type Section 1.1.98 [TrillSpanEvent], page 39.
   Accepted by: Section 2.2.132 [Trill_spanner_engraver], page 360.

1.2.78 tuplet-span-event
Music event type *tuplet-span-event* is in music objects of type Section 1.1.99 [TupletSpan-Event], page 39.
   Accepted by: Section 2.2.119 [Stem_engraver], page 355, and Section 2.2.133 [Tuplet_engraver], page 361.

1.2.79 una-corda-event
Music event type *una-corda-event* is in music objects of type Section 1.1.100 [UnaCordaEvent], page 39.
   Accepted by: Section 2.2.91 [Piano_pedal_engraver], page 347, and Section 2.2.92 [Piano_pedal_performer], page 348.

1.2.80 unisono-event
Music event type *unisono-event* is in music objects of type Section 1.1.102 [UnisonoEvent], page 40.
   Not accepted by any engraver or performer.

1.2.81 vowel-transition-event
Music event type *vowel-transition-event* is in music objects of type Section 1.1.106 [Vowel-TransitionEvent], page 42.
   Accepted by: Section 2.2.54 [Hyphen_engraver], page 334.

1.3 Music properties

*absolute-octave* (integer)
   The absolute octave for an octave check note.

*alteration* (number)
   Alteration for figured bass.

*alternative-dir* (direction)
   Indicates if an AlternativeMusic is the First (-1), Middle (0), or Last (1) of group of alternate endings.

*alternative-increment* (integer)
   The number of times an alternative’s lettering should be incremented.
articulation-type (string)
    Key for script definitions alist.
    TODO: Consider making type into symbol.

articulations (list of music objects)
    Articulation events specifically for this note.

associated-context (string)
    Name of the context associated with this \lyricsto section.

associated-context-type (symbol)
    Type of the context associated with this \lyricsto section.

augmented (boolean)
    This figure is for an augmented figured bass (with + sign).

augmented-slash (boolean)
    This figure is for an augmented figured bass (back-slashed number).

automatically-numbered (boolean)
    Should a footnote be automatically numbered?

autosplit-end (boolean)
    Duration of event was truncated by automatic splitting in Completion_heads_engraver.

bass (boolean)
    Set if this note is a bass note in a chord.

beat-structure (list)
    A beatStructure to be used in autobeaming.

bracket-start (boolean)
    Start a bracket here.
    TODO: Use SpanEvents?

bracket-stop (boolean)
    Stop a bracket here.

break-penalty (number)
    Penalty for line break hint.

break-permission (symbol)
    Whether to allow, forbid or force a line break.

cautionary (boolean)
    If set, this alteration needs a cautionary accidental.

change-to-id (string)
    Name of the context to change to.

change-to-type (symbol)
    Type of the context to change to.

class (symbol)
    The class name of an event class.

context (context)
    The context to which an event is sent.

custom-change-list (list)
    Context changes for \autoChange or \partCombine.
context-id (string)
   Name of context.
context-type (symbol)
   Type of context.
create-new (boolean)
   Create a fresh context.
delta-step (number)
   How much should a fall change pitch?
denominator (integer)
   Denominator in a time signature.
digit (integer)
   Digit for fingering.
diminished (boolean)
   This bass figure should be slashed.
direction (direction)
   Print this up or down?
drum-type (symbol)
   Which percussion instrument to play this note on.
duration (duration)
   Duration of this note or lyric.
element (music)
   The single child of a Music-wrapper music object, or the body of a repeat.
elements (list of music objects)
   A list of elements for sequential of simultaneous music, or the alternatives of repeated music.
elements-callback (procedure)
   Return a list of children, for use by a sequential iterator. Takes a single music parameter.
error-found (boolean)
   If true, a parsing error was found in this expression.
figure (integer)
   A bass figure.
footnote-text (markup)
   Text to appear in a footnote.
force-accidental (boolean)
   If set, a cautionary accidental should always be printed on this note.
grob-property (symbol)
   The symbol of the grob property to set.
grob-property-path (list)
   A list of symbols, locating a nested grob property, e.g., (beamed-lengths details).
grob-value (any type)
   The value of the grob property to set.
id (symbol)
   The ID of an event.
input-tag (any type)
   Arbitrary marker to relate input and output.

inversion (boolean)
   If set, this chord note is inverted.

iterator-ctor (procedure)
   Function to construct a music-event-iterator object for this music.

label (integer or markup)
   Label of a mark.

last-pitch (pitch)
   The last pitch after relativization.

length (moment)
   The duration of this music.

length-callback (procedure)
   How to compute the duration of this music. This property can only be defined as
   initializer in scm/define-music-types.scm.

line-break-permission (symbol)
   When the music is at top-level, whether to allow, forbid or force a line break.

metronome-count (number or pair)
   How many beats in a minute?

midi-extra-velocity (integer)
   How much louder or softer should this note be in MIDI output? The default is 0.

midi-length (procedure)
   Function to determine how long to play a note in MIDI. It should take a moment
   (the written length of the note) and a context, and return a moment (the length to
   play the note).

moment (moment)
   The moment at which an event happens.

music-cause (music)
   The music object that is the cause of an event.

name (symbol)
   Name of this music object.

no-continuation (boolean)
   If set, disallow continuation lines.

numerator (integer)
   Numerator of a time signature.

octavation (integer)
   This pitch was octavated by how many octaves? For chord inversions, this is nega-
   tive.

once (boolean)
   Apply this operation only during one time step?

ops (any type)
   The operations to apply during the creation of a context.

origin (input location)
   Where was this piece of music defined?
ottava-number (integer)
The octavation for \ottava.

page-break-permission (symbol)
When the music is at top-level, whether to allow, forbid or force a page break.

page-label (symbol)
The label of a page marker.

page-marker (boolean)
If true, and the music expression is found at top-level, a page marker object is instanciated instead of a score.

page-turn-permission (symbol)
When the music is at top-level, whether to allow, forbid or force a page turn.

parenthesize (boolean)
Enclose resulting objects in parentheses?

part-combine-status (symbol)
Change to what kind of state? Options are solo1, solo2 and unisono.

pitch (pitch)
The pitch of this note.

pitch-alist (list)
A list of pitches jointly forming the scale of a key signature.

pop-first (boolean)
Do a revert before we try to do an override on some grob property.

procedure (procedure)
The function to run with \applycontext. It must take a single argument, being the context.

property-operations (list)
Do these operations for instantiating the context.

property-path (symbol)
The path of a property.

quoted-context-id (string)
The ID of the context to direct quotes to, e.g., cue.

quoted-context-type (symbol)
The name of the context to direct quotes to, e.g., Voice.

quoted-events (vector)
A vector of with moment and event-list entries.

quoted-music-clef (string)
The clef of the voice to quote.

quoted-music-name (string)
The name of the voice to quote.

quoted-transposition (pitch)
The pitch used for the quote, overriding \transposition.

quoted-voice-direction (direction)
Should the quoted voice be up-stem or down-stem?

repeat-count (integer)
Do a \repeat how often?
**search-direction (direction)**
Limits the scope of \texttt{context} searches.

**slash-count (integer)**
The number of slashes in a single-beat repeat. If zero, signals a beat containing varying durations.

**span-direction (direction)**
Does this start or stop a spanner?

**span-text (markup)**
The displayed text for dynamic text spanners (e.g., cresc.)

**span-type (symbol)**
What kind of dynamic spanner should be created? Options are `text` and `hairpin`.

**spanner-id (index or symbol)**
Identifier to distinguish concurrent spanners.

**start-callback (procedure)**
Function to compute the negative length of starting grace notes. This property can only be defined as initializer in \texttt{scm/define-music-types.scm}.

**string-number (integer)**
The number of the string in a \texttt{StringNumberEvent}.

**symbol (symbol)**
Grob name to perform an override or revert on.

**tags (list)** List of symbols that for denoting extra details, e.g., \texttt{\#\#part ...} could tag a piece of music as only being active in a part.

**tempo-unit (duration)**
The unit for the metronome count.

**text (markup)**
Markup expression to be printed.

**to-relative-callback (procedure)**
How to transform a piece of music to relative pitches.

**tonic (pitch)**
Base of the scale.

**tremolo-type (integer)**
Speed of tremolo, e.g., 16 for \texttt{c4:16}.

**trill-pitch (pitch)**
Pitch of other note of the trill.

**tweaks (list)**
An alist of properties to override in the backend for the grob made of this event.

**type (symbol)**
The type of this music object. Determines iteration in some cases.

**types (list)**
The types of this music object; determines by what engraver this music expression is processed.

**untransposable (boolean)**
If set, this music is not transposed.
value (any type)  
Assignment value for a translation property.

void (boolean)  
If this property is \#t, then the music expression is to be discarded by the toplevel  
music handler.

volta-repeats (list)  
A list that is transformed into a volta repeat element list.

what (symbol)  
What to change for auto-change.  
FIXME: Naming.

X-offset (number)  
Offset of resulting grob; only used for balloon texts.

Y-offset (number)  
Offset of resulting grob; only used for balloon texts.
2 Translation

2.1 Contexts

2.1.1 ChoirStaff

Identical to StaffGroup except that the contained staves are not connected vertically.

This context creates the following layout object(s):

Section 3.1.55 [InstrumentName], page 443, Section 3.1.119 [SystemStartBar], page 514,
Section 3.1.120 [SystemStartBrace], page 515, Section 3.1.121 [SystemStartBracket], page 516,
Section 3.1.122 [SystemStartSquare], page 517, and Section 3.1.138 [VerticalAlignment], page 538.

This context sets the following properties:

• Set translator property instrumentName to '().
• Set translator property localAlterations to '().
• Set translator property shortInstrumentName to '().
• Set translator property shortVocalName to '().
• Set translator property systemStartDelimiter to 'SystemStartBracket.
• Set translator property topLevelAlignment to #f.
• Set translator property vocalName to '().

This is not a 'Bottom' context; search for such a one will commence after creating an implicit
context of type Section 2.1.27 [Staff], page 240.

Context ChoirStaff can contain Section 2.1.1 [ChoirStaff], page 59, Section 2.1.2 [Chord-
Names], page 60, Section 2.1.5 [DrumStaff], page 76, Section 2.1.7 [Dynamics], page 95,
Section 2.1.8 [FiguredBass], page 99, Section 2.1.11 [GrandStaff], page 104, Section 2.1.16
[Lyrics], page 155, Section 2.1.21 [OneStaff], page 187, Section 2.1.24 [PianoStaff], page 212,
Section 2.1.25 [RhythmicStaff], page 215, Section 2.1.27 [Staff], page 240, and Section 2.1.28
[StaffGroup], page 251.

This context is built from the following engraver(s):

Section 2.2.55 [Instrument_name_engraver], page 334
Create a system start text for instrument or vocal names.

Properties (read)

currentCommandColumn (graphical (layout)
object)
Grob that is X-parent to all current breakable
(clef, key signature, etc.) items.

instrumentName (markup)
The name to print left of a staff.
The instrumentName property labels
the staff in the first system, and the
shortInstrumentName property labels
following lines.

shortInstrumentName (markup)
See instrumentName.

shortVocalName (markup)
Name of a vocal line, short version.
vocalName (markup)
Name of a vocal line.

This engraver creates the following layout object(s):
Section 3.1.55 [InstrumentName], page 443.

Section 2.2.120 [System_start_delimiter_engraver], page 356
Create a system start delimiter (i.e., a SystemStartBar, SystemStartBrace, SystemStartBracket or SystemStartSquare spanner).
Properties (read)
currentCommandColumn (graphical (layout) object)
Grob that is X-parent to all current breakable (clef, key signature, etc.) items.
systemStartDelimiter (symbol)
Which grob to make for the start of the system/staff? Set to SystemStartBrace, SystemStartBracket or SystemStartBar.
systemStartDelimiterHierarchy (pair)
A nested list, indicating the nesting of a start delimiters.

This engraver creates the following layout object(s):
Section 3.1.119 [SystemStartBar], page 514, Section 3.1.120 [SystemStartBrace], page 515, Section 3.1.121 [SystemStartBracket], page 516, and Section 3.1.122 [SystemStartSquare], page 517.

Section 2.2.136 [Vertical_align_engraver], page 361
Catch groups (staves, lyrics lines, etc.) and stack them vertically.
Properties (read)
alignAboveContext (string)
Where to insert newly created context in vertical alignment.
alignBelowContext (string)
Where to insert newly created context in vertical alignment.
hasAxisGroup (boolean)
True if the current context is contained in an axis group.

This engraver creates the following layout object(s):
Section 3.1.138 [VerticalAlignment], page 538.

2.1.2 ChordNames
Typesets chord names.
This context also accepts commands for the following context(s):
Staff.
This context creates the following layout object(s):
Section 3.1.24 [ChordName], page 404, Section 3.1.108 [StaffSpacing], page 502, and Section 3.1.139 [VerticalAxisGroup], page 538.

This context sets the following properties:

- Set grob-property `font-size` in Section 3.1.87 [ParenthesesItem], page 481, to 1.5.
- Set grob-property `nonstaff-nonstaff-spacing.padding` in Section 3.1.139 [VerticalAxisGroup], page 538, to 0.5.
- Set grob-property `nonstaff-relatedstaff-spacing.padding` in Section 3.1.139 [VerticalAxisGroup], page 538, to 0.5.
- Set grob-property `remove-empty` in Section 3.1.139 [VerticalAxisGroup], page 538, to #t.
- Set grob-property `remove-first` in Section 3.1.139 [VerticalAxisGroup], page 538, to #t.
- Set grob-property `staff-affinity` in Section 3.1.139 [VerticalAxisGroup], page 538, to -1.

This is a 'Bottom' context; no contexts will be created implicitly from it.

This context cannot contain other contexts.

This context is built from the following engraver(s):

Section 2.2.5 [Axis_group_engraver], page 316
Group all objects created in this context in a `VerticalAxisGroup` spanner.

Properties (read)

  `currentCommandColumn` (graphical (layout) object)
  Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

  `hasAxisGroup` (boolean)
  True if the current context is contained in an axis group.

  `keepAliveInterfaces` (list)
  A list of symbols, signifying grob interfaces that are worth keeping a staff with `remove-empty` set around for.

Properties (write)

  `hasAxisGroup` (boolean)
  True if the current context is contained in an axis group.

This engraver creates the following layout object(s):

Section 3.1.139 [VerticalAxisGroup], page 538.

Section 2.2.15 [Chord_name_engraver], page 320
Catch note and rest events and generate the appropriate chordname.

Music types accepted:

Section 1.2.43 [note-event], page 47, and Section 1.2.54 [rest-event], page 49.

Properties (read)

  `chordChanges` (boolean)
  Only show changes in chords scheme?
chordNameExceptions (list)
An alist of chord exceptions. Contains (chord . markup) entries.

chordNameExceptions (list)
An alist of chord exceptions. Contains (chord . markup) entries.

chordNameFunction (procedure)
The function that converts lists of pitches to chord names.

chordNoteNamer (procedure)
A function that converts from a pitch object to a text markup. Used for single pitches.

chordRootNamer (procedure)
A function that converts from a pitch object to a text markup. Used for chords.

lastChord (markup)
Last chord, used for detecting chord changes.

majorSevenSymbol (markup)
How should the major 7th be formatted in a chord name?

noChordSymbol (markup)
Markup to be displayed for rests in a Chord-Names context.

Properties (write)

lastChord (markup)
Last chord, used for detecting chord changes.

This engraver creates the following layout object(s):
Section 3.1.24 [ChordName], page 404.

Section 2.2.83 [Output_property_engraver], page 344
Apply a procedure to any grob acknowledged.
Music types accepted:
Section 1.2.4 [apply-output-event], page 43,

Section 2.2.104 [Separating_line_group_engraver], page 352
Generate objects for computing spacing parameters.
Properties (read)

createSpacing (boolean)
Create StaffSpacing objects? Should be set for staves.

Properties (write)

hasStaffSpacing (boolean)
True if the current CommandColumn contains items that will affect spacing.

This engraver creates the following layout object(s):
Section 3.1.108 [StaffSpacing], page 502.
2.1.3 CueVoice

Corresponds to a voice on a staff. This context handles the conversion of dynamic signs, stems, beams, super- and subscripts, slurs, ties, and rests.

You have to instantiate this explicitly if you want to have multiple voices on the same staff.

This context also accepts commands for the following context(s):

Voice.

This context creates the following layout object(s):

Section 3.1.9 [Arpeggio], page 386, Section 3.1.19 [Beam], page 397, Section 3.1.20 [BendAfter], page 399, Section 3.1.23 [BreathingSign], page 402, Section 3.1.27 [ClusterSpanner], page 409, Section 3.1.28 [ClusterSpannerBeacon], page 409, Section 3.1.29 [CombineTextScript], page 410, Section 3.1.34 [Dots], page 419, Section 3.1.35 [DoublePercentRepeat], page 420, Section 3.1.36 [DoublePercentRepeatCounter], page 421, Section 3.1.37 [DoubleRepeatSlash], page 423, Section 3.1.38 [DynamicLineSpanner], page 424, Section 3.1.39 [DynamicText], page 425, Section 3.1.40 [DynamicTextSpanner], page 427, Section 3.1.42 [Fingering], page 429, Section 3.1.44 [Flag], page 432, Section 3.1.48 [Glissando], page 437, Section 3.1.52 [Hairpin], page 440, Section 3.1.56 [InstrumentSwitch], page 444, Section 3.1.60 [LaissezVibrerTie], page 452, Section 3.1.61 [LaissezVibrerTieColumn], page 453, Section 3.1.64 [LigatureBracket], page 456, Section 3.1.75 [MultiMeasureRest], page 468, Section 3.1.76 [MultiMeasureRestNumber], page 469, Section 3.1.77 [MultiMeasureRestScript], page 471, Section 3.1.78 [MultiMeasureRestText], page 472, Section 3.1.81 [NoteColumn], page 476, Section 3.1.82 [NoteHead], page 477, Section 3.1.84 [NoteSpacing], page 478, Section 3.1.88 [PercentRepeat], page 482, Section 3.1.89 [PercentRepeatCounter], page 483, Section 3.1.90 [PhrasingSlur], page 484, Section 3.1.93 [RepeatSlash], page 489, Section 3.1.94 [RepeatTie], page 490, Section 3.1.95 [RepeatTieColumn], page 491, Section 3.1.96 [Rest], page 491, Section 3.1.98 [Script], page 493, Section 3.1.99 [ScriptColumn], page 494, Section 3.1.101 [Slur], page 494, Section 3.1.111 [Stem], page 504, Section 3.1.112 [StemStub], page 506, Section 3.1.113 [StemTremolo], page 507, Section 3.1.114 [StringNumber], page 508, Section 3.1.115 [StrokeFinger], page 510, Section 3.1.124 [TextScript], page 519, Section 3.1.125 [TextSpanner], page 521, Section 3.1.126 [Tie], page 523, Section 3.1.127 [TieColumn], page 525, Section 3.1.129 [TrillPitchAccidental], page 528, Section 3.1.130 [TrillPitchGroup], page 529, Section 3.1.131 [TrillPitchHead], page 530, Section 3.1.132 [TrillSpanner], page 531, Section 3.1.133 [TupletBracket], page 532, Section 3.1.134 [TupletNumber], page 534, and Section 3.1.140 [VoiceFollower], page 540.

This context sets the following properties:

- Set grob-property `beam-thickness` in Section 3.1.19 [Beam], page 397, to 0.35.
- Set grob-property `beam-thickness` in Section 3.1.113 [StemTremolo], page 507, to 0.35.
- Set grob-property `ignore-ambitus` in Section 3.1.82 [NoteHead], page 477, to `#t`.
- Set grob-property `length-fraction` in Section 3.1.19 [Beam], page 397, to 0.629960524947437.
- Set grob-property `length-fraction` in Section 3.1.111 [Stem], page 504, to 0.629960524947437.
- Set translator property `fontSize` to -4.

This is a ‘Bottom’ context; no contexts will be created implicitly from it.

This context cannot contain other contexts.

This context is built from the following engraver(s):

Section 2.2.3 [Arpeggio_engraver], page 315

Generate an Arpeggio symbol.
Music types accepted:
Section 1.2.5 [arpeggio-event], page 43,
This engraver creates the following layout object(s):
Section 3.1.9 [Arpeggio], page 386.

Section 2.2.4 [Auto_beam_engraver], page 315
Generate beams based on measure characteristics and observed Stems. Uses baseMoment, beatStructure, beamExceptions, measureLength, and measurePosition to decide when to start and stop a beam. Overriding beaming is done through Section 2.2.119 [Stem_engraver], page 355, properties stemLeftBeamCount and stemRightBeamCount.
Music types accepted:
Section 1.2.9 [beam-forbid-event], page 43,
Properties (read)

autoBeaming (boolean)
If set to true then beams are generated automatically.

baseMoment (moment)
Smallest unit of time that will stand on its own as a subdivided section.

beamExceptions (list)
An alist of exceptions to autobeam rules that normally end on beats.

beamHalfMeasure (boolean)
Whether to allow a beam to begin halfway through the measure in triple time, which could look like 6/8.

beatStructure (list)
List of baseMoments that are combined to make beats.

subdivideBeams (boolean)
If set, multiple beams will be subdivided at baseMoment positions by only drawing one beam over the beat.

This engraver creates the following layout object(s):
Section 3.1.19 [Beam], page 397.

Section 2.2.10 [Beam_engraver], page 318
Handle Beam events by engraving beams. If omitted, then notes are printed with flags instead of beams.
Music types accepted:
Section 1.2.8 [beam-event], page 43,
Properties (read)

baseMoment (moment)
Smallest unit of time that will stand on its own as a subdivided section.

beamMelismaBusy (boolean)
Signal if a beam is present.
**beatStructure** (list)
List of baseMoments that are combined to make beats.

**subdivideBeams** (boolean)
If set, multiple beams will be subdivided at baseMoment positions by only drawing one beam over the beat.

Properties (write)

**forbidBreak** (boolean)
If set to #t, prevent a line break at this point.

This engraver creates the following layout object(s):
Section 3.1.19 [Beam], page 397.

**Section 2.2.12 [Bend_engraver], page 319**
Create fall spanners.
Music types accepted:
Section 1.2.10 [bend-after-event], page 43,
This engraver creates the following layout object(s):
Section 3.1.20 [BendAfter], page 399.

**Section 2.2.14 [Breathing_sign_engraver], page 320**
Create a breathing sign.
Music types accepted:
Section 1.2.14 [breathing-event], page 44,
This engraver creates the following layout object(s):
Section 3.1.23 [BreathingSign], page 402.

**Section 2.2.16 [Chord_tremolo_engraver], page 321**
Generate beams for tremolo repeats.
Music types accepted:
Section 1.2.76 [tremolo-span-event], page 52,
This engraver creates the following layout object(s):
Section 3.1.19 [Beam], page 397.

**Section 2.2.18 [Cluster_spanner_engraver], page 321**
Engrave a cluster using Spanner notation.
Music types accepted:
Section 1.2.15 [cluster-note-event], page 44,
This engraver creates the following layout object(s):
Section 3.1.27 [ClusterSpanner], page 409, and Section 3.1.28 [ClusterSpannerBeacon], page 409.

**Section 2.2.28 [Dots_engraver], page 325**
Create Section 3.1.34 [Dots], page 419, objects for Section 3.2.98 [rhythmic-head-interface], page 601s.
This engraver creates the following layout object(s):
Section 3.1.34 [Dots], page 419.
Section 2.2.29 [Double_percent_repeat_engraver], page 326
Make double measure repeats.
Music types accepted:
Section 1.2.19 [double-percent-event], page 44,
Properties (read)

**countPercentRepeats** (boolean)
If set, produce counters for percent repeats.

**measureLength** (moment)
Length of one measure in the current time signature.

**repeatCountVisibility** (procedure)
A procedure taking as arguments an integer and context, returning whether the corresponding percent repeat number should be printed when **countPercentRepeats** is set.

Properties (write)

**forbidBreak** (boolean)
If set to #t, prevent a line break at this point.

This engraver creates the following layout object(s):
Section 3.1.35 [DoublePercentRepeat], page 420, and Section 3.1.36 [DoublePercentRepeatCounter], page 421.

Section 2.2.32 [Dynamic_align_engraver], page 327
Align hairpins and dynamic texts on a horizontal line.
Properties (read)

**currentMusicalColumn** (graphical (layout) object)
Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).

This engraver creates the following layout object(s):
Section 3.1.38 [DynamicLineSpanner], page 424.

Section 2.2.33 [Dynamic_engraver], page 327
Create hairpins, dynamic texts and dynamic text spanners.
Music types accepted:
Section 1.2.1 [absolute-dynamic-event], page 42, Section 1.2.13 [break-span-event], page 44, and Section 1.2.63 [span-dynamic-event], page 50,
Properties (read)

**crescendoSpanner** (symbol)
The type of spanner to be used for crescendi. Available values are ‘hairpin’ and ‘text’. If unset, a hairpin crescendo is used.

**crescendoText** (markup)
The text to print at start of non-hairpin crescendo, i.e., ‘cresc.’.
currentMusicalColumn (graphical (layout) object)

Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).

decrescendoSpanner (symbol)

The type of spanner to be used for decrescendi. Available values are ‘hairpin’ and ‘text’. If unset, a hairpin decrescendo is used.

decrescendoText (markup)

The text to print at start of non-hairpin decrescendo, i.e., ‘dim.’.

This engraver creates the following layout object(s):
Section 3.1.39 [DynamicText], page 425, Section 3.1.40 [DynamicTextSpanner], page 427, and Section 3.1.52 [Hairpin], page 440.

Section 2.2.40 [Fingering_engraver], page 329
Create fingering scripts.
Music types accepted:
Section 1.2.23 [fingering-event], page 45,
This engraver creates the following layout object(s):
Section 3.1.42 [Fingering], page 429.

Section 2.2.41 [Font_size_engraver], page 330
Put fontSize into font-size grob property.
Properties (read)

fontSize (number)
The relative size of all grobs in a context.

Section 2.2.43 [Forbid_line_break_engraver], page 330
Forbid line breaks when note heads are still playing at some point.
Properties (read)

busyGrobs (list)
A queue of (end-moment . grob) cons cells. This is for internal (C++) use only. This property contains the grobs which are still busy (e.g. note heads, spanners, etc.).

Properties (write)

forbidBreak (boolean)
If set to #t, prevent a line break at this point.

Section 2.2.45 [Glissando_engraver], page 331
Engrave glissandi.
Music types accepted:
Section 1.2.25 [glissando-event], page 45,
Properties (read)

glissandoMap (list)
A map in the form of '((source1 . target1) (source2 . target2) (sourceN . targetN)) showing the glissandi to be drawn for note columns.
The value '()' will default to '([(0 . 0) (1 . 1) (n . n)], where n is the minimal number of note-heads in the two note columns between which the glissandi occur.

This engraver creates the following layout object(s):
Section 3.1.48 [Glissando], page 437.

Section 2.2.46 [Grace_auto_beam_engraver], page 332
Generates one autobeam group across an entire grace phrase. As usual, any manual beaming or \noBeam will block autobeaming, just like setting the context property ‘autoBeaming’ to ##f.
Music types accepted:
Section 1.2.9 [beam-forbid-event], page 43,
Properties (read)

  autoBeaming (boolean)
  If set to true then beams are generated automatically.

This engraver creates the following layout object(s):
Section 3.1.19 [Beam], page 397.

Section 2.2.47 [Grace_beam_engraver], page 332
Handle Beam events by engraving beams. If omitted, then notes are printed with flags instead of beams. Only engraves beams when we are at grace points in time.
Music types accepted:
Section 1.2.8 [beam-event], page 43,
Properties (read)

  baseMoment (moment)
  Smallest unit of time that will stand on its own as a subdivided section.

  beamMelismaBusy (boolean)
  Signal if a beam is present.

  beatStructure (list)
  List of baseMoments that are combined to make beats.

  subdivideBeams (boolean)
  If set, multiple beams will be subdivided at baseMoment positions by only drawing one beam over the beat.

This engraver creates the following layout object(s):
Section 3.1.19 [Beam], page 397.

Section 2.2.48 [Grace_engraver], page 333
Set font size and other properties for grace notes.
Properties (read)

  graceSettings (list)
  Overrides for grace notes. This property should be manipulated through the add-grace-property function.
Section 2.2.52 [Grob_pq_engraver], page 334
Administrate when certain grobs (e.g., note heads) stop playing.

Properties (read)

busyGrobs (list)
A queue of \((\text{end-moment} \cdot \text{grob})\) cons cells.
This is for internal (C++) use only. This property contains the grobs which are still busy (e.g. note heads, spanners, etc.).

Properties (write)

busyGrobs (list)
A queue of \((\text{end-moment} \cdot \text{grob})\) cons cells.
This is for internal (C++) use only. This property contains the grobs which are still busy (e.g. note heads, spanners, etc.).

Section 2.2.56 [Instrument_switch_engraver], page 335
Create a cue text for taking instrument.

Properties (read)

instrumentCueName (markup)
The name to print if another instrument is to be taken.

This engraver creates the following layout object(s):

Section 3.1.56 [InstrumentSwitch], page 444.

Section 2.2.61 [Laissez_vibrer_engraver], page 337
Create laissez vibrer items.

Music types accepted:

Section 1.2.30 [laissez-vibrer-event], page 45,
This engraver creates the following layout object(s):

Section 3.1.60 [LaissezVibrerTie], page 452, and Section 3.1.61 [LaissezVibrerTieColumn], page 453.

Section 2.2.63 [Ligature_bracket_engraver], page 337
Handle Ligature_events by engraving Ligature brackets.

Music types accepted:

Section 1.2.32 [ligature-event], page 46,
This engraver creates the following layout object(s):

Section 3.1.64 [LigatureBracket], page 456.

Section 2.2.75 [Multi_measure_rest_engraver], page 341
Engrave multi-measure rests that are produced with ‘R’. It reads measurePosition and internalBarNumber to determine what number to print over the Section 3.1.75 [MultiMeasureRest], page 468.

Music types accepted:

Section 1.2.39 [multi-measure-articulation-event], page 46,
Section 1.2.40 [multi-measure-rest-event], page 46, and Section 1.2.41 [multi-measure-text-event], page 47,
Properties (read)

`currentCommandColumn` (graphical (layout) object)
Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

`internalBarNumber` (integer)
Contains the current barnumber. This property is used for internal timekeeping, among others by the `Accidental_engraver`.

`measurePosition` (moment)
How much of the current measure have we had. This can be set manually to create incomplete measures.

`restNumberThreshold` (number)
If a multimeasure rest has more measures than this, a number is printed.

`whichBar` (string)
This property is read to determine what type of bar line to create.
Example:
\[ \set Staff.whichBar = ".|:" \]
This will create a start-repeat bar in this staff only. Valid values are described in `scm/bar-line.scm`.

This engraver creates the following layout object(s):
Section 3.1.75 [MultiMeasureRest], page 468, Section 3.1.76 [MultiMeasureRestNumber], page 469, Section 3.1.77 [MultiMeasureRestScript], page 471, and Section 3.1.78 [MultiMeasureRestText], page 472.

Section 2.2.76 [New_fingering_engraver], page 342
Create fingering scripts for notes in a new chord. This engraver is ill-named, since it also takes care of articulations and harmonic note heads.

Properties (read)

`fingeringOrientations` (list)
A list of symbols, containing ‘left’, ‘right’, ‘up’ and/or ‘down’. This list determines where fingerings are put relative to the chord being fingered.

`harmonicDots` (boolean)
If set, harmonic notes in dotted chords get dots.

`stringNumberOrientations` (list)
See `fingeringOrientations`.

`strokeFingerOrientations` (list)
See `fingeringOrientations`.

This engraver creates the following layout object(s):
Section 3.1.42 [Fingering], page 429, Section 3.1.98 [Script], page 493, Section 3.1.114 [StringNumber], page 508, and Section 3.1.115 [StrokeFinger], page 510.
Section 2.2.77 [Note_head_line_engraver], page 343

Engrave a line between two note heads in a staff switch if followVoice is set.

Properties (read)

followVoice (boolean)
If set, note heads are tracked across staff switches by a thin line.

This engraver creates the following layout object(s):
Section 3.1.140 [VoiceFollower], page 540.

Section 2.2.78 [Note_heads_engraver], page 343

Generate note heads.

Music types accepted:
Section 1.2.43 [note-event], page 47,

Properties (read)

middleCPosition (number)
The place of the middle C, measured in half staff-spaces. Usually determined by looking at middleCClefPosition and middleCOffset.

staffLineLayoutFunction (procedure)
Layout of staff lines, traditional, or semitone.

This engraver creates the following layout object(s):
Section 3.1.82 [NoteHead], page 477.

Section 2.2.81 [Note_spacing_engraver], page 344

Generate NoteSpacing, an object linking horizontal lines for use in spacing.

This engraver creates the following layout object(s):
Section 3.1.84 [NoteSpacing], page 478.

Section 2.2.83 [Output_property_engraver], page 344

Apply a procedure to any grob acknowledged.

Music types accepted:
Section 1.2.4 [apply-output-event], page 43,

Section 2.2.87 [Part_combine_engraver], page 346

Part combine engraver for orchestral scores: Print markings 'a2', 'Solo', 'Solo II', and 'unisono'.

Music types accepted:
Section 1.2.43 [note-event], page 47, and Section 1.2.47 [part-combine-event], page 48,

Properties (read)

aDueText (markup)
Text to print at a unisono passage.

partCombineTextsOnNote (boolean)
Print part-combine texts only on the next note rather than immediately on rests or skips.
\texttt{printPartCombineTexts} (boolean)  
Set ‘Solo’ and ‘A due’ texts in the part combiner?

\texttt{soloIIIText} (markup)  
The text for the start of a solo for voice ‘two’ when part-combining.

\texttt{soloText} (markup)  
The text for the start of a solo when part-combining.

This engraver creates the following layout object(s):
Section 3.1.29 [CombineTextScript], page 410.

Section 2.2.88 [Percent_repeat_engraver], page 346  
Make whole measure repeats.
Music types accepted:
Section 1.2.49 [percent-event], page 48,
Properties (read)

\texttt{countPercentRepeats} (boolean)  
If set, produce counters for percent repeats.

\texttt{currentCommandColumn} (graphical (layout) object)  
Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

\texttt{repeatCountVisibility} (procedure)  
A procedure taking as arguments an integer and context, returning whether the corresponding percent repeat number should be printed when \texttt{countPercentRepeats} is set.

This engraver creates the following layout object(s):
Section 3.1.88 [PercentRepeat], page 482, and Section 3.1.89 [PercentRepeatCounter], page 483.

Section 2.2.89 [Phrasing_slur_engraver], page 347  
Print phrasing slurs. Similar to Section 2.2.106 [Slur_engraver], page 352.
Music types accepted:
Section 1.2.43 [note-event], page 47, and Section 1.2.51 [phrasing-slur-event], page 48,
This engraver creates the following layout object(s):
Section 3.1.90 [PhrasingSlur], page 484.

Section 2.2.94 [Pitched_trill_engraver], page 349  
Print the bracketed note head after a note head with trill.
This engraver creates the following layout object(s):
Section 3.1.129 [TrillPitchAccidental], page 528, Section 3.1.130 [TrillPitchGroup], page 529, and Section 3.1.131 [TrillPitchHead], page 530.

Section 2.2.97 [Repeat_tie_engraver], page 350  
Create repeat ties.
Music types accepted:
Section 1.2.53 [repeat-tie-event], page 48,
This engraver creates the following layout object(s):
Section 3.1.94 [RepeatTie], page 490, and Section 3.1.95 [RepeatTieColumn], page 491.

Section 2.2.99 [Rest_engraver], page 350
Engrave rests.
Music types accepted:
Section 1.2.54 [rest-event], page 49,
Properties (read)

\begin{verbatim}
middleCPosition (number)
The place of the middle C, measured in half staff-spaces. Usually determined by looking at middleCClefPosition and middleCOffset.
\end{verbatim}

This engraver creates the following layout object(s):
Section 3.1.96 [Rest], page 491.

Section 2.2.100 [Rhythmic_column_engraver], page 351
Generate NoteColumn, an object that groups stems, note heads, and rests.
This engraver creates the following layout object(s):
Section 3.1.81 [NoteColumn], page 476.

Section 2.2.101 [Script_column_engraver], page 351
Find potentially colliding scripts and put them into a ScriptColumn object; that will fix the collisions.
This engraver creates the following layout object(s):
Section 3.1.99 [ScriptColumn], page 494.

Section 2.2.102 [Script_engraver], page 351
Handle note scripted articulations.
Music types accepted:
Section 1.2.6 [articulation-event], page 43,
Properties (read)

\begin{verbatim}
scriptDefinitions (list)
The description of scripts. This is used by the Script_engraver for typesetting note-superscripts and subscripts. See scm/script.scm for more information.
\end{verbatim}

This engraver creates the following layout object(s):
Section 3.1.98 [Script], page 493.

Section 2.2.105 [Slash_repeat_engraver], page 352
Make beat repeats.
Music types accepted:
Section 1.2.52 [repeat-slash-event], page 48,
This engraver creates the following layout object(s):
Section 3.1.37 [DoubleRepeatSlash], page 423, and Section 3.1.93 [RepeatSlash], page 489.
Section 2.2.106 [Slur_engraver], page 352
Build slur grobs from slur events.
Music types accepted:
Section 1.2.43 [note-event], page 47, and Section 1.2.58 [slur-event], page 49,
Properties (read)

doubleSlurs (boolean)
If set, two slurs are created for every slurred note, one above and one below the chord.

slurMelismaBusy (boolean)
Signal if a slur is present.

This engraver creates the following layout object(s):
Section 3.1.101 [Slur], page 494.

Section 2.2.113 [Spanner_break_forbid_engraver], page 354
Forbid breaks in certain spanners.

Section 2.2.119 [Stem_engraver], page 355
Create stems, flags and single-stem tremolos. It also works together with the beam engraver for overriding beaming.
Music types accepted:
Section 1.2.75 [tremolo-event], page 52, and Section 1.2.78 [tuplet-span-event], page 52,
Properties (read)

stemLeftBeamCount (integer)
Specify the number of beams to draw on the left side of the next note. Overrides automatic beaming. The value is only used once, and then it is erased.

stemRightBeamCount (integer)
See stemLeftBeamCount.

whichBar (string)
This property is read to determine what type of bar line to create.
Example:
\set Staff.whichBar = ".:"
This will create a start-repeat bar in this staff only. Valid values are described in scm/bar-line.scm.

This engraver creates the following layout object(s):
Section 3.1.44 [Flag], page 432, Section 3.1.111 [Stem], page 504, Section 3.1.112 [StemStub], page 506, and Section 3.1.113 [StemTremolo], page 507.

Section 2.2.125 [Text_engraver], page 357
Create text scripts.
Music types accepted:
Section 1.2.71 [text-script-event], page 51,
This engraver creates the following layout object(s):
Section 3.1.124 [TextScript], page 519.

Section 2.2.126 [Text_spanner_engraver], page 358
Create text spanner from an event.
Music types accepted:
Section 1.2.72 [text-span-event], page 51,
Properties (read)

\[ \text{currentMusicalColumn} \] (graphical (layout) object)
Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).

This engraver creates the following layout object(s):
Section 3.1.125 [TextSpanner], page 521.

Section 2.2.127 [Tie_engraver], page 358
Generate ties between note heads of equal pitch.
Music types accepted:
Section 1.2.73 [tie-event], page 51,
Properties (read)

\[ \text{skipTypesetting} \] (boolean)
If true, no typesetting is done, speeding up the interpretation phase. Useful for debugging large scores.

\[ \text{tieWaitForNote} \] (boolean)
If true, tied notes do not have to follow each other directly. This can be used for writing out arpeggios.

Properties (write)

\[ \text{tieMelismaBusy} \] (boolean)
Signal whether a tie is present.

This engraver creates the following layout object(s):
Section 3.1.126 [Tie], page 523, and Section 3.1.127 [TieColumn], page 525.

Section 2.2.132 [Trill_spanner_engraver], page 360
Create trill spanner from an event.
Music types accepted:
Section 1.2.77 [trill-span-event], page 52,
Properties (read)

\[ \text{currentCommandColumn} \] (graphical (layout) object)
Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

\[ \text{currentMusicalColumn} \] (graphical (layout) object)
Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).
This engraver creates the following layout object(s):
Section 3.1.132 [TrillSpanner], page 531.

Section 2.2.133 [Tuplet_ engraver], page 361
Catch tuplet events and generate appropriate bracket.
Music types accepted:
Section 1.2.78 [tuplet-span-event], page 52,
Properties (read)

\begin{itemize}
  \item \textbf{tupletFullLength} (boolean)
    \begin{itemize}
      \item If set, the tuplet is printed up to the start of
           the next note.
    \end{itemize}
  \item \textbf{tupletFullLengthNote} (boolean)
    \begin{itemize}
      \item If set, end at the next note, otherwise end on
           the matter (time signatures, etc.) before the
           note.
    \end{itemize}
\end{itemize}

This engraver creates the following layout object(s):
Section 3.1.133 [TupletBracket], page 532, and Section 3.1.134 [Tuplet-
Number], page 534.

2.1.4 Devnull
Silently discards all musical information given to this context.
This context also accepts commands for the following context(s):
Staff and Voice.
This context creates the following layout object(s):
none.
This is a ‘Bottom’ context; no contexts will be created implicitly from it.
This context cannot contain other contexts.

2.1.5 DrumStaff
Handles typesetting for percussion.
This context also accepts commands for the following context(s):
Staff.
This context creates the following layout object(s):
Section 3.1.11 [BarLine], page 388, Section 3.1.13 [BassFigure], page 394, Section 3.1.14
[BassFigureAlignment], page 394, Section 3.1.15 [BassFigureAlignmentPositioning], page 395,
Section 3.1.16 [BassFigureBracket], page 396, Section 3.1.17 [BassFigureContinuation],
page 396, Section 3.1.18 [BassFigureLine], page 396, Section 3.1.25 [Clef], page 405,
Section 3.1.26 [ClefModifier], page 407, Section 3.1.30 [CueClef], page 411, Section 3.1.31
[CueEndClef], page 414, Section 3.1.33 [DotColumn], page 419, Section 3.1.43 [FingeringCol-
umn], page 431, Section 3.1.55 [InstrumentName], page 443, Section 3.1.62 [LedgerLineSpanner],
page 453, Section 3.1.80 [NoteCollision], page 475, Section 3.1.97 [RestCollision], page 492,
Section 3.1.100 [ScriptRow], page 494, Section 3.1.103 [SostenutoPedalLineSpanner],
page 498, Section 3.1.108 [StaffSpacing], page 502, Section 3.1.109 [StaffSymbol], page 503,
Section 3.1.117 [SustainPedalLineSpanner], page 512, Section 3.1.128 [TimeSignature],
page 525, Section 3.1.136 [UnaCordaPedalLineSpanner], page 536, and Section 3.1.139
[VerticalAxisGroup], page 538.
This context sets the following properties:
\begin{itemize}
  \item Set grob-property \textbf{staff-padding} in Section 3.1.98 [Script], page 493, to 0.75.
\end{itemize}
Set translator property `clefGlyph` to "clefs.percussion".
Set translator property `clefPosition` to 0.
Set translator property `createSpacing` to `#t`.
Set translator property `ignoreFiguredBassRest` to `#f`.
Set translator property `instrumentName` to '()'.
Set translator property `localAlterations` to '()'.
Set translator property `ottavationMarkups` to:

\[((4 . "29")
 (3 . "22")
 (2 . "15")
 (1 . "8")
 (-1 . "8")
 (-2 . "15")
 (-3 . "22")
 (-4 . "29"))\]
Set translator property `shortInstrumentName` to '()'.

This is not a 'Bottom' context; search for such a one will commence after creating an implicit context of type Section 2.1.6 [DrumVoice], page 83.

Context DrumStaff can contain Section 2.1.3 [CueVoice], page 63, Section 2.1.6 [DrumVoice], page 83, and Section 2.1.20 [NullVoice], page 184.

This context is built from the following engraver(s):

**Section 2.2.5 [Axis_group_engraver], page 316**
Group all objects created in this context in a `VerticalAxisGroup` spanner.

Properties (read)

- `currentCommandColumn` (graphical (layout) object)
  Grob that is X-parent to all current breakable (clef, key signature, etc.) items.
- `hasAxisGroup` (boolean)
  True if the current context is contained in an axis group.
- `keepAliveInterfaces` (list)
  A list of symbols, signifying grob interfaces that are worth keeping a staff with `remove-empty` set around for.

Properties (write)

- `hasAxisGroup` (boolean)
  True if the current context is contained in an axis group.

This engraver creates the following layout object(s):

**Section 3.1.139 [VerticalAxisGroup], page 538.**

**Section 2.2.7 [Bar_engraver], page 316**
Create barlines. This engraver is controlled through the `whichBar` property. If it has no bar line to create, it will forbid a linebreak at this point.
This engraver is required to trigger the creation of clefs at the start of systems.

Properties (read)

**whichBar (string)**
This property is read to determine what type of bar line to create.
Example:
```verbatim
\set Staff.whichBar = ".\":"
```
This will create a start-repeat bar in this staff only. Valid values are described in `scm/bar-line.scm`.

Properties (write)

**forbidBreak (boolean)**
If set to `#t`, prevent a line break at this point.

This engraver creates the following layout object(s):
Section 3.1.11 [BarLine], page 388.

**Section 2.2.17 [Clef_engraver], page 321**
Determine and set reference point for pitches.

Properties (read)

**clefGlyph (string)**
Name of the symbol within the music font.

**clefPosition (number)**
Where should the center of the clef symbol go, measured in half staff spaces from the center of the staff.

**clefTransposition (integer)**
Add this much extra transposition. Values of 7 and -7 are common.

**clefTranspositionStyle (symbol)**
Determines the way the ClefModifier grob is displayed. Possible values are ‘default’, ‘parenthesized’ and ‘bracketed’.

**explicitClefVisibility (vector)**
‘break-visibility’ function for clef changes.

**forceClef (boolean)**
Show clef symbol, even if it has not changed. Only active for the first clef after the property is set, not for the full staff.

This engraver creates the following layout object(s):
Section 3.1.25 [Clef], page 405, and Section 3.1.26 [ClefModifier], page 407.

**Section 2.2.19 [Collision_engraver], page 322**
Collect `NoteColumns`, and as soon as there are two or more, put them in a `NoteCollision` object.

This engraver creates the following layout object(s):
Section 3.1.80 [NoteCollision], page 475.
Section 2.2.24 [Cue_clef_engraver], page 324
Determine and set reference point for pitches in cued voices.

Properties (read)

- **clefTransposition** (integer)
  Add this much extra transposition. Values of 7 and -7 are common.

- **cueClefGlyph** (string)
  Name of the symbol within the music font.

- **cueClefPosition** (number)
  Where should the center of the clef symbol go, measured in half staff spaces from the center of the staff.

- **cueClefTransposition** (integer)
  Add this much extra transposition. Values of 7 and -7 are common.

- **cueClefTranspositionStyle** (symbol)
  Determines the way the ClefModifier grob is displayed. Possible values are 'default', 'parenthesized' and 'bracketed'.

- **explicitCueClefVisibility** (vector)
  'break-visibility' function for cue clef changes.

- **middleCCuePosition** (number)
  The position of the middle C, as determined only by the clef of the cue notes. This can be calculated by looking at cueClefPosition and cueClefGlyph.

This engraver creates the following layout object(s):
Section 3.1.26 [ClefModifier], page 407, Section 3.1.30 [CueClef], page 411, and Section 3.1.31 [CueEndClef], page 414.

Section 2.2.27 [Dot_column_engraver], page 325
Engrave dots on dotted notes shifted to the right of the note. If omitted, then dots appear on top of the notes.

This engraver creates the following layout object(s):
Section 3.1.33 [DotColumn], page 419.

Section 2.2.37 [Figured_bass_engraver], page 328
Make figured bass numbers.

Music types accepted:
Section 1.2.7 [bass-figure-event], page 43, and Section 1.2.54 [rest-event], page 49,

Properties (read)

- **figuredBassAlterationDirection** (direction)
  Where to put alterations relative to the main figure.
figuredBassCenterContinuations (boolean)
   Whether to vertically center pairs of extender lines. This does not work with three or more lines.

figuredBassFormatter (procedure)
   A routine generating a markup for a bass figure.

ignoreFiguredBassRest (boolean)
   Don’t swallow rest events.

implicitBassFigures (list)
   A list of bass figures that are not printed as numbers, but only as extender lines.

useBassFigureExtenders (boolean)
   Whether to use extender lines for repeated bass figures.

This engraver creates the following layout object(s):
Section 3.1.13 [BassFigure], page 394, Section 3.1.14 [BassFigure-Alignment], page 394, Section 3.1.16 [BassFigureBracket], page 396, Section 3.1.17 [BassFigureContinuation], page 396, and Section 3.1.18 [BassFigureLine], page 396.

Section 2.2.38 [Figured_bass_position_engraver], page 329
Position figured bass alignments over notes.
This engraver creates the following layout object(s):
Section 3.1.15 [BassFigureAlignmentPositioning], page 395.

Section 2.2.39 [Fingering_column_engraver], page 329
Find potentially colliding scripts and put them into a FingeringColumn object; that will fix the collisions.
This engraver creates the following layout object(s):
Section 3.1.43 [FingeringColumn], page 431.

Section 2.2.41 [Font_size_engraver], page 330
Put fontSize into font-size grob property.
Properties (read)

fontSize (number)
   The relative size of all grobs in a context.

Section 2.2.52 [Grob_pq_engraver], page 334
Administrate when certain grobs (e.g., note heads) stop playing.
Properties (read)

busyGrobs (list)
   A queue of (end-moment . grob) cons cells. This is for internal (C++) use only. This property contains the grobs which are still busy (e.g. note heads, spanners, etc.).

Properties (write)

busyGrobs (list)
   A queue of (end-moment . grob) cons cells. This is for internal (C++) use only. This property contains the grobs which are still busy (e.g. note heads, spanners, etc.).
Section 2.2.55 [Instrument_name_engraver], page 334
Create a system start text for instrument or vocal names.

Properties (read)

\texttt{currentCommandColumn} (graphical (layout) object)
Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

\texttt{instrumentName} (markup)
The name to print left of a staff.
The \texttt{instrumentName} property labels the staff in the first system, and the \texttt{shortInstrumentName} property labels following lines.

\texttt{shortInstrumentName} (markup)
See \texttt{instrumentName}.

\texttt{shortVocalName} (markup)
Name of a vocal line, short version.

\texttt{vocalName} (markup)
Name of a vocal line.

This engraver creates the following layout object(s):
Section 3.1.55 [InstrumentName], page 443.

Section 2.2.62 [Ledger_line_engraver], page 337
Create the spanner to draw ledger lines, and notices objects that need ledger lines.

This engraver creates the following layout object(s):
Section 3.1.62 [LedgerLineSpanner], page 453.

Section 2.2.83 [Output_property_engraver], page 344
Apply a procedure to any grob acknowledged.

Music types accepted:
Section 1.2.4 [apply-output-event], page 43,

Section 2.2.90 [Piano_pedal_align_engraver], page 347
Align piano pedal symbols and brackets.

Properties (read)

\texttt{currentCommandColumn} (graphical (layout) object)
Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

This engraver creates the following layout object(s):
Section 3.1.103 [SostenutoPedalLineSpanner], page 498, Section 3.1.117 [SustainPedalLineSpanner], page 512, and Section 3.1.136 [UnaCordaPedalLineSpanner], page 536.

Section 2.2.95 [Pure_from_neighbor_engraver], page 349
Coordinates items that get their pure heights from their neighbors.
Section 2.2.98 [Rest_collision_engraver], page 350
Handle collisions of rests.

Properties (read)

busyGrobs (list)
A queue of \texttt{end-moment . grob} cons cells.
This is for internal (C++) use only. This property contains the grobs which are still busy (e.g.
note heads, spanners, etc.).

This engraver creates the following layout object(s):
Section 3.1.97 [RestCollision], page 492.

Section 2.2.103 [Script_row_engraver], page 351
Determine order in horizontal side position elements.

This engraver creates the following layout object(s):
Section 3.1.100 [ScriptRow], page 494.

Section 2.2.104 [Separating_line_group_engraver], page 352
Generate objects for computing spacing parameters.

Properties (read)

createSpacing (boolean)
Create \texttt{StaffSpacing} objects? Should be set
for staves.

Properties (write)

hasStaffSpacing (boolean)
True if the current \texttt{CommandColumn} contains
items that will affect spacing.

This engraver creates the following layout object(s):
Section 3.1.108 [StaffSpacing], page 502.

Section 2.2.114 [Staff_collecting_engraver], page 354
Maintain the staffsFound variable.

Properties (read)

staffsFound (list of grobs)
A list of all staff-symbols found.

Properties (write)

staffsFound (list of grobs)
A list of all staff-symbols found.

Section 2.2.116 [Staff_symbol_engraver], page 354
Create the constellation of five (default) staff lines.
Music types accepted:
Section 1.2.65 [staff-span-event], page 50,
This engraver creates the following layout object(s):
Section 3.1.109 [StaffSymbol], page 503.

Section 2.2.129 [Time_signature_engraver], page 359
Create a Section 3.1.128 [TimeSignature], page 525, whenever
timeSignatureFraction changes.
Music types accepted:
Section 1.2.74 [time-signature-event], page 51,
Properties (read)

*initialTimeSignatureVisibility* (vector)
break visibility for the initial time signature.

*partialBusy* (boolean)
Signal that \(\text{partial}\) acts at the current timestep.

*timeSignatureFraction* (fraction, as pair)
A pair of numbers, signifying the time signature. For example, \((4, 4)\) is a 4/4 time signature.

This engraver creates the following layout object(s):
Section 3.1.128 [TimeSignature], page 525.

### 2.1.6 DrumVoice

A voice on a percussion staff.

This context also accepts commands for the following context(s):
Voice.

This context creates the following layout object(s):

Section 3.1.19 [Beam], page 397, Section 3.1.20 [BendAfter], page 399, Section 3.1.23 [BreathingSign], page 402, Section 3.1.29 [CombineTextScript], page 410, Section 3.1.34 [Dots], page 419, Section 3.1.35 [DoublePercentRepeat], page 420, Section 3.1.36 [DoublePercentRepeatCounter], page 421, Section 3.1.37 [DoubleRepeatSlash], page 423, Section 3.1.38 [DynamicLineSpanner], page 424, Section 3.1.39 [DynamicText], page 425, Section 3.1.40 [DynamicTextSpanner], page 427, Section 3.1.44 [Flag], page 432, Section 3.1.52 [Hairpin], page 440, Section 3.1.56 [InstrumentSwitch], page 444, Section 3.1.60 [LaissezVibrerTie], page 452, Section 3.1.61 [LaissezVibrerTieColumn], page 453, Section 3.1.75 [MultiMeasureRest], page 468, Section 3.1.76 [MultiMeasureRestNumber], page 469, Section 3.1.77 [MultiMeasureRestScript], page 471, Section 3.1.78 [MultiMeasureRestText], page 472, Section 3.1.81 [NoteColumn], page 476, Section 3.1.82 [NoteHead], page 477, Section 3.1.84 [NoteSpacing], page 478, Section 3.1.88 [PercentRepeat], page 482, Section 3.1.89 [PercentRepeatCounter], page 483, Section 3.1.90 [PhrasingSlur], page 484, Section 3.1.93 [RepeatSlash], page 489, Section 3.1.94 [Repeat-Tie], page 490, Section 3.1.95 [RepeatTieColumn], page 491, Section 3.1.96 [Rest], page 491, Section 3.1.98 [Script], page 493, Section 3.1.99 [ScriptColumn], page 494, Section 3.1.101 [Slur], page 494, Section 3.1.111 [Stem], page 504, Section 3.1.112 [StemStub], page 506, Section 3.1.113 [StemTremolo], page 507, Section 3.1.124 [TextScript], page 519, Section 3.1.125 [TextSpanner], page 521, Section 3.1.126 [Tie], page 523, Section 3.1.127 [TieColumn], page 525, Section 3.1.129 [TrillPitchAccidental], page 528, Section 3.1.130 [TrillPitchGroup], page 529, Section 3.1.131 [TrillPitchHead], page 530, Section 3.1.132 [TrillSpanner], page 531, Section 3.1.133 [Tuplet-Bracket], page 532, and Section 3.1.134 [TupletNumber], page 534.

This is a ‘Bottom’ context; no contexts will be created implicitly from it.
This context cannot contain other contexts.
This context is built from the following engraver(s):

Section 2.2.4 [Auto_beam_engraver], page 315
Generate beams based on measure characteristics and observed Stems.
Uses baseMoment, beatStructure, beamExceptions, measureLength,
and `measurePosition` to decide when to start and stop a beam. Overriding beaming is done through Section 2.2.119 [Stem_engraver], page 355, properties `stemLeftBeamCount` and `stemRightBeamCount`.

Music types accepted:
Section 1.2.9 [beam-forbid-event], page 43,
Properties (read)

`autoBeaming` (boolean)
  If set to true then beams are generated automatically.

`baseMoment` (moment)
  Smallest unit of time that will stand on its own as a subdivided section.

`beamExceptions` (list)
  An alist of exceptions to autobeam rules that normally end on beats.

`beamHalfMeasure` (boolean)
  Whether to allow a beam to begin halfway through the measure in triple time, which could look like 6/8.

`beatStructure` (list)
  List of `baseMoment`s that are combined to make beats.

`subdivideBeams` (boolean)
  If set, multiple beams will be subdivided at `baseMoment` positions by only drawing one beam over the beat.

This engraver creates the following layout object(s):
Section 3.1.19 [Beam], page 397.

Section 2.2.10 [Beam_engraver], page 318
Handle Beam events by engraving beams. If omitted, then notes are printed with flags instead of beams.
Music types accepted:
Section 1.2.8 [beam-event], page 43,
Properties (read)

`baseMoment` (moment)
  Smallest unit of time that will stand on its own as a subdivided section.

`beamMelismaBusy` (boolean)
  Signal if a beam is present.

`beatStructure` (list)
  List of `baseMoment`s that are combined to make beats.

`subdivideBeams` (boolean)
  If set, multiple beams will be subdivided at `baseMoment` positions by only drawing one beam over the beat.
Properties (write)

`forbidBreak` (boolean)
- If set to `#t`, prevent a line break at this point.

This engraver creates the following layout object(s):
Section 3.1.19 [Beam], page 397.

Section 2.2.12 [Bend_engraver], page 319
Create fall spanners.
Music types accepted:
Section 1.2.10 [bend-after-event], page 43,
This engraver creates the following layout object(s):
Section 3.1.20 [BendAfter], page 399.

Section 2.2.14 [Breathing_sign_engraver], page 320
Create a breathing sign.
Music types accepted:
Section 1.2.14 [breathing-event], page 44,
This engraver creates the following layout object(s):
Section 3.1.23 [BreathingSign], page 402.

Section 2.2.16 [Chord_tremolo_engraver], page 321
Generate beams for tremolo repeats.
Music types accepted:
Section 1.2.76 [tremolo-span-event], page 52,
This engraver creates the following layout object(s):
Section 3.1.19 [Beam], page 397.

Section 2.2.28 [Dots_engraver], page 325
Create Section 3.1.34 [Dots], page 419, objects for Section 3.2.98
[rhythmic-head-interface], page 601s.
This engraver creates the following layout object(s):
Section 3.1.34 [Dots], page 419.

Section 2.2.29 [Double_percent_repeat_engraver], page 326
Make double measure repeats.
Music types accepted:
Section 1.2.19 [double-percent-event], page 44,
Properties (read)

`countPercentRepeats` (boolean)
- If set, produce counters for percent repeats.

`measureLength` (moment)
- Length of one measure in the current time signature.

`repeatCountVisibility` (procedure)
- A procedure taking as arguments an integer and context, returning whether the corresponding percent repeat number should be printed when `countPercentRepeats` is set.
Properties (write)

    forbidBreak (boolean)

        If set to #t, prevent a line break at this point.

This engraver creates the following layout object(s):
Section 3.1.35 [DoublePercentRepeat], page 420, and Section 3.1.36 [DoublePercentRepeatCounter], page 421.

Section 2.2.31 [Drum_notes_engraver], page 326
Generate drum note heads.
Music types accepted:
Section 1.2.43 [note-event], page 47,
Properties (read)

    drumStyleTable (hash table)

        The layout style is a hash table, containing the drum-pitches (e.g., the symbol ‘hihat’) as keys, and a list (notehead-style script vertical-position) as values.

This engraver creates the following layout object(s):
Section 3.1.82 [NoteHead], page 477, and Section 3.1.98 [Script], page 493.

Section 2.2.32 [Dynamic_align_engraver], page 327
Align hairpins and dynamic texts on a horizontal line.
Properties (read)

    currentMusicalColumn (graphical (layout) object)

        Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).

This engraver creates the following layout object(s):
Section 3.1.38 [DynamicLineSpanner], page 424.

Section 2.2.33 [Dynamic_engraver], page 327
Create hairpins, dynamic texts and dynamic text spanners.
Music types accepted:
Section 1.2.1 [absolute-dynamic-event], page 42, Section 1.2.13 [break-span-event], page 44, and Section 1.2.63 [span-dynamic-event], page 50,
Properties (read)

    crescendoSpanner (symbol)

        The type of spanner to be used for crescendi. Available values are ‘hairpin’ and ‘text’. If unset, a hairpin crescendo is used.

    crescendoText (markup)

        The text to print at start of non-hairpin crescendo, i.e., ‘cresc.’.
currentMusicalColumn (graphical (layout) object)
Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).

decrescendoSpanner (symbol)
The type of spanner to be used for decrescendi. Available values are 'hairpin' and 'text'. If unset, a hairpin decrescendo is used.

decrescendoText (markup)
The text to print at start of non-hairpin decrescendo, i.e., ‘dim.’.

This engraver creates the following layout object(s):
Section 3.1.39 [DynamicText], page 425, Section 3.1.40 [DynamicTextSpanner], page 427, and Section 3.1.52 [Hairpin], page 440.

Section 2.2.41 [Font_size_engraver], page 330
Put fontSize into font-size grob property.
Properties (read)

fontSize (number)
The relative size of all grobs in a context.

Section 2.2.43 [Forbid_line_break_engraver], page 330
Forbid line breaks when note heads are still playing at some point.
Properties (read)

busyGrobs (list)
A queue of (end-moment . grob) cons cells. This is for internal (C++) use only. This property contains the grobs which are still busy (e.g. note heads, spanners, etc.).

Properties (write)

forbidBreak (boolean)
If set to #t, prevent a line break at this point.

Section 2.2.46 [Grace_auto_beam_engraver], page 332
Generates one autobeam group across an entire grace phrase. As usual, any manual beaming or \noBeam will block autobeaming, just like setting the context property ‘autoBeaming’ to ##f.
Music types accepted:
Section 1.2.9 [beam-forbid-event], page 43,
Properties (read)

autoBeaming (boolean)
If set to true then beams are generated automatically.

This engraver creates the following layout object(s):
Section 3.1.19 [Beam], page 397.
Section 2.2.47 [Grace_beam_engraver], page 332
Handle Beam events by engraving beams. If omitted, then notes are printed with flags instead of beams. Only engravens beams when we are at grace points in time.

Music types accepted:
Section 1.2.8 [beam-event], page 43,

Properties (read)
baseMoment (moment)
Smallest unit of time that will stand on its own as a subdivided section.

beamMelismaBusy (boolean)
Signal if a beam is present.

beatStructure (list)
List of baseMoments that are combined to make beats.

subdivideBeams (boolean)
If set, multiple beams will be subdivided at baseMoment positions by only drawing one beam over the beat.

This engraver creates the following layout object(s):
Section 3.1.19 [Beam], page 397.

Section 2.2.48 [Grace_engraver], page 333
Set font size and other properties for grace notes.

Properties (read)

graceSettings (list)
Overrides for grace notes. This property should be manipulated through the add-grace-property function.

Section 2.2.52 [Grob_pq_engraver], page 334
Administ rate when certain grobs (e.g., note heads) stop playing.

Properties (read)

busyGrobs (list)
A queue of (end-moment . grob) cons cells. This is for internal (C++) use only. This property contains the grobs which are still busy (e.g. note heads, spanners, etc.).

Properties (write)

busyGrobs (list)
A queue of (end-moment . grob) cons cells. This is for internal (C++) use only. This property contains the grobs which are still busy (e.g. note heads, spanners, etc.).
Properties (read)

**busyGrobs** (list)
A queue of \( \text{end-moment . grob} \) cons cells. This is for internal (C++) use only. This property contains the grobs which are still busy (e.g., note heads, spanners, etc.).

Properties (write)

**busyGrobs** (list)
A queue of \( \text{end-moment . grob} \) cons cells. This is for internal (C++) use only. This property contains the grobs which are still busy (e.g., note heads, spanners, etc.).

Section 2.2.56 [Instrument_switch_engraver], page 335
Create a cue text for taking instrument.

Properties (read)

**instrumentCueName** (markup)
The name to print if another instrument is to be taken.

This engraver creates the following layout object(s):
Section 3.1.56 [InstrumentSwitch], page 444.

Section 2.2.61 [Laissez_vibrer_engraver], page 337
Create laissez vibrer items.

Music types accepted:
Section 1.2.30 [laissez-vibrer-event], page 45,
This engraver creates the following layout object(s):
Section 3.1.60 [LaissezVibrerTie], page 452, and Section 3.1.61 [LaissezVibrerTieColumn], page 453.

Section 2.2.75 [Multi_measure_rest_engraver], page 341
Engrave multi-measure rests that are produced with ‘R’. It reads `measurePosition` and `internalBarNumber` to determine what number to print over the Section 3.1.75 [MultiMeasureRest], page 468.

Music types accepted:
Section 1.2.39 [multi-measure-articulation-event], page 46,
Section 1.2.40 [multi-measure-rest-event], page 46, and Section 1.2.41 [multi-measure-text-event], page 47,

Properties (read)

**currentCommandColumn** (graphical (layout) object)
Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

**internalBarNumber** (integer)
Contains the current bar number. This property is used for internal timekeeping, among others by the Accidental_engraver.
measurePosition (moment)
  How much of the current measure have we had.
  This can be set manually to create incomplete
  measures.

restNumberThreshold (number)
  If a multimeasure rest has more measures than
  this, a number is printed.

whichBar (string)
  This property is read to determine what type
  of bar line to create.
  Example:
      \set Staff.whichBar = ".\|:\"
  This will create a start-repeat bar in this
  staff only. Valid values are described in
  scm/bar-line.scm.

This engraver creates the following layout object(s):
Section 3.1.75 [MultiMeasureRest], page 468, Section 3.1.76 [MultiMea-
 sureRestNumber], page 469, Section 3.1.77 [MultiMeasureRestScript],
page 471, and Section 3.1.78 [MultiMeasureRestText], page 472.

Section 2.2.81 [Note_spacing_engraver], page 344
Generate NoteSpacing, an object linking horizontal lines for use in
spacing.
  This engraver creates the following layout object(s):
  Section 3.1.84 [NoteSpacing], page 478.

Section 2.2.83 [Output_property_engraver], page 344
Apply a procedure to any grob acknowledged.
  Music types accepted:
  Section 1.2.4 [apply-output-event], page 43,

Section 2.2.87 [Part_combine_engraver], page 346
Part combine engraver for orchestral scores: Print markings ‘a2’, ‘Solo’,
‘Solo II’, and ‘unisono’.
  Music types accepted:
  Section 1.2.43 [note-event], page 47, and Section 1.2.47 [part-combin-
event], page 48,
  Properties (read)

  aDueText (markup)
  Text to print at a unisono passage.

  partCombineTextsOnNote (boolean)
  Print part-combine texts only on the next note
  rather than immediately on rests or skips.

  printPartCombineTexts (boolean)
  Set ‘Solo’ and ‘A due’ texts in the part com-
  biner?

  soloIIText (markup)
  The text for the start of a solo for voice ‘two’
  when part-combining.
soloText (markup)
The text for the start of a solo when part-combining.

This engraver creates the following layout object(s):
Section 3.1.29 [CombineTextScript], page 410.

Section 2.2.88 [Percent_repeat_engraver], page 346
Make whole measure repeats.
Music types accepted:
Section 1.2.49 [percent-event], page 48,
Properties (read)

  countPercentRepeats (boolean)
  If set, produce counters for percent repeats.

  currentCommandColumn (graphical (layout) object)
  Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

  repeatCountVisibility (procedure)
  A procedure taking as arguments an integer and context, returning whether the corresponding percent repeat number should be printed when countPercentRepeats is set.

This engraver creates the following layout object(s):
Section 3.1.88 [PercentRepeat], page 482, and Section 3.1.89 [PercentRepeatCounter], page 483.

Section 2.2.89 [Phrasing_slur_engraver], page 347
Print phrasing slurs. Similar to Section 2.2.106 [Slur_engraver], page 352.
Music types accepted:
Section 1.2.43 [note-event], page 47, and Section 1.2.51 [phrasing-slur-event], page 48,
This engraver creates the following layout object(s):
Section 3.1.90 [PhrasingSlur], page 484.

Section 2.2.94 [Pitched_trill_engraver], page 349
Print the bracketed note head after a note head with trill.
This engraver creates the following layout object(s):
Section 3.1.129 [TrillPitchAccidental], page 528, Section 3.1.130 [TrillPitchGroup], page 529, and Section 3.1.131 [TrillPitchHead], page 530.

Section 2.2.97 [Repeat_tie_engraver], page 350
Create repeat ties.
Music types accepted:
Section 1.2.53 [repeat-tie-event], page 48,
This engraver creates the following layout object(s):
Section 3.1.94 [RepeatTie], page 490, and Section 3.1.95 [RepeatTieColumn], page 491.
Section 2.2.99 [Rest_engraver], page 350
Engrave rests.
Music types accepted:
Section 1.2.54 [rest-event], page 49,
Properties (read)

```
middleCPosition (number)
The place of the middle C, measured in half
staff-spaces. Usually determined by looking at
middleCClefPosition and middleCOffset.
```

This engraver creates the following layout object(s):
Section 3.1.96 [Rest], page 491.

Section 2.2.100 [Rhythmic_column_engraver], page 351
Generate NoteColumn, an object that groups stems, note heads, and
rests.
This engraver creates the following layout object(s):
Section 3.1.81 [NoteColumn], page 476.

Section 2.2.101 [Script_column_engraver], page 351
Find potentially colliding scripts and put them into a ScriptColumn
object; that will fix the collisions.
This engraver creates the following layout object(s):
Section 3.1.99 [ScriptColumn], page 494.

Section 2.2.102 [Script_engraver], page 351
Handle note scripted articulations.
Music types accepted:
Section 1.2.6 [articulation-event], page 43,
Properties (read)

```
scriptDefinitions (list)
The description of scripts. This is used
by the Script_engraver for typesetting
note-superscripts and subscripts. See scm/
script.scm for more information.
```

This engraver creates the following layout object(s):
Section 3.1.98 [Script], page 493.

Section 2.2.105 [Slash_repeat_engraver], page 352
Make beat repeats.
Music types accepted:
Section 1.2.52 [repeat-slash-event], page 48,
This engraver creates the following layout object(s):
Section 3.1.37 [DoubleRepeatSlash], page 423, and Section 3.1.93 [Re-
peatSlash], page 489.

Section 2.2.106 [Slur_engraver], page 352
Build slur grobs from slur events.
Music types accepted:
Section 1.2.43 [note-event], page 47, and Section 1.2.58 [slur-event], page 49,

Properties (read)

**doubleSlurs** (boolean)
  If set, two slurs are created for every slurred note, one above and one below the chord.

**slurMelismaBusy** (boolean)
  Signal if a slur is present.

This engraver creates the following layout object(s):
Section 3.1.101 [Slur], page 494.

Section 2.2.113 [Spanner_break_forbid_engraver], page 354
Forbid breaks in certain spanners.

Section 2.2.119 [Stem_engraver], page 355
Create stems, flags and single-stem tremolos. It also works together with the beam engraver for overriding beaming.

Music types accepted:
Section 1.2.75 [tremolo-event], page 52, and Section 1.2.78 [tuplet-span-event], page 52,

Properties (read)

**stemLeftBeamCount** (integer)
  Specify the number of beams to draw on the left side of the next note. Overrides automatic beaming. The value is only used once, and then it is erased.

**stemRightBeamCount** (integer)
  See **stemLeftBeamCount**.

**whichBar** (string)
  This property is read to determine what type of bar line to create.
  Example:
  \set Staff.whichBar = ".|:"
  This will create a start-repeat bar in this staff only. Valid values are described in scm/bar-line.scm.

This engraver creates the following layout object(s):
Section 3.1.44 [Flag], page 432, Section 3.1.111 [Stem], page 504, Section 3.1.112 [StemStub], page 506, and Section 3.1.113 [StemTremolo], page 507.

Section 2.2.125 [Text_engraver], page 357
Create text scripts.

Music types accepted:
Section 1.2.71 [text-script-event], page 51,

This engraver creates the following layout object(s):
Section 3.1.124 [TextScript], page 519.
Section 2.2.126 [Text_spanner_engraver], page 358
Create text spanner from an event.
Music types accepted:
Section 1.2.72 [text-span-event], page 51,
Properties (read)

\texttt{currentMusicalColumn} \texttt{(graphical (layout)}
\texttt{object)}
Grob that is X-parent to all non-breakable
items (note heads, lyrics, etc.).

This engraver creates the following layout object(s):
Section 3.1.125 [TextSpanner], page 521.

Section 2.2.127 [Tie_engraver], page 358
Generate ties between note heads of equal pitch.
Music types accepted:
Section 1.2.73 [tie-event], page 51,
Properties (read)

\texttt{skipTypesetting} \texttt{(boolean)}
If true, no typesetting is done, speeding up
the interpretation phase. Useful for debugging
large scores.

\texttt{tieWaitForNote} \texttt{(boolean)}
If true, tied notes do not have to follow each
other directly. This can be used for writing out
arpeggios.

Properties (write)

\texttt{tieMelismaBusy} \texttt{(boolean)}
Signal whether a tie is present.

This engraver creates the following layout object(s):
Section 3.1.126 [Tie], page 523, and Section 3.1.127 [TieColumn],
page 525.

Section 2.2.132 [Trill_spanner_engraver], page 360
Create trill spanner from an event.
Music types accepted:
Section 1.2.77 [trill-span-event], page 52,
Properties (read)

\texttt{currentCommandColumn} \texttt{(graphical (layout)}
\texttt{object)}
Grob that is X-parent to all current breakable
(clef, key signature, etc.) items.

\texttt{currentMusicalColumn} \texttt{(graphical (layout)}
\texttt{object)}
Grob that is X-parent to all non-breakable
items (note heads, lyrics, etc.).

This engraver creates the following layout object(s):
Section 3.1.132 [TrillSpanner], page 531.
Section 2.2.133 [Tuplet_ engraver], page 361
Catch tuplet events and generate appropriate bracket.
Music types accepted:
Section 1.2.78 [tuplet-span-event], page 52,
Properties (read)

\[ \texttt{tupletFullLength} \] (boolean)
If set, the tuplet is printed up to the start of
the next note.

\[ \texttt{tupletFullLengthNote} \] (boolean)
If set, end at the next note, otherwise end on
the matter (time signatures, etc.) before the
note.
This engraver creates the following layout object(s):
Section 3.1.133 [TupletBracket], page 532, and Section 3.1.134 [Tuplet-
Number], page 534.

2.1.7 Dynamics
Holds a single line of dynamics, which will be centered between the staves surrounding this
context.

This context also accepts commands for the following context(s):
Voice.
This context creates the following layout object(s):
Section 3.1.11 [BarLine], page 388, Section 3.1.38 [DynamicLineSpanner], page 424,
Section 3.1.39 [DynamicText], page 425, Section 3.1.40 [DynamicTextSpanner], page 427,
Section 3.1.52 [Hairpin], page 440, Section 3.1.91 [PianoPedalBracket], page 486, Section 3.1.98
[Script], page 493, Section 3.1.102 [SostenutoPedal], page 497, Section 3.1.116 [SustainPedal],
page 511, Section 3.1.124 [TextScript], page 519, Section 3.1.125 [TextSpanner], page 521,
Section 3.1.135 [UnaCordaPedal], page 535, and Section 3.1.139 [VerticalAxisGroup], page 538.
This context sets the following properties:
• Set grob-property \texttt{font-shape} in Section 3.1.124 [TextScript], page 519, to \texttt{\textquotesingle italic}.
• Set grob-property \texttt{nonstaff-relatedstaff-spacing} in Section 3.1.139 [VerticalAxisGroup], page 538, to:
\texttt{((basic-distance . 5) (padding . 0.5))}
• Set grob-property \texttt{outside-staff-priority} in Section 3.1.38 [DynamicLineSpanner],
page 424, to \#f.
• Set grob-property \texttt{outside-staff-priority} in Section 3.1.39 [DynamicText], page 425, to
\#f.
• Set grob-property \texttt{outside-staff-priority} in Section 3.1.52 [Hairpin], page 440, to \#f.
• Set grob-property \texttt{staff-affinity} in Section 3.1.139 [VerticalAxisGroup], page 538, to 0.
• Set grob-property \texttt{Y-offset} in Section 3.1.38 [DynamicLineSpanner], page 424, to 0.
• Set translator property \texttt{pedalSustainStrings} to:
\texttt{"Ped.\" "*Ped.\" "]star\")
• Set translator property \texttt{pedalUnaCordaStrings} to:
\texttt{("una corda\" "]\" "tre corde\")}
This is a ‘Bottom’ context; no contexts will be created implicitly from it.
This context cannot contain other contexts.
This context is built from the following engraver(s):

Section 2.2.5 [Axis_group_engraver], page 316
Group all objects created in this context in a VerticalAxisGroup spanner.
Properties (read)

\texttt{currentCommandColumn} \quad \text{(graphical (layout) object)}
\begin{quote}
Grob that is X-parent to all current breakable (clef, key signature, etc.) items.
\end{quote}

\texttt{hasAxisGroup} \quad \text{(boolean)}
\begin{quote}
True if the current context is contained in an axis group.
\end{quote}

\texttt{keepAliveInterfaces} \quad \text{(list)}
\begin{quote}
A list of symbols, signifying grob interfaces that are worth keeping a staff with \texttt{remove-empty} set around for.
\end{quote}

Properties (write)

\texttt{hasAxisGroup} \quad \text{(boolean)}
\begin{quote}
True if the current context is contained in an axis group.
\end{quote}

This engraver creates the following layout object(s):
Section 3.1.139 [VerticalAxisGroup], page 538.

Section 2.2.7 [Bar_engraver], page 316
Create barlines. This engraver is controlled through the \texttt{whichBar} property. If it has no bar line to create, it will forbid a linebreak at this point.
This engraver is required to trigger the creation of clefs at the start of systems.
Properties (read)

\texttt{whichBar} \quad \text{(string)}
\begin{quote}
This property is read to determine what type of bar line to create.
Example:
\begin{verbatim}
\set Staff.whichBar = ".|:
\end{verbatim}
This will create a start-repeat bar in this staff only. Valid values are described in \texttt{scm/bar-line.scm}.
\end{quote}

Properties (write)

\texttt{forbidBreak} \quad \text{(boolean)}
\begin{quote}
If set to \texttt{#t}, prevent a line break at this point.
\end{quote}

This engraver creates the following layout object(s):
Section 3.1.11 [BarLine], page 388.
Section 2.2.32 [Dynamic_align_engraver], page 327
Align hairpins and dynamic texts on a horizontal line.

Properties (read)

- **currentMusicalColumn** (graphical (layout) object)
  Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).

This engraver creates the following layout object(s):
Section 3.1.38 [DynamicLineSpanner], page 424.

Section 2.2.33 [Dynamic_engraver], page 327
Create hairpins, dynamic texts and dynamic text spanners.

Music types accepted:
Section 1.2.1 [absolute-dynamic-event], page 42, Section 1.2.13 [break-span-event], page 44, and Section 1.2.63 [span-dynamic-event], page 50.

Properties (read)

- **crescendoSpanner** (symbol)
  The type of spanner to be used for crescendi. Available values are ‘hairpin’ and ‘text’. If unset, a hairpin crescendo is used.

- **crescendoText** (markup)
  The text to print at start of non-hairpin crescendo, i.e., ‘cresc.’.

- **currentMusicalColumn** (graphical (layout) object)
  Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).

- **decrescendoSpanner** (symbol)
  The type of spanner to be used for decrescendi. Available values are ‘hairpin’ and ‘text’. If unset, a hairpin decrescendo is used.

- **decrescendoText** (markup)
  The text to print at start of non-hairpin decrescendo, i.e., ‘dim.’.

This engraver creates the following layout object(s):
Section 3.1.39 [DynamicText], page 425, Section 3.1.40 [DynamicTextSpanner], page 427, and Section 3.1.52 [Hairpin], page 440.

Section 2.2.41 [Font_size_engraver], page 330
Put **fontSize** into font-size grob property.

Properties (read)

- **fontSize** (number)
  The relative size of all grobs in a context.

Section 2.2.83 [Output_property_engraver], page 344
Apply a procedure to any grob acknowledged.

Music types accepted:
Section 1.2.4 [apply-output-event], page 43,
Section 2.2.91 [Piano_pedal_engraver], page 347
Engrave piano pedal symbols and brackets.
Music types accepted:
Section 1.2.61 [sostenuto-event], page 49, Section 1.2.69 [sustain-event],
page 51, and Section 1.2.79 [una-corda-event], page 52,
Properties (read)
  currentCommandColumn (graphical (layout)
  object)
    Grob that is X-parent to all current breakable
    (clef, key signature, etc.) items.
pedalSostenutoStrings (list)
  See pedalSustainStrings.
pedalSostenutoStyle (symbol)
  See pedalSustainStyle.
pedalSustainStrings (list)
  A list of strings to print for sustain-pedal. Format is
  (up updown down), where each of the
  three is the string to print when this is done
  with the pedal.
pedalSustainStyle (symbol)
  A symbol that indicates how to print sustain
  pedals: text, bracket or mixed (both).
pedalUnaCordaStrings (list)
  See pedalSustainStrings.
pedalUnaCordaStyle (symbol)
  See pedalSustainStyle.

This engraver creates the following layout object(s):
Section 3.1.91 [PianoPedalBracket], page 486, Section 3.1.102 [SostenutoPedal],
page 497, Section 3.1.116 [SustainPedal], page 511, and
Section 3.1.135 [UnaCordaPedal], page 535.

Section 2.2.102 [Script_engraver], page 351
Handle note scripted articulations.
Music types accepted:
Section 1.2.6 [articulation-event], page 43,
Properties (read)
  scriptDefinitions (list)
    The description of scripts. This is used
    by the Script_engraver for typesetting
    note-superscripts and subscripts. See scm/
    script.scm for more information.

This engraver creates the following layout object(s):
Section 3.1.98 [Script], page 493.

Section 2.2.125 [Text_engraver], page 357
Create text scripts.
Music types accepted:
Section 1.2.71 [text-script-event], page 51,
This engraver creates the following layout object(s):
Section 3.1.124 [TextScript], page 519.

Section 2.2.126 [Text_spanner_engraver], page 358
Create text spanner from an event.
Music types accepted:
Section 1.2.72 [text-span-event], page 51,
Properties (read)
  currentMusicalColumn (graphical (layout) object)
  Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).

This engraver creates the following layout object(s):
Section 3.1.125 [TextSpanner], page 521.

2.1.8 FiguredBass
A context for printing a figured bass line.
This context creates the following layout object(s):
Section 3.1.13 [BassFigure], page 394, Section 3.1.14 [BassFigureAlignment], page 394, Section 3.1.16 [BassFigureBracket], page 396, Section 3.1.17 [BassFigureContinuation], page 396, Section 3.1.18 [BassFigureLine], page 396, Section 3.1.108 [StaffSpacing], page 502, and Section 3.1.139 [VerticalAxisGroup], page 538.
This context sets the following properties:
• Set grob-property nonstaff-nonstaff-spacing.padding in Section 3.1.139 [VerticalAxisGroup], page 538, to 0.5.
• Set grob-property nonstaff-relatedstaff-spacing.padding in Section 3.1.139 [VerticalAxisGroup], page 538, to 0.5.
• Set grob-property remove-empty in Section 3.1.139 [VerticalAxisGroup], page 538, to #t.
• Set grob-property remove-first in Section 3.1.139 [VerticalAxisGroup], page 538, to #t.
• Set grob-property staff-affinity in Section 3.1.139 [VerticalAxisGroup], page 538, to 1.
This is a ‘Bottom’ context; no contexts will be created implicitly from it.
This context cannot contain other contexts.
This context is built from the following engraver(s):
Section 2.2.5 [Axis_group_engraver], page 316
Group all objects created in this context in a VerticalAxisGroup spanner.
Properties (read)
  currentCommandColumn (graphical (layout) object)
  Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

  hasAxisGroup (boolean)
  True if the current context is contained in an axis group.
**keepAliveInterfaces** (list)
A list of symbols, signifying grob interfaces that are worth keeping a staff with `remove-empty` set around for.

Properties (write)

**hasAxisGroup** (boolean)
True if the current context is contained in an axis group.

This engraver creates the following layout object(s):
Section 3.1.139 [VerticalAxisGroup], page 538.

**Section 2.2.37 [Figured_bass_engraver], page 328**
Make figured bass numbers.
Music types accepted:
Section 1.2.7 [bass-figure-event], page 43, and Section 1.2.54 [rest-event], page 49,

Properties (read)

**figuredBassAlterationDirection** (direction)
Where to put alterations relative to the main figure.

**figuredBassCenterContinuations** (boolean)
Whether to vertically center pairs of extender lines. This does not work with three or more lines.

**figuredBassFormatter** (procedure)
A routine generating a markup for a bass figure.

**ignoreFiguredBassRest** (boolean)
Don’t swallow rest events.

**implicitBassFigures** (list)
A list of bass figures that are not printed as numbers, but only as extender lines.

**useBassFigureExtenders** (boolean)
Whether to use extender lines for repeated bass figures.

This engraver creates the following layout object(s):
Section 3.1.13 [BassFigure], page 394, Section 3.1.14 [BassFigure-Alignment], page 394, Section 3.1.16 [BassFigureBracket], page 396, Section 3.1.17 [BassFigureContinuation], page 396, and Section 3.1.18 [BassFigureLine], page 396.

**Section 2.2.104 [Separating_line_group_engraver], page 352**
Generate objects for computing spacing parameters.
Properties (read)

**createSpacing** (boolean)
Create StaffSpacing objects? Should be set for staves.
Chapter 2: Translation

2.1.9 FretBoards

A context for displaying fret diagrams.

This context also accepts commands for the following context(s):
Staff.

This context creates the following layout object(s):
Section 3.1.47 [FretBoard], page 435, Section 3.1.55 [InstrumentName], page 443, Section 3.1.108 [StaffSpacing], page 502, and Section 3.1.139 [VerticalAxisGroup], page 538.

This context sets the following properties:
• Set translator property handleNegativeFrets to 'recalculate.
• Set translator property instrumentName to '().
• Set translator property predefinedDiagramTable to ##<hash-table 0/113>.
• Set translator property restrainOpenStrings to #f.
• Set translator property shortInstrumentName to '().

This is a ‘Bottom’ context; no contexts will be created implicitly from it.
This context cannot contain other contexts.

This context is built from the following engraver(s):

Section 2.2.5 [Axis_group_engraver], page 316
Group all objects created in this context in a VerticalAxisGroup spanner.

Properties (read)

**currentCommandColumn** (graphical (layout) object)
Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

**hasAxisGroup** (boolean)
True if the current context is contained in an axis group.

**keepAliveInterfaces** (list)
A list of symbols, signifying grob interfaces that are worth keeping a staff with remove-empty set around for.

Properties (write)

**hasAxisGroup** (boolean)
True if the current context is contained in an axis group.

This engraver creates the following layout object(s):
Section 3.1.139 [VerticalAxisGroup], page 538.
Section 2.2.41 [Font_size_engraver], page 330

Put fontSize into font-size grob property.

Properties (read)

fontSize (number)

The relative size of all grobs in a context.

Section 2.2.44 [Fretboard_engraver], page 331

Generate fret diagram from one or more events of type NoteEvent.

Music types accepted:

Section 1.2.23 [fingering-event], page 45, Section 1.2.43 [note-event], page 47, and Section 1.2.67 [string-number-event], page 51,

Properties (read)

chordChanges (boolean)

Only show changes in chords scheme?

defaultStrings (list)

A list of strings to use in calculating frets for tablatures and fretboards if no strings are provided in the notes for the current moment.

highStringOne (boolean)

Whether the first string is the string with highest pitch on the instrument. This used by the automatic string selector for tablature notation.

maximumFretStretch (number)

Don’t allocate frets further than this from specified frets.

minimumFret (number)

The tablature auto string-selecting mechanism selects the highest string with a fret at least minimumFret.

noteToFretFunction (procedure)

Convert list of notes and list of defined strings to full list of strings and fret numbers. Parameters: The context, a list of note events, a list of tabstring events, and the fretboard grob if a fretboard is desired.

predefinedDiagramTable (hash table)

The hash table of predefined fret diagrams to use in FretBoards.

stringTunings (list)

The tablature strings tuning. It is a list of the pitches of each string (starting with the lowest numbered one).

tablatureFormat (procedure)

A function formatting a tablature note head. Called with three arguments: context, string number and, fret number. It returns the text as a markup.
This engraver creates the following layout object(s):
Section 3.1.47 [FretBoard], page 435.

Section 2.2.55 [Instrument_name_engraver], page 334
Create a system start text for instrument or vocal names.
Properties (read)

\begin{itemize}
\item \texttt{currentCommandColumn} (graphical (layout) object)
\quad Grob that is X-parent to all current breakable (clef, key signature, etc.) items.
\item \texttt{instrumentName} (markup)
\quad The name to print left of a staff.
\quad The \texttt{instrumentName} property labels the staff in the first system, and the \texttt{shortInstrumentName} property labels following lines.
\item \texttt{shortInstrumentName} (markup)
\quad See \texttt{instrumentName}.
\item \texttt{shortVocalName} (markup)
\quad Name of a vocal line, short version.
\item \texttt{vocalName} (markup)
\quad Name of a vocal line.
\end{itemize}

This engraver creates the following layout object(s):
Section 3.1.55 [InstrumentName], page 443.

Section 2.2.83 [Output_property_engraver], page 344
Apply a procedure to any grob acknowledged.
Music types accepted:
Section 1.2.4 [apply-output-event], page 43,
Section 2.2.104 [Separating_line_group_engraver], page 352
Generate objects for computing spacing parameters.
Properties (read)

\begin{itemize}
\item \texttt{createSpacing} (boolean)
\quad Create \texttt{StaffSpacing} objects? Should be set for staves.
\end{itemize}

Properties (write)

\begin{itemize}
\item \texttt{hasStaffSpacing} (boolean)
\quad True if the current \texttt{CommandColumn} contains items that will affect spacing.
\end{itemize}

This engraver creates the following layout object(s):
Section 3.1.108 [StaffSpacing], page 502.

\section*{2.1.10 Global}
Hard coded entry point for LilyPond. Cannot be tuned.
This context creates the following layout object(s):
none.
2.1.11 GrandStaff

A group of staves, with a brace on the left side, grouping the staves together. The bar lines of the contained staves are connected vertically.

This context creates the following layout object(s):

Section 3.1.9 [Arpeggio], page 386, Section 3.1.55 [InstrumentName], page 443, Section 3.1.105 [SpanBar], page 500, Section 3.1.106 [SpanBarStub], page 501, Section 3.1.119 [SystemStartBar], page 514, Section 3.1.120 [SystemStartBrace], page 515, Section 3.1.121 [SystemStartBracket], page 516, Section 3.1.122 [SystemStartSquare], page 517, and Section 3.1.138 [VerticalAlignment], page 538.

This context sets the following properties:

- Set grob-property extra-spacing-width in Section 3.1.39 [DynamicText], page 425, to #f.
- Set translator property instrumentName to '().
- Set translator property localAlterations to '().
- Set translator property shortInstrumentName to '().
- Set translator property systemStartDelimiter to 'SystemStartBrace.
- Set translator property topLevelAlignment to #f.

This is not a ‘Bottom’ context; search for such a one will commence after creating an implicit context of type Section 2.1.26 [Score], page 219.

Context Global can contain Section 2.1.26 [Score], page 219.

This context is built from the following engraver(s):

Section 2.2.55 [Instrument_name_engraver], page 334
Create a system start text for instrument or vocal names.

Properties (read)

currentCommandColumn (graphical (layout) object)
Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

instrumentName (markup)
The name to print left of a staff. The instrumentName property labels the staff in the first system, and the shortInstrumentName property labels following lines.

shortInstrumentName (markup)
See instrumentName.

shortVocalName (markup)
Name of a vocal line, short version.

ingVocalName (markup)
Name of a vocal line.
This engraver creates the following layout object(s):
Section 3.1.55 [InstrumentName], page 443.

**Section 2.2.109 [Span_arpeggio_engraver], page 353**
Make arpeggios that span multiple staves.
Properties (read)

- **connectArpeggios** (boolean)
  If set, connect arpeggios across piano staff.

This engraver creates the following layout object(s):
Section 3.1.9 [Arpeggio], page 386.

**Section 2.2.110 [Span_bar_engraver], page 353**
Make cross-staff bar lines: It catches all normal bar lines and draws a single span bar across them.
This engraver creates the following layout object(s):
Section 3.1.105 [SpanBar], page 500.

**Section 2.2.111 [Span_bar_stub_engraver], page 354**
Make stubs for span bars in all contexts that the span bars cross.
This engraver creates the following layout object(s):
Section 3.1.106 [SpanBarStub], page 501.

**Section 2.2.120 [System_start_delimiter_engraver], page 356**
Create a system start delimiter (i.e., a SystemStartBar, SystemStartBrace, SystemStartBracket or SystemStartSquare spanner).
Properties (read)

- **currentCommandColumn** (graphical (layout) object)
  Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

- **systemStartDelimiter** (symbol)
  Which grob to make for the start of the system/staff? Set to SystemStartBrace, SystemStartBracket or SystemStartBar.

- **systemStartDelimiterHierarchy** (pair)
  A nested list, indicating the nesting of a start delimiters.

This engraver creates the following layout object(s):
Section 3.1.119 [SystemStartBar], page 514, Section 3.1.120 [SystemStartBrace], page 515, Section 3.1.121 [SystemStartBracket], page 516, and Section 3.1.122 [SystemStartSquare], page 517.

**Section 2.2.136 [Vertical_align_engraver], page 361**
Catch groups (staves, lyrics lines, etc.) and stack them vertically.
Properties (read)

- **alignAboveContext** (string)
  Where to insert newly created context in vertical alignment.
alignBelowContext (string)
   Where to insert newly created context in vertical alignment.

hasAxisGroup (boolean)
   True if the current context is contained in an axis group.

This engraver creates the following layout object(s):
   Section 3.1.138 [VerticalAlignment], page 538.

2.1.12 GregorianTranscriptionStaff
Handles clefs, bar lines, keys, accidentals. It can contain Voice contexts.

This context also accepts commands for the following context(s):
   Staff.

This context creates the following layout object(s):
   Section 3.1.1 [Accidental], page 377, Section 3.1.2 [AccidentalCautionary], page 378, Section 3.1.3 [AccidentalPlacement], page 379, Section 3.1.4 [AccidentalSuggestion], page 380, Section 3.1.11 [BarLine], page 388, Section 3.1.13 [BassFigure], page 394, Section 3.1.14 [BassFigureAlignment], page 394, Section 3.1.15 [BassFigureAlignmentPositioning], page 395, Section 3.1.16 [BassFigureBracket], page 396, Section 3.1.17 [BassFigureContinuation], page 396, Section 3.1.18 [BassFigureLine], page 396, Section 3.1.25 [Clef], page 405, Section 3.1.26 [ClefModifier], page 407, Section 3.1.30 [CueClef], page 411, Section 3.1.31 [CueEndClef], page 414, Section 3.1.33 [DotColumn], page 419, Section 3.1.43 [FingeringColumn], page 431, Section 3.1.55 [InstrumentName], page 443, Section 3.1.57 [KeyCancellation], page 446, Section 3.1.58 [KeySignature], page 448, Section 3.1.62 [LedgerLineSpanner], page 453, Section 3.1.80 [NoteCollision], page 475, Section 3.1.85 [OttavaBracket], page 479, Section 3.1.91 [PianoPedalBracket], page 486, Section 3.1.97 [RestCollision], page 492, Section 3.1.100 [ScriptRow], page 494, Section 3.1.102 [SostenutoPedal], page 497, Section 3.1.103 [SostenutoPedalLineSpanner], page 498, Section 3.1.108 [StaffSpacing], page 502, Section 3.1.109 [StaffSymbol], page 503, Section 3.1.116 [SustainPedal], page 511, Section 3.1.117 [SustainPedalLineSpanner], page 512, Section 3.1.128 [TimeSignature], page 525, Section 3.1.135 [UnaCordaPedal], page 535, Section 3.1.136 [UnaCordaPedalLineSpanner], page 536, and Section 3.1.139 [VerticalAxisGroup], page 538.

This context sets the following properties:
   • Set grob-property transparent in Section 3.1.11 [BarLine], page 388, to #t.
   • Set translator property createSpacing to #t.
   • Set translator property ignoreFiguredBassRest to #f.
   • Set translator property instrumentName to '().
   • Set translator property localAlterations to '().
   • Set translator property ottavationMarkups to:
     '((4 . "29")
      (3 . "22")
      (2 . "15")
      (1 . "8")
      (-1 . "8")
      (-2 . "15")
      (-3 . "22")
      (-4 . "29"))
   • Set translator property shortInstrumentName to '().
This is not a ‘Bottom’ context; search for such a one will commence after creating an implicit context of type Section 2.1.13 [GregorianTranscriptionVoice], page 117.

Context GregorianTranscriptionStaff can contain Section 2.1.3 [CueVoice], page 63, Section 2.1.13 [GregorianTranscriptionVoice], page 117, and Section 2.1.20 [NullVoice], page 184.

This context is built from the following engraver(s):

Section 2.2.1 [Accidental_engraver], page 313
Make accidentals. Catch note heads, ties and notices key-change events. This engraver usually lives at Staff level, but reads the settings for Accidental at Voice level, so you can \override them at Voice.

Properties (read)

accidentalGrouping (symbol)
If set to 'voice, accidentals on the same note in different octaves may be horizontally staggered if in different voices.

autoAccidentals (list)
List of different ways to typeset an accidental. For determining when to print an accidental, several different rules are tried. The rule that gives the highest number of accidentals is used. Each entry in the list is either a symbol or a procedure.

symbol The symbol is the name of the context in which the following rules are to be applied. For example, if context is Section “Score” in Internals Reference then all staves share accidentals, and if context is Section “Staff” in Internals Reference then all voices in the same staff share accidentals, but staves do not.

procedure The procedure represents an accidental rule to be applied to the previously specified context. The procedure takes the following arguments:

ccontext The current context to which the rule should be applied.
pitch The pitch of the note to be evaluated.
barnum The current bar number.
measurepos The current measure position.
The procedure returns a pair of booleans. The first states whether an extra natural should be added. The second states whether an accidental should be printed. (#t . #f) does not make sense.

**autoCautionaries** *(list)*
List similar to **autoAccidentals**, but it controls cautionary accidentals rather than normal ones. Both lists are tried, and the one giving the most accidentals wins. In case of draw, a normal accidental is typeset.

**extraNatural** *(boolean)*
Whether to typeset an extra natural sign before accidentals that reduce the effect of a previous alteration.

**harmonicAccidentals** *(boolean)*
If set, harmonic notes in chords get accidentals.

**internalBarNumber** *(integer)*
Contains the current bar number. This property is used for internal timekeeping, among others by the **Accidental_engraver**.

**keyAlterations** *(list)*
The current key signature. This is an list containing (step . alter) or ((octave . step) . alter), where step is a number in the range 0 to 6 and alter a fraction, denoting alteration. For alterations, use symbols, e.g. 
keyAlterations = #`((6 ,FLAT)).

**localAlterations** *(list)*
The key signature at this point in the measure. The format is the same as for **keyAlterations**, but can also contain ((octave . name) . (alter barnumber . measureposition)) pairs.

Properties (write)

**localAlterations** *(list)*
The key signature at this point in the measure. The format is the same as for **keyAlterations**, but can also contain ((octave . name) . (alter barnumber . measureposition)) pairs.

This engraver creates the following layout object(s):
Section 3.1.1 [Accidental], page 377, Section 3.1.2 [AccidentalCautionary], page 378, Section 3.1.3 [AccidentalPlacement], page 379, and Section 3.1.4 [AccidentalSuggestion], page 380.

**Section 2.2.5 [Axis_group_engraver], page 316**
Group all objects created in this context in a **VerticalAxisGroup** spanner.
Properties (read)

**currentCommandColumn** (graphical layout object)
Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

**hasAxisGroup** (boolean)
True if the current context is contained in an axis group.

**keepAliveInterfaces** (list)
A list of symbols, signifying grob interfaces that are worth keeping a staff with `remove-empty` set around for.

Properties (write)

**hasAxisGroup** (boolean)
True if the current context is contained in an axis group.

This engraver creates the following layout object(s):
Section 3.1.139 [VerticalAxisGroup], page 538.

**Section 2.2.7 [Bar_engraver], page 316**
Create barlines. This engraver is controlled through the `whichBar` property. If it has no bar line to create, it will forbid a line break at this point. This engraver is required to trigger the creation of clefs at the start of systems.

Properties (read)

**whichBar** (string)
This property is read to determine what type of bar line to create.
Example:

```
\set Staff.whichBar = ".|:
```
This will create a start-repeat bar in this staff only. Valid values are described in `scm/bar-line.scm`.

Properties (write)

**forbidBreak** (boolean)
If set to `#t`, prevent a line break at this point.

This engraver creates the following layout object(s):
Section 3.1.11 [BarLine], page 388.

**Section 2.2.17 [Clef_engraver], page 321**
Determine and set reference point for pitches.

Properties (read)

**clefGlyph** (string)
Name of the symbol within the music font.

**clefPosition** (number)
Where should the center of the clef symbol go, measured in half staff spaces from the center of the staff.
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**clefTransposition** (integer)
Add this much extra transposition. Values of 7 and -7 are common.

**clefTranspositionStyle** (symbol)
Determines the way the ClefModifier grob is displayed. Possible values are ‘default’, ‘parenthesized’ and ‘bracketed’.

**explicitClefVisibility** (vector)
‘break-visibility’ function for clef changes.

**forceClef** (boolean)
Show clef symbol, even if it has not changed.
Only active for the first clef after the property is set, not for the full staff.

This engraver creates the following layout object(s):
Section 3.1.25 [Clef], page 405, and Section 3.1.26 [ClefModifier], page 407.

Section 2.2.19 [Collision_engraver], page 322
Collect NoteColumns, and as soon as there are two or more, put them in a NoteCollision object.
This engraver creates the following layout object(s):
Section 3.1.80 [NoteCollision], page 475.

Section 2.2.24 [Cue_clef_engraver], page 324
Determine and set reference point for pitches in cued voices.

Properties (read)

**clefTransposition** (integer)
Add this much extra transposition. Values of 7 and -7 are common.

**cueClefGlyph** (string)
Name of the symbol within the music font.

**cueClefPosition** (number)
Where should the center of the clef symbol go, measured in half staff spaces from the center of the staff.

**cueClefTransposition** (integer)
Add this much extra transposition. Values of 7 and -7 are common.

**cueClefTranspositionStyle** (symbol)
Determines the way the ClefModifier grob is displayed. Possible values are ‘default’, ’parenthesized’ and ’bracketed’.

**explicitCueClefVisibility** (vector)
’break-visibility’ function for cue clef changes.

**middleCCuePosition** (number)
The position of the middle C, as determined only by the clef of the cue notes. This can be
calculated by looking at cueClefPosition and cueClefGlyph.

This engraver creates the following layout object(s):
Section 3.1.26 [ClefModifier], page 407, Section 3.1.30 [CueClef], page 411, and Section 3.1.31 [CueEndClef], page 414.

Section 2.2.27 [Dot_column_engraver], page 325
Engrave dots on dotted notes shifted to the right of the note. If omitted, then dots appear on top of the notes.
This engraver creates the following layout object(s):
Section 3.1.33 [DotColumn], page 419.

Section 2.2.37 [Figured_bass_engraver], page 328
Make figured bass numbers.
Music types accepted:
Section 1.2.7 [bass-figure-event], page 43, and Section 1.2.54 [rest-event], page 49,
Properties (read)

figuredBassAlterationDirection (direction)
Where to put alterations relative to the main figure.

figuredBassCenterContinuations (boolean)
Whether to vertically center pairs of extender lines. This does not work with three or more lines.

figuredBassFormatter (procedure)
A routine generating a markup for a bass figure.

ignoreFiguredBassRest (boolean)
Don’t swallow rest events.

implicitBassFigures (list)
A list of bass figures that are not printed as numbers, but only as extender lines.

useBassFigureExtenders (boolean)
Whether to use extender lines for repeated bass figures.

This engraver creates the following layout object(s):
Section 3.1.13 [BassFigure], page 394, Section 3.1.14 [BassFigure-Alignment], page 394, Section 3.1.16 [BassFigureBracket], page 396, Section 3.1.17 [BassFigureContinuation], page 396, and Section 3.1.18 [BassFigureLine], page 396.

Section 2.2.38 [Figured_bass_position_engraver], page 329
Position figured bass alignments over notes.
This engraver creates the following layout object(s):
Section 3.1.15 [BassFigureAlignmentPositioning], page 395.
Section 2.2.39 [Fingering_column_engraver], page 329
Find potentially colliding scripts and put them into a FingeringColumn object; that will fix the collisions.
This engraver creates the following layout object(s):
Section 3.1.43 [FingeringColumn], page 431.

Section 2.2.41 [Font_size_engraver], page 330
Put fontSize into font-size grob property.
Properties (read)

fontSize (number)
The relative size of all grobs in a context.

Section 2.2.52 [Grob_pq_engraver], page 334
Administrate when certain grobs (e.g., note heads) stop playing.
Properties (read)

busyGrobs (list)
A queue of (end-moment . grob) cons cells.
This is for internal (C++) use only. This property contains the grobs which are still busy (e.g. note heads, spanners, etc.).

Properties (write)

busyGrobs (list)
A queue of (end-moment . grob) cons cells.
This is for internal (C++) use only. This property contains the grobs which are still busy (e.g. note heads, spanners, etc.).

Section 2.2.55 [Instrument_name_engraver], page 334
Create a system start text for instrument or vocal names.
Properties (read)

currentCommandColumn (graphical (layout) object)
Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

instrumentName (markup)
The name to print left of a staff.
The instrumentName property labels the staff in the first system, and the shortInstrumentName property labels following lines.

shortInstrumentName (markup)
See instrumentName.

shortVocalName (markup)
Name of a vocal line, short version.

vocalName (markup)
Name of a vocal line.
This engraver creates the following layout object(s):
Section 3.1.55 [InstrumentName], page 443.
Section 2.2.58 [Key_engraver], page 335
Engrave a key signature.
Music types accepted:
Section 1.2.28 [key-change-event], page 45,
Properties (read)

createKeyOnClefChange (boolean)
Print a key signature whenever the clef is changed.

explicitKeySignatureVisibility (vector)
‘break-visibility’ function for explicit key changes. ‘override’ of the break-visibility property will set the visibility for normal (i.e., at the start of the line) key signatures.

extraNatural (boolean)
Whether to typeset an extra natural sign before accidentals that reduce the effect of a previous alteration.

keyAlterationOrder (list)
An alist that defines in what order alterations should be printed. The format is (step . alter), where step is a number from 0 to 6 and alter from -2 (sharp) to 2 (flat).

keyAlterations (list)
The current key signature. This is an alist containing (step . alter) or ((octave . step) . alter), where step is a number in the range 0 to 6 and alter a fraction, denoting alteration. For alterations, use symbols, e.g. keyAlterations = #`((6 . ,FLAT)).

lastKeyAlterations (list)
Last key signature before a key signature change.

middleCClefPosition (number)
The position of the middle C, as determined only by the clef. This can be calculated by looking at clefPosition and clefGlyph.

printKeyCancellation (boolean)
Print restoration alterations before a key signature change.

Properties (write)

keyAlterations (list)
The current key signature. This is an alist containing (step . alter) or ((octave . step) . alter), where step is a number in the range 0 to 6 and alter a fraction, denoting alteration. For alterations, use symbols, e.g. keyAlterations = #`((6 . ,FLAT)).
lastKeyAlterations (list)
Last key signature before a key signature change.

tonic (pitch)
The tonic of the current scale.

This engraver creates the following layout object(s):
Section 3.1.57 [KeyCancellation], page 446, and Section 3.1.58 [KeySignature], page 448.

Section 2.2.62 [Ledger_line_engraver], page 337
Create the spanner to draw ledger lines, and notices objects that need ledger lines.
This engraver creates the following layout object(s):
Section 3.1.62 [LedgerLineSpanner], page 453.

Section 2.2.82 [Ottava_spanner_engraver], page 344
Create a text spanner when the ottavation property changes.
Properties (read)
currentMusicalColumn (graphical (layout) object)
Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).
middleCOffset (number)
The offset of middle C from the position given by middleCClefPosition This is used for ottava brackets.
ottomation (markup)
If set, the text for an ottava spanner. Changing this creates a new text spanner.

This engraver creates the following layout object(s):
Section 3.1.85 [OttavaBracket], page 479.

Section 2.2.83 [Output_property_engraver], page 344
Apply a procedure to any grob acknowledged.
Music types accepted:
Section 1.2.4 [apply-output-event], page 43,

Section 2.2.90 [Piano_pedal_align_engraver], page 347
Align piano pedal symbols and brackets.
Properties (read)
currentCommandColumn (graphical (layout) object)
Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

This engraver creates the following layout object(s):
Section 3.1.103 [SostenutoPedalLineSpanner], page 498, Section 3.1.117 [SustainPedalLineSpanner], page 512, and Section 3.1.136 [UnaCordaPedalLineSpanner], page 536.
Section 2.2.91 [Piano_pedal_ engraver], page 347
Engrave piano pedal symbols and brackets.
Music types accepted:
Section 1.2.61 [sostenuto-event], page 49, Section 1.2.69 [sustain-event], page 51, and Section 1.2.79 [una-corda-event], page 52,
Properties (read)
  currentCommandColumn (graphical (layout)
object)
    Grob that is X-parent to all current breakable
    (clef, key signature, etc.) items.
  pedalSostenutoStrings (list)
    See pedalSustainStrings.
  pedalSostenutoStyle (symbol)
    See pedalSustainStyle.
  pedalSustainStrings (list)
    A list of strings to print for sustain-pedal. Format is (up updown down), where each of the
    three is the string to print when this is done
    with the pedal.
  pedalSustainStyle (symbol)
    A symbol that indicates how to print sustain
    pedals: text, bracket or mixed (both).
  pedalUnaCordaStrings (list)
    See pedalSustainStrings.
  pedalUnaCordaStyle (symbol)
    See pedalSustainStyle.
This engraver creates the following layout object(s):
Section 3.1.91 [PianoPedalBracket], page 486, Section 3.1.102 [SostenutoPedal], page 497, Section 3.1.116 [SustainPedal], page 511, and
Section 3.1.135 [UnaCordaPedal], page 535.

Section 2.2.95 [Pure_from_neighbor_engraver], page 349
Coordinates items that get their pure heights from their neighbors.

Section 2.2.98 [Rest_collision_ engraver], page 350
Handle collisions of rests.
Properties (read)
  busyGrobs (list)
    A queue of (end-moment . grob) cons cells.
    This is for internal (C++) use only. This prop-
    erty contains the grobs which are still busy (e.g.
    note heads, spanners, etc.).
This engraver creates the following layout object(s):
Section 3.1.97 [RestCollision], page 492.

Section 2.2.103 [Script_row_ engraver], page 351
Determine order in horizontal side position elements.
This engraver creates the following layout object(s):
Section 3.1.100 [ScriptRow], page 494.
Section 2.2.104 [Separating_line_group_engraver], page 352
Generate objects for computing spacing parameters.
Properties (read)

createSpacing (boolean)
Create StaffSpacing objects? Should be set for staves.

Properties (write)

hasStaffSpacing (boolean)
True if the current CommandColumn contains items that will affect spacing.

This engraver creates the following layout object(s):
Section 3.1.108 [StaffSpacing], page 502.

Section 2.2.114 [Staff_collecting_engraver], page 354
Maintain the stavesFound variable.
Properties (read)

stavesFound (list of grobs)
A list of all staff-symbols found.

Properties (write)

stavesFound (list of grobs)
A list of all staff-symbols found.

Section 2.2.116 [Staff_symbol_engraver], page 354
Create the constellation of five (default) staff lines.
Music types accepted:
Section 1.2.65 [staff-span-event], page 50.
This engraver creates the following layout object(s):
Section 3.1.109 [StaffSymbol], page 503.

Section 2.2.129 [Time_signature_engraver], page 359
Create a Section 3.1.128 [TimeSignature], page 525, whenever timeSignatureFraction changes.
Music types accepted:
Section 1.2.74 [time-signature-event], page 51,
Properties (read)

initialTimeSignatureVisibility (vector)
brake visibility for the initial time signature.

partialBusy (boolean)
Signal that \partial acts at the current timestep.

timeSignatureFraction (fraction, as pair)
A pair of numbers, signifying the time signature. For example, '(4 . 4) is a 4/4 time signature.

This engraver creates the following layout object(s):
Section 3.1.128 [TimeSignature], page 525.
2.1.13 GregorianTranscriptionVoice

Corresponds to a voice on a staff. This context handles the conversion of dynamic signs, stems, beams, super- and subscripts, slurs, ties, and rests.

You have to instantiate this explicitly if you want to have multiple voices on the same staff.

This context also accepts commands for the following context(s):

Voice.

This context creates the following layout object(s):

Section 3.1.9 [Arpeggio], page 386, Section 3.1.19 [Beam], page 397, Section 3.1.20 [BendAfter], page 399, Section 3.1.23 [BreathingSign], page 402, Section 3.1.27 [ClusterSpanner], page 409, Section 3.1.28 [ClusterSpannerBeacon], page 409, Section 3.1.29 [CombineTextScript], page 410, Section 3.1.34 [Dots], page 419, Section 3.1.35 [DoublePercentRepeat], page 420, Section 3.1.36 [DoublePercentRepeatCounter], page 421, Section 3.1.37 [DoubleRepeatSlash], page 423, Section 3.1.38 [DynamicLineSpanner], page 424, Section 3.1.39 [DynamicText], page 425, Section 3.1.40 [DynamicTextSpanner], page 427, Section 3.1.41 [Episema], page 429, Section 3.1.42 [Fingering], page 429, Section 3.1.44 [Flag], page 432, Section 3.1.48 [Glissando], page 437, Section 3.1.52 [Hairpin], page 440, Section 3.1.56 [InstrumentSwitch], page 444, Section 3.1.60 [LaissezVibrerTie], page 452, Section 3.1.61 [LaissezVibrerTieColumn], page 453, Section 3.1.64 [Ligature Bracket], page 456, Section 3.1.75 [MultiMeasureRest], page 468, Section 3.1.76 [MultiMeasureRestNumber], page 469, Section 3.1.77 [MultiMeasureRestScript], page 471, Section 3.1.78 [MultiMeasureText], page 472, Section 3.1.81 [NoteColumn], page 476, Section 3.1.82 [NoteHead], page 477, Section 3.1.84 [NoteSpacing], page 478, Section 3.1.88 [PercentRepeat], page 482, Section 3.1.89 [PercentRepeatCounter], page 483, Section 3.1.90 [PhrasingSlur], page 484, Section 3.1.93 [RepeatSlash], page 489, Section 3.1.94 [RepeatTie], page 490, Section 3.1.95 [RepeatTieColumn], page 491, Section 3.1.96 [Rest], page 491, Section 3.1.98 [Script], page 493, Section 3.1.99 [ScriptColumn], page 494, Section 3.1.101 [Slur], page 494, Section 3.1.111 [Stem], page 504, Section 3.1.112 [StemStub], page 506, Section 3.1.113 [StemTremolo], page 507, Section 3.1.114 [StringNumber], page 508, Section 3.1.115 [StrokeFinger], page 510, Section 3.1.124 [TextScript], page 519, Section 3.1.125 [TextSpanner], page 521, Section 3.1.126 [Tie], page 523, Section 3.1.127 [TieColumn], page 525, Section 3.1.129 [TrillPitchAccidental], page 528, Section 3.1.130 [TrillPitchGroup], page 529, Section 3.1.131 [TrillPitchHead], page 530, Section 3.1.132 [TrillSpanner], page 531, Section 3.1.133 [TupletBracket], page 532, Section 3.1.134 [TupletNumber], page 534, and Section 3.1.140 [VoiceFollower], page 540.

This context sets the following properties:

- Set grob-property `padding` in Section 3.1.98 [Script], page 493, to 0.5.
- Set grob-property `transparent` in Section 3.1.64 [LigatureBracket], page 456, to #t.
- Set translator property `autoBeaming` to #f.

This is a ‘Bottom’ context; no contexts will be created implicitly from it.

This context cannot contain other contexts.

This context is built from the following engraver(s):

Section 2.2.3 [Arpeggio_engraver], page 315
Generate an Arpeggio symbol.

Music types accepted:

Section 1.2.5 [arpeggio-event], page 43,
This engraver creates the following layout object(s):

Section 3.1.9 [Arpeggio], page 386.
Section 2.2.4 [Auto_beam_engraver], page 315

Generate beams based on measure characteristics and observed Stems. Uses baseMoment, beatStructure, beamExceptions, measureLength, and measurePosition to decide when to start and stop a beam. Overriding beaming is done through Section 2.2.119 [Stem_engraver], page 355, properties stemLeftBeamCount and stemRightBeamCount.

Music types accepted:
Section 1.2.9 [beam-forbid-event], page 43,

Properties (read)

autoBeaming (boolean)
If set to true then beams are generated automatically.

baseMoment (moment)
Smallest unit of time that will stand on its own as a subdivided section.

beamExceptions (list)
An alist of exceptions to autobeam rules that normally end on beats.

beamHalfMeasure (boolean)
Whether to allow a beam to begin halfway through the measure in triple time, which could look like 6/8.

beatStructure (list)
List of baseMoments that are combined to make beats.

subdivideBeams (boolean)
If set, multiple beams will be subdivided at baseMoment positions by only drawing one beam over the beat.

This engraver creates the following layout object(s):
Section 3.1.19 [Beam], page 397.

Section 2.2.10 [Beam_engraver], page 318

Handle Beam events by engraving beams. If omitted, then notes are printed with flags instead of beams.

Music types accepted:
Section 1.2.8 [beam-event], page 43,

Properties (read)

baseMoment (moment)
Smallest unit of time that will stand on its own as a subdivided section.

beamMelismaBusy (boolean)
Signal if a beam is present.

beatStructure (list)
List of baseMoments that are combined to make beats.
subdivideBeams (boolean)
If set, multiple beams will be subdivided at baseMoment positions by only drawing one beam over the beat.

Properties (write)
forbidBreak (boolean)
If set to #t, prevent a line break at this point.

This engraver creates the following layout object(s):
Section 3.1.19 [Beam], page 397.

Section 2.2.12 [Bend_engraver], page 319
Create fall spanners.
Music types accepted:
Section 1.2.10 [bend-after-event], page 43,
This engraver creates the following layout object(s):
Section 3.1.20 [BendAfter], page 399.

Section 2.2.14 [Breathing_sign_engraver], page 320
Create a breathing sign.
Music types accepted:
Section 1.2.14 [breathing-event], page 44,
This engraver creates the following layout object(s):
Section 3.1.23 [BreathingSign], page 402.

Section 2.2.16 [Chord_tremolo_engraver], page 321
Generate beams for tremolo repeats.
Music types accepted:
Section 1.2.76 [tremolo-span-event], page 52,
This engraver creates the following layout object(s):
Section 3.1.19 [Beam], page 397.

Section 2.2.18 [Cluster_spanner_engraver], page 321
Engrave a cluster using Spanner notation.
Music types accepted:
Section 1.2.15 [cluster-note-event], page 44,
This engraver creates the following layout object(s):
Section 3.1.27 [ClusterSpanner], page 409, and Section 3.1.28 [ClusterSpannerBeacon], page 409.

Section 2.2.28 [Dots_engraver], page 325
Create Section 3.1.34 [Dots], page 419, objects for Section 3.2.98 [rhythmic-head-interface], page 601s.
This engraver creates the following layout object(s):
Section 3.1.34 [Dots], page 419.

Section 2.2.29 [Double_percent_repeat_engraver], page 326
Make double measure repeats.
Music types accepted:
Section 1.2.19 [double-percent-event], page 44,
Properties (read)

`countPercentRepeats` (boolean)
If set, produce counters for percent repeats.

`measureLength` (moment)
Length of one measure in the current time signature.

`repeatCountVisibility` (procedure)
A procedure taking as arguments an integer and context, returning whether the corresponding percent repeat number should be printed when `countPercentRepeats` is set.

Properties (write)

`forbidBreak` (boolean)
If set to `#t`, prevent a line break at this point.

This engraver creates the following layout object(s):
Section 3.1.35 [DoublePercentRepeat], page 420, and Section 3.1.36 [DoublePercentRepeatCounter], page 421.

Section 2.2.32 [Dynamic_align_engraver], page 327
Align hairpins and dynamic texts on a horizontal line.

Properties (read)

`currentMusicalColumn` (graphical (layout) object)
Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).

This engraver creates the following layout object(s):
Section 3.1.38 [DynamicLineSpanner], page 424.

Section 2.2.33 [Dynamic_engraver], page 327
Create hairpins, dynamic texts and dynamic text spanners.

Music types accepted:
Section 1.2.1 [absolute-dynamic-event], page 42, Section 1.2.13 [break-span-event], page 44, and Section 1.2.63 [span-dynamic-event], page 50,

Properties (read)

`crescendoSpanner` (symbol)
The type of spanner to be used for crescendi. Available values are `hairpin` and `text`. If unset, a hairpin crescendo is used.

`crescendoText` (markup)
The text to print at start of non-hairpin crescendo, i.e., `cresc.`.

`currentMusicalColumn` (graphical (layout) object)
Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).
**decrescendoSpanner** (symbol)
The type of spanner to be used for decrescendi. Available values are ‘hairpin’ and ‘text’. If unset, a hairpin decrescendo is used.

**decrescendoText** (markup)
The text to print at start of non-hairpin decrescendo, i.e., ‘dim.’.

This engraver creates the following layout object(s):

**Section 2.2.35 [Episema_engraver], page 328**
Create an *Editio Vaticana*-style episema line.
Music types accepted:
Section 1.2.21 [episema-event], page 45,
This engraver creates the following layout object(s):
Section 3.1.41 [Episema], page 429.

**Section 2.2.40 [Fingering_engraver], page 329**
Create fingering scripts.
Music types accepted:
Section 1.2.23 [fingering-event], page 45,
This engraver creates the following layout object(s):
Section 3.1.42 [Fingering], page 429.

**Section 2.2.41 [Font_size_engraver], page 330**
Put *fontSize* into *font-size* grob property.
Properties (read)

**fontSize** (number)
The relative size of all grobs in a context.

**Section 2.2.43 [Forbid_line_break_engraver], page 330**
Forbid line breaks when note heads are still playing at some point.
Properties (read)

**busyGrobs** (list)
A queue of (end-moment . grob) cons cells. This is for internal (C++) use only. This property contains the grobs which are still busy (e.g. note heads, spanners, etc.).

Properties (write)

**forbidBreak** (boolean)
If set to #t, prevent a line break at this point.

**Section 2.2.45 [Glissando_engraver], page 331**
Engrave glissandi.
Music types accepted:
Section 1.2.25 [glissando-event], page 45,
Properties (read)

\textbf{glissandoMap} (list)
A map in the form of `((source1 . target1) (source2 . target2) (sourceN . targetN))' showing the glissandi to be drawn for note columns. The value `()' will default to `((0 . 0) (1 . 1) (n . n))', where n is the minimal number of note-heads in the two note columns between which the glissandi occur.

This engraver creates the following layout object(s):
Section 3.1.48 [Glissando], page 437.

\textbf{Section 2.2.46 [Grace_auto_beam_engraver], page 332}
Generates one autobeam group across an entire grace phrase. As usual, any manual beaming or `noBeam' will block autobeaming, just like setting the context property `autoBeaming' to `\#f'.
Music types accepted:
Section 1.2.9 [beam-forbid-event], page 43,
Properties (read)

\textbf{autoBeaming} (boolean)
If set to true then beams are generated automatically.

This engraver creates the following layout object(s):
Section 3.1.19 [Beam], page 397.

\textbf{Section 2.2.47 [Grace_beam_engraver], page 332}
Handle \texttt{Beam} events by engraving beams. If omitted, then notes are printed with flags instead of beams. Only engrav es beams when we are at grace points in time.
Music types accepted:
Section 1.2.8 [beam-event], page 43,
Properties (read)

\textbf{baseMoment} (moment)
Smallest unit of time that will stand on its own as a subdivided section.

\textbf{beamMelismaBusy} (boolean)
Signal if a beam is present.

\textbf{beatStructure} (list)
List of \texttt{baseMoments} that are combined to make beats.

\textbf{subdivideBeams} (boolean)
If set, multiple beams will be subdivided at \texttt{baseMoment} positions by only drawing one beam over the beat.

This engraver creates the following layout object(s):
Section 3.1.19 [Beam], page 397.
Section 2.2.48 [Grace_engraver], page 333
Set font size and other properties for grace notes.

Properties (read)

graceSettings (list)
Overrides for grace notes. This property should be manipulated through the add-grace-property function.

Section 2.2.52 [Grob_pq_engraver], page 334
Administrate when certain grobs (e.g., note heads) stop playing.

Properties (read)

busyGrobs (list)
A queue of (end-moment . grob) cons cells. This is for internal (C++) use only. This property contains the grobs which are still busy (e.g. note heads, spanners, etc.).

Properties (write)

busyGrobs (list)
A queue of (end-moment . grob) cons cells. This is for internal (C++) use only. This property contains the grobs which are still busy (e.g. note heads, spanners, etc.).

Section 2.2.56 [Instrument_switch_engraver], page 335
Create a cue text for taking instrument.

Properties (read)

instrumentCueName (markup)
The name to print if another instrument is to be taken.

This engraver creates the following layout object(s):
Section 3.1.56 [InstrumentSwitch], page 444.

Section 2.2.61 [Laissez_vibrer_engraver], page 337
Create laissez vibrer items.

Music types accepted:
Section 1.2.30 [laissez-vibrer-event], page 45,
This engraver creates the following layout object(s):
Section 3.1.60 [LaissezVibrerTie], page 452, and Section 3.1.61 [LaissezVibrerTieColumn], page 453.

Section 2.2.63 [Ligature_bracket_engraver], page 337
Handle Ligature_events by engraving Ligature brackets.

Music types accepted:
Section 1.2.32 [ligature-event], page 46,
This engraver creates the following layout object(s):
Section 3.1.64 [LigatureBracket], page 456.

Section 2.2.75 [Multi_measure_rest_engraver], page 341
Engrave multi-measure rests that are produced with ‘R’. It reads measurePosition and internalBarNumber to determine what number to print over the Section 3.1.75 [MultiMeasureRest], page 468.
Music types accepted:
Section 1.2.39 [multi-measure-articulation-event], page 46, Section 1.2.40 [multi-measure-rest-event], page 46, and Section 1.2.41 [multi-measure-text-event], page 47,

Properties (read)

currentCommandColumn (graphical (layout) object)
Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

internalBarNumber (integer)
Contains the current barnumber. This property is used for internal timekeeping, among others by the Accidental_ engraver.

measurePosition (moment)
How much of the current measure have we had. This can be set manually to create incomplete measures.

restNumberThreshold (number)
If a multimeasure rest has more measures than this, a number is printed.

whichBar (string)
This property is read to determine what type of bar line to create.
Example:
\set Staff.whichBar = ".|:
This will create a start-repeat bar in this staff only. Valid values are described in scm/bar-line.scm.

This engraver creates the following layout object(s):
Section 3.1.75 [MultiMeasureRest], page 468, Section 3.1.76 [MultiMeasureRestNumber], page 469, Section 3.1.77 [MultiMeasureRestScript], page 471, and Section 3.1.78 [MultiMeasureRestText], page 472.

Section 2.2.76 [New_fingering_engraver], page 342
Create fingering scripts for notes in a new chord. This engraver is ill-named, since it also takes care of articulations and harmonic note heads.

Properties (read)

fingeringOrientations (list)
A list of symbols, containing ‘left’, ‘right’, ‘up’ and/or ‘down’. This list determines where fingerings are put relative to the chord being fingered.

harmonicDots (boolean)
If set, harmonic notes in dotted chords get dots.

stringNumberOrientations (list)
See fingeringOrientations.
strokeFingerOrientations (list)

See fingeringOrientations.

This engraver creates the following layout object(s):
Section 3.1.42 [Fingering], page 429, Section 3.1.98 [Script], page 493, Section 3.1.114 [StringNumber], page 508, and Section 3.1.115 [StrokeFinger], page 510.

Section 2.2.77 [Note_head_line_engraver], page 343
Engrave a line between two note heads in a staff switch if followVoice is set.
Properties (read)

followVoice (boolean)

If set, note heads are tracked across staff switches by a thin line.

This engraver creates the following layout object(s):
Section 3.1.140 [VoiceFollower], page 540.

Section 2.2.78 [Note_heads_engraver], page 343
Generate note heads.

Music types accepted:
Section 1.2.43 [note-event], page 47,
Properties (read)

middleCPosition (number)

The place of the middle C, measured in half staff-spaces. Usually determined by looking at middleCClefPosition and middleCOffset.

staffLineLayoutFunction (procedure)

Layout of staff lines, traditional, or semitone.

This engraver creates the following layout object(s):
Section 3.1.82 [NoteHead], page 477.

Section 2.2.81 [Note_spacing_engraver], page 344
Generate NoteSpacing, an object linking horizontal lines for use in spacing.
This engraver creates the following layout object(s):
Section 3.1.84 [NoteSpacing], page 478.

Section 2.2.83 [Output_property_engraver], page 344
Apply a procedure to any grob acknowledged.

Music types accepted:
Section 1.2.4 [apply-output-event], page 43,

Section 2.2.87 [Part_combine_engraver], page 346
Part combine engraver for orchestral scores: Print markings ‘a2’, ‘Solo’, ‘Solo II’, and ‘unisono’.

Music types accepted:
Section 1.2.43 [note-event], page 47, and Section 1.2.47 [part-combine-event], page 48,
Properties (read)

\texttt{aDueText} (markup)
Text to print at a unisono passage.

\texttt{partCombineTextsOnNote} (boolean)
Print part-combine texts only on the next note rather than immediately on rests or skips.

\texttt{printPartCombineTexts} (boolean)
Set ‘Solo’ and ‘A due’ texts in the part-combiner?

\texttt{soloIIIText} (markup)
The text for the start of a solo for voice ‘two’ when part-combining.

\texttt{soloText} (markup)
The text for the start of a solo when part-combining.

This engraver creates the following layout object(s):
Section 3.1.29 [CombineTextScript], page 410.

Section 2.2.88 [Percent_repeat_engraver], page 346
Make whole measure repeats.
Music types accepted:
Section 1.2.49 [percent-event], page 48,
Properties (read)

\texttt{countPercentRepeats} (boolean)
If set, produce counters for percent repeats.

\texttt{currentCommandColumn} (graphical (layout) object)
Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

\texttt{repeatCountVisibility} (procedure)
A procedure taking as arguments an integer and context, returning whether the corresponding percent repeat number should be printed when \texttt{countPercentRepeats} is set.

This engraver creates the following layout object(s):
Section 3.1.88 [PercentRepeat], page 482, and Section 3.1.89 [PercentRepeatCounter], page 483.

Section 2.2.89 [Phrasing_slur_engraver], page 347
Print phrasing slurs. Similar to Section 2.2.106 [Slur_engraver], page 352.
Music types accepted:
Section 1.2.43 [note-event], page 47, and Section 1.2.51 [phrasing-slur-event], page 48,
This engraver creates the following layout object(s):
Section 3.1.90 [PhrasingSlur], page 484.
Section 2.2.94 [Pitched_trill_engraver], page 349
Print the bracketed note head after a note head with trill.
This engraver creates the following layout object(s):
Section 3.1.129 [TrillPitchAccidental], page 528, Section 3.1.130 [TrillPitchGroup], page 529, and Section 3.1.131 [TrillPitchHead], page 530.

Section 2.2.97 [Repeat_tie_engraver], page 350
Create repeat ties.
Music types accepted:
Section 1.2.53 [repeat-tie-event], page 48,
This engraver creates the following layout object(s):
Section 3.1.94 [RepeatTie], page 490, and Section 3.1.95 [RepeatTieColumn], page 491.

Section 2.2.99 [Rest_engraver], page 350
Engrave rests.
Music types accepted:
Section 1.2.54 [rest-event], page 49,
Properties (read)

middleCPosition (number)
The place of the middle C, measured in half staff-spaces. Usually determined by looking at middleCClefPosition and middleCOffset.

This engraver creates the following layout object(s):
Section 3.1.96 [Rest], page 491.

Section 2.2.100 [Rhythmic_column_engraver], page 351
Generate NoteColumn, an object that groups stems, note heads, and rests.
This engraver creates the following layout object(s):
Section 3.1.81 [NoteColumn], page 476.

Section 2.2.101 [Script_column_engraver], page 351
Find potentially colliding scripts and put them into a ScriptColumn object; that will fix the collisions.
This engraver creates the following layout object(s):
Section 3.1.99 [ScriptColumn], page 494.

Section 2.2.102 [Script_engraver], page 351
Handle note scripted articulations.
Music types accepted:
Section 1.2.6 [articulation-event], page 43,
Properties (read)

scriptDefinitions (list)
The description of scripts. This is used by the Script_engraver for typesetting note-superscripts and subscripts. See scm/script.scm for more information.

This engraver creates the following layout object(s):
Section 3.1.98 [Script], page 493.
Section 2.2.105 [Slash_repeat_engraver], page 352
Make beat repeats.
Music types accepted:
Section 1.2.52 [repeat-slash-event], page 48,
This engraver creates the following layout object(s):
Section 3.1.37 [DoubleRepeatSlash], page 423, and Section 3.1.93 [RepeatSlash], page 489.

Section 2.2.106 [Slur_engraver], page 352
Build slur grobs from slur events.
Music types accepted:
Section 1.2.43 [note-event], page 47, and Section 1.2.58 [slur-event], page 49,
Properties (read)
\begin{itemize}
\item \texttt{doubleSlurs} (boolean)
\hspace{1cm} If set, two slurs are created for every slurred note, one above and one below the chord.
\item \texttt{slurMelismaBusy} (boolean)
\hspace{1cm} Signal if a slur is present.
\end{itemize}
This engraver creates the following layout object(s):
Section 3.1.101 [Slur], page 494.

Section 2.2.113 [Spanner_break_forbid_engraver], page 354
Forbid breaks in certain spanners.

Section 2.2.119 [Stem_engraver], page 355
Create stems, flags and single-stem tremolos. It also works together with the beam engraver for overriding beaming.
Music types accepted:
Section 1.2.75 [tremolo-event], page 52, and Section 1.2.78 [tuplet-span-event], page 52,
Properties (read)
\begin{itemize}
\item \texttt{stemLeftBeamCount} (integer)
\hspace{1cm} Specify the number of beams to draw on the left side of the next note. Overrides automatic beaming. The value is only used once, and then it is erased.
\item \texttt{stemRightBeamCount} (integer)
\hspace{1cm} See \texttt{stemLeftBeamCount}.
\item \texttt{whichBar} (string)
\hspace{1cm} This property is read to determine what type of bar line to create.
\item Example:
\begin{verbatim}
\set Staff.whichBar = ".|:
\end{verbatim}
This will create a start-repeat bar in this staff only. Valid values are described in \texttt{scm/bar-line.scm}.\end{itemize}
This engraver creates the following layout object(s):
Section 3.1.44 [Flag], page 432, Section 3.1.111 [Stem], page 504,
Section 3.1.112 [StemStub], page 506, and Section 3.1.113
[StemTremolo], page 507.

Section 2.2.125 [Text_ engraver], page 357
Create text scripts.
Music types accepted:
Section 1.2.71 [text-script-event], page 51,
This engraver creates the following layout object(s):
Section 3.1.124 [TextScript], page 519.

Section 2.2.126 [Text_spanner_engraver], page 358
Create text spanner from an event.
Music types accepted:
Section 1.2.72 [text-span-event], page 51,
Properties (read)

\texttt{currentMusicalColumn} \ (\text{graphical (layout)}
\hspace{1em}object)
Grob that is X-parent to all non-breakable
items (note heads, lyrics, etc.).

This engraver creates the following layout object(s):
Section 3.1.125 [TextSpanner], page 521.

Section 2.2.127 [Tie_ engraver], page 358
Generate ties between note heads of equal pitch.
Music types accepted:
Section 1.2.73 [tie-event], page 51,
Properties (read)

\texttt{skipTypesetting} \ (\text{boolean})
If true, no typesetting is done, speeding up
the interpretation phase. Useful for debugging
large scores.

\texttt{tieWaitForNote} \ (\text{boolean})
If true, tied notes do not have to follow each
other directly. This can be used for writing out
arpeggios.

Properties (write)

\texttt{tieMelismaBusy} \ (\text{boolean})
Signal whether a tie is present.

This engraver creates the following layout object(s):
Section 3.1.126 [Tie], page 523, and Section 3.1.127 [TieColumn],
page 525.

Section 2.2.132 [Trill_spanner_engraver], page 360
Create trill spanner from an event.
Music types accepted:
Section 1.2.77 [trill-span-event], page 52,
Properties (read)

**currentCommandColumn** (graphical (layout) object)
Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

**currentMusicalColumn** (graphical (layout) object)
Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).

This engraver creates the following layout object(s):
Section 3.1.132 [TrillSpanner], page 531.

**Section 2.2.133 [Tuplet_engraver], page 361**
Catch tuplet events and generate appropriate bracket.
Music types accepted:
Section 1.2.78 [tuplet-span-event], page 52,
Properties (read)

**tupletFullLength** (boolean)
If set, the tuplet is printed up to the start of the next note.

**tupletFullLengthNote** (boolean)
If set, end at the next note, otherwise end on the matter (time signatures, etc.) before the note.

This engraver creates the following layout object(s):
Section 3.1.133 [TupletBracket], page 532, and Section 3.1.134 [Tuplet-Number], page 534.

**2.1.14 KievanStaff**
Same as **Staff** context, except that it is accommodated for typesetting a piece in Kievan style.

This context also accepts commands for the following context(s):
Staff.

This context creates the following layout object(s):
Section 3.1.1 [Accidental], page 377, Section 3.1.2 [AccidentalCautionary], page 378, Section 3.1.3 [AccidentalPlacement], page 379, Section 3.1.4 [AccidentalSuggestion], page 380, Section 3.1.11 [BarLine], page 388, Section 3.1.13 [BassFigure], page 394, Section 3.1.14 [BassFigureAlignment], page 394, Section 3.1.15 [BassFigureAlignmentPositioning], page 395, Section 3.1.16 [BassFigureBracket], page 396, Section 3.1.17 [BassFigureContinuation], page 396, Section 3.1.18 [BassFigureLine], page 396, Section 3.1.25 [Clef], page 405, Section 3.1.26 [ClefModifier], page 407, Section 3.1.30 [CueClef], page 411, Section 3.1.31 [CueEndClef], page 414, Section 3.1.33 [DotColumn], page 419, Section 3.1.43 [FingeringColumn], page 431, Section 3.1.55 [InstrumentName], page 443, Section 3.1.57 [KeyCancellation], page 446, Section 3.1.58 [KeySignature], page 448, Section 3.1.62 [LedgerLineSpanner], page 453, Section 3.1.80 [NoteCollision], page 475, Section 3.1.85 [OttavaBracket], page 479, Section 3.1.91 [PianoPedalBracket], page 486, Section 3.1.97 [RestCollision], page 492, Section 3.1.100 [ScriptRow], page 494, Section 3.1.102 [SostenutoPedal], page 497, Section 3.1.103 [SostenutoPedalLineSpanner], page 498, Section 3.1.108 [StaffSpacing], page 502, Section 3.1.109 [StaffSymbol], page 503, Section 3.1.116 [SustainPedal], page 511,
Section 3.1.117 [SustainPedalLineSpanner], page 512, Section 3.1.135 [UnaCordaPedal], page 535, Section 3.1.136 [UnaCordaPedalLineSpanner], page 536, and Section 3.1.139 [VerticalAxisGroup], page 538.

This context sets the following properties:

- Set translator property `autoAccidentals` to:
  
  `(Staff #<procedure #f (context pitch barnum measurepos)>
   #<procedure neo-modern-accidental-rule (context pitch barnum measurepos)>)`

- Set translator property `autoCautionaries` to `()`.  
- Set translator property `clefGlyph` to "clefs.kievan.do". 
- Set translator property `clefPosition` to 0. 
- Set translator property `clefTransposition` to 0. 
- Set translator property `createSpacing` to `#t`. 
- Set translator property `extraNatural` to `#f`. 
- Set translator property `ignoreFiguredBassRest` to `#f`. 
- Set translator property `instrumentName` to `()`. 
- Set translator property `localAlterations` to `()`. 
- Set translator property `middleCClefPosition` to 0. 
- Set translator property `middleCPosition` to 0. 
- Set translator property `ottavationMarkups` to:
  
  `((4 . "29")
   (3 . "22")
   (2 . "15")
   (1 . "8")
   (-1 . "8")
   (-2 . "15")
   (-3 . "22")
   (-4 . "29"))`

- Set translator property `printKeyCancellation` to `#f`. 
- Set translator property `shortInstrumentName` to `()`. 

This is not a ‘Bottom’ context; search for such a one will commence after creating an implicit context of type Section 2.1.15 [KievanVoice], page 141.

Context KievanStaff can contain Section 2.1.3 [CueVoice], page 63, Section 2.1.15 [KievanVoice], page 141, and Section 2.1.20 [NullVoice], page 184.

This context is built from the following engraver(s):

Section 2.2.1 [Accidental_engraver], page 313

Make accidentals. Catch note heads, ties and notices key-change events.

This engraver usually lives at Staff level, but reads the settings for
Accidental at Voice level, so you can `\override` them at Voice.

Properties (read)

`accidentalGrouping` (symbol)

If set to 'voice, accidentals on the same note in different octaves may be horizontally staggered if in different voices.

`autoAccidentals` (list)

List of different ways to typeset an accidental.
For determining when to print an accidental, several different rules are tried. The rule that gives the highest number of accidentals is used. Each entry in the list is either a symbol or a procedure.

**symbol** The symbol is the name of the context in which the following rules are to be applied. For example, if context is Section “Score” in Internals Reference then all staves share accidentals, and if context is Section “Staff” in Internals Reference then all voices in the same staff share accidentals, but staves do not.

**procedure** The procedure represents an accidental rule to be applied to the previously specified context.

The procedure takes the following arguments:

- **context** The current context to which the rule should be applied.
- **pitch** The pitch of the note to be evaluated.
- **barnum** The current bar number.
- **measurepos** The current measure position.

The procedure returns a pair of booleans. The first states whether an extra natural should be added. The second states whether an accidental should be printed. (\texttt{#t}, \texttt{#f}) does not make sense.

**autoCautionaries** (list)
List similar to autoAccidentals, but it controls cautionary accidentals rather than normal ones. Both lists are tried, and the one giving the most accidentals wins. In case of draw, a normal accidental is typeset.

**extraNatural** (boolean)
Whether to typeset an extra natural sign before accidentals that reduce the effect of a previous alteration.

**harmonicAccidentals** (boolean)
If set, harmonic notes in chords get accidentals.
**internalBarNumber** (integer)
- Contains the current bar number. This property is used for internal timekeeping, among others by the `Accidental_engraver`.

**keyAlterations** (list)
- The current key signature. This is an alist containing `(step . alter)` or `((octave . step) . alter)`, where `step` is a number in the range 0 to 6 and `alter` a fraction, denoting alteration. For alterations, use symbols, e.g. `keyAlterations = #`((6 . ,FLAT)).

**localAlterations** (list)
- The key signature at this point in the measure. The format is the same as for `keyAlterations`, but can also contain `((octave . name) . (alter barnumber . measureposition))` pairs.

**Properties (write)**

**localAlterations** (list)
- The key signature at this point in the measure. The format is the same as for `keyAlterations`, but can also contain `((octave . name) . (alter barnumber . measureposition))` pairs.

This engraver creates the following layout object(s):

**Section 3.1.1** [Accidental], page 377, **Section 3.1.2** [AccidentalCautionary], page 378, **Section 3.1.3** [AccidentalPlacement], page 379, and **Section 3.1.4** [AccidentalSuggestion], page 380.

**Section 2.2.5** [Axis_group_engraver], page 316

Group all objects created in this context in a `VerticalAxisGroup` spanner.

**Properties (read)**

**currentCommandColumn** (graphical (layout) object)
- Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

**hasAxisGroup** (boolean)
- True if the current context is contained in an axis group.

**keepAliveInterfaces** (list)
- A list of symbols, signifying grob interfaces that are worth keeping a staff with `remove-empty` set around for.

**Properties (write)**

**hasAxisGroup** (boolean)
- True if the current context is contained in an axis group.

This engraver creates the following layout object(s):

**Section 3.1.39** [VerticalAxisGroup], page 538.
Section 2.2.7 [Bar_engraver], page 316
Create barlines. This engraver is controlled through the whichBar property. If it has no bar line to create, it will forbid a linebreak at this point. This engraver is required to trigger the creation of clefs at the start of systems.

Properties (read)

whichBar (string)
This property is read to determine what type of bar line to create.
Example:
\set Staff.whichBar = ".|:
This will create a start-repeat bar in this staff only. Valid values are described in \texttt{scm/bar-line.scm}.

Properties (write)

forbidBreak (boolean)
If set to \texttt{#t}, prevent a line break at this point.

This engraver creates the following layout object(s):
Section 3.1.11 [BarLine], page 388.

Section 2.2.17 [Clef_engraver], page 321
Determine and set reference point for pitches.

Properties (read)

clefGlyph (string)
Name of the symbol within the music font.

clefPosition (number)
Where should the center of the clef symbol go, measured in half staff spaces from the center of the staff.

clefTransposition (integer)
Add this much extra transposition. Values of 7 and -7 are common.

clefTranspositionStyle (symbol)
Determines the way the ClefModifier grob is displayed. Possible values are \texttt{default}, \texttt{parenthesized} and \texttt{bracketed}.

explicitClefVisibility (vector)
\texttt{'break-visibility'} function for clef changes.

forceClef (boolean)
Show clef symbol, even if it has not changed.
Only active for the first clef after the property is set, not for the full staff.

This engraver creates the following layout object(s):
Section 3.1.25 [Clef], page 405, and Section 3.1.26 [ClefModifier], page 407.
Section 2.2.19 [Collision_engraver], page 322
Collect NoteColumns, and as soon as there are two or more, put them in a NoteCollision object.
This engraver creates the following layout object(s):
Section 3.1.80 [NoteCollision], page 475.

Section 2.2.24 [Cue_clef_engraver], page 324
Determine and set reference point for pitches in cued voices.
Properties (read)

- clefTransposition (integer)
  Add this much extra transposition. Values of 7 and -7 are common.

- cueClefGlyph (string)
  Name of the symbol within the music font.

- cueClefPosition (number)
  Where should the center of the clef symbol go, measured in half staff spaces from the center of the staff.

- cueClefTransposition (integer)
  Add this much extra transposition. Values of 7 and -7 are common.

- cueClefTranspositionStyle (symbol)
  Determines the way the ClefModifier grob is displayed. Possible values are ’default’, ’parenthesized’ and ’bracketed’.

- explicitCueClefVisibility (vector)
  ’break-visibility’ function for cue clef changes.

- middleCCuePosition (number)
  The position of the middle C, as determined only by the clef of the cue notes. This can be calculated by looking at cueClefPosition and cueClefGlyph.

This engraver creates the following layout object(s):
Section 3.1.26 [ClefModifier], page 407, Section 3.1.30 [CueClef], page 411, and Section 3.1.31 [CueEndClef], page 414.

Section 2.2.27 [Dot_column_engraver], page 325
Engrave dots on dotted notes shifted to the right of the note. If omitted, then dots appear on top of the notes.
This engraver creates the following layout object(s):
Section 3.1.33 [DotColumn], page 419.

Section 2.2.37 [Figured_bass_engraver], page 328
Make figured bass numbers.
Music types accepted:
Section 1.2.7 [bass-figure-event], page 43, and Section 1.2.54 [rest-event], page 49,
Properties (read)

**figuredBassAlterationDirection** (direction)
Where to put alterations relative to the main figure.

**figuredBassCenterContinuations** (boolean)
Whether to vertically center pairs of extender lines. This does not work with three or more lines.

**figuredBassFormatter** (procedure)
A routine generating a markup for a bass figure.

**ignoreFiguredBassRest** (boolean)
Don’t swallow rest events.

**implicitBassFigures** (list)
A list of bass figures that are not printed as numbers, but only as extender lines.

**useBassFigureExtenders** (boolean)
Whether to use extender lines for repeated bass figures.

This engraver creates the following layout object(s):
Section 3.1.13 [BassFigure], page 394, Section 3.1.14 [BassFigure-Alignment], page 394, Section 3.1.16 [BassFigureBracket], page 396, Section 3.1.17 [BassFigureContinuation], page 396, and Section 3.1.18 [BassFigureLine], page 396.

**Section 2.2.38 [Figured_bass_position_engraver], page 329**
Position figured bass alignments over notes.
This engraver creates the following layout object(s):
Section 3.1.15 [BassFigureAlignmentPositioning], page 395.

**Section 2.2.39 [Fingering_column_engraver], page 329**
Find potentially colliding scripts and put them into a FingeringColumn object; that will fix the collisions.
This engraver creates the following layout object(s):
Section 3.1.43 [FingeringColumn], page 431.

**Section 2.2.41 [Font_size_engraver], page 330**
Put fontSize into font-size grob property.
Properties (read)

**fontSize** (number)
The relative size of all grobs in a context.

**Section 2.2.52 [Grob_pq_engraver], page 334**
Administrate when certain grobs (e.g., note heads) stop playing.
Properties (read)

**busyGrobs** (list)
A queue of (end-moment . grob) cons cells.
This is for internal (C++) use only. This property contains the grobs which are still busy (e.g. note heads, spanners, etc.).
Properties (write)

**busyGrobs** (list)
A queue of \texttt{(end-moment . grob)} cons cells. This is for internal (C++) use only. This property contains the grobs which are still busy (e.g., note heads, spanners, etc.).

Section 2.2.55 [Instrument\_name\_engraver], page 334
Create a system start text for instrument or vocal names.

Properties (read)

**currentCommandColumn** (graphical (layout) object)
Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

**instrumentName** (markup)
The name to print left of a staff. The \texttt{instrumentName} property labels the staff in the first system, and the \texttt{shortInstrumentName} property labels following lines.

**shortInstrumentName** (markup)
See \texttt{instrumentName}.

**shortVocalName** (markup)
Name of a vocal line, short version.

**vocalName** (markup)
Name of a vocal line.

This engraver creates the following layout object(s):
Section 3.1.55 [Instrument\_Name], page 443.

Section 2.2.58 [Key\_engraver], page 335
Engrave a key signature.

Music types accepted:
Section 1.2.28 [key-change-event], page 45,

Properties (read)

**createKeyOnClefChange** (boolean)
Print a key signature whenever the clef is changed.

**explicitKeySignatureVisibility** (vector)
‘break-visibility’ function for explicit key changes. ‘\texttt{\textbackslash{}override}’ of the \texttt{break-visibility} property will set the visibility for normal (i.e., at the start of the line) key signatures.

**extraNatural** (boolean)
Whether to typeset an extra natural sign before accidentals that reduce the effect of a previous alteration.
keyAlterationOrder (list)
An alist that defines in what order alterations should be printed. The format is (step . alter), where step is a number from 0 to 6 and alter from -2 (sharp) to 2 (flat).

keyAlterations (list)
The current key signature. This is an alist containing (step . alter) or ((octave . step) . alter), where step is a number in the range 0 to 6 and alter a fraction, denoting alteration. For alterations, use symbols, e.g. keyAlterations = #'((6 . ,FLAT)).

lastKeyAlterations (list)
Last key signature before a key signature change.

middleCClefPosition (number)
The position of the middle C, as determined only by the clef. This can be calculated by looking at clefPosition and clefGlyph.

printKeyCancellation (boolean)
Print restoration alterations before a key signature change.

Properties (write)

keyAlterations (list)
The current key signature. This is an alist containing (step . alter) or ((octave . step) . alter), where step is a number in the range 0 to 6 and alter a fraction, denoting alteration. For alterations, use symbols, e.g. keyAlterations = #'((6 . ,FLAT)).

lastKeyAlterations (list)
Last key signature before a key signature change.

tonic (pitch)
The tonic of the current scale.

This engraver creates the following layout object(s):
Section 3.1.57 [KeyCancellation], page 446, and Section 3.1.58 [KeySignature], page 448.

Section 2.2.62 [Ledger_line_engraver], page 337
Create the spanner to draw ledger lines, and notices objects that need ledger lines.
This engraver creates the following layout object(s):
Section 3.1.62 [LedgerLineSpanner], page 453.

Section 2.2.82 [Ottava_spanner_engraver], page 344
Create a text spanner when the ottavation property changes.
Properties (read)

`currentMusicalColumn` (graphical (layout) object)
Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).

`middleCOffset` (number)
The offset of middle C from the position given by `middleCClefPosition` This is used for ottava brackets.

`ottavation` (markup)
If set, the text for an ottava spanner. Changing this creates a new text spanner.

This engraver creates the following layout object(s):
Section 3.1.85 [OttavaBracket], page 479.

Section 2.2.83 [Output_property_engraver], page 344
Apply a procedure to any grob acknowledged.
Music types accepted:
Section 1.2.4 [apply-output-event], page 43,

Section 2.2.90 [Piano_pedal_align_engraver], page 347
Align piano pedal symbols and brackets.
Properties (read)

`currentCommandColumn` (graphical (layout) object)
Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

This engraver creates the following layout object(s):
Section 3.1.103 [SostenutoPedalLineSpanner], page 498, Section 3.1.117 [SustainPedalLineSpanner], page 512, and Section 3.1.136 [UnaCordaPedalLineSpanner], page 536.

Section 2.2.91 [Piano_pedal_engraver], page 347
Engrave piano pedal symbols and brackets.
Music types accepted:
Section 1.2.61 [sostenuto-event], page 49, Section 1.2.69 [sustain-event], page 51, and Section 1.2.79 [una-corda-event], page 52,
Properties (read)

`currentCommandColumn` (graphical (layout) object)
Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

`pedalSostenutoStrings` (list)
See `pedalSustainStrings`.

`pedalSostenutoStyle` (symbol)
See `pedalSustainStyle`. 
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pedalSustainStrings (list)
A list of strings to print for sustain-pedal. Format is (up updown down), where each of the three is the string to print when this is done with the pedal.

pedalSustainStyle (symbol)
A symbol that indicates how to print sustain pedals: text, bracket or mixed (both).

pedalUnaCordaStrings (list)
See pedalSustainStrings.

pedalUnaCordaStyle (symbol)
See pedalSustainStyle.

This engraver creates the following layout object(s):
Section 3.1.91 [PianoPedalBracket], page 486, Section 3.1.102 [SostenutoPedal], page 497, Section 3.1.116 [SustainPedal], page 511, and Section 3.1.135 [UnaCordaPedal], page 535.

Section 2.2.95 [Pure_from_neighbor_engraver], page 349
Coordinates items that get their pure heights from their neighbors.

Section 2.2.98 [Rest_collision_engraver], page 350
Handle collisions of rests.
Properties (read)

busyGrobs (list)
A queue of (end-moment . grob) cons cells. This is for internal (C++) use only. This property contains the grobs which are still busy (e.g. note heads, spanners, etc.).

This engraver creates the following layout object(s):
Section 3.1.97 [RestCollision], page 492.

Section 2.2.103 [Script_row_engraver], page 351
Determine order in horizontal side position elements.
This engraver creates the following layout object(s):
Section 3.1.100 [ScriptRow], page 494.

Section 2.2.104 [Separating_line_group_engraver], page 352
Generate objects for computing spacing parameters.
Properties (read)

createSpacing (boolean)
Create StaffSpacing objects? Should be set for staves.

Properties (write)

hasStaffSpacing (boolean)
True if the current CommandColumn contains items that will affect spacing.

This engraver creates the following layout object(s):
Section 3.1.108 [StaffSpacing], page 502.
Section 2.2.114 [Staff_collecting_engraver], page 354
Maintain the stavesFound variable.

Properties (read)

\texttt{stavesFound} (list of grobs)
A list of all staff-symbols found.

Properties (write)

\texttt{stavesFound} (list of grobs)
A list of all staff-symbols found.

Section 2.2.116 [Staff_symbol_engraver], page 354
Create the constellation of five (default) staff lines.

Music types accepted:
Section 1.2.65 [staff-span-event], page 50.
This engraver creates the following layout object(s):
Section 3.1.109 [StaffSymbol], page 503.

2.1.15 KievanVoice
Same as Voice context, except that it is accommodated for typesetting a piece in Kievan style.

This context also accepts commands for the following context(s):
Voice.

This context creates the following layout object(s):
Section 3.1.9 [Arpeggio], page 386, Section 3.1.19 [Beam], page 397, Section 3.1.20 [BendAfter], page 399, Section 3.1.23 [BreathingSign], page 402, Section 3.1.27 [ClusterSpanner], page 409, Section 3.1.28 [ClusterSpannerBeacon], page 409, Section 3.1.29 [CombineTextScript], page 410, Section 3.1.34 [Dots], page 419, Section 3.1.35 [DoublePercentRepeat], page 420, Section 3.1.36 [DoublePercentRepeatCounter], page 421, Section 3.1.37 [DoubleRepeatSlash], page 423, Section 3.1.38 [DynamicLineSpanner], page 424, Section 3.1.39 [DynamicText], page 425, Section 3.1.40 [DynamicTextSpanner], page 427, Section 3.1.42 [Fingering], page 429, Section 3.1.44 [Flag], page 432, Section 3.1.45 [Glissando], page 437, Section 3.1.52 [Hairpin], page 440, Section 3.1.56 [InstrumentSwitch], page 444, Section 3.1.59 [KievanLigature], page 451, Section 3.1.60 [LaissezVibrerTie], page 452, Section 3.1.61 [LaissezVibrerTieColumn], page 453, Section 3.1.75 [MultiMeasureRest], page 468, Section 3.1.76 [MultiMeasureRestNumber], page 469, Section 3.1.77 [MultiMeasureRestScript], page 471, Section 3.1.78 [MultiMeasureRestText], page 472, Section 3.1.81 [NoteColumn], page 476, Section 3.1.82 [NoteHead], page 477, Section 3.1.84 [NoteSpacing], page 478, Section 3.1.88 [PercentRepeat], page 482, Section 3.1.89 [PercentRepeatCounter], page 483, Section 3.1.90 [PhrasingSlur], page 484, Section 3.1.93 [RepeatSlash], page 489, Section 3.1.94 [RepeatTie], page 490, Section 3.1.95 [RepeatTieColumn], page 491, Section 3.1.96 [Rest], page 491, Section 3.1.98 [Script], page 493, Section 3.1.99 [ScriptColumn], page 494, Section 3.1.101 [Slur], page 494, Section 3.1.111 [Stem], page 504, Section 3.1.112 [StemStub], page 506, Section 3.1.113 [StemTremolo], page 507, Section 3.1.114 [StringNumber], page 508, Section 3.1.115 [StrokeFinger], page 510, Section 3.1.124 [TextScript], page 519, Section 3.1.125 [TextSpanner], page 521, Section 3.1.126 [Tie], page 523, Section 3.1.127 [TieColumn], page 525, Section 3.1.129 [TrillPitchAccidental], page 528, Section 3.1.130 [TrillPitchGroup], page 529, Section 3.1.131 [TrillPitchHead], page 530, Section 3.1.132 [TrillSpanner], page 531, Section 3.1.133 [TupletBracket], page 532, Section 3.1.134 [TupletNumber], page 534, and Section 3.1.140 [VoiceFollower], page 540.

This context sets the following properties:
• Set grob-property \texttt{duration-log} in Section 3.1.82 [NoteHead], page 477, to \texttt{note-head::calc-kievan-duration-log}.
• Set grob-property `glyph-name-alist` in Section 3.1.1 [Accidental], page 377, to:
  
  `'( (-1/2 . "accidentals.kievanM1")
      (1/2 . "accidentals.kievan1")
  )`

• Set grob-property `length` in Section 3.1.111 [Stem], page 504, to 0.0.

• Set grob-property `positions` in Section 3.1.19 [Beam], page 397, to `beam::get-kievan-positions`.

• Set grob-property `quantized-positions` in Section 3.1.19 [Beam], page 397, to `beam::get-kievan-quantized-positions`.

• Set grob-property `stencil` in Section 3.1.44 [Flag], page 432, to `#f`.

• Set grob-property `stencil` in Section 3.1.101 [Slur], page 494, to `#f`.

• Set grob-property `stencil` in Section 3.1.111 [Stem], page 504, to `#f`.

• Set grob-property `style` in Section 3.1.34 [Dots], page 419, to `kievan`.

• Set grob-property `style` in Section 3.1.82 [NoteHead], page 477, to `kievan`.

• Set grob-property `style` in Section 3.1.96 [Rest], page 491, to `mensural`.

• Set grob-property `X-offset` in Section 3.1.111 [Stem], page 504, to `stem::kievan-offset-callback`.

• Set translator property `autoBeaming` to `#f`.

This is a 'Bottom' context; no contexts will be created implicitly from it.

This context cannot contain other contexts.

This context is built from the following engraver(s):

Section 2.2.3 [Arpeggio_engraver], page 315
  Generate an Arpeggio symbol.
  Music types accepted:
  Section 1.2.5 [arpeggio-event], page 43,
  This engraver creates the following layout object(s):
  Section 3.1.9 [Arpeggio], page 386.

Section 2.2.4 [Auto_beam_engraver], page 315
  Generate beams based on measure characteristics and observed Stems.
  Uses `baseMoment`, `beatStructure`, `beamExceptions`, `measureLength`, and `measurePosition` to decide when to start and stop a beam.
  Overriding beaming is done through Section 2.2.119 [Stem_engraver], page 355, properties `stemLeftBeamCount` and `stemRightBeamCount`.
  Music types accepted:
  Section 1.2.9 [beam-forbid-event], page 43,
  Properties (read)

  `autoBeaming` (boolean)
  If set to true then beams are generated automatically.

  `baseMoment` (moment)
  Smallest unit of time that will stand on its own as a subdivided section.

  `beamExceptions` (list)
  An alist of exceptions to autobeam rules that normally end on beats.
beamHalfMeasure (boolean)
Whether to allow a beam to begin halfway through the measure in triple time, which could look like 6/8.

beatStructure (list)
List of baseMoments that are combined to make beats.

subdivideBeams (boolean)
If set, multiple beams will be subdivided at baseMoment positions by only drawing one beam over the beat.

This engraver creates the following layout object(s):
Section 3.1.19 [Beam], page 397.

Section 2.2.10 [Beam_engraver], page 318
Handle Beam events by engraving beams. If omitted, then notes are printed with flags instead of beams.
Music types accepted:
Section 1.2.8 [beam-event], page 43,
Properties (read)

baseMoment (moment)
Smallest unit of time that will stand on its own as a subdivided section.

beamMelismaBusy (boolean)
Signal if a beam is present.

beatStructure (list)
List of baseMoments that are combined to make beats.

subdivideBeams (boolean)
If set, multiple beams will be subdivided at baseMoment positions by only drawing one beam over the beat.

Properties (write)

forbidBreak (boolean)
If set to #t, prevent a line break at this point.

This engraver creates the following layout object(s):
Section 3.1.19 [Beam], page 397.

Section 2.2.12 [Bend_engraver], page 319
Create fall spanners.
Music types accepted:
Section 1.2.10 [bend-after-event], page 43,
This engraver creates the following layout object(s):
Section 3.1.20 [BendAfter], page 399.

Section 2.2.14 [Breathing_sign_engraver], page 320
Create a breathing sign.
Musical types accepted:
Section 1.2.14 [breathing-event], page 44,
This engraver creates the following layout object(s):
Section 3.1.23 [BreathingSign], page 402.

Section 2.2.16 [Chord_tremolo_engraver], page 321
Generate beams for tremolo repeats.
Musical types accepted:
Section 1.2.76 [tremolo-span-event], page 52,
This engraver creates the following layout object(s):
Section 3.1.19 [Beam], page 397.

Section 2.2.18 [Cluster_spanner_engraver], page 321
Engrave a cluster using *Spanner* notation.
Musical types accepted:
Section 1.2.15 [cluster-note-event], page 44,
This engraver creates the following layout object(s):
Section 3.1.27 [ClusterSpanner], page 409, and Section 3.1.28 [ClusterSpannerBeacon], page 409.

Section 2.2.28 [Dots_engraver], page 325
Create Section 3.1.34 [Dots], page 419, objects for Section 3.2.98 [rhythmic-head-interface], page 601.
This engraver creates the following layout object(s):
Section 3.1.34 [Dots], page 419.

Section 2.2.29 [Double_percent_repeat_engraver], page 326
Make double measure repeats.
Musical types accepted:
Section 1.2.19 [double-percent-event], page 44,
Properties (read)

\[
\text{countPercentRepeats} \text{ (boolean)}
\]
If set, produce counters for percent repeats.

\[
\text{measureLength} \text{ (moment)}
\]
Length of one measure in the current time signature.

\[
\text{repeatCountVisibility} \text{ (procedure)}
\]
A procedure taking as arguments an integer and context, returning whether the corresponding percent repeat number should be printed when countPercentRepeats is set.

Properties (write)

\[
\text{forbidBreak} \text{ (boolean)}
\]
If set to \#t, prevent a line break at this point.

This engraver creates the following layout object(s):
Section 3.1.35 [DoublePercentRepeat], page 420, and Section 3.1.36 [DoublePercentRepeatCounter], page 421.
Section 2.2.32 [Dynamic_align_ engraver], page 327
Align hairpins and dynamic texts on a horizontal line.
Properties (read)

\texttt{currentMusicalColumn} (graphical (layout) object)
Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).

This engraver creates the following layout object(s):
Section 3.1.38 [DynamicLineSpanner], page 424.

Section 2.2.33 [Dynamic_ engraver], page 327
Create hairpins, dynamic texts and dynamic text spanners.
Music types accepted:
Section 1.2.1 [absolute-dynamic-event], page 42, Section 1.2.13 [break-span-event], page 44, and Section 1.2.63 [span-dynamic-event], page 50,
Properties (read)

\texttt{crescendoSpanner} (symbol)
The type of spanner to be used for crescendi.
Available values are ‘\texttt{hairpin}’ and ‘\texttt{text}’. If unset, a hairpin crescendo is used.

\texttt{crescendoText} (markup)
The text to print at start of non-hairpin crescendo, i.e., ‘\texttt{cresc}.’.

\texttt{currentMusicalColumn} (graphical (layout) object)
Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).

\texttt{decrescendoSpanner} (symbol)
The type of spanner to be used for decrescendi.
Available values are ‘\texttt{hairpin}’ and ‘\texttt{text}’. If unset, a hairpin decrescendo is used.

\texttt{decrescendoText} (markup)
The text to print at start of non-hairpin decrescendo, i.e., ‘\texttt{dim}.’.

This engraver creates the following layout object(s):
Section 3.1.39 [DynamicText], page 425, Section 3.1.40 [DynamicTextSpanner], page 427, and Section 3.1.52 [Hairpin], page 440.

Section 2.2.40 [Fingering_ engraver], page 329
Create fingering scripts.
Music types accepted:
Section 1.2.23 [fingering-event], page 45,
This engraver creates the following layout object(s):
Section 3.1.42 [Fingering], page 429.

Section 2.2.41 [Font_size_ engraver], page 330
Put \texttt{fontSize} into \texttt{font-size grob property}.  


Properties (read)

*fontSize (number)*

The relative size of all grobs in a context.

**Section 2.2.43 [Forbid_line_break_engraver], page 330**

Forbid line breaks when note heads are still playing at some point.

Properties (read)

*busyGrobs (list)*

A queue of \((\text{end-moment} . \text{grob})\) cons cells.
This is for internal (C++) use only. This property contains the grobs which are still busy (e.g. note heads, spanners, etc.).

Properties (write)

*forbidBreak (boolean)*

If set to \#t, prevent a line break at this point.

**Section 2.2.45 [Glissando_engraver], page 331**

Engrave glissandi.

Music types accepted:

Section 1.2.25 [glissando-event], page 45,

Properties (read)

*glissandoMap (list)*

A map in the form of \'(((source1 . target1) (source2 . target2) (sourcec . targetn)) showing the glissandi to be drawn for note columns. The value \'() will default to \'((0 . 0) (1 . 1) (n . n)), where n is the minimal number of note-heads in the two note columns between which the glissandi occur.

This engraver creates the following layout object(s):

Section 3.1.48 [Glissando], page 437.

**Section 2.2.46 [Grace_auto_beam_engraver], page 332**

Generates one autobeam group across an entire grace phrase. As usual, any manual beaming or \textbackslash noBeam will block autobeaming, just like setting the context property ‘autoBeaming’ to \#f.

Music types accepted:

Section 1.2.9 [beam-forbid-event], page 43,

Properties (read)

*autoBeaming (boolean)*

If set to true then beams are generated automatically.

This engraver creates the following layout object(s):

Section 3.1.19 [Beam], page 397.

**Section 2.2.47 [Grace_beam_engraver], page 332**

Handle Beam events by engraving beams. If omitted, then notes are printed with flags instead of beams. Only engraves beams when we are at grace points in time.
Music types accepted:
Section 1.2.8 [beam-event], page 43,
Properties (read)

baseMoment (moment)
Smallest unit of time that will stand on its own
as a subdivided section.

beamMelismaBusy (boolean)
Signal if a beam is present.

beatStructure (list)
List of baseMoments that are combined to make
beats.

subdivideBeams (boolean)
If set, multiple beams will be subdivided at
baseMoment positions by only drawing one
beam over the beat.

This engraver creates the following layout object(s):
Section 3.1.19 [Beam], page 397.

Section 2.2.48 [Grace_engraver], page 333
Set font size and other properties for grace notes.
Properties (read)

graceSettings (list)
Overrides for grace notes. This property
should be manipulated through the
add-grace-property function.

Section 2.2.52 [Grob_pq_engraver], page 334
Administrate when certain grobs (e.g., note heads) stop playing.
Properties (read)

busyGrobs (list)
A queue of (end-moment . grob) cons cells.
This is for internal (C++) use only. This prop-
erty contains the grobs which are still busy (e.g.
note heads, spanners, etc.).

Properties (write)

busyGrobs (list)
A queue of (end-moment . grob) cons cells.
This is for internal (C++) use only. This prop-
erty contains the grobs which are still busy (e.g.
note heads, spanners, etc.).

Section 2.2.56 [Instrument_switch_engraver], page 335
Create a cue text for taking instrument.
Properties (read)

instrumentCueName (markup)
The name to print if another instrument is to
be taken.
This engraver creates the following layout object(s):
Section 3.1.56 [InstrumentSwitch], page 444.

Section 2.2.60 [Kievan_ligature_engraver], page 337
Handle Kievan_ligature_events by glueing Kievan heads together.
Music types accepted:
Section 1.2.32 [ligature-event], page 46,
This engraver creates the following layout object(s):
Section 3.1.59 [KievanLigature], page 451.

Section 2.2.61 [Laissez_vibrer_engraver], page 337
Create laissez vibrer items.
Music types accepted:
Section 1.2.30 [laissez-vibrer-event], page 45,
This engraver creates the following layout object(s):
Section 3.1.60 [LaissezVibrerTie], page 452, and Section 3.1.61 [LaissezVibrerTieColumn], page 453.

Section 2.2.75 [Multi_measure_rest_engraver], page 341
Engrave multi-measure rests that are produced with ‘R’. It reads measurePosition and internalBarNumber to determine what number to print over the Section 3.1.75 [MultiMeasureRest], page 468.
Music types accepted:
Section 1.2.39 [multi-measure-articulation-event], page 46, Section 1.2.40 [multi-measure-rest-event], page 46, and Section 1.2.41 [multi-measure-text-event], page 47,
Properties (read)

\[\text{currentCommandColumn (graphical (layout)}\]
\text{object)}
Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

\[\text{internalBarNumber (integer)}\]
Contains the current barnumber. This property is used for internal timekeeping, among others by the Accidental_engraver.

\[\text{measurePosition (moment)}\]
How much of the current measure have we had. This can be set manually to create incomplete measures.

\[\text{restNumberThreshold (number)}\]
If a multimeasure rest has more measures than this, a number is printed.

\[\text{whichBar (string)}\]
This property is read to determine what type of bar line to create.
Example:
\texttt{\set Staff.whichBar = ".|:"}
This will create a start-repeat bar in this staff only. Valid values are described in `scm/bar-line.scm`.

This engraver creates the following layout object(s):
Section 3.1.75 [MultiMeasureRest], page 468, Section 3.1.76 [MultiMeasureRestNumber], page 469, Section 3.1.77 [MultiMeasureRestScript], page 471, and Section 3.1.78 [MultiMeasureRestText], page 472.

Section 2.2.76 [New_fingering_engraver], page 342
Create fingering scripts for notes in a new chord. This engraver is ill-named, since it also takes care of articulations and harmonic note heads.

Properties (read)

- `fingeringOrientations` (list)
  A list of symbols, containing ‘left’, ‘right’, ‘up’ and/or ‘down’. This list determines where fingerings are put relative to the chord being fingered.

- `harmonicDots` (boolean)
  If set, harmonic notes in dotted chords get dots.

- `stringNumberOrientations` (list)
  See `fingeringOrientations`.

- `strokeFingerOrientations` (list)
  See `fingeringOrientations`.

This engraver creates the following layout object(s):
Section 3.1.42 [Fingering], page 429, Section 3.1.98 [Script], page 493, Section 3.1.114 [StringNumber], page 508, and Section 3.1.115 [StrokeFinger], page 510.

Section 2.2.77 [Note_head_line_engraver], page 343
Engrave a line between two note heads in a staff switch if `followVoice` is set.

Properties (read)

- `followVoice` (boolean)
  If set, note heads are tracked across staff switches by a thin line.

This engraver creates the following layout object(s):
Section 3.1.140 [VoiceFollower], page 540.

Section 2.2.78 [Note_heads_engraver], page 343
Generate note heads.

Music types accepted:
Section 1.2.43 [note-event], page 47,

Properties (read)

- `middleCPosition` (number)
  The place of the middle C, measured in half staff-spaces. Usually determined by looking at `middleCClefPosition` and `middleCOffset`. 
staffLineLayoutFunction (procedure)
  Layout of staff lines, traditional, or semitone.

This engraver creates the following layout object(s):
Section 3.1.82 [NoteHead], page 477.

Section 2.2.81 [Note_spacing_engraver], page 344
  Generate NoteSpacing, an object linking horizontal lines for use in spacing.
  This engraver creates the following layout object(s):
  Section 3.1.84 [NoteSpacing], page 478.

Section 2.2.83 [Output_property_engraver], page 344
  Apply a procedure to any grob acknowledged.
  Music types accepted:
  Section 1.2.4 [apply-output-event], page 43,

Section 2.2.87 [Part_combine_engraver], page 346
  Part combine engraver for orchestral scores: Print markings ‘a2’, ‘Solo’, ‘Solo II’, and ‘unisono’.
  Music types accepted:
  Section 1.2.43 [note-event], page 47, and Section 1.2.47 [part-combine-event], page 48,
  Properties (read)

  aDueText (markup)
  Text to print at a unisono passage.

  partCombineTextsOnNote (boolean)
  Print part-combine texts only on the next note rather than immediately on rests or skips.

  printPartCombineTexts (boolean)
  Set ‘Solo’ and ‘A due’ texts in the part combiner?

  soloIIText (markup)
  The text for the start of a solo for voice ‘two’ when part-combining.

  soloText (markup)
  The text for the start of a solo when part-combining.

  This engraver creates the following layout object(s):
  Section 3.1.29 [CombineTextScript], page 410.

Section 2.2.88 [Percent_repeat_engraver], page 346
  Make whole measure repeats.
  Music types accepted:
  Section 1.2.49 [percent-event], page 48,
  Properties (read)

  countPercentRepeats (boolean)
  If set, produce counters for percent repeats.
currentCommandColumn (graphical (layout) object)
  Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

repeatCountVisibility (procedure)
  A procedure taking as arguments an integer and context, returning whether the corresponding percent repeat number should be printed when countPercentRepeats is set.

This engraver creates the following layout object(s):
Section 3.1.88 [PercentRepeat], page 482, and Section 3.1.89 [PercentRepeatCounter], page 483.

Section 2.2.89 [Phrasing_slur_engraver], page 347
  Print phrasing slurs. Similar to Section 2.2.106 [Slur_engraver], page 352.
  Music types accepted:
  Section 1.2.43 [note-event], page 47, and Section 1.2.51 [phrasing-slur-event], page 48,
  This engraver creates the following layout object(s):
  Section 3.1.90 [PhrasingSlur], page 484.

Section 2.2.94 [Pitched_trill_engraver], page 349
  Print the bracketed note head after a note head with trill.
  This engraver creates the following layout object(s):
  Section 3.1.129 [TrillPitchAccidental], page 528, Section 3.1.130 [TrillPitchGroup], page 529, and Section 3.1.131 [TrillPitchHead], page 530.

Section 2.2.97 [Repeat_tie_engraver], page 350
  Create repeat ties.
  Music types accepted:
  Section 1.2.53 [repeat-tie-event], page 48,
  This engraver creates the following layout object(s):
  Section 3.1.94 [RepeatTie], page 490, and Section 3.1.95 [RepeatTieColumn], page 491.

Section 2.2.99 [Rest_engraver], page 350
  Engrave rests.
  Music types accepted:
  Section 1.2.54 [rest-event], page 49,
  Properties (read)

  middleCPosition (number)
  The place of the middle C, measured in half staff-spaces. Usually determined by looking at middleCClefPosition and middleCOffset.

This engraver creates the following layout object(s):
Section 3.1.96 [Rest], page 491.
Section 2.2.100 [Rhythmic_column_engraver], page 351
Generate NoteColumn, an object that groups stems, note heads, and rests.
This engraver creates the following layout object(s):
Section 3.1.81 [NoteColumn], page 476.

Section 2.2.101 [Script_column_engraver], page 351
Find potentially colliding scripts and put them into a ScriptColumn object; that will fix the collisions.
This engraver creates the following layout object(s):
Section 3.1.99 [ScriptColumn], page 494.

Section 2.2.102 [Script_engraver], page 351
Handle note scripted articulations.
Music types accepted:
Section 1.2.6 [articulation-event], page 43,
Properties (read)

\[\text{scriptDefinitions (list)}\]
The description of scripts. This is used by the Script_engraver for typesetting note-superscripts and subscripts. See scm/script.scm for more information.

This engraver creates the following layout object(s):
Section 3.1.98 [Script], page 493.

Section 2.2.105 [Slash_repeat_engraver], page 352
Make beat repeats.
Music types accepted:
Section 1.2.52 [repeat-slash-event], page 48,
This engraver creates the following layout object(s):
Section 3.1.37 [DoubleRepeatSlash], page 423, and Section 3.1.93 [RepeatSlash], page 489.

Section 2.2.106 [Slur_engraver], page 352
Build slur grobs from slur events.
Music types accepted:
Section 1.2.43 [note-event], page 47, and Section 1.2.58 [slur-event], page 49,
Properties (read)

\[\text{doubleSlurs (boolean)}\]
If set, two slurs are created for every slurred note, one above and one below the chord.

\[\text{slurMelismaBusy (boolean)}\]
Signal if a slur is present.

This engraver creates the following layout object(s):
Section 3.1.101 [Slur], page 494.

Section 2.2.113 [Spanner_break_forbid_engraver], page 354
Forbid breaks in certain spanners.
Section 2.2.119 [Stem_engraver], page 355
Create stems, flags and single-stem tremolos. It also works together with the beam engraver for overriding beaming.

Music types accepted:
Section 1.2.75 [tremolo-event], page 52, and Section 1.2.78 [tuplet-span-event], page 52,

Properties (read)

\begin{itemize}
\item \textbf{stemLeftBeamCount} (integer)
\hspace{2cm} Specify the number of beams to draw on the left side of the next note. Overrides automatic beaming. The value is only used once, and then it is erased.
\item \textbf{stemRightBeamCount} (integer)
\hspace{2cm} See \textbf{stemLeftBeamCount}.
\item \textbf{whichBar} (string)
\hspace{2cm} This property is read to determine what type of bar line to create.
\hspace{2cm} Example:
\begin{verbatim}
\set Staff.whichBar = ".::"
\end{verbatim}
\hspace{2cm} This will create a start-repeat bar in this staff only. Valid values are described in \texttt{scm/bar-line.scm}.
\end{itemize}

This engraver creates the following layout object(s):
Section 3.1.44 [Flag], page 432, Section 3.1.111 [Stem], page 504, Section 3.1.112 [StemStub], page 506, and Section 3.1.113 [StemTremolo], page 507.

Section 2.2.125 [Text_engraver], page 357
Create text scripts.

Music types accepted:
Section 1.2.71 [text-script-event], page 51,

This engraver creates the following layout object(s):
Section 3.1.124 [TextScript], page 519.

Section 2.2.126 [Text_spanner_engraver], page 358
Create text spanner from an event.

Music types accepted:
Section 1.2.72 [text-span-event], page 51,

Properties (read)

\begin{itemize}
\item \textbf{currentMusicalColumn} (graphical (layout) object)
\hspace{2cm} Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).
\end{itemize}

This engraver creates the following layout object(s):
Section 3.1.125 [TextSpanner], page 521.

Section 2.2.127 [Tie_engraver], page 358
Generate ties between note heads of equal pitch.
Music types accepted:
Section 1.2.73 [tie-event], page 51,
Properties (read)

\texttt{skipTypesetting} (boolean)
If true, no typesetting is done, speeding up the interpretation phase. Useful for debugging large scores.

\texttt{tieWaitForNote} (boolean)
If true, tied notes do not have to follow each other directly. This can be used for writing out arpeggios.

Properties (write)

\texttt{tieMelismaBusy} (boolean)
Signal whether a tie is present.

This engraver creates the following layout object(s):
Section 3.1.126 [Tie], page 523, and Section 3.1.127 [TieColumn], page 525.

\textbf{Section 2.2.132 [Trill_spanner_ engraver], page 360}
Create trill spanner from an event.
Music types accepted:
Section 1.2.77 [trill-span-event], page 52,
Properties (read)

\texttt{currentCommandColumn} (graphical (layout) object)
Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

\texttt{currentMusicalColumn} (graphical (layout) object)
Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).

This engraver creates the following layout object(s):
Section 3.1.132 [TrillSpanner], page 531.

\textbf{Section 2.2.133 [Tuplet_ engraver], page 361}
Catch tuplet events and generate appropriate bracket.
Music types accepted:
Section 1.2.78 [tuplet-span-event], page 52,
Properties (read)

\texttt{tupletFullLength} (boolean)
If set, the tuplet is printed up to the start of the next note.

\texttt{tupletFullLengthNote} (boolean)
If set, end at the next note, otherwise end on the matter (time signatures, etc.) before the note.
This engraver creates the following layout object(s):
Section 3.1.133 [TupletBracket], page 532, and Section 3.1.134 [Tuplet-Number], page 534.

2.1.16 Lyrics

Corresponds to a voice with lyrics. Handles the printing of a single line of lyrics.

This context creates the following layout object(s):
Section 3.1.55 [InstrumentName], page 443, Section 3.1.65 [LyricExtender], page 458, Section 3.1.66 [LyricHyphen], page 458, Section 3.1.67 [LyricSpace], page 459, Section 3.1.68 [LyricText], page 460, Section 3.1.110 [StanzaNumber], page 503, Section 3.1.139 [VerticalAxisGroup], page 538, and Section 3.1.143 [VowelTransition], page 544.

This context sets the following properties:
- Set grob-property bar-extent in Section 3.1.11 [BarLine], page 388, to:
  `(-0.05 . 0.05)

- Set grob-property font-size in Section 3.1.55 [InstrumentName], page 443, to 1.0.
- Set grob-property nonstaff-nonstaff-spacing in Section 3.1.139 [VerticalAxisGroup], page 538, to:
  `((basic-distance . 0)
   (minimum-distance . 2.8)
   (padding . 0.2)
   (stretchability . 0))

- Set grob-property nonstaff-relatedstaff-spacing in Section 3.1.139 [VerticalAxisGroup], page 538, to:
  `((basic-distance . 5.5)
   (padding . 0.5)
   (stretchability . 1))

- Set grob-property nonstaff-unrelatedstaff-spacing.padding in Section 3.1.139 [VerticalAxisGroup], page 538, to 1.5.

- Set grob-property remove-empty in Section 3.1.139 [VerticalAxisGroup], page 538, to #t.

- Set grob-property remove-first in Section 3.1.139 [VerticalAxisGroup], page 538, to #t.

- Set grob-property self-alignment-Y in Section 3.1.55 [InstrumentName], page 443, to #f.

- Set grob-property staff-affinity in Section 3.1.139 [VerticalAxisGroup], page 538, to 1.

- Set translator property instrumentName to '().

- Set translator property searchForVoice to #f.

- Set translator property shortInstrumentName to '().

This is a ‘Bottom’ context; no contexts will be created implicitly from it.
This context cannot contain other contexts.

This context is built from the following engraver(s):
Section 2.2.5 [Axis_group_engraver], page 316
Group all objects created in this context in a VerticalAxisGroup spanner.
Properties (read)
currentCommandColumn (graphical (layout)
object)
Grob that is X-parent to all current breakable
clef, key signature, etc.) items.
hasAxisGroup (boolean)
True if the current context is contained in an axis group.

keepAliveInterfaces (list)
A list of symbols, signifying grob interfaces that are worth keeping a staff with remove-empty set around for.

Properties (write)

hasAxisGroup (boolean)
True if the current context is contained in an axis group.

This engraver creates the following layout object(s):
Section 3.1.139 [VerticalAxisGroup], page 538.

Section 2.2.36 [Extender_engraver], page 328
Create lyric extenders.
Music types accepted:
Section 1.2.16 [completize-extender-event], page 44, and Section 1.2.22 [extender-event], page 45,

Properties (read)

extendersOverRests (boolean)
Whether to continue extenders as they cross a rest.

This engraver creates the following layout object(s):
Section 3.1.65 [LyricExtender], page 458.

Section 2.2.41 [Font_size_engraver], page 330
Put fontSize into font-size grob property.

Properties (read)

fontSize (number)
The relative size of all grobs in a context.

Section 2.2.54 [Hyphen_engraver], page 334
Create lyric hyphens, vowel transitions and distance constraints between words.
Music types accepted:
Section 1.2.27 [hyphen-event], page 45, and Section 1.2.81 [vowel-transition-event], page 52,

This engraver creates the following layout object(s):
Section 3.1.66 [LyricHyphen], page 458, Section 3.1.67 [LyricSpace], page 459, and Section 3.1.143 [VowelTransition], page 544.

Section 2.2.55 [Instrument_name_engraver], page 334
Create a system start text for instrument or vocal names.

Properties (read)

currentCommandColumn (graphical (layout) object)
Grob that is X-parent to all current breakable (clef, key signature, etc.) items.
**instrumentName** (markup)
The name to print left of a staff.
The **instrumentName** property labels the staff in the first system, and the **shortInstrumentName** property labels following lines.

**shortInstrumentName** (markup)
See **instrumentName**.

**shortVocalName** (markup)
Name of a vocal line, short version.

**vocalName** (markup)
Name of a vocal line.

This engraver creates the following layout object(s):
Section 3.1.55 [InstrumentName], page 443.

Section 2.2.64 [Lyric_engraver], page 338
Engrave text for lyrics.
Music types accepted:
Section 1.2.34 [lyric-event], page 46,
Properties (read)

**ignoreMelismata** (boolean)
Ignore melismata for this Section “Lyrics” in Internals Reference line.

**lyricMelismaAlignment** (number)
Alignment to use for a melisma syllable.

**searchForVoice** (boolean)
Signal whether a search should be made of all contexts in the context hierarchy for a voice to provide rhythms for the lyrics.

This engraver creates the following layout object(s):
Section 3.1.68 [LyricText], page 460.

Section 2.2.95 [Pure_from_neighbor_engraver], page 349
Coordinates items that get their pure heights from their neighbors.

Section 2.2.118 [Stanza_number_engraver], page 355
Engrave stanza numbers.
Properties (read)

**stanza** (markup)
Stanza ‘number’ to print before the start of a verse. Use in Lyrics context.

This engraver creates the following layout object(s):
Section 3.1.110 [StanzaNumber], page 503.

### 2.1.17 MensuralStaff

Same as **Staff** context, except that it is accommodated for typesetting a piece in mensural style.

This context also accepts commands for the following context(s):
Staff.

This context creates the following layout object(s):

Section 3.1.1 [Accidental], page 377, Section 3.1.2 [AccidentalCautionary], page 378, Section 3.1.3 [AccidentalPlacement], page 379, Section 3.1.4 [AccidentalSuggestion], page 380, Section 3.1.11 [BarLine], page 388, Section 3.1.13 [BassFigure], page 394, Section 3.1.14 [BassFigureAlignment], page 394, Section 3.1.15 [BassFigureAlignmentPositioning], page 395, Section 3.1.16 [BassFigureBracket], page 396, Section 3.1.17 [BassFigureContinuation], page 396, Section 3.1.18 [BassFigureLine], page 396, Section 3.1.25 [Clef], page 405, Section 3.1.26 [ClefModifier], page 407, Section 3.1.30 [CueClef], page 411, Section 3.1.31 [CueEndClef], page 414, Section 3.1.32 [Custos], page 417, Section 3.1.33 [DotColumn], page 419, Section 3.1.43 [FingeringColumn], page 431, Section 3.1.55 [InstrumentName], page 443, Section 3.1.57 [KeyCancellation], page 446, Section 3.1.58 [KeySignature], page 448, Section 3.1.62 [LedgerLineSpanner], page 453, Section 3.1.80 [NoteCollision], page 475, Section 3.1.85 [OttavaBracket], page 479, Section 3.1.91 [PianoPedalBracket], page 486, Section 3.1.97 [RestCollision], page 492, Section 3.1.100 [ScriptRow], page 494, Section 3.1.102 [SostenutoPedal], page 497, Section 3.1.103 [SostenutoPedalLineSpanner], page 498, Section 3.1.108 [StaffSpacing], page 502, Section 3.1.109 [StaffSymbol], page 503, Section 3.1.116 [SustainPedal], page 511, Section 3.1.117 [SustainPedalLineSpanner], page 512, Section 3.1.128 [TimeSignature], page 525, Section 3.1.135 [UnaCordaPedal], page 535, Section 3.1.136 [UnaCordaPedalLineSpanner], page 536, and Section 3.1.139 [VerticalAxisGroup], page 538.

This context sets the following properties:

- Set grob-property glyph-name-alist in Section 3.1.4 [AccidentalSuggestion], page 380, to:
  
  `((-1/2 . "accidentals.mensuralM1")
   (0 . "accidentals.vaticana0")
   (1/2 . "accidentals.mensural1"))`

- Set grob-property glyph-name-alist in Section 3.1.1 [Accidental], page 377, to:
  
  `((-1/2 . "accidentals.mensuralM1")
   (0 . "accidentals.vaticana0")
   (1/2 . "accidentals.mensural1"))`

- Set grob-property glyph-name-alist in Section 3.1.58 [KeySignature], page 448, to:
  
  `((-1/2 . "accidentals.mensuralM1")
   (0 . "accidentals.vaticana0")
   (1/2 . "accidentals.mensural1"))`

- Set grob-property neutral-direction in Section 3.1.32 [Custos], page 417, to -1.
- Set grob-property neutral-position in Section 3.1.32 [Custos], page 417, to 3.
- Set grob-property style in Section 3.1.32 [Custos], page 417, to 'mensural.
- Set grob-property style in Section 3.1.128 [TimeSignature], page 525, to 'mensural.
- Set grob-property thickness in Section 3.1.109 [StaffSymbol], page 503, to 0.6.
- Set translator property transparent in Section 3.1.11 [BarLine], page 388, to #t.
- Set translator property autoAccidentals to:
  
  `(Staff #<procedure #f (context pitch barnum measurepos)>)`

- Set translator property autoCautionaries to '().
- Set translator property clefGlyph to "clefs.mensural.g".
- Set translator property clefPosition to -2.
- Set translator property clefTransposition to 0.
- Set translator property createSpacing to #t.
• Set translator property `extraNatural` to `#f`.
• Set translator property `ignoreFiguredBassRest` to `#f`.
• Set translator property `instrumentName` to `'()`.
• Set translator property `localAlterations` to `'()`.
• Set translator property `middleCClefPosition` to `-6`.
• Set translator property `middleCPosition` to `-6`.
• Set translator property `ottavationMarkups` to:
  `((4 . "29")
   (3 . "22")
   (2 . "15")
   (1 . "8")
   (-1 . "8")
   (-2 . "15")
   (-3 . "22")
   (-4 . "29"))`
• Set translator property `printKeyCancellation` to `#f`.
• Set translator property `shortInstrumentName` to `'()`.

This is not a ‘Bottom’ context; search for such a one will commence after creating an implicit context of type Section 2.1.18 [MensuralVoice], page 169.

Context MensuralStaff can contain Section 2.1.3 [CueVoice], page 63, Section 2.1.18 [MensuralVoice], page 169, and Section 2.1.20 [NullVoice], page 184.

This context is built from the following engraver(s):

Section 2.2.1 [Accidental_ engraver], page 313
Make accidentals. Catch note heads, ties and notices key-change events.
This engraver usually lives at Staff level, but reads the settings for Accidental at Voice level, so you can `\override` them at Voice.

Properties (read)

`accidentalGrouping` (symbol)
If set to `voice`, accidentals on the same note in different octaves may be horizontally staggered if in different voices.

`autoAccidentals` (list)
List of different ways to typeset an accidental.
For determining when to print an accidental, several different rules are tried. The rule that gives the highest number of accidentals is used.
Each entry in the list is either a symbol or a procedure.

`symbol` The symbol is the name of the context in which the following rules are to be applied. For example, if context is Section “Score” in Internals Reference then all staves share accidentals, and if context is Section “Staff” in Internals Reference then all voices in the same staff share accidentals, but staves do not.
The procedure represents an accidental rule to be applied to the previously specified context. The procedure takes the following arguments:

- **context**: The current context to which the rule should be applied.
- **pitch**: The pitch of the note to be evaluated.
- **barnum**: The current bar number.
- **measurepos**: The current measure position.

The procedure returns a pair of booleans. The first states whether an extra natural should be added. The second states whether an accidental should be printed. \((\texttt{#t} . \texttt{#f})\) does not make sense.

- **autoCautionaries** (list) List similar to **autoAccidentals**, but it controls cautionary accidentals rather than normal ones. Both lists are tried, and the one giving the most accidentals wins. In case of draw, a normal accidental is typeset.

- **extraNatural** (boolean) Whether to typeset an extra natural sign before accidentals that reduce the effect of a previous alteration.

- **harmonicAccidentals** (boolean) If set, harmonic notes in chords get accidentals.

- **internalBarNumber** (integer) Contains the current bar number. This property is used for internal timekeeping, among others by the **Accidental_engraver**.

- **keyAlterations** (list) The current key signature. This is an alist containing \((\texttt{step}\ . \texttt{alter})\) or \((\texttt{octave}\ . \texttt{step}\ . \texttt{alter})\), where \texttt{step} is a number in the range 0 to 6 and \texttt{alter} a fraction, denoting alteration. For alterations, use symbols, e.g. \(\texttt{keyAlterations} = \#\texttt{`((6}\ . \texttt{FLAT})}\).

- **localAlterations** (list) The key signature at this point in the measure. The format is the same as for **keyAlterations**, \(\texttt{keyAlterations} = \#\texttt{`((6}\ . \texttt{FLAT})}\).
but can also contain \((\text{octave} \cdot \text{name}) \cdot (\text{alter barnumber} \cdot \text{measureposition})\) pairs.

Properties (write)

\text{localAlterations} (list)

The key signature at this point in the measure. The format is the same as for \text{keyAlterations}, but can also contain \((\text{octave} \cdot \text{name}) \cdot (\text{alter barnumber} \cdot \text{measureposition})\) pairs.

This engraver creates the following layout object(s):

Section 3.1.1 [Accidental], page 377, Section 3.1.2 [AccidentalCautionary], page 378, Section 3.1.3 [AccidentalPlacement], page 379, and Section 3.1.4 [AccidentalSuggestion], page 380.

Section 2.2.5 [Axis\_group\_engraver], page 316

Group all objects created in this context in a \text{VerticalAxisGroup} spanner.

Properties (read)

\text{currentCommandColumn} (graphical (layout) object)

Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

\text{hasAxisGroup} (boolean)

True if the current context is contained in an axis group.

\text{keepAliveInterfaces} (list)

A list of symbols, signifying grob interfaces that are worth keeping a staff with \text{remove-empty} set around for.

Properties (write)

\text{hasAxisGroup} (boolean)

True if the current context is contained in an axis group.

This engraver creates the following layout object(s):

Section 3.1.139 [VerticalAxisGroup], page 538.

Section 2.2.7 [Bar\_engraver], page 316

Create barlines. This engraver is controlled through the \text{whichBar} property. If it has no bar line to create, it will forbid a linebreak at this point. This engraver is required to trigger the creation of clefs at the start of systems.

Properties (read)

\text{whichBar} (string)

This property is read to determine what type of bar line to create.

Example:

\verbatim": \set Staff.whichBar = ".":"\endverbatim
This will create a start-repeat bar in this staff only. Valid values are described in scm/bar-line.scm.

Properties (write)

forbidBreak (boolean)
If set to #t, prevent a line break at this point.

This engraver creates the following layout object(s):
Section 3.1.11 [BarLine], page 388.

Section 2.2.17 [Clef_engraver], page 321
Determine and set reference point for pitches.

Properties (read)

clefGlyph (string)
Name of the symbol within the music font.

clefPosition (number)
Where should the center of the clef symbol go, measured in half staff spaces from the center of the staff.

clefTransposition (integer)
Add this much extra transposition. Values of 7 and -7 are common.

clefTranspositionStyle (symbol)
Determines the way the ClefModifier grob is displayed. Possible values are ‘default’, ‘parenthesized’ and ‘bracketed’.

explicitClefVisibility (vector)
‘break-visibility’ function for clef changes.

forceClef (boolean)
Show clef symbol, even if it has not changed. Only active for the first clef after the property is set, not for the full staff.

This engraver creates the following layout object(s):
Section 3.1.25 [Clef], page 405, and Section 3.1.26 [ClefModifier], page 407.

Section 2.2.19 [Collision_engraver], page 322
Collect NoteColumns, and as soon as there are two or more, put them in a NoteCollision object.

This engraver creates the following layout object(s):
Section 3.1.80 [NoteCollision], page 475.

Section 2.2.24 [Cue_clef_engraver], page 324
Determine and set reference point for pitches in cued voices.

Properties (read)

clefTransposition (integer)
Add this much extra transposition. Values of 7 and -7 are common.
cueClefGlyph (string)
Name of the symbol within the music font.

cueClefPosition (number)
Where should the center of the clef symbol go, measured in half staff spaces from the center of the staff.

cueClefTransposition (integer)
Add this much extra transposition. Values of 7 and -7 are common.

cueClefTranspositionStyle (symbol)
Determines the way the ClefModifier grob is displayed. Possible values are ‘default’, ‘parenthesized’ and ‘bracketed’.

explicitCueClefVisibility (vector)
‘break-visibility’ function for cue clef changes.

middleCCuePosition (number)
The position of the middle C, as determined only by the clef of the cue notes. This can be calculated by looking at cueClefPosition and cueClefGlyph.

This engraver creates the following layout object(s):
Section 3.1.26 [ClefModifier], page 407, Section 3.1.30 [CueClef], page 411, and Section 3.1.31 [CueEndClef], page 414.

Section 2.2.25 [Custos_engraver], page 324
Engrave custodes.
This engraver creates the following layout object(s):
Section 3.1.32 [Custos], page 417.

Section 2.2.27 [Dot_column_engraver], page 325
Engrave dots on dotted notes shifted to the right of the note. If omitted, then dots appear on top of the notes.
This engraver creates the following layout object(s):
Section 3.1.33 [DotColumn], page 419.

Section 2.2.37 [Figured_bass_engraver], page 328
Make figured bass numbers.
Music types accepted:
Section 1.2.7 [bass-figure-event], page 43, and Section 1.2.54 [rest-event], page 49,
Properties (read)

figuredBassAlterationDirection
(direction)
Where to put alterations relative to the main figure.

figuredBassCenterContinuations (boolean)
Whether to vertically center pairs of extender lines. This does not work with three or more lines.
figuredBassFormatter (procedure)
A routine generating a markup for a bass figure.

ignoreFiguredBassRest (boolean)
Don’t swallow rest events.

implicitBassFigures (list)
A list of bass figures that are not printed as numbers, but only as extender lines.

useBassFigureExtenders (boolean)
Whether to use extender lines for repeated bass figures.

This engraver creates the following layout object(s):
Section 3.1.13 [BassFigure], page 394, Section 3.1.14 [BassFigure-Alignment], page 394, Section 3.1.16 [BassFigureBracket], page 396, Section 3.1.17 [BassFigureContinuation], page 396, and Section 3.1.18 [BassFigureLine], page 396.

Section 2.2.38 [Figured_bass_position_engraver], page 329
Position figured bass alignments over notes.
This engraver creates the following layout object(s):
Section 3.1.15 [BassFigureAlignmentPositioning], page 395.

Section 2.2.39 [Fingering_column_engraver], page 329
Find potentially colliding scripts and put them into a FingeringColumn object; that will fix the collisions.
This engraver creates the following layout object(s):
Section 3.1.43 [FingeringColumn], page 431.

Section 2.2.41 [Font_size_engraver], page 330
Put fontSize into font-size grob property.
Properties (read)

fontSize (number)
The relative size of all grobs in a context.

Section 2.2.52 [Grob_pq_engraver], page 334
Administrte when certain grobs (e.g., note heads) stop playing.
Properties (read)

busyGrobs (list)
A queue of (end-moment . grob) cons cells. This is for internal (C++) use only. This property contains the grobs which are still busy (e.g. note heads, spanners, etc.).

Properties (write)

busyGrobs (list)
A queue of (end-moment . grob) cons cells. This is for internal (C++) use only. This property contains the grobs which are still busy (e.g. note heads, spanners, etc.).

Section 2.2.55 [Instrument_name_engraver], page 334
Create a system start text for instrument or vocal names.
Properties (read)

```plaintext
currentCommandColumn (graphical (layout) object)
Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

instrumentName (markup)
The name to print left of a staff. The `instrumentName` property labels
the staff in the first system, and the `shortInstrumentName` property labels
following lines.

shortInstrumentName (markup)
See `instrumentName`.

shortVocalName (markup)
Name of a vocal line, short version.

vocalName (markup)
Name of a vocal line.
```

This engraver creates the following layout object(s):

Section 3.1.55 [InstrumentName], page 443.

Section 2.2.58 [Key_engraver], page 335
Engrave a key signature.

Music types accepted:
Section 1.2.28 [key-change-event], page 45,

Properties (read)

```plaintext
createKeyOnClefChange (boolean)
Print a key signature whenever the clef is changed.

explicitKeySignatureVisibility (vector)
`break-visibility` function for explicit key changes. `\overline` of the
`break-visibility` property will set the visibility for normal (i.e., at the start of the
line) key signatures.

extraNatural (boolean)
Whether to typeset an extra natural sign before accidentals that reduce the effect of a previous
alteration.

keyAlterationOrder (list)
An alist that defines in what order alterations should be printed. The format is `(step . alter)`, where `step` is a number from 0 to 6 and `alter` from -2 (sharp) to 2 (flat).

keyAlterations (list)
The current key signature. This is an alist containing `(step . alter)` or `((octave . step) . alter)`, where `step` is a number in the
range 0 to 6 and alter a fraction, denoting alteration. For alterations, use symbols, e.g. keyAlterations = #`(6 , FLAT)).

lastKeyAlterations (list)
Last key signature before a key signature change.

middleCClefPosition (number)
The position of the middle C, as determined only by the clef. This can be calculated by looking at clefPosition and clefGlyph.

printKeyCancellation (boolean)
Print restoration alterations before a key signature change.

Properties (write)

keyAlterations (list)
The current key signature. This is an alist containing (step . alter) or ((octave . step) . alter), where step is a number in the range 0 to 6 and alter a fraction, denoting alteration. For alterations, use symbols, e.g. keyAlterations = #`(6 , FLAT)).

lastKeyAlterations (list)
Last key signature before a key signature change.

tonic (pitch)
The tonic of the current scale.

This engraver creates the following layout object(s):
Section 3.1.57 [KeyCancellation], page 446, and Section 3.1.58 [KeySignature], page 448.

Section 2.2.62 [Ledger_line_engraver], page 337
Create the spanner to draw ledger lines, and notices objects that need ledger lines.

This engraver creates the following layout object(s):
Section 3.1.62 [LedgerLineSpanner], page 453.

Section 2.2.82 [Ottava_spanner_engraver], page 344
Create a text spanner when the ottavation property changes.

Properties (read)

currentMusicalColumn (graphical (layout) object)
Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).

middleCOffset (number)
The offset of middle C from the position given by middleCClefPosition This is used for ottava brackets.
ottavation (markup)
If set, the text for an ottava spanner. Changing this creates a new text spanner.

This engraver creates the following layout object(s):
Section 3.1.85 [OttavaBracket], page 479.

Section 2.2.83 [Output_property_engraver], page 344
Apply a procedure to any grob acknowledged.
Music types accepted:
Section 1.2.4 [apply-output-event], page 43,

Section 2.2.90 [Piano_pedal_align_engraver], page 347
Align piano pedal symbols and brackets.
Properties (read)
\begin{verbatim}
currentCommandColumn (graphical (layout) object)
Grob that is X-parent to all current breakable (clef, key signature, etc.) items.
\end{verbatim}

This engraver creates the following layout object(s):
Section 3.1.103 [SostenutoPedalLineSpanner], page 498, Section 3.1.117 [SustainPedalLineSpanner], page 512, and Section 3.1.136 [UnaCordaPedalLineSpanner], page 536.

Section 2.2.91 [Piano_pedal_engraver], page 347
Engrave piano pedal symbols and brackets.
Music types accepted:
Section 1.2.61 [sostenuto-event], page 49, Section 1.2.69 [sustain-event], page 51, and Section 1.2.79 [una-corda-event], page 52,
Properties (read)
\begin{verbatim}
currentCommandColumn (graphical (layout) object)
Grob that is X-parent to all current breakable (clef, key signature, etc.) items.
pedalSostenutoStrings (list)
See pedalSustainStrings.
pedalSostenutoStyle (symbol)
See pedalSustainStyle.
pedalSustainStrings (list)
A list of strings to print for sustain-pedal. Format is \texttt{(up updown down)}, where each of the three is the string to print when this is done with the pedal.
pedalSustainStyle (symbol)
A symbol that indicates how to print sustain pedals: text, bracket or mixed (both).
pedalUnaCordaStrings (list)
See pedalSustainStrings.
\end{verbatim}
pedalUnaCordaStyle (symbol)
   See pedalSustainStyle.

This engraver creates the following layout object(s):
Section 3.1.91 [PianoPedalBracket], page 486, Section 3.1.102 [SostenutoPedal], page 497, Section 3.1.116 [SustainPedal], page 511, and Section 3.1.135 [UnaCordaPedal], page 535.

Section 2.2.95 [Pure_from_neighbor_engraver], page 349
Coordinates items that get their pure heights from their neighbors.

Section 2.2.98 [Rest_collision_engraver], page 350
Handle collisions of rests.
Properties (read)
   busyGrobs (list)
      A queue of \texttt{(end-moment . grob)} cons cells.
      This is for internal (C++) use only. This property contains the grobs which are still busy (e.g. note heads, spanners, etc.).

This engraver creates the following layout object(s):
Section 3.1.97 [RestCollision], page 492.

Section 2.2.103 [Script_row_engraver], page 351
Determine order in horizontal side position elements.
This engraver creates the following layout object(s):
Section 3.1.100 [ScriptRow], page 494.

Section 2.2.104 [Separating_line_group_engraver], page 352
Generate objects for computing spacing parameters.
Properties (read)
   createSpacing (boolean)
      Create \texttt{StaffSpacing} objects? Should be set for staves.

Properties (write)
   hasStaffSpacing (boolean)
      True if the current \texttt{CommandColumn} contains items that will affect spacing.

This engraver creates the following layout object(s):
Section 3.1.108 [StaffSpacing], page 502.

Section 2.2.114 [Staff_collecting_engraver], page 354
Maintain the \texttt{stavesFound} variable.
Properties (read)
   stavesFound (list of grobs)
      A list of all staff-symbols found.

Properties (write)
   stavesFound (list of grobs)
      A list of all staff-symbols found.
Section 2.2.116 [Staff_symbol_engraver], page 354
Create the constellation of five (default) staff lines.
Music types accepted:
Section 1.2.65 [staff-span-event], page 50,
This engraver creates the following layout object(s):
Section 3.1.109 [StaffSymbol], page 503.

Section 2.2.129 [Time_signature_engraver], page 359
Create a Section 3.1.128 [TimeSignature], page 525, whenever
\texttt{timeSignatureFraction} changes.
Music types accepted:
Section 1.2.74 [time-signature-event], page 51,
Properties (read)
\begin{itemize}
  \item \texttt{initialTimeSignatureVisibility} (vector)
    break visibility for the initial time signature.
  \item \texttt{partialBusy} (boolean)
    Signal that `\texttt{partial}` acts at the current
timestep.
  \item \texttt{timeSignatureFraction} (fraction, as pair)
    A pair of numbers, signifying the time signa-
ture. For example, `(4 . 4)` is a 4/4 time sig-

This engraver creates the following layout object(s):
Section 3.1.128 [TimeSignature], page 525.

2.1.18 MensuralVoice
Same as Voice context, except that it is accommodated for typesetting a piece in mensural style.
This context also accepts commands for the following context(s):
Voice.
This context creates the following layout object(s):
Section 3.1.9 [Arpeggio], page 386, Section 3.1.19 [Beam], page 397, Section 3.1.20
[BendAfter], page 399, Section 3.1.23 [BreathingSign], page 402, Section 3.1.27 [Clus-
terSpanner], page 409, Section 3.1.28 [ClusterSpannerBeacon], page 409, Section 3.1.29
[CombineTextScript], page 410, Section 3.1.34 [Dots], page 419, Section 3.1.35 [DoublePer-
centRepeat], page 420, Section 3.1.36 [DoublePercentRepeatCounter], page 421, Section 3.1.37
[DoubleRepeatSlash], page 423, Section 3.1.38 [DynamicLineSpanner], page 424, Section 3.1.39
[DynamicText], page 425, Section 3.1.40 [DynamicTextSpanner], page 427, Section 3.1.42
[Fingering], page 429, Section 3.1.44 [Flag], page 432, Section 3.1.48 [Glissando], page 437,
Section 3.1.52 [Hairpin], page 440, Section 3.1.56 [InstrumentSwitch], page 444, Section 3.1.60
[LaissezViberTie], page 452, Section 3.1.61 [LaissezViberTieColumn], page 453, Section 3.1.73
[MensuralLigature], page 466, Section 3.1.75 [MultiMeasureRest], page 468, Section 3.1.76
[MultiMeasureRestNumber], page 469, Section 3.1.77 [MultiMeasureRestScript], page 471,
Section 3.1.78 [MultiMeasureRestText], page 472, Section 3.1.81 [NoteColumn], page 476,
Section 3.1.82 [NoteHead], page 477, Section 3.1.84 [NoteSpacing], page 478, Section 3.1.88
[PercentRepeat], page 482, Section 3.1.89 [PercentRepeatCounter], page 483, Section 3.1.90
[PhrasingSlur], page 484, Section 3.1.93 [RepeatSlash], page 489, Section 3.1.94 [RepeatTie],
page 490, Section 3.1.95 [RepeatTieColumn], page 491, Section 3.1.96 [Rest], page 491,
Section 3.1.98 [Script], page 493, Section 3.1.99 [ScriptColumn], page 494, Section 3.1.111
This context sets the following properties:

- Set grob-property `style` in Section 3.1.44 [Flag], page 432, to 'mensural'.
- Set grob-property `style` in Section 3.1.82 [NoteHead], page 477, to 'mensural'.
- Set grob-property `style` in Section 3.1.96 [Rest], page 491, to 'mensural'.
- Set translator property `autoBeaming` to #f.

This is a 'Bottom' context; no contexts will be created implicitly from it.

This context cannot contain other contexts.

This context is built from the following engraver(s):

**Section 2.2.3 [Arpeggio_engraver], page 315**

Generate an Arpeggio symbol.

Music types accepted:

Section 1.2.5 [arpeggio-event], page 43,

This engraver creates the following layout object(s):

Section 3.1.9 [Arpeggio], page 386.

**Section 2.2.4 [Auto_beam_engraver], page 315**

Generate beams based on measure characteristics and observed Stems.

Uses `baseMoment`, `beatStructure`, `beamExceptions`, `measureLength`, and `measurePosition` to decide when to start and stop a beam. Overriding beaming is done through Section 2.2.119 [Stem_engraver], page 355, properties `stemLeftBeamCount` and `stemRightBeamCount`.

Music types accepted:

Section 1.2.9 [beam-forbid-event], page 43,

Properties (read)

`autoBeaming` (boolean)

If set to true then beams are generated automatically.

`baseMoment` (moment)

Smallest unit of time that will stand on its own as a subdivided section.

`beamExceptions` (list)

Analist of exceptions to autobeam rules that normally end on beats.

`beamHalfMeasure` (boolean)

Whether to allow a beam to begin halfway through the measure in triple time, which could look like 6/8.

`beatStructure` (list)

List of `baseMoments` that are combined to make beats.
subdivideBeams (boolean)
If set, multiple beams will be subdivided at baseMoment positions by only drawing one beam over the beat.

This engraver creates the following layout object(s):
Section 3.1.19 [Beam], page 397.

Section 2.2.10 [Beam_ engraver], page 318
Handle Beam events by engraving beams. If omitted, then notes are printed with flags instead of beams.
Music types accepted:
Section 1.2.8 [beam-event], page 43,
Properties (read)

baseMoment (moment)
Smallest unit of time that will stand on its own as a subdivided section.

beamMelismaBusy (boolean)
Signal if a beam is present.

beatStructure (list)
List of baseMoments that are combined to make beats.

subdivideBeams (boolean)
If set, multiple beams will be subdivided at baseMoment positions by only drawing one beam over the beat.

Properties (write)

forbidBreak (boolean)
If set to #t, prevent a line break at this point.

This engraver creates the following layout object(s):
Section 3.1.19 [Beam], page 397.

Section 2.2.12 [Bend_ engraver], page 319
Create fall spanners.
Music types accepted:
Section 1.2.10 [bend-after-event], page 43,
This engraver creates the following layout object(s):
Section 3.1.20 [BendAfter], page 399.

Section 2.2.14 [Breathing_ sign_ engraver], page 320
Create a breathing sign.
Music types accepted:
Section 1.2.14 [breathing-event], page 44,
This engraver creates the following layout object(s):
Section 3.1.23 [BreathingSign], page 402.

Section 2.2.16 [Chord_ tremolo_ engraver], page 321
Generate beams for tremolo repeats.
Music types accepted:
Section 1.2.76 [tremolo-span-event], page 52,
This engraver creates the following layout object(s):
Section 3.1.19 [Beam], page 397.

Section 2.2.18 [Cluster_spanner_engraver], page 321
Engrave a cluster using Spanner notation.
Music types accepted:
Section 1.2.15 [cluster-note-event], page 44,
This engraver creates the following layout object(s):
Section 3.1.27 [ClusterSpanner], page 409, and Section 3.1.28 [ClusterSpannerBeacon], page 409.

Section 2.2.28 [Dots_engraver], page 325
Create Section 3.1.34 [Dots], page 419, objects for Section 3.2.98 [rhythmic-head-interface], page 601s.
This engraver creates the following layout object(s):
Section 3.1.34 [Dots], page 419.

Section 2.2.29 [Double_percent_repeat_engraver], page 326
Make double measure repeats.
Music types accepted:
Section 1.2.19 [double-percent-event], page 44,
Properties (read)

\begin{verbatim}
  countPercentRepeats (boolean)
  If set, produce counters for percent repeats.

  measureLength (moment)
  Length of one measure in the current time signature.

  repeatCountVisibility (procedure)
  A procedure taking as arguments an integer and context, returning whether the corresponding percent repeat number should be printed when countPercentRepeats is set.
\end{verbatim}

Properties (write)

\begin{verbatim}
  forbidBreak (boolean)
  If set to #t, prevent a line break at this point.
\end{verbatim}

This engraver creates the following layout object(s):
Section 3.1.35 [DoublePercentRepeat], page 420, and Section 3.1.36 [DoublePercentRepeatCounter], page 421.

Section 2.2.32 [Dynamic_align_engraver], page 327
Align hairpins and dynamic texts on a horizontal line.
Properties (read)

\begin{verbatim}
  currentMusicalColumn (graphical (layout) object)
  Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).
\end{verbatim}
This engraver creates the following layout object(s):
Section 3.1.38 [DynamicLineSpanner], page 424.

Section 2.2.33 [Dynamic_engraver], page 327
Create hairpins, dynamic texts and dynamic text spanners.
Music types accepted:
Section 1.2.1 [absolute-dynamic-event], page 42, Section 1.2.13 [break-span-event], page 44, and Section 1.2.63 [span-dynamic-event], page 50,
Properties (read)

\texttt{crescendoSpanner} (symbol)
\begin{itemize}
\item The type of spanner to be used for crescendi.
\item Available values are ‘hairpin’ and ‘text’. If unset, a hairpin crescendo is used.
\end{itemize}

\texttt{crescendoText} (markup)
\begin{itemize}
\item The text to print at start of non-hairpin crescendo, i.e., ‘cresc.’.
\end{itemize}

\texttt{currentMusicalColumn} (graphical (layout) object)
\begin{itemize}
\item Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).
\end{itemize}

\texttt{decrescendoSpanner} (symbol)
\begin{itemize}
\item The type of spanner to be used for decrescendi.
\item Available values are ‘hairpin’ and ‘text’. If unset, a hairpin decrescendo is used.
\end{itemize}

\texttt{decrescendoText} (markup)
\begin{itemize}
\item The text to print at start of non-hairpin decrescendo, i.e., ‘dim.’.
\end{itemize}

This engraver creates the following layout object(s):
Section 3.1.39 [DynamicText], page 425, Section 3.1.40 [DynamicTextSpanner], page 427, and Section 3.1.52 [Hairpin], page 440.

Section 2.2.40 [Fingering_engraver], page 329
Create fingering scripts.
Music types accepted:
Section 1.2.23 [fingering-event], page 45,
This engraver creates the following layout object(s):
Section 3.1.42 [Fingering], page 429.

Section 2.2.41 [Font_size_engraver], page 330
Put \texttt{fontSize} into \texttt{font-size} grob property.
Properties (read)

\texttt{fontSize} (number)
\begin{itemize}
\item The relative size of all grobs in a context.
\end{itemize}

Section 2.2.43 [Forbid_line_break_engraver], page 330
Forbid line breaks when note heads are still playing at some point.
Properties (read)

busyGrobs (list)
A queue of \textit{(end-moment . grob)} cons cells.
This is for internal (C++) use only. This property contains the grobs which are still busy (e.g. note heads, spanners, etc.).

Properties (write)

forbidBreak (boolean)
If set to \#t, prevent a line break at this point.

Section 2.2.45 \textit{[Glissando_engraver]}, page 331

Engrave glissandi.

Music types accepted:
Section 1.2.25 \textit{[glissando-event]}, page 45,

Properties (read)

glissandoMap (list)
A map in the form of \'(source1 . target1) (source2 . target2) (source\textit{n} . target\textit{n})\) showing the glissandi to be drawn for note columns.
The value \'() will default to \'(0 . 0) (1 . 1) (n . n)), where \textit{n} is the minimal number of note-heads in the two note columns between which the glissandi occur.

This engraver creates the following layout object(s):
Section 3.1.48 \textit{[Glissando]}, page 437.

Section 2.2.46 \textit{[Grace_auto_beam_engraver]}, page 332

Generates one autobeam group across an entire grace phrase. As usual, any manual beaming or \texttt{noBeam} will block autobeaming, just like setting the context property \texttt{autoBeaming} \texttt{#f}. Music types accepted:
Section 1.2.9 \textit{[beam-forbid-event]}, page 43,

Properties (read)

autoBeaming (boolean)
If set to true then beams are generated automatically.

This engraver creates the following layout object(s):
Section 3.1.19 \textit{[Beam]}, page 397.

Section 2.2.47 \textit{[Grace_beam_engraver]}, page 332

Handle Beam events by engraving beams. If omitted, then notes are printed with flags instead of beams. Only engraves beams when we are at grace points in time.
Music types accepted:
Section 1.2.8 \textit{[beam-event]}, page 43,

Properties (read)

baseMoment (moment)
Smallest unit of time that will stand on its own as a subdivided section.
beamMelismaBusy (boolean)
 Signal if a beam is present.

beatStructure (list)
 List of baseMoments that are combined to make beats.

subdivideBeams (boolean)
 If set, multiple beams will be subdivided at baseMoment positions by only drawing one beam over the beat.

This engraver creates the following layout object(s):
Section 3.1.19 [Beam], page 397.

Section 2.2.48 [Grace-engraver], page 333
Set font size and other properties for grace notes.
Properties (read)

graceSettings (list)
Overrides for grace notes. This property should be manipulated through the add-grace-property function.

Section 2.2.52 [Grob_pq-engraver], page 334
Administrate when certain grobs (e.g., note heads) stop playing.
Properties (read)

busyGrobs (list)
A queue of (end-moment . grob) cons cells. This is for internal (C++) use only. This property contains the grobs which are still busy (e.g. note heads, spanners, etc.).

Properties (write)

busyGrobs (list)
A queue of (end-moment . grob) cons cells. This is for internal (C++) use only. This property contains the grobs which are still busy (e.g. note heads, spanners, etc.).

Section 2.2.56 [Instrument_switch-engraver], page 335
Create a cue text for taking instrument.
Properties (read)

instrumentCueName (markup)
The name to print if another instrument is to be taken.

This engraver creates the following layout object(s):
Section 3.1.56 [InstrumentSwitch], page 444.

Section 2.2.61 [Laissez_vibrer-engraver], page 337
Create laissez vibrer items.
Music types accepted:
Section 1.2.30 [laissez-vibrer-event], page 45,
This engraver creates the following layout object(s):
Section 3.1.60 [LaissezVibrerTie], page 452, and Section 3.1.61 [LaissezVibrerTieColumn], page 453.

Section 2.2.71 [Mensural_ligature_engraver], page 340
Handle Mensural_ligature_events by gluing special ligature heads together.
Music types accepted:
Section 1.2.32 [ligature-event], page 46,
This engraver creates the following layout object(s):
Section 3.1.73 [MensuralLigature], page 466.

Section 2.2.75 [Multi_measure_rest_engraver], page 341
Engrave multi-measure rests that are produced with ‘R’. It reads measurePosition and internalBarNumber to determine what number to print over the Section 3.1.75 [MultiMeasureRest], page 468.
Music types accepted:
Section 1.2.39 [multi-measure-articulation-event], page 46, Section 1.2.40 [multi-measure-rest-event], page 46, and Section 1.2.41 [multi-measure-text-event], page 47.

Properties (read)

currentCommandColumn (graphical (layout) object)
Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

internalBarNumber (integer)
Contains the current barnumber. This property is used for internal timekeeping, among others by the Accidental_engraver.

measurePosition (moment)
How much of the current measure have we had. This can be set manually to create incomplete measures.

restNumberThreshold (number)
If a multimeasure rest has more measures than this, a number is printed.

whichBar (string)
This property is read to determine what type of bar line to create.
Example:
\set Staff.whichBar = ".|:
This will create a start-repeat bar in this staff only. Valid values are described in scm/bar-line.scm.

This engraver creates the following layout object(s):
Section 3.1.75 [MultiMeasureRest], page 468, Section 3.1.76 [MultiMeasureRestNumber], page 469, Section 3.1.77 [MultiMeasureRestScript], page 471, and Section 3.1.78 [MultiMeasureRestText], page 472.
Section 2.2.76 [New_fingering_engraver], page 342
Create fingering scripts for notes in a new chord. This engraver is ill-named, since it also takes care of articulations and harmonic note heads.
Properties (read)

fingeringOrientations (list)
A list of symbols, containing ‘left’, ‘right’, ‘up’ and/or ‘down’. This list determines where fingerings are put relative to the chord being fingered.

harmonicDots (boolean)
If set, harmonic notes in dotted chords get dots.

stringNumberOrientations (list)
See fingeringOrientations.

strokeFingerOrientations (list)
See fingeringOrientations.

This engraver creates the following layout object(s):
Section 3.1.42 [Fingering], page 429, Section 3.1.98 [Script], page 493, Section 3.1.114 [StringNumber], page 508, and Section 3.1.115 [StrokeFinger], page 510.

Section 2.2.77 [Note_head_line_engraver], page 343
Engrave a line between two note heads in a staff switch if followVoice is set.
Properties (read)

followVoice (boolean)
If set, note heads are tracked across staff switches by a thin line.

This engraver creates the following layout object(s):
Section 3.1.140 [VoiceFollower], page 540.

Section 2.2.78 [Note_heads_engraver], page 343
Generate note heads.
Music types accepted:
Section 1.2.43 [note-event], page 47,
Properties (read)

middleCPosition (number)
The place of the middle C, measured in half staff-spaces. Usually determined by looking at middleCClefPosition and middleCOffset.

staffLineLayoutFunction (procedure)
Layout of staff lines, traditional, or semitone.

This engraver creates the following layout object(s):
Section 3.1.82 [NoteHead], page 477.

Section 2.2.81 [Note_spacing_engraver], page 344
Generate NoteSpacing, an object linking horizontal lines for use in spacing.
This engraver creates the following layout object(s):
Section 3.1.84 [NoteSpacing], page 478.

**Section 2.2.83 [Output_property_engraver], page 344**
Apply a procedure to any grob acknowledged.
Music types accepted:
Section 1.2.4 [apply-output-event], page 43,

**Section 2.2.87 [Part_combine_engraver], page 346**
Part combine engraver for orchestral scores: Print markings ‘a2’, ‘Solo’, ‘Solo II’, and ‘unisono’.
Music types accepted:
Section 1.2.43 [note-event], page 47, and Section 1.2.47 [part-combine-event], page 48,

Properties (read)
- **aDueText** (markup)
  Text to print at a unisono passage.
- **partCombineTextsOnNote** (boolean)
  Print part-combine texts only on the next note rather than immediately on rests or skips.
- **printPartCombineTexts** (boolean)
  Set ‘Solo’ and ‘A due’ texts in the part combiner?
- **soloIIIText** (markup)
  The text for the start of a solo for voice ‘two’ when part-combining.
- **soloText** (markup)
  The text for the start of a solo when part-combining.

This engraver creates the following layout object(s):
Section 3.1.29 [CombineTextScript], page 410.

**Section 2.2.88 [Percent_repeat_engraver], page 346**
Make whole measure repeats.
Music types accepted:
Section 1.2.49 [percent-event], page 48,
Properties (read)
- **countPercentRepeats** (boolean)
  If set, produce counters for percent repeats.
- **currentCommandColumn** (graphical (layout) object)
  Grob that is X-parent to all current breakable (clef, key signature, etc.) items.
- **repeatCountVisibility** (procedure)
  A procedure taking as arguments an integer and context, returning whether the corresponding percent repeat number should be printed when **countPercentRepeats** is set.
This engraver creates the following layout object(s):
Section 3.1.88 [PercentRepeat], page 482, and Section 3.1.89 [PercentRepeatCounter], page 483.

Section 2.2.89 [Phrasing_slur_engraver], page 347
Print phrasing slurs. Similar to Section 2.2.106 [Slur_engraver], page 352.
Music types accepted:
Section 1.2.43 [note-event], page 47, and Section 1.2.51 [phrasing-slur-event], page 48,
This engraver creates the following layout object(s):
Section 3.1.90 [PhrasingSlur], page 484.

Section 2.2.94 [Pitched_trill_engraver], page 349
Print the bracketed note head after a note head with trill.
This engraver creates the following layout object(s):
Section 3.1.129 [TrillPitchAccidental], page 528, Section 3.1.130 [TrillPitchGroup], page 529, and Section 3.1.131 [TrillPitchHead], page 530.

Section 2.2.97 [Repeat_tie_engraver], page 350
Create repeat ties.
Music types accepted:
Section 1.2.53 [repeat-tie-event], page 48,
This engraver creates the following layout object(s):
Section 3.1.94 [RepeatTie], page 490, and Section 3.1.95 [RepeatTieColumn], page 491.

Section 2.2.99 [Rest_engraver], page 350
Engrave rests.
Music types accepted:
Section 1.2.54 [rest-event], page 49,
Properties (read)

\[
middleCPosition \text{(number)}
\]
The place of the middle C, measured in half staff-spaces. Usually determined by looking at middleCClefPosition and middleCOffset.

This engraver creates the following layout object(s):
Section 3.1.96 [Rest], page 491.

Section 2.2.100 [Rhythmic_column_engraver], page 351
Generate NoteColumn, an object that groups stems, note heads, and rests.
This engraver creates the following layout object(s):
Section 3.1.81 [NoteColumn], page 476.

Section 2.2.101 [Script_column_engraver], page 351
Find potentially colliding scripts and put them into a ScriptColumn object; that will fix the collisions.
This engraver creates the following layout object(s):
Section 3.1.99 [ScriptColumn], page 494.
Chapter 2: Translation

Section 2.2.102 [Script_engraver], page 351
Handle note scripted articulations.
Music types accepted:
Section 1.2.6 [articulation-event], page 43,
Properties (read)

scriptDefinitions (list)
The description of scripts. This is used
by the Script_engraver for typesetting
note-superscripts and subscripts. See scm/
script.scm for more information.

This engraver creates the following layout object(s):
Section 3.1.98 [Script], page 493.

Section 2.2.105 [Slash_repeat_engraver], page 352
Make beat repeats.
Music types accepted:
Section 1.2.52 [repeat-slash-event], page 48,
This engraver creates the following layout object(s):
Section 3.1.37 [DoubleRepeatSlash], page 423, and Section 3.1.93 [RepeatSlash], page 489.

Section 2.2.113 [Spanner_break_forbid_engraver], page 354
Forbid breaks in certain spanners.

Section 2.2.119 [Stem_engraver], page 355
Create stems, flags and single-stem tremolos. It also works together
with the beam engraver for overriding beaming.
Music types accepted:
Section 1.2.75 [tremolo-event], page 52, and Section 1.2.78 [tuplet-span-
event], page 52,
Properties (read)

stemLeftBeamCount (integer)
Specify the number of beams to draw on the
left side of the next note. Overrides automatic
beaming. The value is only used once, and then
it is erased.

stemRightBeamCount (integer)
See stemLeftBeamCount.

whichBar (string)
This property is read to determine what type
of bar line to create.
Example:
\set Staff.whichBar = ".|:
This will create a start-repeat bar in this
staff only. Valid values are described in
scm/bar-line.scm.

This engraver creates the following layout object(s):
Section 3.1.44 [Flag], page 432, Section 3.1.111 [Stem], page 504, Section 3.1.112 [StemStub], page 506, and Section 3.1.113 [StemTremolo], page 507.

Section 2.2.125 [Text_engraver], page 357
Create text scripts.
Music types accepted:
Section 1.2.71 [text-script-event], page 51,
This engraver creates the following layout object(s):
Section 3.1.124 [TextScript], page 519.

Section 2.2.126 [Text_spanner_engraver], page 358
Create text spanner from an event.
Music types accepted:
Section 1.2.72 [text-span-event], page 51,
Properties (read)
  currentMusicalColumn (graphical (layout) object)
  Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).
This engraver creates the following layout object(s):
Section 3.1.125 [TextSpanner], page 521.

Section 2.2.127 [Tie_engraver], page 358
Generate ties between note heads of equal pitch.
Music types accepted:
Section 1.2.73 [tie-event], page 51,
Properties (read)
  skipTypesetting (boolean)
  If true, no typesetting is done, speeding up the interpretation phase. Useful for debugging large scores.
  tieWaitForNote (boolean)
  If true, tied notes do not have to follow each other directly. This can be used for writing out arpeggios.
Properties (write)
  tieMelismaBusy (boolean)
  Signal whether a tie is present.
This engraver creates the following layout object(s):
Section 3.1.126 [Tie], page 523, and Section 3.1.127 [TieColumn], page 525.

Section 2.2.132 [Trill_spanner_engraver], page 360
Create trill spanner from an event.
Music types accepted:
Section 1.2.77 [trill-span-event], page 52,
Properties (read)

\texttt{currentCommandColumn} (graphical (layout) object)
Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

\texttt{currentMusicalColumn} (graphical (layout) object)
Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).

This engraver creates the following layout object(s):
Section 3.1.132 [TrillSpanner], page 531.

Section 2.2.133 [Tuplet_engraver], page 361
Catch tuplet events and generate appropriate bracket.
Music types accepted:
Section 1.2.78 [tuplet-span-event], page 52,
Properties (read)

\texttt{tupletFullLength} (boolean)
If set, the tuplet is printed up to the start of the next note.

\texttt{tupletFullLengthNote} (boolean)
If set, end at the next note, otherwise end on the matter (time signatures, etc.) before the note.

This engraver creates the following layout object(s):
Section 3.1.133 [TupletBracket], page 532, and Section 3.1.134 [Tuplet-Number], page 534.

2.1.19 NoteNames

A context for printing the names of notes.

This context also accepts commands for the following context(s):
Staff.

This context creates the following layout object(s):
Section 3.1.83 [NoteName], page 478, Section 3.1.108 [StaffSpacing], page 502, Section 3.1.126 [Tie], page 523, Section 3.1.127 [TieColumn], page 525, and Section 3.1.139 [VerticalAxisGroup], page 538.

This context sets the following properties:

- Set grob-property \texttt{nonstaff-nonstaff-spacing} in Section 3.1.139 [VerticalAxisGroup], page 538, to:
  `'((basic-distance . 0)
  (minimum-distance . 2.8)
  (padding . 0.2)
  (stretchability . 0))`

- Set grob-property \texttt{nonstaff-relatedstaff-spacing} in Section 3.1.139 [VerticalAxisGroup], page 538, to:
  `'((basic-distance . 5.5)
  (padding . 0.5)
  (stretchability . 1))`
• Set grob-property nonstaff-unrelatedstaff-spacing.padding in Section 3.1.139 [VerticalAxisGroup], page 538, to 1.5.
• Set grob-property staff-affinity in Section 3.1.139 [VerticalAxisGroup], page 538, to 1.

This is a ‘Bottom’ context; no contexts will be created implicitly from it.
This context cannot contain other contexts.
This context is built from the following engraver(s):

Section 2.2.5 [Axis_group_ engraver], page 316
Group all objects created in this context in a VerticalAxisGroup spanner.
Properties (read)

  currentCommandColumn (graphical (layout) object)
      Grob that is X-parent to all current breakable (clef, key signature, etc.) items.
  hasAxisGroup (boolean)
      True if the current context is contained in an axis group.
  keepAliveInterfaces (list)
      A list of symbols, signifying grob interfaces that are worth keeping a staff with remove-empty set around for.
Properties (write)

  hasAxisGroup (boolean)
      True if the current context is contained in an axis group.

This engraver creates the following layout object(s):
Section 3.1.139 [VerticalAxisGroup], page 538.

Section 2.2.79 [Note_name_ engraver], page 343
Print pitches as words.
Music types accepted:
Section 1.2.43 [note-event], page 47,
Properties (read)

  noteNameFunction (procedure)
      Function used to convert pitches into strings and markups.
  noteNameSeparator (string)
      String used to separate simultaneous Note-Name objects.
  printAccidentalNames (boolean or symbol)
      Print accidentals in the NoteNames context.
  printNotesLanguage (string)
      Use a specific language in the NoteNames context.
  printOctaveNames (boolean or symbol)
      Print octave marks in the NoteNames context.
This engraver creates the following layout object(s):
Section 3.1.83 [NoteName], page 478.

Section 2.2.104 [Separating_line_group_engraver], page 352
Generate objects for computing spacing parameters.
Properties (read)

createSpacing (boolean)
Create StaffSpacing objects? Should be set for staves.

Properties (write)

hasStaffSpacing (boolean)
True if the current CommandColumn contains items that will affect spacing.

This engraver creates the following layout object(s):
Section 3.1.108 [StaffSpacing], page 502.

Section 2.2.127 [Tie_engraver], page 358
Generate ties between note heads of equal pitch.
Music types accepted:
Section 1.2.73 [tie-event], page 51,
Properties (read)

skipTypesetting (boolean)
If true, no typesetting is done, speeding up the interpretation phase. Useful for debugging large scores.

tieWaitForNote (boolean)
If true, tied notes do not have to follow each other directly. This can be used for writing out arpeggios.

Properties (write)

tieMelismaBusy (boolean)
Signal whether a tie is present.

This engraver creates the following layout object(s):
Section 3.1.126 [Tie], page 523, and Section 3.1.127 [TieColumn], page 525.

2.1.20 NullVoice
For aligning lyrics without printing notes

This context also accepts commands for the following context(s):
Staff and Voice.
This context creates the following layout object(s):
Section 3.1.19 [Beam], page 397, Section 3.1.82 [NoteHead], page 477, Section 3.1.101 [Slur], page 494, Section 3.1.126 [Tie], page 523, and Section 3.1.127 [TieColumn], page 525.

This context sets the following properties:
• Set grob-property no-ledgers in Section 3.1.82 [NoteHead], page 477, to #t.
• Set grob-property stencil in Section 3.1.19 [Beam], page 397, to #f.
• Set grob-property `stencil` in Section 3.1.82 [NoteHead], page 477, to \#f.
• Set grob-property `stencil` in Section 3.1.101 [Slur], page 494, to \#f.
• Set grob-property `stencil` in Section 3.1.126 [Tie], page 523, to \#f.
• Set grob-property `X-extent` in Section 3.1.82 [NoteHead], page 477, to \#<procedure \#f (g)>.
• Set translator property `nullAccidentals` to \#t.
• Set translator property `squashedPosition` to 0.

This is a ‘Bottom’ context; no contexts will be created implicitly from it.
This context cannot contain other contexts.
This context is built from the following engraver(s):

Section 2.2.10 [Beam_engraver], page 318
Handle Beam events by engraving beams. If omitted, then notes are printed with flags instead of beams.
Music types accepted:
Section 1.2.8 [beam-event], page 43,
Properties (read)

`baseMoment` (moment)
Smallest unit of time that will stand on its own as a subdivided section.

`beamMelismaBusy` (boolean)
Signal if a beam is present.

`beatStructure` (list)
List of `baseMoment`s that are combined to make beats.

`subdivideBeams` (boolean)
If set, multiple beams will be subdivided at `baseMoment` positions by only drawing one beam over the beat.

Properties (write)

`forbidBreak` (boolean)
If set to \#t, prevent a line break at this point.

This engraver creates the following layout object(s):
Section 3.1.19 [Beam], page 397.

Section 2.2.52 [Grob_pq_engraver], page 334
Administrate when certain grobs (e.g., note heads) stop playing.
Properties (read)

`busyGros` (list)
A queue of `(end-moment . grob)` cons cells. This is for internal (C++) use only. This property contains the grobs which are still busy (e.g. note heads, spanners, etc.).
Properties (write)

busyGrobs (list)
A queue of (end-moment . grob) cons cells. This is for internal (C++) use only. This property contains the grobs which are still busy (e.g. note heads, spanners, etc.).

Section 2.2.78 [Note_heads_engraver], page 343
Generate note heads.
Music types accepted:
Section 1.2.43 [note-event], page 47,
Properties (read)

middleCPosition (number)
The place of the middle C, measured in half staff-spaces. Usually determined by looking at middleCClefPosition and middleCOffset.

staffLineLayoutFunction (procedure)
Layout of staff lines, traditional, or semitone.

This engraver creates the following layout object(s):
Section 3.1.82 [NoteHead], page 477.

Section 2.2.93 [Pitch_squash_engraver], page 348
Set the vertical position of note heads to squashedPosition, if that property is set. This can be used to make a single-line staff demonstrating the rhythm of a melody.
Properties (read)

squashedPosition (integer)
Vertical position of squashing for Section “Pitch_squash_engraver” in Internals Reference.

Section 2.2.106 [Slur_engraver], page 352
Build slur grobs from slur events.
Music types accepted:
Section 1.2.43 [note-event], page 47, and Section 1.2.58 [slur-event], page 49,
Properties (read)

doubleSlurs (boolean)
If set, two slurs are created for every slurred note, one above and one below the chord.

slurMelismaBusy (boolean)
Signal if a slur is present.

This engraver creates the following layout object(s):
Section 3.1.101 [Slur], page 494.

Section 2.2.127 [Tie_engraver], page 358
Generate ties between note heads of equal pitch.
Music types accepted:
Section 1.2.73 [tie-event], page 51,
Properties (read)

**skipTypesetting** (boolean)
If true, no typesetting is done, speeding up the interpretation phase. Useful for debugging large scores.

**tieWaitForNote** (boolean)
If true, tied notes do not have to follow each other directly. This can be used for writing out arpeggios.

Properties (write)

**tieMelismaBusy** (boolean)
Signal whether a tie is present.

This engraver creates the following layout object(s):
Section 3.1.126 [Tie], page 523, and Section 3.1.127 [TieColumn], page 525.

2.1.21 OneStaff
Provides a common axis for the contained staves, making all of them appear in the same vertical space. This can be useful for typesetting staves of different types in immediate succession or for temporarily changing the character of one staff or overlaying it with a different one. Often used with `\stopStaff` and `\startStaff` for best results.

This context creates the following layout object(s):
Section 3.1.139 [VerticalAxisGroup], page 538.

This is not a ‘Bottom’ context; search for such a one will commence after creating an implicit context of type Section 2.1.27 [Staff], page 240.

Context OneStaff can contain Section 2.1.2 [ChordNames], page 60, Section 2.1.5 [DrumStaff], page 76, Section 2.1.7 [Dynamics], page 95, Section 2.1.8 [FiguredBass], page 99, Section 2.1.9 [FretBoards], page 101, Section 2.1.12 [GregorianTranscriptionStaff], page 106, Section 2.1.14 [KievanStaff], page 130, Section 2.1.16 [Lyrics], page 155, Section 2.1.17 [MensuralStaff], page 157, Section 2.1.19 [NoteNames], page 182, Section 2.1.22 [PetrucciStaff], page 188, Section 2.1.25 [RhythmicStaff], page 215, Section 2.1.27 [Staff], page 240, Section 2.1.29 [TabStaff], page 253, and Section 2.1.31 [VaticanaStaff], page 276.

This context is built from the following engraver(s):

Section 2.2.5 [Axis_group_engraver], page 316
Group all objects created in this context in a VerticalAxisGroup spanner.
Properties (read)

**currentCommandColumn** (graphical (layout) object)
Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

**hasAxisGroup** (boolean)
True if the current context is contained in an axis group.
keepAliveInterfaces (list)
A list of symbols, signifying grob interfaces that are worth keeping a staff with remove-empty set around for.

Properties (write)

hasAxisGroup (boolean)
True if the current context is contained in an axis group.

This engraver creates the following layout object(s):
Section 3.1.139 [VerticalAxisGroup], page 538.

2.1.22 PetrucciStaff

Same as Staff context, except that it is accommodated for typesetting a piece in Petrucci style.

This context also accepts commands for the following context(s):
Staff.

This context creates the following layout object(s):
Section 3.1.1 [Accidental], page 377, Section 3.1.2 [AccidentalCautionary], page 378, Section 3.1.3 [AccidentalPlacement], page 379, Section 3.1.4 [AccidentalSuggestion], page 380, Section 3.1.11 [BarLine], page 388, Section 3.1.13 [BassFigure], page 394, Section 3.1.14 [BassFigureAlignment], page 394, Section 3.1.15 [BassFigureAlignmentPositioning], page 395, Section 3.1.16 [BassFigureBracket], page 396, Section 3.1.17 [BassFigureContinuation], page 396, Section 3.1.18 [BassFigureLine], page 396, Section 3.1.25 [Clef], page 405, Section 3.1.26 [ClefModifier], page 407, Section 3.1.30 [CueClef], page 411, Section 3.1.31 [CueEndClef], page 414, Section 3.1.32 [Custos], page 417, Section 3.1.33 [DotColumn], page 419, Section 3.1.43 [FingeringColumn], page 431, Section 3.1.55 [InstrumentName], page 443, Section 3.1.57 [KeyCancellation], page 446, Section 3.1.58 [KeySignature], page 448, Section 3.1.62 [ LedgerLineSpanner], page 453, Section 3.1.80 [NoteCollision], page 475, Section 3.1.85 [OttavaBracket], page 479, Section 3.1.91 [ PianoPedalBracket], page 486, Section 3.1.97 [RestCollision], page 492, Section 3.1.100 [ScriptRow], page 494, Section 3.1.102 [ SostenutoPedal], page 497, Section 3.1.103 [ SostenutoPedalLineSpanner], page 498, Section 3.1.108 [ StaffSpacing], page 502, Section 3.1.109 [ StaffSymbol], page 503, Section 3.1.116 [ SustainPedal], page 511, Section 3.1.117 [ SustainPedalLineSpanner], page 512, Section 3.1.128 [ TimeSignature], page 525, Section 3.1.135 [UnaCordaPedal], page 535, Section 3.1.136 [UnaCordaPedalLineSpanner], page 536, and Section 3.1.139 [ VerticalAxisGroup], page 538.

This context sets the following properties:

- Set grob-property neutral-direction in Section 3.1.32 [Custos], page 417, to -1.
- Set grob-property neutral-position in Section 3.1.32 [Custos], page 417, to 3.
- Set grob-property style in Section 3.1.32 [Custos], page 417, to 'mensural.'
- Set translator property autoAccidentals to:
  ' (Staff #<procedure #f (context pitch barnum measurepos)>
     #<procedure neo-modern-accidental-rule (context pitch barnum measurepos)>)
- Set translator property autoCautionaries to '().
- Set translator property clefGlyph to "clefs.petrucci.g".
- Set translator property clefPosition to -2.
- Set translator property clefTransposition to 0.
• Set translator property `createSpacing` to `#t`.
• Set translator property `extraNatural` to `#f`.
• Set translator property `ignoreFiguredBassRest` to `#f`.
• Set translator property `instrumentName` to `'()`.
• Set translator property `localAlterations` to `'()`.
• Set translator property `middleCClefPosition` to `-6`.
• Set translator property `middleCPosition` to `-6`.
• Set translator property `ottavationMarkups` to:
  `'((4 . "29")
   (3 . "22")
   (2 . "15")
   (1 . "8")
   (-1 . "8")
   (-2 . "15")
   (-3 . "22")
   (-4 . "29"))`
• Set translator property `printKeyCancellation` to `#f`.
• Set translator property `shortInstrumentName` to `'()`.

This is not a ‘Bottom’ context; search for such a one will commence after creating an implicit context of type `Section 2.1.23 [PetrucciVoice]`, page 199.

Context `PetrucciStaff` can contain `Section 2.1.3 [CueVoice]`, page 63, `Section 2.1.20 [NullVoice]`, page 184, and `Section 2.1.23 [PetrucciVoice]`, page 199.

This context is built from the following engraver(s):

**Section 2.2.1 [Accidental_engraver], page 313**

Make accidentals. Catch note heads, ties and notices key-change events. This engraver usually lives at `Staff` level, but reads the settings for `Accidental` at `Voice` level, so you can `\override` them at `Voice`.

Properties (read)

- **accidentalGrouping (symbol)**
  If set to `'voice`, accidentals on the same note in different octaves may be horizontally staggered if in different voices.

- **autoAccidentals (list)**
  List of different ways to typeset an accidental.
  For determining when to print an accidental, several different rules are tried. The rule that gives the highest number of accidentals is used.
  Each entry in the list is either a symbol or a procedure.

  - **symbol**
    The symbol is the name of the context in which the following rules are to be applied. For example, if `context` is `Section “Score”` in `Internals Reference` then all staves share accidentals, and if `context` is `Section “Staff”` in `Internals Reference` then
all voices in the same staff share accidentals, but staves do not.

**procedure**

The procedure represents an accidental rule to be applied to the previously specified context.

The procedure takes the following arguments:

- **context**: The current context to which the rule should be applied.
- **pitch**: The pitch of the note to be evaluated.
- **barnum**: The current bar number.
- **measurepos**: The current measure position.

The procedure returns a pair of booleans. The first states whether an extra natural should be added. The second states whether an accidental should be printed. \((\#t . \#f)\) does not make sense.

**autoCautionaries** (list)

List similar to **autoAccidentals**, but it controls cautionary accidentals rather than normal ones. Both lists are tried, and the one giving the most accidentals wins. In case of draw, a normal accidental is typeset.

**extraNatural** (boolean)

Whether to typeset an extra natural sign before accidentals that reduce the effect of a previous alteration.

**harmonicAccidentals** (boolean)

If set, harmonic notes in chords get accidentals.

**internalBarNumber** (integer)

Contains the current bar number. This property is used for internal timekeeping, among others by the **Accidental_{engraver}**.

**keyAlterations** (list)

The current key signature. This is an alist containing \((\text{step} . \text{alter})\) or \((\text{octave} . \text{step}) . \text{alter})\), where \text{step} is a number in the range 0 to 6 and \text{alter} a fraction, denoting alteration. For alterations, use symbols, e.g. **keyAlterations** = `#`\((6 ,FLAT))`. 
The key signature at this point in the measure. The format is the same as for `keyAlterations`, but can also contain `((octave . name) . (alter barnumber . measureposition))` pairs.

This engraver creates the following layout object(s):

Section 3.1.1 [Accidental], page 377, Section 3.1.2 [AccidentalCautionary], page 378, Section 3.1.3 [AccidentalPlacement], page 379, and Section 3.1.4 [AccidentalSuggestion], page 380.

Section 2.2.5 [Axis_group_engraver], page 316

Group all objects created in this context in a `VerticalAxisGroup` spanner.

This engraver creates the following layout object(s):

Section 3.1.139 [VerticalAxisGroup], page 538.

Section 2.2.7 [Bar_engraver], page 316

Create barlines. This engraver is controlled through the `whichBar` property. If it has no bar line to create, it will forbid a linebreak at this point.

This engraver is required to trigger the creation of clefs at the start of systems.

This property is read to determine what type of bar line to create.
Example:

\set Staff\.whichBar = "\.|

This will create a start-repeat bar in this staff only. Valid values are described in \texttt{scm/bar-line.scm}.

Properties \text{(write)}

\texttt{forbidBreak} (boolean)
If set to \texttt{#t}, prevent a line break at this point.

This engraver creates the following layout object(s):
Section 3.1.11 \texttt{[BarLine]}, page 388.

\textbf{Section 2.2.17 \texttt{[Clef_engraver]}}, page 321
Determine and set reference point for pitches.

Properties \text{(read)}

\texttt{clefGlyph} (string)
Name of the symbol within the music font.

\texttt{clefPosition} (number)
Where should the center of the clef symbol go, measured in half staff spaces from the center of the staff.

\texttt{clefTransposition} (integer)
Add this much extra transposition. Values of 7 and -7 are common.

\texttt{clefTranspositionStyle} (symbol)
Determines the way the ClefModifier grob is displayed. Possible values are 'default', 'parenthesized' and 'bracketed'.

\texttt{explicitClefVisibility} (vector)
'break-visibility' function for clef changes.

\texttt{forceClef} (boolean)
Show clef symbol, even if it has not changed. Only active for the first clef after the property is set, not for the full staff.

This engraver creates the following layout object(s):
Section 3.1.25 \texttt{[Clef]}, page 405, and Section 3.1.26 \texttt{[ClefModifier]}, page 407.

\textbf{Section 2.2.19 \texttt{[Collision_engraver]}}, page 322
Collect \texttt{NoteColumns}, and as soon as there are two or more, put them in a \texttt{NoteCollision} object.
This engraver creates the following layout object(s):
Section 3.1.80 \texttt{[NoteCollision]}, page 475.

\textbf{Section 2.2.24 \texttt{[Cue_clef_engraver]}}, page 324
Determine and set reference point for pitches in cued voices.

Properties \text{(read)}

\texttt{clefTransposition} (integer)
Add this much extra transposition. Values of 7 and -7 are common.
**cueClefGlyph** (string)
Name of the symbol within the music font.

**cueClefPosition** (number)
Where should the center of the clef symbol go, measured in half staff spaces from the center of the staff.

**cueClefTransposition** (integer)
Add this much extra transposition. Values of 7 and -7 are common.

**cueClefTranspositionStyle** (symbol)
Determines the way the ClefModifier grob is displayed. Possible values are ‘default’, ‘parenthesized’ and ‘bracketed’.

**explicitCueClefVisibility** (vector)
‘break-visibility’ function for cue clef changes.

**middleCCuePosition** (number)
The position of the middle C, as determined only by the clef of the cue notes. This can be calculated by looking at **cueClefPosition** and **cueClefGlyph**.

This engraver creates the following layout object(s):
Section 3.1.26 [ClefModifier], page 407, Section 3.1.30 [CueClef], page 411, and Section 3.1.31 [CueEndClef], page 414.

**Section 2.2.25 [Custos_engraver], page 324**
Engrave custodes.
This engraver creates the following layout object(s):
Section 3.1.32 [Custos], page 417.

**Section 2.2.27 [Dot_column_engraver], page 325**
Engrave dots on dotted notes shifted to the right of the note. If omitted, then dots appear on top of the notes.
This engraver creates the following layout object(s):
Section 3.1.33 [DotColumn], page 419.

**Section 2.2.37 [Figured_bass_engraver], page 328**
Make figured bass numbers.
Music types accepted:
Section 1.2.7 [bass-figure-event], page 43, and Section 1.2.54 [rest-event], page 49.

Properties (read)

**figuredBassAlterationDirection** (direction)
Where to put alterations relative to the main figure.

**figuredBassCenterContinuations** (boolean)
Whether to vertically center pairs of extender lines. This does not work with three or more lines.
figuredBassFormatter (procedure)
A routine generating a markup for a bass figure.

ignoreFiguredBassRest (boolean)
Don’t swallow rest events.

implicitBassFigures (list)
A list of bass figures that are not printed as numbers, but only as extender lines.

useBassFigureExtenders (boolean)
Whether to use extender lines for repeated bass figures.

This engraver creates the following layout object(s):
Section 3.1.13 [BassFigure], page 394, Section 3.1.14 [BassFigureAlignment], page 394, Section 3.1.16 [BassFigureBracket], page 396, Section 3.1.17 [BassFigureContinuation], page 396, and Section 3.1.18 [BassFigureLine], page 396.

Section 2.2.38 [Figured_bass_position_engraver], page 329
Position figured bass alignments over notes.
This engraver creates the following layout object(s):
Section 3.1.15 [BassFigureAlignmentPositioning], page 395.

Section 2.2.39 [Fingering_column_engraver], page 329
Find potentially colliding scripts and put them into a FingeringColumn object; that will fix the collisions.
This engraver creates the following layout object(s):
Section 3.1.43 [FingeringColumn], page 431.

Section 2.2.41 [Font_size_engraver], page 330
Put fontSize into font-size grob property.
Properties (read)

fontSize (number)
The relative size of all grobs in a context.

Section 2.2.52 [Grob_pq_engraver], page 334
Administrate when certain grobs (e.g., note heads) stop playing.
Properties (read)

busyGrobs (list)
A queue of (end-moment . grob) cons cells.
This is for internal (C++) use only. This property contains the grobs which are still busy (e.g., note heads, spanners, etc.).

Properties (write)

busyGrobs (list)
A queue of (end-moment . grob) cons cells.
This is for internal (C++) use only. This property contains the grobs which are still busy (e.g., note heads, spanners, etc.).

Section 2.2.55 [Instrument_name_engraver], page 334
Create a system start text for instrument or vocal names.
Properties (read)

$currentCommandColumn$ (graphical layout object)
Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

$instrumentName$ (markup)
The name to print left of a staff. The $instrumentName$ property labels the staff in the first system, and the $shortInstrumentName$ property labels following lines.

$shortInstrumentName$ (markup)
See $instrumentName$.

$shortVocalName$ (markup)
Name of a vocal line, short version.

$vocalName$ (markup)
Name of a vocal line.

This engraver creates the following layout object(s):
Section 3.1.55 [InstrumentName], page 443.

Section 2.2.58 [Key_engraver], page 335
Engrave a key signature.

Music types accepted:
Section 1.2.28 [key-change-event], page 45,
Properties (read)

$createKeyOnClefChange$ (boolean)
Print a key signature whenever the clef is changed.

$explicitKeySignatureVisibility$ (vector)
`break-visibility` function for explicit key changes. `\override` of the $break-visibility$ property will set the visibility for normal (i.e., at the start of the line) key signatures.

$extraNatural$ (boolean)
Whether to typeset an extra natural sign before accidentals that reduce the effect of a previous alteration.

$keyAlterationOrder$ (list)
An alist that defines in what order alterations should be printed. The format is ($step$ . $alter$), where $step$ is a number from 0 to 6 and $alter$ from -2 (sharp) to 2 (flat).

$keyAlterations$ (list)
The current key signature. This is an alist containing ($step$ . $alter$) or (($octave$ . $step$) . $alter$), where $step$ is a number in the
range 0 to 6 and alter a fraction, denoting alteration. For alterations, use symbols, e.g. `keyAlterations = #`(6 . ,FLAT)).

lastKeyAlterations (list)
Last key signature before a key signature change.

middleCClefPosition (number)
The position of the middle C, as determined only by the clef. This can be calculated by looking at clefPosition and clefGlyph.

printKeyCancellation (boolean)
Print restoration alterations before a key signature change.

Properties (write)

keyAlterations (list)
The current key signature. This is an alist containing (step . alter) or ((octave . step) . alter), where step is a number in the range 0 to 6 and alter a fraction, denoting alteration. For alterations, use symbols, e.g. `keyAlterations = #`((6 . ,FLAT)).

lastKeyAlterations (list)
Last key signature before a key signature change.

tonic (pitch)
The tonic of the current scale.

This engraver creates the following layout object(s):
Section 3.1.57 [KeyCancellation], page 446, and Section 3.1.58 [KeySignature], page 448.

Section 2.2.62 [Ledger_line_ engraver], page 337
Create the spanner to draw ledger lines, and notices objects that need ledger lines.

This engraver creates the following layout object(s):
Section 3.1.62 [LedgerLineSpanner], page 453.

Section 2.2.82 [Ottava_spanner_ engraver], page 344
Create a text spanner when the ottavation property changes.

Properties (read)

currentMusicalColumn (graphical (layout) object)
Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).

middleCOffset (number)
The offset of middle C from the position given by middleCClefPosition. This is used for ottava brackets.
ottavation (markup)
If set, the text for an ottava spanner. Changing
this creates a new text spanner.

This engraver creates the following layout object(s):
Section 3.1.85 [OttavaBracket], page 479.

Section 2.2.83 [Output_property_engraver], page 344
Apply a procedure to any grob acknowledged.

Music types accepted:
Section 1.2.4 [apply-output-event], page 43,

Section 2.2.90 [Piano_pedal_align_engraver], page 347
Align piano pedal symbols and brackets.

Properties (read)
currentCommandColumn (graphical (layout)
object)
Grob that is X-parent to all current breakable
(clef, key signature, etc.) items.

This engraver creates the following layout object(s):
Section 3.1.103 [SostenutoPedalLineSpanner], page 498, Section 3.1.117
[SustainPedalLineSpanner], page 512, and Section 3.1.136 [UnaCordaPedalLineSpanner], page 536.

Section 2.2.91 [Piano_pedal_engraver], page 347
Engrave piano pedal symbols and brackets.

Music types accepted:
Section 1.2.61 [sostenuto-event], page 49, Section 1.2.69 [sustain-event],
page 51, and Section 1.2.79 [una-corda-event], page 52,

Properties (read)
currentCommandColumn (graphical (layout)
object)
Grob that is X-parent to all current breakable
(clef, key signature, etc.) items.

pedalSostenutoStrings (list)
See pedalSustainStrings.

pedalSostenutoStyle (symbol)
See pedalSustainStyle.

pedalSustainStrings (list)
A list of strings to print for sustain-pedal. Format is (up updown down),
where each of the three is the string to print when this is done
with the pedal.

pedalSustainStyle (symbol)
A symbol that indicates how to print sustain
pedals: text, bracket or mixed (both).

pedalUnaCordaStrings (list)
See pedalSustainStrings.
pedalUnaCordaStyle (symbol)
See pedalSustainStyle.

This engraver creates the following layout object(s):
Section 3.1.91 [PianoPedalBracket], page 486, Section 3.1.102 [SostenutoPedal], page 497, Section 3.1.116 [SustainPedal], page 511, and Section 3.1.135 [UnaCordaPedal], page 535.

Section 2.2.95 [Pure_from_neighbor_engraver], page 349
Coordinates items that get their pure heights from their neighbors.

Section 2.2.98 [Rest_collision_engraver], page 350
Handle collisions of rests.
Properties (read)

busyGrobs (list)
A queue of \texttt{(end-moment . grob)} cons cells.
This is for internal (C++) use only. This property contains the grobs which are still busy (e.g. note heads, spanners, etc.).

This engraver creates the following layout object(s):
Section 3.1.97 [RestCollision], page 492.

Section 2.2.103 [Script_row_engraver], page 351
Determine order in horizontal side position elements.
This engraver creates the following layout object(s):
Section 3.1.100 [ScriptRow], page 494.

Section 2.2.104 [Separating_line_group_engraver], page 352
Generate objects for computing spacing parameters.
Properties (read)

createSpacing (boolean)
Create \texttt{StaffSpacing} objects? Should be set for staves.

Properties (write)

hasStaffSpacing (boolean)
True if the current \texttt{CommandColumn} contains items that will affect spacing.

This engraver creates the following layout object(s):
Section 3.1.108 [StaffSpacing], page 502.

Section 2.2.114 [Staff_collecting_engraver], page 354
Maintain the \texttt{stavesFound} variable.
Properties (read)

stavesFound (list of grobs)
A list of all staff-symbols found.

Properties (write)

stavesFound (list of grobs)
A list of all staff-symbols found.
Section 2.2.116 [Staff_symbol_ engraver], page 354
Create the constellation of five (default) staff lines.
Music types accepted:
Section 1.2.65 [staff-span-event], page 50,
This engraver creates the following layout object(s):
Section 3.1.109 [StaffSymbol], page 503.

Section 2.2.129 [Time_signature_ engraver], page 359
Create a Section 3.1.128 [TimeSignature], page 525, whenever
\texttt{timeSignatureFraction} changes.
Music types accepted:
Section 1.2.74 [time-signature-event], page 51,
Properties (read)
\texttt{initialTimeSignatureVisibility} (vector)
break visibility for the initial time signature.
\texttt{partialBusy} (boolean)
Signal that \texttt{partial} acts at the current timestep.
\texttt{timeSignatureFraction} (fraction, as pair)
A pair of numbers, signifying the time signature. For example, \texttt{\ '(4 . 4)} is a 4/4 time signature.

This engraver creates the following layout object(s):
Section 3.1.128 [TimeSignature], page 525.

2.1.23 PetrucciVoice
Same as \texttt{Voice} context, except that it is accommodated for typesetting a piece in Petrucci style.
This context also accepts commands for the following context(s):
\texttt{Voice}.
This context creates the following layout object(s):
Section 3.1.19 [Arpeggio], page 386, Section 3.1.19 [Beam], page 397, Section 3.1.20 [BendAfter], page 399, Section 3.1.23 [BreathingSign], page 402, Section 3.1.27 [ClusterSpanner], page 409, Section 3.1.28 [ClusterSpannerBeacon], page 409, Section 3.1.29 [CombineTextScript], page 410, Section 3.1.34 [Dots], page 419, Section 3.1.35 [DoublePercentRepeat], page 420, Section 3.1.36 [DoublePercentRepeatCounter], page 421, Section 3.1.37 [DoubleRepeatSlash], page 423, Section 3.1.38 [DynamicLineSpanner], page 424, Section 3.1.39 [DynamicText], page 425, Section 3.1.40 [DynamicTextSpanner], page 427, Section 3.1.42 [Fingering], page 429, Section 3.1.44 [Flag], page 432, Section 3.1.46 [Glissando], page 437, Section 3.1.52 [Hairpin], page 440, Section 3.1.56 [InstrumentSwitch], page 444, Section 3.1.60 [LaissezVibrerTie], page 452, Section 3.1.61 [LaissezVibrerTieColumn], page 453, Section 3.1.73 [MensuralLigature], page 466, Section 3.1.75 [MultiMeasureRest], page 468, Section 3.1.76 [MultiMeasureRestNumber], page 469, Section 3.1.77 [MultiMeasureRestScript], page 471, Section 3.1.78 [MultiMeasureRestText], page 472, Section 3.1.81 [NoteColumn], page 476, Section 3.1.82 [NoteHead], page 477, Section 3.1.84 [NoteSpacing], page 478, Section 3.1.88 [PercentRepeat], page 482, Section 3.1.89 [PercentRepeatCounter], page 483, Section 3.1.90 [PhrasingSlur], page 484, Section 3.1.93 [RepeatSlash], page 489, Section 3.1.94 [RepeatTie], page 490, Section 3.1.95 [RepeatTieColumn], page 491, Section 3.1.96 [Rest], page 491, Section 3.1.98 [Script], page 493, Section 3.1.99 [ScriptColumn], page 494, Section 3.1.101
This context sets the following properties:

- Set grob-property `length` in Section 3.1.111 [Stem], page 504, to 5.
- Set grob-property `style` in Section 3.1.82 [NoteHead], page 477, to 'petrucci.'
- Set grob-property `style` in Section 3.1.96 [Rest], page 491, to 'mensural.'
- Set grob-property `thickness` in Section 3.1.111 [Stem], page 504, to 1.7.
- Set translator property `autoBeaming` to #f.

This is a ‘Bottom’ context; no contexts will be created implicitly from it.

This context cannot contain other contexts.

This context is built from the following engraver(s):

**Section 2.2.3 [Arpeggio_engraver], page 315**
Generate an Arpeggio symbol.

Music types accepted:
Section 1.2.5 [arpeggio-event], page 43,
This engraver creates the following layout object(s):
Section 3.1.9 [Arpeggio], page 386.

**Section 2.2.4 [Auto_beam_engraver], page 315**
Generate beams based on measure characteristics and observed Stems. Uses `baseMoment`, `beatStructure`, `beamExceptions`, `measureLength`, and `measurePosition` to decide when to start and stop a beam. Overriding beaming is done through Section 2.2.119 [Stem_engraver], page 355, properties `stemLeftBeamCount` and `stemRightBeamCount`.

Music types accepted:
Section 1.2.9 [beam-forbid-event], page 43,
Properties (read)

- `autoBeaming` (boolean)
  If set to true then beams are generated automatically.

- `baseMoment` (moment)
  Smallest unit of time that will stand on its own as a subdivided section.

- `beamExceptions` (list)
  An alist of exceptions to autobeam rules that normally end on beats.

- `beamHalfMeasure` (boolean)
  Whether to allow a beam to begin halfway through the measure in triple time, which could look like 6/8.
**beatStructure** (list)
List of baseMoments that are combined to make beats.

**subdivideBeams** (boolean)
If set, multiple beams will be subdivided at baseMoment positions by only drawing one beam over the beat.

This engraver creates the following layout object(s):
Section 3.1.19 [Beam], page 397.

**Section 2.2.10 [Beam_engraver], page 318**
Handle Beam events by engraving beams. If omitted, then notes are printed with flags instead of beams.
Music types accepted:
Section 1.2.8 [beam-event], page 43,
Properties (read)

**baseMoment** (moment)
Smallest unit of time that will stand on its own as a subdivided section.

**beamMelismaBusy** (boolean)
Signal if a beam is present.

**beatStructure** (list)
List of baseMoments that are combined to make beats.

**subdivideBeams** (boolean)
If set, multiple beams will be subdivided at baseMoment positions by only drawing one beam over the beat.

Properties (write)

**forbidBreak** (boolean)
If set to \#t, prevent a line break at this point.

This engraver creates the following layout object(s):
Section 3.1.19 [Beam], page 397.

**Section 2.2.12 [Bend_engraver], page 319**
Create fall spanners.
Music types accepted:
Section 1.2.10 [bend-after-event], page 43,
This engraver creates the following layout object(s):
Section 3.1.20 [BendAfter], page 399.

**Section 2.2.14 [Breathing_sign_engraver], page 320**
Create a breathing sign.
Music types accepted:
Section 1.2.14 [breathing-event], page 44,
This engraver creates the following layout object(s):
Section 3.1.23 [BreathingSign], page 402.
Section 2.2.16 [Chord_tremolo_engraver], page 321
Generate beams for tremolo repeats.
Music types accepted:
Section 1.2.76 [tremolo-span-event], page 52,
This engraver creates the following layout object(s):
Section 3.1.19 [Beam], page 397.

Section 2.2.18 [Cluster_spanner_engraver], page 321
Engrave a cluster using Spanner notation.
Music types accepted:
Section 1.2.15 [cluster-note-event], page 44,
This engraver creates the following layout object(s):
Section 3.1.27 [ClusterSpanner], page 409, and Section 3.1.28 [ClusterSpannerBeacon], page 409.

Section 2.2.28 [Dots_engraver], page 325
Create Section 3.1.34 [Dots], page 419, objects for Section 3.2.98 [rhythmic-head-interface], page 601.
This engraver creates the following layout object(s):
Section 3.1.34 [Dots], page 419.

Section 2.2.29 [Double_percent_repeat_engraver], page 326
Make double measure repeats.
Music types accepted:
Section 1.2.19 [double-percent-event], page 44,
Properties (read)

  countPercentRepeats (boolean)
  If set, produce counters for percent repeats.

  measureLength (moment)
  Length of one measure in the current time signature.

  repeatCountVisibility (procedure)
  A procedure taking as arguments an integer and context, returning whether the corresponding percent repeat number should be printed when countPercentRepeats is set.

Properties (write)

  forbidBreak (boolean)
  If set to #t, prevent a line break at this point.

This engraver creates the following layout object(s):
Section 3.1.35 [DoublePercentRepeat], page 420, and Section 3.1.36 [DoublePercentRepeatCounter], page 421.

Section 2.2.32 [Dynamic_align_engraver], page 327
Align hairpins and dynamic texts on a horizontal line.
Properties (read)

  currentMusicalColumn (graphical object)
  Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).
This engraver creates the following layout object(s):
Section 3.1.38 [DynamicLineSpanner], page 424.

Section 2.2.33 [Dynamic_engraver], page 327
Create hairpins, dynamic texts and dynamic text spanners.
Music types accepted:
Section 1.2.1 [absolute-dynamic-event], page 42, Section 1.2.13 [break-span-event], page 44, and Section 1.2.63 [span-dynamic-event], page 50,
Properties (read)

\texttt{crescendoSpanner} (symbol)
The type of spanner to be used for crescendi.
Available values are ‘\texttt{hairpin}’ and ‘\texttt{text}’. If unset, a hairpin crescendo is used.

\texttt{crescendoText} (markup)
The text to print at start of non-hairpin crescendo, i.e., ‘\texttt{cresc.}’.

\texttt{currentMusicalColumn} (graphical (layout) object)
Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).

\texttt{decrescendoSpanner} (symbol)
The type of spanner to be used for decrescendi.
Available values are ‘\texttt{hairpin}’ and ‘\texttt{text}’. If unset, a hairpin decrescendo is used.

\texttt{decrescendoText} (markup)
The text to print at start of non-hairpin decrescendo, i.e., ‘\texttt{dim.}’.

This engraver creates the following layout object(s):
Section 3.1.39 [DynamicText], page 425, Section 3.1.40 [DynamicTextSpanner], page 427, and Section 3.1.52 [Hairpin], page 440.

Section 2.2.40 [Fingering_engraver], page 329
Create fingering scripts.
Music types accepted:
Section 1.2.23 [fingering-event], page 45,
This engraver creates the following layout object(s):
Section 3.1.42 [Fingering], page 429.

Section 2.2.41 [Font_size_engraver], page 330
Put \texttt{fontSize} into \texttt{font-size} grob property.
Properties (read)

\texttt{fontSize} (number)
The relative size of all grobs in a context.

Section 2.2.43 [Forbid_line_break_engraver], page 330
Forbid line breaks when note heads are still playing at some point.
Properties (read)

**busyGrobs** (list)
A queue of `(end-moment . grob)` cons cells.
This is for internal (C++) use only. This property contains the grobs which are still busy (e.g., note heads, spanners, etc.).

Properties (write)

**forbidBreak** (boolean)
If set to `#t`, prevent a line break at this point.

Section 2.2.45 [Glissando_engraver], page 331
Engrave glissandi.
Music types accepted:
Section 1.2.25 [glissando-event], page 45,
Properties (read)

**glissandoMap** (list)
A map in the form of `'(source1 . target1) (source2 . target2) (sourceN . targetN)` showing the glissandi to be drawn for note columns.
The value `'()` will default to `'(0 . 0) (1 . 1) (n . n)`, where n is the minimal number of note-heads in the two note columns between which the glissandi occur.

This engraver creates the following layout object(s):
Section 3.1.48 [Glissando], page 437.

Section 2.2.46 [Grace_auto_beam_engraver], page 332
Generates one autobeam group across an entire grace phrase. As usual, any manual beaming or `\noBeam` will block autobeaming, just like setting the context property `'autoBeaming' to `##f`.
Music types accepted:
Section 1.2.9 [beam-forbid-event], page 43,
Properties (read)

**autoBeaming** (boolean)
If set to true then beams are generated automatically.

This engraver creates the following layout object(s):
Section 3.1.19 [Beam], page 397.

Section 2.2.47 [Grace_beam_engraver], page 332
Handle Beam events by engraving beams. If omitted, then notes are printed with flags instead of beams. Only engraves beams when we are at grace points in time.
Music types accepted:
Section 1.2.8 [beam-event], page 43,
Properties (read)

**baseMoment** (moment)
Smallest unit of time that will stand on its own as a subdivided section.
beamMelismaBusy (boolean)
  Signal if a beam is present.

beatStructure (list)
  List of baseMoments that are combined to make beats.

subdivideBeams (boolean)
  If set, multiple beams will be subdivided at baseMoment positions by only drawing one beam over the beat.

This engraver creates the following layout object(s):
Section 3.1.19 [Beam], page 397.

Section 2.2.48 [Grace_engraver], page 333
Set font size and other properties for grace notes.
Properties (read)

  graceSettings (list)
  Overrides for grace notes. This property should be manipulated through the add-grace-property function.

Section 2.2.52 [Grob_pq_engraver], page 334
Administrate when certain grobs (e.g., note heads) stop playing.
Properties (read)

  busyGrobs (list)
  A queue of (end-moment . grob) cons cells. This is for internal (C++) use only. This property contains the grobs which are still busy (e.g. note heads, spanners, etc.).

Properties (write)

  busyGrobs (list)
  A queue of (end-moment . grob) cons cells. This is for internal (C++) use only. This property contains the grobs which are still busy (e.g. note heads, spanners, etc.).

Section 2.2.56 [Instrument_switch_engraver], page 335
Create a cue text for taking instrument.
Properties (read)

  instrumentCueName (markup)
  The name to print if another instrument is to be taken.

This engraver creates the following layout object(s):
Section 3.1.56 [InstrumentSwitch], page 444.

Section 2.2.61 [Laissez_vibrer_engraver], page 337
Create laissez vibrer items.
Music types accepted:
Section 1.2.30 [laissez-vibrer-event], page 45,
This engraver creates the following layout object(s):
Section 3.1.60 [LaissezVibrerTie], page 452, and Section 3.1.61 [LaissezVibrerTieColumn], page 453.

Section 2.2.71 [Mensural_ligature_engraver], page 340
Handle Mensural_ligature_events by gluing special ligature heads together.
Music types accepted:
Section 1.2.32 [ligature-event], page 46,
This engraver creates the following layout object(s):
Section 3.1.73 [MensuralLigature], page 466.

Section 2.2.75 [Multi_measure_rest_engraver], page 341
Engrave multi-measure rests that are produced with ‘R’. It reads measurePosition and internalBarNumber to determine what number to print over the Section 3.1.75 [MultiMeasureRest], page 468.
Music types accepted:
Section 1.2.39 [multi-measure-articulation-event], page 46, Section 1.2.40 [multi-measure-rest-event], page 46, and Section 1.2.41 [multi-measure-text-event], page 47.
Properties (read)

\textbf{currentCommandColumn} (graphical \textbf{(layout)}
\textbf{object})
\hspace{1cm} Grob that is X-parent to all current breakable
\hspace{1cm} (clef, key signature, etc.) items.

\textbf{internalBarNumber} (integer)
\hspace{1cm} Contains the current bar number. This property
\hspace{1cm} is used for internal timekeeping, among others
\hspace{1cm} by the \texttt{Accidental_engraver}.

\textbf{measurePosition} (moment)
\hspace{1cm} How much of the current measure have we had.
\hspace{1cm} This can be set manually to create incomplete
\hspace{1cm} measures.

\textbf{restNumberThreshold} (number)
\hspace{1cm} If a multimeasure rest has more measures than
\hspace{1cm} this, a number is printed.

\textbf{whichBar} (string)
\hspace{1cm} This property is read to determine what type
\hspace{1cm} of bar line to create.
\hspace{1cm} Example:
\begin{verbatim}
\set Staff.whichBar = ",|:
\end{verbatim}
\hspace{1cm} This will create a start-repeat bar in this
\hspace{1cm} staff only. Valid values are described in
\hspace{1cm} \texttt{scm/bar-line.scm}.

This engraver creates the following layout object(s):
Section 3.1.75 [MultiMeasureRest], page 468, Section 3.1.76 [MultiMeasureRestNumber], page 469, Section 3.1.77 [MultiMeasureRestScript], page 471, and Section 3.1.78 [MultiMeasureRestText], page 472.
Section 2.2.76 [New_fingering_engraver], page 342
Create fingering scripts for notes in a new chord. This engraver is ill-named, since it also takes care of articulations and harmonic note heads.

Properties (read)

fingeringOrientations (list)
A list of symbols, containing ‘left’, ‘right’, ‘up’ and/or ‘down’. This list determines where fingerings are put relative to the chord being fingered.

harmonicDots (boolean)
If set, harmonic notes in dotted chords get dots.

stringNumberOrientations (list)
See fingeringOrientations.

strokeFingerOrientations (list)
See fingeringOrientations.

This engraver creates the following layout object(s):
Section 3.1.42 [Fingering], page 429, Section 3.1.98 [Script], page 493, Section 3.1.114 [StringNumber], page 508, and Section 3.1.115 [StrokeFinger], page 510.

Section 2.2.77 [Note_head_line_engraver], page 343
Engrave a line between two note heads in a staff switch if followVoice is set.

Properties (read)

followVoice (boolean)
If set, note heads are tracked across staff switches by a thin line.

This engraver creates the following layout object(s):
Section 3.1.140 [VoiceFollower], page 540.

Section 2.2.78 [Note_heads_engraver], page 343
Generate note heads.

Music types accepted:
Section 1.2.43 [note-event], page 47,

Properties (read)

middleCPosition (number)
The place of the middle C, measured in half staff-spaces. Usually determined by looking at middleCClefPosition and middleCOffset.

staffLineLayoutFunction (procedure)
Layout of staff lines, traditional, or semitone.

This engraver creates the following layout object(s):
Section 3.1.82 [NoteHead], page 477.

Section 2.2.81 [Note_spacing_engraver], page 344
Generate NoteSpacing, an object linking horizontal lines for use in spacing.
This engraver creates the following layout object(s):
Section 3.1.84 [NoteSpacing], page 478.

Section 2.2.83 [Output_property_engraver], page 344
Apply a procedure to any grob acknowledged.
Music types accepted:
Section 1.2.4 [apply-output-event], page 43,

Section 2.2.87 [Part_combine_engraver], page 346
Part combine engraver for orchestral scores: Print markings ‘a2’, ‘Solo’, ‘Solo II’, and ‘unisono’.
Music types accepted:
Section 1.2.43 [note-event], page 47, and Section 1.2.47 [part-combine-event], page 48,
Properties (read)

aDueText (markup)
Text to print at a unisono passage.

partCombineTextsOnNote (boolean)
Print part-combine texts only on the next note rather than immediately on rests or skips.

printPartCombineTexts (boolean)
Set ‘Solo’ and ‘A due’ texts in the part combiner?

soloIIText (markup)
The text for the start of a solo for voice ‘two’ when part-combining.

soloText (markup)
The text for the start of a solo when part-combining.

This engraver creates the following layout object(s):
Section 3.1.29 [CombineTextScript], page 410.

Section 2.2.88 [Percent_repeat_engraver], page 346
Make whole measure repeats.
Music types accepted:
Section 1.2.49 [percent-event], page 48,
Properties (read)

countPercentRepeats (boolean)
If set, produce counters for percent repeats.

currentCommandColumn (graphical (layout) object)
Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

repeatCountVisibility (procedure)
A procedure taking as arguments an integer and context, returning whether the corresponding percent repeat number should be printed when countPercentRepeats is set.
This engraver creates the following layout object(s):
Section 3.1.88 [PercentRepeat], page 482, and Section 3.1.89 [PercentRepeatCounter], page 483.

Section 2.2.89 [PhrasingSlurEngraver], page 347
Print phrasing slurs. Similar to Section 2.2.106 [SlurEngraver], page 352.
Music types accepted:
Section 1.2.43 [note-event], page 47, and Section 1.2.51 [phrasing-slur-event], page 48,
This engraver creates the following layout object(s):
Section 3.1.90 [PhrasingSlur], page 484.

Section 2.2.94 [PitchedTrillEngraver], page 349
Print the bracketed note head after a note head with trill.
This engraver creates the following layout object(s):
Section 3.1.129 [TrillPitchAccidental], page 528, Section 3.1.130 [TrillPitchGroup], page 529, and Section 3.1.131 [TrillPitchHead], page 530.

Section 2.2.97 [RepeatTieEngraver], page 350
Create repeat ties.
Music types accepted:
Section 1.2.53 [repeat-tie-event], page 48,
This engraver creates the following layout object(s):
Section 3.1.94 [RepeatTie], page 490, and Section 3.1.95 [RepeatTieColumn], page 491.

Section 2.2.99 [RestEngraver], page 350
Engrave rests.
Music types accepted:
Section 1.2.54 [rest-event], page 49,
Properties (read)

\texttt{middleCPosition} \ (\text{number})
\quad \text{The place of the middle C, measured in half staff-spaces. Usually determined by looking at middleCClefPosition and middleCOffset.}

This engraver creates the following layout object(s):
Section 3.1.96 [Rest], page 491.

Section 2.2.100 [RhythmicColumnEngraver], page 351
Generate \texttt{NoteColumn}, an object that groups stems, note heads, and rests.
This engraver creates the following layout object(s):
Section 3.1.81 [NoteColumn], page 476.

Section 2.2.101 [ScriptColumnEngraver], page 351
Find potentially colliding scripts and put them into a \texttt{ScriptColumn} object; that will fix the collisions.
This engraver creates the following layout object(s):
Section 3.1.99 [ScriptColumn], page 494.
Section 2.2.102 [Script_engraver], page 351
Handle note scripted articulations.
Music types accepted:
Section 1.2.6 [articulation-event], page 43,
Properties (read)

scriptDefinitions (list)
The description of scripts. This is used
by the Script_engraver for typesetting
note-superscripts and subscripts. See scm/
script.scm for more information.

This engraver creates the following layout object(s):
Section 3.1.98 [Script], page 493.

Section 2.2.105 [Slash_repeat_engraver], page 352
Make beat repeats.
Music types accepted:
Section 1.2.52 [repeat-slash-event], page 48,
This engraver creates the following layout object(s):
Section 3.1.37 [DoubleRepeatSlash], page 423, and Section 3.1.93 [Re-
peatSlash], page 489.

Section 2.2.106 [Slur_engraver], page 352
Build slur grobs from slur events.
Music types accepted:
Section 1.2.43 [note-event], page 47, and Section 1.2.58 [slur-event],
page 49,
Properties (read)

doubleSlurs (boolean)
If set, two slurs are created for every slurred
note, one above and one below the chord.

slurMelismaBusy (boolean)
Signal if a slur is present.

This engraver creates the following layout object(s):
Section 3.1.101 [Slur], page 494.

Section 2.2.113 [Spanner_break_forbid_engraver], page 354
Forbid breaks in certain spanners.

Section 2.2.119 [Stem_engraver], page 355
Create stems, flags and single-stem tremolos. It also works together
with the beam engraver for overriding beaming.
Music types accepted:
Section 1.2.75 [tremolo-event], page 52, and Section 1.2.78 [tuplet-span-
event], page 52,
Properties (read)

stemLeftBeamCount (integer)
Specify the number of beams to draw on the
left side of the next note. Overrides automatic
beaming. The value is only used once, and then
it is erased.
stemRightBeamCount (integer)
See stemLeftBeamCount.

whichBar (string)
This property is read to determine what type
of bar line to create.
Example:
\set Staff.whichBar = ".|:
This will create a start-repeat bar in this
staff only. Valid values are described in
scm/bar-line.scm.

This engraver creates the following layout object(s):
Section 3.1.44 [Flag], page 432, Section 3.1.111 [Stem], page 504,
Section 3.1.112 [StemStub], page 506, and Section 3.1.113
[StemTremolo], page 507.

Section 2.2.125 [Text_engraver], page 357
Create text scripts.
Music types accepted:
Section 1.2.71 [text-script-event], page 51,
This engraver creates the following layout object(s):
Section 3.1.124 [TextScript], page 519.

Section 2.2.126 [Text_spanner_engraver], page 358
Create text spanner from an event.
Music types accepted:
Section 1.2.72 [text-span-event], page 51,
Properties (read)
   currentMusicalColumn (graphical (layout)
object)
   Grob that is X-parent to all non-breakable
   items (note heads, lyrics, etc.).

This engraver creates the following layout object(s):
Section 3.1.125 [TextSpanner], page 521.

Section 2.2.127 [Tie_engraver], page 358
Generate ties between note heads of equal pitch.
Music types accepted:
Section 1.2.73 [tie-event], page 51,
Properties (read)
   skipTypesetting (boolean)
   If true, no typesetting is done, speeding up
   the interpretation phase. Useful for debugging
   large scores.
   tieWaitForNote (boolean)
   If true, tied notes do not have to follow each
   other directly. This can be used for writing out
   arpeggios.
Properties (write)

tieMelismaBusy (boolean)

Signal whether a tie is present.

This engraver creates the following layout object(s):
Section 3.1.126 [Tie], page 523, and Section 3.1.127 [TieColumn], page 525.

Section 2.2.132 [Trill_spanner_engraver], page 360
Create trill spanner from an event.
Music types accepted:
Section 1.2.77 [trill-span-event], page 52,
Properties (read)

currentCommandColumn (graphical (layout) object)

Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

currentMusicalColumn (graphical (layout) object)

Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).

This engraver creates the following layout object(s):
Section 3.1.132 [TrillSpanner], page 531.

Section 2.2.133 [Tuplet_engraver], page 361
Catch tuplet events and generate appropriate bracket.
Music types accepted:
Section 1.2.78 [tuplet-span-event], page 52,
Properties (read)

tupletFullLength (boolean)

If set, the tuplet is printed up to the start of the next note.

tupletFullLengthNote (boolean)

If set, end at the next note, otherwise end on the matter (time signatures, etc.) before the note.

This engraver creates the following layout object(s):
Section 3.1.133 [TupletBracket], page 532, and Section 3.1.134 [TupletNumber], page 534.

2.1.24 PianoStaff
Just like GrandStaff, but the staves are only removed together, never separately.

This context also accepts commands for the following context(s):

GrandStaff.

This context creates the following layout object(s):
Section 3.1.9 [Arpeggio], page 386, Section 3.1.55 [InstrumentName], page 443,
Section 3.1.105 [SpanBar], page 500, Section 3.1.106 [SpanBarStub], page 501, Section 3.1.119
This context sets the following properties:

- Set grob-property `extra-spacing-width` in Section 3.1.39 [DynamicText], page 425, to `#f`.
- Set translator property `instrumentName` to `'()`.
- Set translator property `instrumentName` to `'()`.
- Set translator property `localAlterations` to `'()`.
- Set translator property `shortInstrumentName` to `'()`.
- Set translator property `shortVocalName` to `'()`.
- Set translator property `topLevelAlignment` to `#f`.
- Set translator property `topLevelAlignment` to `#f`.

This is not a 'Bottom' context; search for such a one will commence after creating an implicit context of type Section 2.1.27 [Staff], page 240.

Context PianoStaff can contain Section 2.1.2 [ChordNames], page 60, Section 2.1.5 [Drum-Staff], page 76, Section 2.1.7 [Dynamics], page 95, Section 2.1.8 [FiguredBass], page 99, Section 2.1.16 [Lyrics], page 155, Section 2.1.25 [RhythmicStaff], page 215, Section 2.1.27 [Staff], page 240, and Section 2.1.29 [TabStaff], page 253.

This context is built from the following engraver(s):

Section 2.2.55 [Instrument_name_engraver], page 334
Create a system start text for instrument or vocal names.

Properties (read)

- `currentCommandColumn` (graphical (layout) object)
  Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

- `instrumentName` (markup)
  The name to print left of a staff. The `instrumentName` property labels the staff in the first system, and the `shortInstrumentName` property labels following lines.

- `shortInstrumentName` (markup)
  See `instrumentName`.

- `shortVocalName` (markup)
  Name of a vocal line, short version.

- `vocalName` (markup)
  Name of a vocal line.

This engraver creates the following layout object(s):
Section 3.1.55 [InstrumentName], page 443.

Section 2.2.57 [Keep_alive_together_engraver], page 335
This engraver collects all `Hara_kiri_group_spanners` that are created in contexts at or below its own. These spanners are then tied together so that one will be removed only if all are removed. For example, if a
**StaffGroup** uses this engraver, then the staves in the group will all be visible as long as there is a note in at least one of them.

**Section 2.2.109 [Span_arpeggio_engraver], page 353**
Make arpeggios that span multiple staves.
Properties (read)

- **connectArpeggios** (boolean)
  - If set, connect arpeggios across piano staff.

This engraver creates the following layout object(s):
Section 3.1.9 [Arpeggio], page 386.

**Section 2.2.110 [Span_bar_engraver], page 353**
Make cross-staff bar lines: It catches all normal bar lines and draws a single span bar across them.
This engraver creates the following layout object(s):
Section 3.1.105 [SpanBar], page 500.

**Section 2.2.111 [Span_bar_stub_engraver], page 354**
Make stubs for span bars in all contexts that the span bars cross.
This engraver creates the following layout object(s):
Section 3.1.106 [SpanBarStub], page 501.

**Section 2.2.120 [System_start_delimiter_engraver], page 356**
Create a system start delimiter (i.e., a SystemStartBar, SystemStartBrace, SystemStartBracket or SystemStartSquare spanner).
Properties (read)

- **currentCommandColumn** (graphical (layout) object)
  - Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

- **systemStartDelimiter** (symbol)
  - Which grob to make for the start of the system/staff? Set to SystemStartBrace, SystemStartBracket or SystemStartBar.

- **systemStartDelimiterHierarchy** (pair)
  - A nested list, indicating the nesting of a start delimiters.

This engraver creates the following layout object(s):
Section 3.1.119 [SystemStartBar], page 514, Section 3.1.120 [SystemStartBrace], page 515, Section 3.1.121 [SystemStartBracket], page 516, and Section 3.1.122 [SystemStartSquare], page 517.

**Section 2.2.136 [Vertical_align_engraver], page 361**
Catch groups (staves, lyrics lines, etc.) and stack them vertically.
Properties (read)

- **alignAboveContext** (string)
  - Where to insert newly created context in vertical alignment.
alignBelowContext (string)
Where to insert newly created context in vertical alignment.

hasAxisGroup (boolean)
True if the current context is contained in an axis group.

This engraver creates the following layout object(s):
Section 3.1.138 [VerticalAlignment], page 538.

Section 2.2.136 [Vertical_align_engraver], page 361
Catch groups (staves, lyrics lines, etc.) and stack them vertically.
Properties (read)

alignAboveContext (string)
Where to insert newly created context in vertical alignment.

alignBelowContext (string)
Where to insert newly created context in vertical alignment.

hasAxisGroup (boolean)
True if the current context is contained in an axis group.

This engraver creates the following layout object(s):
Section 3.1.138 [VerticalAlignment], page 538.

2.1.25 RhythmicStaff
A context like Staff but for printing rhythms. Pitches are ignored; the notes are printed on one line.

This context also accepts commands for the following context(s):
Staff.

This context creates the following layout object(s):
Section 3.1.11 [BarLine], page 388, Section 3.1.33 [DotColumn], page 419, Section 3.1.55 [InstrumentName], page 443, Section 3.1.62 [LedgerLineSpanner], page 453, Section 3.1.108 [StaffSpacing], page 502, Section 3.1.109 [StaffSymbol], page 503, Section 3.1.128 [TimeSignature], page 525, and Section 3.1.139 [VerticalAxisGroup], page 538.

This context sets the following properties:

- Set grob-property line-count in Section 3.1.109 [StaffSymbol], page 503, to 1.
- Set grob-property neutral-direction in Section 3.1.19 [Beam], page 397, to 1.
- Set grob-property neutral-direction in Section 3.1.111 [Stem], page 504, to 1.
- Set grob-property staff-padding in Section 3.1.141 [VoltaBracket], page 541, to 3.
- Set translator property createSpacing to #t.
- Set translator property instrumentName to '().
- Set translator property localAlterations to '().
- Set translator property shortInstrumentName to '().
- Set translator property squashedPosition to 0.
This is not a ‘Bottom’ context; search for such a one will commence after creating an implicit context of type Section 2.1.33 [Voice], page 299.

Context RhythmicStaff can contain Section 2.1.3 [CueVoice], page 63, Section 2.1.20 [NullVoice], page 184, and Section 2.1.33 [Voice], page 299.

This context is built from the following engraver(s):

**Section 2.2.5 [Axis_group_engraver], page 316**
Group all objects created in this context in a VerticalAxisGroup spanner.

**Properties (read)**

- `currentCommandColumn` (graphical (layout) object)
  Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

- `hasAxisGroup` (boolean)
  True if the current context is contained in an axis group.

- `keepAliveInterfaces` (list)
  A list of symbols, signifying grob interfaces that are worth keeping a staff with `remove-empty` set around for.

**Properties (write)**

- `hasAxisGroup` (boolean)
  True if the current context is contained in an axis group.

This engraver creates the following layout object(s):

**Section 3.1.139 [VerticalAxisGroup], page 538.**

**Section 2.2.7 [Bar_engraver], page 316**
Create barlines. This engraver is controlled through the `whichBar` property. If it has no bar line to create, it will forbid a linebreak at this point. This engraver is required to trigger the creation of clefs at the start of systems.

**Properties (read)**

- `whichBar` (string)
  This property is read to determine what type of bar line to create.

  Example:
  ```latex
  \set Staff.whichBar = ".|:
  ```

  This will create a start-repeat bar in this staff only. Valid values are described in `scm/bar-line.scm`.

**Properties (write)**

- `forbidBreak` (boolean)
  If set to `#t`, prevent a line break at this point.

This engraver creates the following layout object(s):

**Section 3.1.11 [BarLine], page 388.**
Section 2.2.27 [Dot_column_engraver], page 325
Engrave dots on dotted notes shifted to the right of the note. If omitted, then dots appear on top of the notes.
This engraver creates the following layout object(s):
Section 3.1.33 [DotColumn], page 419.

Section 2.2.41 [Font_size_engraver], page 330
Put fontSize into font-size grob property.
Properties (read)

\[\text{fontSize (number)}\]
The relative size of all grobs in a context.

Section 2.2.55 [Instrument_name_engraver], page 334
Create a system start text for instrument or vocal names.
Properties (read)

\[\text{currentCommandColumn (graphical (layout)}\]
object)
Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

\[\text{instrumentName (markup)}\]
The name to print left of a staff.
The \text{instrumentName} property labels the staff in the first system, and the
\text{shortInstrumentName} property labels following lines.

\[\text{shortInstrumentName (markup)}\]
See \text{instrumentName}.

\[\text{shortVocalName (markup)}\]
Name of a vocal line, short version.

\[\text{vocalName (markup)}\]
Name of a vocal line.
This engraver creates the following layout object(s):
Section 3.1.55 [InstrumentName], page 443.

Section 2.2.62 [Ledger_line_engraver], page 337
Create the spanner to draw ledger lines, and notices objects that need ledger lines.
This engraver creates the following layout object(s):
Section 3.1.62 [LedgerLineSpanner], page 453.

Section 2.2.83 [Output_property_engraver], page 344
Apply a procedure to any grob acknowledged.
Music types accepted:
Section 1.2.4 [apply-output-event], page 43,

Section 2.2.93 [Pitch_squash_engraver], page 348
Set the vertical position of note heads to squashedPosition, if that property is set. This can be used to make a single-line staff demonstrating the rhythm of a melody.
Properties (read)

squashedPosition (integer)
Vertical position of squashing for "Pitch_squash_engraver" in Internals Reference.

Section 2.2.104 [Separating_line_group_engraver], page 352
Generate objects for computing spacing parameters.
Properties (read)

createSpacing (boolean)
Create StaffSpacing objects? Should be set for staves.

Properties (write)

hasStaffSpacing (boolean)
True if the current CommandColumn contains items that will affect spacing.

This engraver creates the following layout object(s):
Section 3.1.108 [StaffSpacing], page 502.

Section 2.2.116 [Staff_symbol_engraver], page 354
Create the constellation of five (default) staff lines.
Music types accepted:
Section 1.2.65 [staff-span-event], page 50.
This engraver creates the following layout object(s):
Section 3.1.109 [StaffSymbol], page 503.

Section 2.2.129 [Time_signature_engraver], page 359
Create a Section 3.1.128 [TimeSignature], page 525, whenever timeSignatureFraction changes.
Music types accepted:
Section 1.2.74 [time-signature-event], page 51;
Properties (read)

initialTimeSignatureVisibility (vector)
break visibility for the initial time signature.

partialBusy (boolean)
Signal that \partial acts at the current timestep.

timeSignatureFraction (fraction, as pair)
A pair of numbers, signifying the time signature. For example, '(4 . 4) is a 4/4 time signature.

This engraver creates the following layout object(s):
Section 3.1.128 [TimeSignature], page 525.
2.1.26 Score

This is the top level notation context. No other context can contain a `Score` context. This context handles the administration of time signatures. It also makes sure that items such as clefs, time signatures, and key-signatures are aligned across staves.

You cannot explicitly instantiate a `Score` context (since it is not contained in any other context). It is instantiated automatically when an output definition (a `\score` or `\layout` block) is processed.

This context also accepts commands for the following context(s):

- **Timing**

This context creates the following layout object(s):

- Section 3.1.12 [BarNumber], page 392, Section 3.1.21 [BreakAlignGroup], page 400, Section 3.1.22 [BreakAlignment], page 400, Section 3.1.45 [FootnoteItem], page 433, Section 3.1.46 [FootnoteSpanner], page 434, Section 3.1.49 [GraceSpacing], page 438, Section 3.1.63 [LeftEdge], page 454, Section 3.1.74 [MetronomeMark], page 466, Section 3.1.79 [NonMusicalPaperColumn], page 474, Section 3.1.86 [PaperColumn], page 480, Section 3.1.87 [ParenthesesItem], page 481, Section 3.1.92 [RehearsalMark], page 487, Section 3.1.104 [SpacingSpanner], page 499, Section 3.1.119 [SystemStartBar], page 514, Section 3.1.120 [SystemStartBrace], page 515, Section 3.1.121 [SystemStartBracket], page 516, Section 3.1.122 [SystemStartSquare], page 517, Section 3.1.138 [VerticalAlignment], page 538, Section 3.1.141 [VoltaBracket], page 541, and Section 3.1.142 [VoltaBracketSpanner], page 542.

This context sets the following properties:

- Set translator property `additionalPitchPrefix` to "".
- Set translator property `aDueText` to "a2".
- Set translator property `alternativeRestores` to:
  
  `(measurePosition measureLength lastChord)

- Set translator property `associatedVoiceType` to 'Voice.
- Set translator property `autoAccidentals` to:
  
  `(Staff `<procedure # f (context pitch barnum measurepos)>)

- Set translator property `autoBeamCheck` to default-auto-beam-check.
- Set translator property `autoBeaming` to #t.
- Set translator property `autoCautionaries` to '('.
- Set translator property `automaticBars` to #t.
- Set translator property `barCheckSynchronize` to #f.
- Set translator property `barNumberFormatter` to robust-bar-number-function.
- Set translator property `barNumberVisibility` to first-bar-number-invisible-and-no-parenthesized-bar-numbers.
- Set translator property `beamHalfMeasure` to #t.
- Set translator property `chordNameExceptions` to:

  `(((<Pitch e' > <Pitch gis' >)
   <procedure line-markup (layout props args)>
   (+"+")
  )
  ((<Pitch ees' > <Pitch ges' >)
   <procedure line-markup (layout props args)>
  )
  )

  `<procedure line-markup (layout props increment arg)>

  `)
  `)
  `)

  `)
  `)
(\#<procedure super-markup (layout props arg)>
"ø"))
((#<Pitch ees' > #<Pitch ges' > #<Pitch bes' >)
#<procedure concat-markup (layout props args)>
((#<procedure line-markup (layout props args)>
"˚")))
((#<Pitch ees' > #<Pitch ges' > #<Pitch beses' >)
#<procedure super-markup (layout props arg)>
"ø"))
((#<Pitch e' >
#<Pitch g' >
#<Pitch b' >
#<Pitch fis'' >)
#<procedure line-markup (layout props args)>
((#<procedure super-markup (layout props arg)>
"lyd")))
((#<Pitch e' >
#<Pitch g' >
#<Pitch bes' >
#<Pitch des'' >
#<Pitch ees'' >
#<Pitch fis'' >
#<Pitch aes'' >)
#<procedure line-markup (layout props args)>
((#<procedure super-markup (layout props arg)>
"alt")))
((#<Pitch g' >)
#<procedure line-markup (layout props args)>
((#<procedure super-markup (layout props arg)>
"5")))
((#<Pitch g' > #<Pitch c'' >)
#<procedure line-markup (layout props args)>
((#<procedure super-markup (layout props arg)>
"5")))
• Set translator property chordNameFunction to ignatzek-chord-names.
• Set translator property chordNameLowercaseMinor to #f.
• Set translator property chordNameSeparator to:
  '(#<procedure hspace-markup (layout props amount)> 0.5)
• Set translator property chordNoteNamer to '().
• Set translator property chordPrefixSpacer to 0.
• Set translator property chordRootNamer to note-name->markup.
• Set translator property clefGlyph to "clefs.0".
• Set translator property clefPosition to -2.
• Set translator property clefTranspositionFormatter to clef-transposition-markup.
• Set translator property completionFactor to unity-if-multimeasure.
• Set translator property \texttt{crescendoSpanner} to 'hairpin.
• Set translator property \texttt{cueClefTranspositionFormatter} to \texttt{clef-transposition-markup}.
• Set translator property \texttt{decrescendoSpanner} to 'hairpin.
• Set translator property \texttt{defaultBarType} to ".|.
• Set translator property \texttt{doubleRepeatType} to ":..:
• Set translator property \texttt{drumStyleTable} to \texttt{#<hash-table 29/61>}
• Set translator property \texttt{endRepeatType} to ":|.
• Set translator property \texttt{explicitClefVisibility} to:
  \texttt{#(#t #t #t)}
• Set translator property \texttt{explicitCueClefVisibility} to:
  \texttt{#(#f #t #t)}
• Set translator property \texttt{explicitKeySignatureVisibility} to:
  \texttt{#(#t #t #t)}
• Set translator property \texttt{extendersOverRests} to \texttt{#t}.
• Set translator property \texttt{extraNatural} to \texttt{#t}.
• Set translator property \texttt{figuredBassFormatter} to \texttt{format-bass-figure}.
• Set translator property \texttt{fingeringOrientations} to:
  '(up down)
• Set translator property \texttt{firstClef} to \texttt{#t}.
• Set translator property \texttt{graceSettings} to:
  '((Voice Stem direction 1)
   (Voice Slur direction -1)
   (Voice Stem font-size -3)
   (Voice Flag font-size -3)
   (Voice NoteHead font-size -3)
   (Voice TabNoteHead font-size -4)
   (Voice Dots font-size -3)
   (Voice Stem length-fraction 0.8)
   (Voice Stem no-stem-extend #t)
   (Voice Beam beam-thickness 0.384)
   (Voice Beam length-fraction 0.8)
   (Voice Accidental font-size -4)
   (Voice AccidentalCautionary font-size -4)
   (Voice Script font-size -3)
   (Voice Fingering font-size -8)
   (Voice StringNumber font-size -8))
• Set translator property \texttt{harmonicAccidentals} to \texttt{#t}.
• Set translator property \texttt{highStringOne} to \texttt{#t}.
• Set translator property \texttt{initialTimeSignatureVisibility} to:
  \texttt{#(#f #t #t)}
• Set translator property \texttt{instrumentTransposition} to \texttt{#<Pitch c'>}.
• Set translator property \texttt{keepAliveInterfaces} to:
  '(bass-figure-interface
   chord-name-interface
   cluster-beacon-interface
   bass-figure-interface
   chord-name-interface
   cluster-beacon-interface
   bass-figure-interface
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• Set translator property `keyAlterationOrder` to:
  
  `'((6 . -1/2)
   (2 . -1/2)
   (5 . -1/2)
   (1 . -1/2)
   (4 . -1/2)
   (0 . -1/2)
   (3 . -1/2)
   (3 . 1/2)
   (0 . 1/2)
   (4 . 1/2)
   (1 . 1/2)
   (5 . 1/2)
   (2 . 1/2)
   (6 . 1/2)
   (6 . -1)
   (2 . -1)
   (5 . -1)
   (1 . -1)
   (4 . -1)
   (0 . -1)
   (3 . -1)
   (3 . 1)
   (0 . 1)
   (4 . 1)
   (1 . 1)
   (5 . 1)
   (2 . 1)
   (6 . 1))`

• Set translator property `lyricMelismaAlignment` to `-1`.  
• Set translator property `majorSevenSymbol` to:
  
  `'(#<procedure line-markup (layout props args)>
    ((#<procedure fontsize-markup (layout props increment arg)>
      -3
      (#<procedure triangle-markup (layout props filled)>
        #f))))`

• Set translator property `markFormatter` to `format-mark-letters`.  
• Set translator property `melismaBusyProperties` to:
  
  `'(melismaBusy
    slurMelismaBusy
    tieMelismaBusy
    beamMelismaBusy)"
• Set translator property metronomeMarkFormatter to format-metronome-markup.
• Set translator property middleCClefPosition to -6.
• Set translator property middleCPosition to -6.
• Set translator property minorChordModifier to:
  '(#<procedure simple-markup (layout props str)> "m")
• Set translator property noChordSymbol to:
  '(#<procedure simple-markup (layout props str)> "N.C.")
• Set translator property noteNameFunction to note-name-markup.
• Set translator property noteNameSeparator to "/".
• Set translator property noteToFretFunction to determine-frets.
• Set translator property partCombineTextsOnNote to #t.
• Set translator property pedalSostenutoStrings to:
• Set translator property pedalSostenutoStyle to 'mixed.
• Set translator property pedalSustainStrings to:
  '("Ped." "Ped." "")
• Set translator property pedalSustainStyle to 'text.
• Set translator property pedalUnaCordaStrings to:
  '("una corda" "tre corde")
• Set translator property pedalUnaCordaStyle to 'text.
• Set translator property predefinedDiagramTable to #f.
• Set translator property printAccidentalNames to #t.
• Set translator property printKeyCancellation to #t.
• Set translator property printOctaveNames to #f.
• Set translator property printPartCombineTexts to #t.
• Set translator property quotedCueEventTypes to:
  '(note-event  
    rest-event  
    tie-event  
    beam-event  
    tuplet-span-event  
    tremolo-event)
• Set translator property quotedEventTypes to:
  '(StreamEvent)
• Set translator property rehearsalMark to 1.
• Set translator property repeatCountVisibility to all-repeat-counts-visible.
• Set translator property restNumberThreshold to 1.
• Set translator property scriptDefinitions to:
  '(("accent"  
      (avoid-slur . around)  
      (padding . 0.2)
(script-stencil feta "ictus" . "ictus")
(side-relative-direction . -1)
(quantize-position . #t)
(avoid-slur . ignore)
(padding . 0.2)
(script-priority . -100)
(direction . -1))
("lheel"
(script-stencil feta "upedalheel" . "upedalheel")
(padding . 0.2)
(avoid-slur . around)
(direction . -1))
("lineprall"
(script-stencil feta "lineprall" . "lineprall")
(padding . 0.2)
(avoid-slur . around)
(direction . 1))
("longfermata"
(script-stencil
 feta
 "dlongfermata"
.
 "ulongfermata")
(padding . 0.2)
(avoid-slur . around)
(direction . 1))
("ltoe"
(script-stencil feta "upedaltoe" . "upedaltoe")
(padding . 0.2)
(avoid-slur . around)
(direction . -1))
("marcato"
(script-stencil feta "dmarcato" . "umarcato")
(padding . 0.2)
(avoid-slur . inside)
(quantize-position . #t)
(side-relative-direction . -1))
("mordent"
(script-stencil feta "mordent" . "mordent")
(padding . 0.2)
(avoid-slur . around)
(direction . 1))
("open"
(avoid-slur . outside)
(padding . 0.2)
(script-stencil feta "open" . "open")
(direction . 1))
("portato"
(script-stencil feta "uportato" . "dportato")
(avoid-slur . around)
(padding . 0.45)
(side-relative-direction . -1))
(direction . 1))
("semicirculus"
(script-stencil
 feta
  "dsemicirculus"
  "dsemicirculus")
(side-relative-direction . -1)
(quantize-position . #t)
(avoid-slur . ignore)
(padding . 0.2)
(script-priority . -100)
(direction . 1))
("shortfermata"
(script-stencil
 feta
  "dshortfermata"
  "ushortfermata")
(padding . 0.2)
(avoid-slur . around)
(direction . 1))
("signumcongruentiae"
(script-stencil
 feta
  "dsignumcongruentiae"
  "usignumcongruentiae")
(padding . 0.2)
(avoid-slur . outside)
(direction . 1))
("slashturn"
(script-stencil feta "slashturn" "slashturn")
(padding . 0.2)
(avoid-slur . inside)
(direction . 1))
("snappizzicato"
(script-stencil
 feta
  "snappizzicato"
  "snappizzicato")
(padding . 0.2)
(avoid-slur . outside)
(direction . 1))
("staccatissimo"
(avoid-slur . inside)
(quantize-position . #t)
(script-stencil
 feta
  "dstaccatissimo" .
"ustaccatissimo")
(padding . 0.2)
(skyline-horizontal-padding . 0.1)
(side-relative-direction . -1)
(toward-stem-shift . 1.0)
(toward-stem-shift-in-column . 0.0))
("staccato"
(script-stencil feta "staccato" . "staccato")
(side-relative-direction . -1)
(quantize-position . #t)
(avoid-slur . inside)
(toward-stem-shift . 1.0)
(toward-stem-shift-in-column . 0.0)
(padding . 0.2)
(skyline-horizontal-padding . 0.1)
(script-priority . -100))
("stopped"
(script-stencil feta "stopped" . "stopped")
(avoid-slur . inside)
(padding . 0.2)
(direction . 1))
("tenuto"
(script-stencil feta "tenuto" . "tenuto")
(quantize-position . #t)
(avoid-slur . inside)
(padding . 0.2)
(side-relative-direction . -1))
("trill"
(script-stencil feta "trill" . "trill")
(direction . 1)
(padding . 0.2)
(avoid-slur . outside)
(script-priority . 2000))
("turn"
(script-stencil feta "turn" . "turn")
(avoid-slur . inside)
(padding . 0.2)
(direction . 1))
("upbow"
(script-stencil feta "upbow" . "upbow")
(avoid-slur . around)
(padding . 0.2)
(direction . 1)
(script-priority . 150))
("upmordent"
(script-stencil feta "upmordent" . "upmordent")
(padding . 0.2)
(avoid-slur . around)
(direction . 1))
("upprall"
(script-stencil feta "upprall" . "upprall")
(padding . 0.2)
(avoid-slur . around)
(direction . 1))
("varcoda"
(script-stencil feta "varcoda" . "varcoda")
(padding . 0.2)
(avoid-slur . outside)
(direction . 1))
("varcomma"
(script-stencil feta "lvarcomma" . "rvarcomma")
(quantize-position . #t)
(padding . 0.2)
(avoid-slur . ignore)
(direction . 1))
("verylongfermata"
(script-stencil
 feta
  "dverylongfermata"
  .
  "uverylongfermata")
(padding . 0.2)
(avoid-slur . around)
(direction . 1))
("veryshortfermata"
(script-stencil
 feta
  "dveryshortfermata"
  .
  "uveryshortfermata")
(padding . 0.2)
(avoid-slur . around)
(direction . 1)))

• Set translator property slashChordSeparator to:
  "(/"
• Set translator property soloIIText to "Solo II".
• Set translator property soloText to "Solo".
• Set translator property startRepeatType to ".|:".
• Set translator property stringNumberOrientations to:
  '(up down)
• Set translator property stringOneTopmost to #t.
• Set translator property stringTunings to:
  '(#<Pitch e' >
  #<Pitch b >
  #<Pitch g >
  #<Pitch d >
  #<Pitch a, >
  #<Pitch e, >)
• Set translator property strokeFingerOrientations to:
  '(right)
• Set translator property `subdivideBeams` to `#f`.
• Set translator property `systemStartDelimiter` to 'SystemStartBar'.
• Set translator property `tablatureFormat` to `fret-number-tablature-format`.
• Set translator property `tabStaffLineLayoutFunction` to `tablature-position-on-lines`.
• Set translator property `tieWaitForNote` to `#f`.
• Set translator property `timeSignatureFraction` to:
  `(4 . 4)`
• Set translator property `timeSignatureSettings` to:
  `'((2 . 2) (beamExceptions (end (1/32 8 8 8 8 8 8 8 8)))
   ((3 . 2)
    (beamExceptions (end (1/32 8 8 8 8 8 8 8 8)))
   ((3 . 4)
    (beamExceptions (end (1/8 6) (1/12 3 3 3))))
   ((3 . 8) (beamExceptions (end (1/8 3)))
   ((4 . 2)
    (beamExceptions (end (1/16 4 4 4 4 4 4 4 4)))
   ((4 . 4)
    (beamExceptions (end (1/8 4 4) (1/12 3 3 3 3))))
   ((4 . 8) (beatStructure 2 2))
   ((6 . 4)
    (beamExceptions (end (1/16 4 4 4 4 4 4 4 4)))
   ((9 . 4)
    (beamExceptions (end (1/32 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8)))
   ((12 . 4)
    (beamExceptions
     (end (1/32 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8)))
   ((5 . 8) (beatStructure 3 2))
   ((8 . 8) (beatStructure 3 3 2)))`
• Set translator property `timing` to `#t`.
• Set translator property `topLevelAlignment` to `#t`.

This is not a 'Bottom' context; search for such a one will commence after creating an implicit
context of type Section 2.1.27 [Staff], page 240.

Context Score can contain Section 2.1.1 [ChoirStaff], page 59, Section 2.1.2 [ChordNames],
page 60, Section 2.1.4 [Devnull], page 76, Section 2.1.5 [DrumStaff], page 76, Section 2.1.7 [Dynamics],
page 95, Section 2.1.8 [FiguredBass], page 99, Section 2.1.9 [FretBoards], page 101,
Section 2.1.11 [GrandStaff], page 104, Section 2.1.12 [GregorianTranscriptionStaff], page 106,
Section 2.1.14 [KievanStaff], page 130, Section 2.1.16 [Lyrics], page 155, Section 2.1.17 [MensuralStaff],
page 157, Section 2.1.19 [NoteNames], page 182, Section 2.1.21 [OneStaff], page 187,
Section 2.1.22 [PetrucciStaff], page 188, Section 2.1.24 [PianoStaff], page 212, Section 2.1.25 [RhythmicStaff],
page 215, Section 2.1.27 [Staff], page 240, Section 2.1.28 [StaffGroup], page 251,
Section 2.1.29 [TabStaff], page 253, and Section 2.1.31 [VaticanaStaff], page 276.

This context is built from the following engraver(s):

Section 2.2.8 [Bar_number_engraver], page 317
A bar number is created whenever `measurePosition` is zero and when there is a bar line (i.e., when `whichBar` is set). It is put on top of all staves, and appears only at the left side of the staff. The staves are taken from `stavesFound`, which is maintained by Section 2.2.114 [Staff_collecting_engraver], page 354.
Music types accepted:
Section 1.2.2 [alternative-event], page 42,
Properties (read)

**alternativeNumberingStyle** (symbol)
The style of an alternative’s bar numbers. Can be **numbers** for going back to the same number or **numbers-with-letters** for going back to the same number with letter suffixes. No setting will not go back in measure-number time.

**barNumberFormatter** (procedure)
A procedure that takes a bar number, measure position, and alternative number and returns a markup of the bar number to print.

**barNumberVisibility** (procedure)
A procedure that takes a bar number and a measure position and returns whether the corresponding bar number should be printed. Note that the actual print-out of bar numbers is controlled with the **break-visibility** property.

The following procedures are predefined:

**all-bar-numbers-visible**
Enable bar numbers for all bars, including the first one and broken bars (which get bar numbers in parentheses).

**first-bar-number-invisible**
Enable bar numbers for all bars (including broken bars) except the first one. If the first bar is broken, it doesn’t get a bar number either.

**first-bar-number-invisible-save-broken-bars**
Enable bar numbers for all bars (including broken bars) except the first one. A broken first bar gets a bar number.

**first-bar-number-invisible-and-no-parenthesized-bar-numbers**
Enable bar numbers for all bars except the first bar and broken bars. This is the default.

(every-nth-bar-number-visible n)
Assuming n is value 2, for example, this enables bar numbers for bars 2, 4, 6, etc.
If bar numbers 1, 4, 7, etc., should be enabled, \(n\) (the modulo) must be set to 3 and \(m\) (the division remainder) to 1.

**currentBarNumber** (integer)
Contains the current bar number. This property is incremented at every bar line.

**stavesFound** (list of grobs)
A list of all staff symbols found.

**whichBar** (string)
This property is read to determine what type of bar line to create.
Example:
\[
\texttt{\set Staff.whichBar = ".|:"}
\]
This will create a start-repeat bar in this staff only. Valid values are described in `scm/bar-line.scm`.

Properties (write)

**currentBarNumber** (integer)
Contains the current bar number. This property is incremented at every bar line.

This engraver creates the following layout object(s):
Section 3.1.12 [BarNumber], page 392.

Section 2.2.9 [Beam_collision_engraver], page 318
Help beams avoid colliding with notes and clefs in other voices.

Section 2.2.13 [Break_align_engraver], page 319
Align grobs with corresponding break-align-symbols into groups, and order the groups according to breakAlignOrder. The left edge of the alignment gets a separate group, with a symbol `left-edge`.
This engraver creates the following layout object(s):
Section 3.1.21 [BreakAlignGroup], page 400, Section 3.1.22 [BreakAlignment], page 400, and Section 3.1.63 [LeftEdge], page 454.

Section 2.2.22 [Concurrent_hairpin_engraver], page 323
Collect concurrent hairpins.

Section 2.2.26 [Default_bar_line_engraver], page 324
This engraver determines what kind of automatic bar lines should be produced, and sets whichBar accordingly. It should be at the same level as Section 2.2.131 [Timing_translator], page 359.
Properties (read)

**automaticBars** (boolean)
If set to false then bar lines will not be printed automatically; they must be explicitly created with a `\bar` command. Unlike the `\cadenzaOn`
key word, measures are still counted. Bar line generation will resume according to that count if this property is unset.

**barAlways** (boolean)
If set to true a bar line is drawn after each note.

**defaultBarType** (string)
Set the default type of bar line. See whichBar for information on available bar types.

This variable is read by Section “Timing_translator” in *Internals Reference* at Section “Score” in *Internals Reference* level.

**measureLength** (moment)
Length of one measure in the current time signature.

**measurePosition** (moment)
How much of the current measure have we had. This can be set manually to create incomplete measures.

**timing** (boolean)
Keep administration of measure length, position, bar number, etc.? Switch off for cadenzas.

**whichBar** (string)
This property is read to determine what type of bar line to create.

Example:
```
\set Staff.whichBar = ".|.:
```
This will create a start-repeat bar in this staff only. Valid values are described in `scm/bar-line.scm`.

Section 2.2.42 [Footnote_engraver], page 330
Create footnote texts.
Properties (read)

**currentMusicalColumn** (graphical (layout) object)
Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).

This engraver creates the following layout object(s):
Section 3.1.45 [FootnoteItem], page 433, and Section 3.1.46 [FootnoteSpanner], page 434.

Section 2.2.49 [Grace_spacing_engraver], page 333
Bookkeeping of shortest starting and playing notes in grace note runs.
Properties (read)

**currentMusicalColumn** (graphical (layout) object)
Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).
This engraver creates the following layout object(s):
Section 3.1.49 [GraceSpacing], page 438.

Section 2.2.66 [Mark_engraver], page 338
Create RehearsalMark objects. It puts them on top of all staves (which is taken from the property stavesFound). If moving this engraver to a different context, Section 2.2.114 [Staff_collecting_engraver], page 354, must move along, otherwise all marks end up on the same Y location.

Music types accepted:
Section 1.2.35 [mark-event], page 46,
Properties (read)

markFormatter (procedure)
A procedure taking as arguments the context and the rehearsal mark. It should return the formatted mark as a markup object.

rehearsalMark (integer)
The last rehearsal mark printed.

stavesFound (list of grobs)
A list of all staff-symbols found.

This engraver creates the following layout object(s):
Section 3.1.92 [RehearsalMark], page 487.

Section 2.2.73 [Metronome_mark_engraver], page 340
Engrave metronome marking. This delegates the formatting work to the function in the metronomeMarkFormatter property. The mark is put over all staves. The staves are taken from the stavesFound property, which is maintained by Section 2.2.114 [Staff_collecting_engraver], page 354.

Music types accepted:
Section 1.2.70 [tempo-change-event], page 51,
Properties (read)

currentCommandColumn (graphical (layout) object)
Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

currentMusicalColumn (graphical (layout) object)
Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).

metronomeMarkFormatter (procedure)
How to produce a metronome markup. Called with two arguments: a TempoChangeEvent and context.

stavesFound (list of grobs)
A list of all staff-symbols found.

tempoHideNote (boolean)
Hide the note = count in tempo marks.
This engraver creates the following layout object(s):
Section 3.1.74 [MetronomeMark], page 466.

Section 2.2.83 [Output_property_engraver], page 344
Apply a procedure to any grob acknowledged.
Music types accepted:
Section 1.2.4 [apply-output-event], page 43,

Section 2.2.85 [Paper_column_engraver], page 345
Take care of generating columns.
This engraver decides whether a column is breakable. The default is that a column is always breakable. However, every Bar_engraver that does not have a barline at a certain point will set forbidBreaks in the score context to stop line breaks. In practice, this means that you can make a break point by creating a bar line (assuming that there are no beams or notes that prevent a break point).
Music types accepted:
Section 1.2.12 [break-event], page 44, and Section 1.2.29 [label-event], page 45,
Properties (read)

forbidBreak (boolean)
If set to #t, prevent a line break at this point.

Properties (write)

currentCommandColumn (graphical (layout) object)
Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

currentMusicalColumn (graphical (layout) object)
Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).

forbidBreak (boolean)
If set to #t, prevent a line break at this point.

This engraver creates the following layout object(s):
Section 3.1.79 [NonMusicalPaperColumn], page 474, and Section 3.1.86 [PaperColumn], page 480.

Section 2.2.86 [Parenthesis_engraver], page 346
Parenthesize objects whose music cause has the parenthesize property.
This engraver creates the following layout object(s):
Section 3.1.87 [ParenthesesItem], page 481.

Section 2.2.96 [Repeat_acknowledge_engraver], page 349
Acknowledge repeated music, and convert the contents of repeatCommands into an appropriate setting for whichBar.
Properties (read)

doubleRepeatSegnoType (string)
Set the default bar line for the combinations double repeat with segno. Default is ‘:|.:|:.’.
doubleRepeatType (string)
Set the default bar line for double repeats.

endRepeatSegnoType (string)
Set the default bar line for the combinations ending of repeat with segno. Default is ‘\:'.

endRepeatType (string)
Set the default bar line for the ending of repeats.

repeatCommands (list)
This property is a list of commands of the form (list 'volta x), where x is a string or #f. 'end-repeat' is also accepted as a command.

segnoType (string)
Set the default bar line for a requested segno. Default is ‘S'.

startRepeatSegnoType (string)
Set the default bar line for the combinations beginning of repeat with segno. Default is ‘S:.‘.

startRepeatType (string)
Set the default bar line for the beginning of repeats.

whichBar (string)
This property is read to determine what type of bar line to create.
Example:
\set Staff.whichBar = "\:"
This will create a start-repeat bar in this staff only. Valid values are described in scm/bar-line.scm.

Section 2.2.108 [Spacing_engraver], page 353
Make a SpacingSpanner and do bookkeeping of shortest starting and playing notes.

Music types accepted:
Section 1.2.62 [spacing-section-event], page 49,
Properties (read)

currentCommandColumn (graphical (layout) object)
Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

currentMusicalColumn (graphical (layout) object)
Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).

proportionalNotationDuration (moment)
Global override for shortest-playing duration.
This is used for switching on proportional notation.
This engraver creates the following layout object(s):
Section 3.1.104 [SpacingSpanner], page 499.

Section 2.2.114 [Staff_collecting_engraver], page 354
Maintain the stavesFound variable.
Properties (read)

stavesFound (list of grobs)
A list of all staff-symbols found.

Properties (write)

stavesFound (list of grobs)
A list of all staff-symbols found.

Section 2.2.117 [Stanza_number_align_engraver], page 355
This engraver ensures that stanza numbers are neatly aligned.

Section 2.2.120 [System_start_delimiter_engraver], page 356
Create a system start delimiter (i.e., a SystemStartBar,
SystemStartBrace, SystemStartBracket or SystemStartSquare
spanner).
Properties (read)

currentCommandColumn (graphical (layout)
object)
Grob that is X-parent to all current breakable
(clef, key signature, etc.) items.

systemStartDelimiter (symbol)
Which grob to make for the start of the
system/staff? Set to SystemStartBar,
SystemStartBrace, SystemStartBracket or SystemStartSquare.

systemStartDelimiterHierarchy (pair)
A nested list, indicating the nesting of a start
delimiters.

This engraver creates the following layout object(s):
Section 3.1.119 [SystemStartBar], page 514, Section 3.1.120 [System-
StartBrace], page 515, Section 3.1.121 [SystemStartBracket], page 516,
and Section 3.1.122 [SystemStartSquare], page 517.

Section 2.2.131 [Timing_translator], page 359
This engraver adds the alias Timing to its containing context. Responsible for synchronizing timing information from staves. Normally in Score. In order to create polyrhythmic music, this engraver should be removed from Score and placed in Staff.
Properties (read)

baseMoment (moment)
Smallest unit of time that will stand on its own
as a subdivided section.

currentBarNumber (integer)
Contains the current barnumber. This property
is incrementated at every bar line.
internalBarNumber (integer)
Contains the current bar number. This property is used for internal timekeeping, among others by the Accidental_engraver.

measureLength (moment)
Length of one measure in the current time signature.

measurePosition (moment)
How much of the current measure have we had. This can be set manually to create incomplete measures.

timeSignatureFraction (fraction, as pair)
A pair of numbers, signifying the time signature. For example, '(4 . 4) is a 4/4 time signature.

Properties (write)

baseMoment (moment)
Smallest unit of time that will stand on its own as a subdivided section.

currentBarNumber (integer)
Contains the current bar number. This property is incremented at every bar line.

internalBarNumber (integer)
Contains the current bar number. This property is used for internal timekeeping, among others by the Accidental_engraver.

measureLength (moment)
Length of one measure in the current time signature.

measurePosition (moment)
How much of the current measure have we had. This can be set manually to create incomplete measures.

timeSignatureFraction (fraction, as pair)
A pair of numbers, signifying the time signature. For example, '(4 . 4) is a 4/4 time signature.

Section 2.2.134 [Tweak_engraver], page 361
Read the tweaks property from the originating event, and set properties.

Section 2.2.136 [Vertical_align_engraver], page 361
Catch groups (staves, lyrics lines, etc.) and stack them vertically.
Properties (read)

alignAboveContext (string)
Where to insert newly created context in vertical alignment.
alignBelowContext (string)  
Where to insert newly created context in vertical alignment.

hasAxisGroup (boolean)  
True if the current context is contained in an axis group.

This engraver creates the following layout object(s):
Section 3.1.138 [VerticalAlignment], page 538.

Section 2.2.137 [Volta_engraver], page 362  
Make volta brackets.

Properties (read)

repeatCommands (list)  
This property is a list of commands of the form (list 'volta x), where x is a string or #f.  
'end-repeat is also accepted as a command.

stavesFound (list of grobs)  
A list of all staff-symbols found.

voltaSpannerDuration (moment)  
This specifies the maximum duration to use for the brackets printed for alternative. This can be used to shrink the length of brackets in the situation where one alternative is very large.

This engraver creates the following layout object(s):
Section 3.1.141 [VoltaBracket], page 541, and Section 3.1.142 [VoltaBracketSpanner], page 542.

2.1.27 Staff  
Handles clefs, bar lines, keys, accidentals. It can contain Voice contexts.

This context creates the following layout object(s):

Section 3.1.1 [Accidental], page 377, Section 3.1.2 [AccidentalCautionary], page 378,  
Section 3.1.3 [AccidentalPlacement], page 379, Section 3.1.4 [AccidentalSuggestion], page 380,  
Section 3.1.11 [BarLine], page 388, Section 3.1.13 [BassFigure], page 394, Section 3.1.14 [BassFigureAlignment], page 394, Section 3.1.15 [BassFigureAlignmentPositioning], page 395,  
Section 3.1.16 [BassFigureBracket], page 396, Section 3.1.17 [BassFigureContinuation], page 396, Section 3.1.18 [BassFigureLine], page 396, Section 3.1.25 [Clef], page 405,  
Section 3.1.26 [ClefModifier], page 407, Section 3.1.30 [CueClef], page 411, Section 3.1.31 [CueEndClef], page 414, Section 3.1.33 [DotColumn], page 419, Section 3.1.43 [FingeringColumn], page 431, Section 3.1.55 [InstrumentName], page 443, Section 3.1.57 [KeyCancellation], page 446, Section 3.1.58 [KeySignature], page 448, Section 3.1.62 [LedgerLineSpanner], page 453, Section 3.1.80 [NoteCollision], page 475, Section 3.1.85 [OttavaBracket], page 479,  
Section 3.1.91 [PianoPedalBracket], page 486, Section 3.1.97 [RestCollision], page 492,  
Section 3.1.100 [ScriptRow], page 494, Section 3.1.102 [SostenutoPedal], page 497,  
Section 3.1.103 [SostenutoPedalLineSpanner], page 498, Section 3.1.108 [StaffSpacing], page 502, Section 3.1.109 [StaffSymbol], page 503, Section 3.1.116 [SustainPedal], page 511,  
Section 3.1.117 [SustainPedalLineSpanner], page 512, Section 3.1.128 [TimeSignature], page 525,  
Section 3.1.135 [UnaCordaPedal], page 535, Section 3.1.136 [UnaCordaPedalLineSpanner], page 536, and Section 3.1.139 [VerticalAxisGroup], page 538.
This context sets the following properties:

- Set translator property `createSpacing` to `#t`.
- Set translator property `ignoreFiguredBassRest` to `#f`.
- Set translator property `instrumentName` to `'( )`.
- Set translator property `localAlterations` to `'( )`.
- Set translator property `ottavationMarkups` to:

  `((4 . "29")
   (3 . "22")
   (2 . "15")
   (1 . "8")
   (-1 . "8")
   (-2 . "15")
   (-3 . "22")
   (-4 . "29"))`

- Set translator property `shortInstrumentName` to `'( )`.

This is not a ‘Bottom’ context; search for such a one will commence after creating an implicit context of type Section 2.1.33 [Voice], page 299.

Context Staff can contain Section 2.1.3 [CueVoice], page 63, Section 2.1.20 [NullVoice], page 184, and Section 2.1.33 [Voice], page 299.

This context is built from the following engraver(s):

**Section 2.2.1 [Accidental_engraver], page 313**

Make accidentals. Catch note heads, ties and notices key-change events.

This engraver usually lives at Staff level, but reads the settings for Accidental at Voice level, so you can `\override` them at Voice.

Properties (read)

- `accidentalGrouping` (symbol)
  - If set to 'voice, accidentals on the same note in different octaves may be horizontally staggered if in different voices.

- `autoAccidentals` (list)
  - List of different ways to typeset an accidental.
    - For determining when to print an accidental, several different rules are tried. The rule that gives the highest number of accidentals is used.
    - Each entry in the list is either a symbol or a procedure.

- `symbol` (The symbol is the name of the context in which the following rules are to be applied. For example, if context is Section “Score” in *Internals Reference* then all staves share accidentals, and if context is Section “Staff” in *Internals Reference* then all voices in the same staff share accidentals, but staves do not.)
**procedure**  The procedure represents an accidental rule to be applied to the previously specified context.

The procedure takes the following arguments:

- **context**  The current context to which the rule should be applied.
- **pitch**  The pitch of the note to be evaluated.
- **barnum**  The current bar number.
- **measurepos**  The current measure position.

The procedure returns a pair of booleans. The first states whether an extra natural should be added. The second states whether an accidental should be printed. (#t . #f) does not make sense.

- **autoCautionaries** (list)
  List similar to autoAccidentals, but it controls cautionary accidentals rather than normal ones. Both lists are tried, and the one giving the most accidentals wins. In case of draw, a normal accidental is typeset.

- **extraNatural** (boolean)
  Whether to typeset an extra natural sign before accidentals that reduce the effect of a previous alteration.

- **harmonicAccidentals** (boolean)
  If set, harmonic notes in chords get accidentals.

- **internalBarNumber** (integer)
  Contains the current bar number. This property is used for internal timekeeping, among others by the Accidental_engraver.

- **keyAlterations** (list)
  The current key signature. This is an alist containing (step . alter) or ((octave . step) . alter), where step is a number in the range 0 to 6 and alter a fraction, denoting alteration. For alterations, use symbols, e.g. keyAlterations = #`((6 . ,FLAT)).

- **localAlterations** (list)
  The key signature at this point in the measure. The format is the same as for keyAlterations,
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but can also contain \((\text{octave} \cdot \text{name}) \cdot (\text{alter barnumber} \cdot \text{measureposition})\) pairs.

Properties (write)

\textbf{localAlterations} (list)

The key signature at this point in the measure. The format is the same as for \textbf{keyAlterations}, but can also contain \((\text{octave} \cdot \text{name}) \cdot (\text{alter barnumber} \cdot \text{measureposition})\) pairs.

This engraver creates the following layout object(s):

Section 3.1.1 [Accidental], page 377, Section 3.1.2 [AccidentalCautionary], page 378, Section 3.1.3 [AccidentalPlacement], page 379, and Section 3.1.4 [AccidentalSuggestion], page 380.

Section 2.2.5 [Axis_group_engraver], page 316

Group all objects created in this context in a \textbf{VerticalAxisGroup} spanner.

Properties (read)

\textbf{currentCommandColumn} (graphical (layout) object)

Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

\textbf{hasAxisGroup} (boolean)

True if the current context is contained in an axis group.

\textbf{keepAliveInterfaces} (list)

A list of symbols, signifying grob interfaces that are worth keeping a staff with \texttt{remove-empty} set around for.

Properties (write)

\textbf{hasAxisGroup} (boolean)

True if the current context is contained in an axis group.

This engraver creates the following layout object(s):

Section 3.1.139 [VerticalAxisGroup], page 538.

Section 2.2.7 [Bar_engraver], page 316

Create barlines. This engraver is controlled through the \texttt{whichBar} property. If it has no bar line to create, it will forbid a linebreak at this point. This engraver is required to trigger the creation of clefs at the start of systems.

Properties (read)

\texttt{whichBar} (string)

This property is read to determine what type of bar line to create.

Example:

\begin{verbatim}
\set Staff.whichBar = ".|:
\end{verbatim}
This will create a start-repeat bar in this staff only. Valid values are described in
scm/bar-line.scm.

Properties (write)

forbidBreak (boolean)
If set to #t, prevent a line break at this point.

This engraver creates the following layout object(s):
Section 3.1.11 [BarLine], page 388.

Section 2.2.17 [Clef_engraver], page 321
Determine and set reference point for pitches.

Properties (read)

clefGlyph (string)
Name of the symbol within the music font.

clefPosition (number)
Where should the center of the clef symbol go, measured in half staff spaces from the center of
the staff.

clefTransposition (integer)
Add this much extra transposition. Values of 7 and -7 are common.

clefTranspositionStyle (symbol)
Determines the way the ClefModifier grob is displayed. Possible values are ‘default’,
‘parenthesized’ and ‘bracketed’.

explicitClefVisibility (vector)
‘break-visibility’ function for clef changes.

forceClef (boolean)
Show clef symbol, even if it has not changed. Only active for the first clef after the property
is set, not for the full staff.

This engraver creates the following layout object(s):
Section 3.1.25 [Clef], page 405, and Section 3.1.26 [ClefModifier], page 407.

Section 2.2.19 [Collision_engraver], page 322
Collect NoteColumns, and as soon as there are two or more, put them in a NoteCollision object.

This engraver creates the following layout object(s):
Section 3.1.80 [NoteCollision], page 475.

Section 2.2.24 [Cue_clef_engraver], page 324
Determine and set reference point for pitches in cued voices.

Properties (read)

clefTransposition (integer)
Add this much extra transposition. Values of 7 and -7 are common.
cueClefGlyph (string)
Name of the symbol within the music font.

cueClefPosition (number)
Where should the center of the clef symbol go, measured in half staff spaces from the center of the staff.

cueClefTransposition (integer)
Add this much extra transposition. Values of 7 and -7 are common.

cueClefTranspositionStyle (symbol)
Determines the way the ClefModifier grob is displayed. Possible values are 'default', 'parenthesized' and 'bracketed'.

explicitCueClefVisibility (vector)
'break-visibility' function for cue clef changes.

middleCCuePosition (number)
The position of the middle C, as determined only by the clef of the cue notes. This can be calculated by looking at cueClefPosition and cueClefGlyph.

This engraver creates the following layout object(s):
Section 3.1.26 [ClefModifier], page 407, Section 3.1.30 [CueClef], page 411, and Section 3.1.31 [CueEndClef], page 414.

Section 2.2.27 [Dot_column_engraver], page 325
Engrave dots on dotted notes shifted to the right of the note. If omitted, then dots appear on top of the notes.
This engraver creates the following layout object(s):
Section 3.1.33 [DotColumn], page 419.

Section 2.2.37 [Figured_bass_engraver], page 328
Make figured bass numbers.
Music types accepted:
Section 1.2.7 [bass-figure-event], page 43, and Section 1.2.54 [rest-event], page 49,
Properties (read)

figuredBassAlterationDirection (direction)
Where to put alterations relative to the main figure.

figuredBassCenterContinuations (boolean)
Whether to vertically center pairs of extender lines. This does not work with three or more lines.

figuredBassFormatter (procedure)
A routine generating a markup for a bass figure.
ignoreFiguredBassRest (boolean)
  Don’t swallow rest events.

implicitBassFigures (list)
  A list of bass figures that are not printed as numbers, but only as extender lines.

useBassFigureExtenders (boolean)
  Whether to use extender lines for repeated bass figures.

This engraver creates the following layout object(s):
Section 3.1.13 [BassFigure], page 394, Section 3.1.14 [BassFigure-Alignment], page 394, Section 3.1.16 [BassFigureBracket], page 396, Section 3.1.17 [BassFigureContinuation], page 396, and Section 3.1.18 [BassFigureLine], page 396.

Section 2.2.38 [Figured_bass_position_engraver], page 329
Position figured bass alignments over notes.
This engraver creates the following layout object(s):
Section 3.1.15 [BassFigureAlignmentPositioning], page 395.

Section 2.2.39 [Fingering_column_engraver], page 329
Find potentially colliding scripts and put them into a FingeringColumn object; that will fix the collisions.
This engraver creates the following layout object(s):
Section 3.1.43 [FingeringColumn], page 431.

Section 2.2.41 [Font_size_engraver], page 330
Put fontSize into font-size grob property.
Properties (read)

  fontSize (number)
  The relative size of all grobs in a context.

Section 2.2.52 [Grob_pq_engraver], page 334
Administrate when certain grobs (e.g., note heads) stop playing.
Properties (read)

  busyGrobs (list)
  A queue of (end-moment . grob) cons cells. This is for internal (C++) use only. This property contains the grobs which are still busy (e.g. note heads, spanners, etc.).

Properties (write)

  busyGrobs (list)
  A queue of (end-moment . grob) cons cells. This is for internal (C++) use only. This property contains the grobs which are still busy (e.g. note heads, spanners, etc.).

Section 2.2.55 [Instrument_name_engraver], page 334
Create a system start text for instrument or vocal names.
Properties (read)

`currentCommandColumn` (graphical (layout) object)
Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

`instrumentName` (markup)
The name to print left of a staff. The `instrumentName` property labels the staff in the first system, and the `shortInstrumentName` property labels following lines.

`shortInstrumentName` (markup)
See `instrumentName`.

`shortVocalName` (markup)
Name of a vocal line, short version.

`vocalName` (markup)
Name of a vocal line.

This engraver creates the following layout object(s):
Section 3.1.55 [InstrumentName], page 443.

Section 2.2.58 [Key_ engraver], page 335
Engrave a key signature.

Music types accepted:
Section 1.2.28 [key-change-event], page 45,
Properties (read)

`createKeyOnClefChange` (boolean)
Print a key signature whenever the clef is changed.

`explicitKeySignatureVisibility` (vector)
`break-visibility` function for explicit key changes. `\override` of the `break-visibility` property will set the visibility for normal (i.e., at the start of the line) key signatures.

`extraNatural` (boolean)
Whether to typeset an extra natural sign before accidentals that reduce the effect of a previous alteration.

`keyAlterationOrder` (list)
An alist that defines in what order alterations should be printed. The format is `(step . alter)`, where `step` is a number from 0 to 6 and `alter` from -2 (sharp) to 2 (flat).

`keyAlterations` (list)
The current key signature. This is an alist containing `(step . alter)` or `((octave . step) . alter)`, where `step` is a number in the
range 0 to 6 and alter a fraction, denoting alteration. For alterations, use symbols, e.g.
keyAlterations = #'(6 . ,FLAT)).

lastKeyAlterations (list)
Last key signature before a key signature change.

middleCClefPosition (number)
The position of the middle C, as determined only by the clef. This can be calculated by looking at clefPosition and clefGlyph.

printKeyCancellation (boolean)
Print restoration alterations before a key signature change.

Properties (write)

keyAlterations (list)
The current key signature. This is an alist containing (step . alter) or ((octave . step) . alter), where step is a number in the range 0 to 6 and alter a fraction, denoting alteration. For alterations, use symbols, e.g.
keyAlterations = #'(6 . ,FLAT)).

lastKeyAlterations (list)
Last key signature before a key signature change.

tonic (pitch)
The tonic of the current scale.

This engraver creates the following layout object(s):
Section 3.1.57 [KeyCancellation], page 446, and Section 3.1.58 [KeySignature], page 448.

Section 2.2.62 [Ledger_line_engraver], page 337
Create the spanner to draw ledger lines, and notices objects that need ledger lines.
This engraver creates the following layout object(s):
Section 3.1.62 [LedgerLineSpanner], page 453.

Section 2.2.82 [Ottava_spanner_engraver], page 344
Create a text spanner when the ottavation property changes.

Properties (read)

currentMusicalColumn (graphical (layout) object)
Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).

middleCOffset (number)
The offset of middle C from the position given by middleCClefPosition. This is used for ottava brackets.
ottavation (markup)
If set, the text for an ottava spanner. Changing this creates a new text spanner.

This engraver creates the following layout object(s):
Section 3.1.85 [OttavaBracket], page 479.

Section 2.2.83 [Output_property_engraver], page 344
Apply a procedure to any grob acknowledged.
Music types accepted:
Section 1.2.4 [apply-output-event], page 43,

Section 2.2.90 [Piano_pedal_align_engraver], page 347
Align piano pedal symbols and brackets.
Properties (read)

  currentCommandColumn (graphical (layout) object)
  Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

This engraver creates the following layout object(s):
Section 3.1.103 [SostenutoPedalLineSpanner], page 498, Section 3.1.117 [SustainPedalLineSpanner], page 512, and Section 3.1.136 [UnaCordaPedalLineSpanner], page 536.

Section 2.2.91 [Piano_pedal_engraver], page 347
Engrave piano pedal symbols and brackets.
Music types accepted:
Section 1.2.61 [sostenuto-event], page 49, Section 1.2.69 [sustain-event], page 51, and Section 1.2.79 [una-corda-event], page 52,
Properties (read)

  currentCommandColumn (graphical (layout) object)
  Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

  pedalSostenutoStrings (list)
  See pedalSustainStrings.

  pedalSostenutoStyle (symbol)
  See pedalSustainStyle.

  pedalSustainStrings (list)
  A list of strings to print for sustain-pedal. Format is (up updown down), where each of the three is the string to print when this is done with the pedal.

  pedalSustainStyle (symbol)
  A symbol that indicates how to print sustain pedals: text, bracket or mixed (both).

  pedalUnaCordaStrings (list)
  See pedalSustainStrings.
pedalUnaCordaStyle (symbol)
See pedalSustainStyle.

This engraver creates the following layout object(s):
Section 3.1.91 [PianoPedalBracket], page 486, Section 3.1.102 [SostenutoPedal], page 497, Section 3.1.116 [SustainPedal], page 511, and Section 3.1.135 [UnaCordaPedal], page 535.

Section 2.2.95 [Pure_from_neighbor_engraver], page 349
Coordinates items that get their pure heights from their neighbors.

Section 2.2.98 [Rest_collision_engraver], page 350
Handle collisions of rests.
Properties (read)

busyGrobs (list)
A queue of (end-moment . grob) cons cells.
This is for internal (C++) use only. This property contains the grobs which are still busy (e.g. note heads, spanners, etc.).

This engraver creates the following layout object(s):
Section 3.1.97 [RestCollision], page 492.

Section 2.2.103 [Script_row_engraver], page 351
Determine order in horizontal side position elements.
This engraver creates the following layout object(s):
Section 3.1.100 [ScriptRow], page 494.

Section 2.2.104 [Separating_line_group_engraver], page 352
Generate objects for computing spacing parameters.
Properties (read)

createSpacing (boolean)
Create StaffSpacing objects? Should be set for staves.

Properties (write)

hasStaffSpacing (boolean)
True if the current CommandColumn contains items that will affect spacing.

This engraver creates the following layout object(s):
Section 3.1.108 [StaffSpacing], page 502.

Section 2.2.114 [Staff_collecting_engraver], page 354
Maintain the stavesFound variable.
Properties (read)

stavesFound (list of grobs)
A list of all staff-symbols found.

Properties (write)

stavesFound (list of grobs)
A list of all staff-symbols found.
Section 2.2.116 [Staff_symbol_engraver], page 354
Create the constellation of five (default) staff lines.
Music types accepted:
Section 1.2.65 [staff-span-event], page 50,
This engraver creates the following layout object(s):
Section 3.1.109 [StaffSymbol], page 503.

Section 2.2.129 [Time_signature_engraver], page 359
Create a Section 3.1.128 [TimeSignature], page 525, whenever
timeSignatureFraction changes.
Music types accepted:
Section 1.2.74 [time-signature-event], page 51,
Properties (read)

    initialTimeSignatureVisibility (vector)
    break visibility for the initial time signature.

    partialBusy (boolean)
    Signal that \partial acts at the current timestep.

    timeSignatureFraction (fraction, as pair)
    A pair of numbers, signifying the time signature. For example, '(4 . 4) is a 4/4 time signature.

This engraver creates the following layout object(s):
Section 3.1.128 [TimeSignature], page 525.

2.1.28 StaffGroup

Groups staves while adding a bracket on the left side, grouping the staves together. The bar lines of the contained staves are connected vertically. StaffGroup only consists of a collection of staves, with a bracket in front and spanning bar lines.

This context creates the following layout object(s):
Section 3.1.9 [Arpeggio], page 386, Section 3.1.55 [InstrumentName], page 443, Section 3.1.105 [SpanBar], page 500, Section 3.1.106 [SpanBarStub], page 501, Section 3.1.119 [SystemStartBar], page 514, Section 3.1.120 [SystemStartBrace], page 515, Section 3.1.121 [SystemStartBracket], page 516, Section 3.1.122 [SystemStartSquare], page 517, and Section 3.1.138 [VerticalAlignment], page 538.

This context sets the following properties:
• Set grob-property extra-spacing-width in Section 3.1.39 [DynamicText], page 425, to #f.
• Set translator property instrumentName to '('.
• Set translator property shortInstrumentName to '('.
• Set translator property systemStartDelimiter to 'SystemStartBracket.'
• Set translator property topLevelAlignment to #f.

This is not a 'Bottom' context; search for such a one will commence after creating an implicit context of type Section 2.1.27 [Staff], page 240.

Context StaffGroup can contain Section 2.1.1 [ChoirStaff], page 59, Section 2.1.2 [Chord-Names], page 60, Section 2.1.5 [DrumStaff], page 76, Section 2.1.8 [FiguredBass], page 99, Section 2.1.9 [FretBoards], page 101, Section 2.1.11 [GrandStaff], page 104, Section 2.1.16
This context is built from the following engraver(s):

**Section 2.2.55 [Instrument_name_engraver], page 334**
Create a system start text for instrument or vocal names.

**Properties (read)**

- `currentCommandColumn` (graphical (layout) object)
  
  Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

- `instrumentName` (markup)
  
  The name to print left of a staff.
  
  The `instrumentName` property labels the staff in the first system, and the `shortInstrumentName` property labels following lines.

- `shortInstrumentName` (markup)
  
  See `instrumentName`.

- `shortVocalName` (markup)
  
  Name of a vocal line, short version.

- `vocalName` (markup)
  
  Name of a vocal line.

This engraver creates the following layout object(s):

**Section 3.1.55 [InstrumentName], page 443.**

**Section 2.2.83 [Output_property_engraver], page 344**
Apply a procedure to any grob acknowledged.

Music types accepted:

**Section 1.2.4 [apply-output-event], page 43,**

**Section 2.2.109 [Span_arpeggio_engraver], page 353**
Make arpeggios that span multiple staves.

**Properties (read)**

- `connectArpeggios` (boolean)
  
  If set, connect arpeggios across piano staff.

This engraver creates the following layout object(s):

**Section 3.1.9 [Arpeggio], page 386.**

**Section 2.2.110 [Span_bar_engraver], page 353**
Make cross-staff bar lines: It catches all normal bar lines and draws a single span bar across them.

This engraver creates the following layout object(s):

**Section 3.1.105 [SpanBar], page 500.**

**Section 2.2.111 [Span_bar_stub_engraver], page 354**
Make stubs for span bars in all contexts that the span bars cross.

This engraver creates the following layout object(s):

**Section 3.1.106 [SpanBarStub], page 501.**
Section 2.2.120 [System_start_delimiter_engraver], page 356
Create a system start delimiter (i.e., a SystemStartBar, SystemStartBrace, SystemStartBracket or SystemStartSquare spanner).

Properties (read)

**currentCommandColumn** (graphical (layout) object)
Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

**systemStartDelimiter** (symbol)
Which grob to make for the start of the system/staff? Set to SystemStartBrace, SystemStartBracket or SystemStartBar.

**systemStartDelimiterHierarchy** (pair)
A nested list, indicating the nesting of a start delimiters.

This engraver creates the following layout object(s):
Section 3.1.119 [SystemStartBar], page 514, Section 3.1.120 [SystemStartBrace], page 515, Section 3.1.121 [SystemStartBracket], page 516, and Section 3.1.122 [SystemStartSquare], page 517.

Section 2.2.136 [Vertical_align_engraver], page 361
Catch groups (staves, lyrics lines, etc.) and stack them vertically.

Properties (read)

**alignAboveContext** (string)
Where to insert newly created context in vertical alignment.

**alignBelowContext** (string)
Where to insert newly created context in vertical alignment.

**hasAxisGroup** (boolean)
True if the current context is contained in an axis group.

This engraver creates the following layout object(s):
Section 3.1.138 [VerticalAlignment], page 538.

2.1.29 TabStaff
Context for generating tablature. It accepts only TabVoice contexts and handles the line spacing, the tablature clef etc. properly.

This context also accepts commands for the following context(s):
Staff.

This context creates the following layout object(s):
Section 3.1.11 [BarLine], page 388, Section 3.1.13 [BassFigure], page 394, Section 3.1.14 [BassFigureAlignment], page 394, Section 3.1.15 [BassFigureAlignmentPositioning], page 395, Section 3.1.16 [BassFigureBracket], page 396, Section 3.1.17 [BassFigureContinuation], page 396, Section 3.1.18 [BassFigureLine], page 396, Section 3.1.25 [Clef], page 405, Section 3.1.26 [ClefModifier], page 407, Section 3.1.30 [CueClef], page 411, Section 3.1.31
This context sets the following properties:

- Set grob-property `after-line-breaking` in Section 3.1.94 [RepeatTie], page 490, to `repeat-tie::handle-tab-note-head`.
- Set grob-property `after-line-breaking` in Section 3.1.126 [Tie], page 523, to `tie::handle-tab-note-head`.
- Set grob-property `avoid-note-head` in Section 3.1.111 [Stem], page 504, to `#t`.
- Set grob-property `beam-thickness` in Section 3.1.19 [Beam], page 397, to `0.32`.
- Set grob-property `beam-thickness` in Section 3.1.113 [StemTremolo], page 507, to `0.32`.
- Set grob-property `beam-width` in Section 3.1.113 [StemTremolo], page 507, to `stem-tremolo::calc-tab-width`.
- Set grob-property `bound-details.left` in Section 3.1.48 [Glissando], page 437, to:
  
  '(attach-dir . 1) (padding . 0.3))

- Set grob-property `bound-details.right` in Section 3.1.48 [Glissando], page 437, to:
  
  '(attach-dir . -1) (padding . 0.3))

- Set grob-property `details` in Section 3.1.111 [Stem], page 504, to:
  
  '((lengths 0 0 0 0 0)
    (beamed-lengths 0 0 0)
    (beamed-minimum-free-lengths 0 0 0)
    (beamed-extreme-minimum-free-lengths 0 0)
    (stem-shorten 0 0))

- Set grob-property `extra-dy` in Section 3.1.48 [Glissando], page 437, to `glissando::calc-tab-extra-dy`.
- Set grob-property `glyph-name` in Section 3.1.123 [TabNoteHead], page 518, to `tab-note-head::calc-glyph-name`.
- Set grob-property `ignore-collision` in Section 3.1.81 [NoteColumn], page 476, to `#t`.
- Set grob-property `length-fraction` in Section 3.1.19 [Beam], page 397, to `0.62`.
- Set grob-property `length-fraction` in Section 3.1.113 [StemTremolo], page 507, to `#<procedure #f (grob)>`.
- Set grob-property `no-stem-extend` in Section 3.1.111 [Stem], page 504, to `#t`.
- Set grob-property `staff-space` in Section 3.1.109 [StaffSymbol], page 503, to `1.5`.
- Set grob-property `stencil` in Section 3.1.9 [Arpeggio], page 386, to `#f`.
- Set grob-property `stencil` in Section 3.1.19 [Beam], page 397, to `#f`.
- Set grob-property `stencil` in Section 3.1.25 [Clef], page 405, to `clef::print-modern-tab-if-set`.
- Set grob-property `stencil` in Section 3.1.34 [Dots], page 419, to `#f`.
- Set grob-property `stencil` in Section 3.1.40 [DynamicTextSpanner], page 427, to `#f`.

\[\text{CueEndClef}, \text{page 414, Section 3.1.33} \text{[DotColumn], page 419, Section 3.1.43} \text{[FingeringColumn], page 431, Section 3.1.55} \text{[InstrumentName], page 443, Section 3.1.62} \text{[LedgerLineSpanner], page 453, Section 3.1.80} \text{[NoteCollision], page 475, Section 3.1.91} \text{[PianoPedalBracket], page 486, Section 3.1.97} \text{[RestCollision], page 492, Section 3.1.100} \text{[ScriptRow], page 494, Section 3.1.102} \text{[SostenutoPedal], page 497, Section 3.1.103} \text{[SostenutoPedalLineSpanner], page 498, Section 3.1.108} \text{[StaffSpacing], page 502, Section 3.1.116} \text{[SustainPedal], page 511, Section 3.1.117} \text{[SustainPedalLineSpanner], page 512, Section 3.1.128} \text{[TimeSignature], page 525, Section 3.1.135} \text{[UnaCordaPedal], page 535, Section 3.1.136} \text{[UnaCordaPedalLineSpanner], page 536, and Section 3.1.139} \text{[VerticalAxisGroup], page 538.}\]
• Set grob-property stencil in Section 3.1.39 [DynamicText], page 425, to \#f.
• Set grob-property stencil in Section 3.1.44 [Flag], page 432, to \#f.
• Set grob-property stencil in Section 3.1.48 [Glissando], page 437, to glissando::draw-tab-glissando.
• Set grob-property stencil in Section 3.1.52 [Hairpin], page 440, to \#f.
• Set grob-property stencil in Section 3.1.60 [LaissezVibrerTie], page 452, to \#f.
• Set grob-property stencil in Section 3.1.75 [MultiMeasureRest], page 468, to \#f.
• Set grob-property stencil in Section 3.1.76 [MultiMeasureRestNumber], page 469, to \#f.
• Set grob-property stencil in Section 3.1.77 [MultiMeasureRestScript], page 471, to \#f.
• Set grob-property stencil in Section 3.1.78 [MultiMeasureRestText], page 472, to \#f.
• Set grob-property stencil in Section 3.1.80 [MultiMeasureRestNumber], page 474, to \#f.
• Set grob-property stencil in Section 3.1.81 [MultiMeasureRestScript], page 475, to \#f.
• Set grob-property stencil in Section 3.1.82 [MultiMeasureRestText], page 476, to \#f.
• Set grob-property stencil in Section 3.1.83 [MultiMeasureRest], page 478, to \#f.
• Set grob-property stencil in Section 3.1.84 [MultiMeasureRestNumber], page 479, to \#f.
• Set grob-property stencil in Section 3.1.85 [MultiMeasureRestScript], page 480, to \#f.
• Set grob-property stencil in Section 3.1.86 [MultiMeasureRestText], page 481, to \#f.
• Set grob-property stencil in Section 3.1.87 [MultiMeasureRest], page 482, to \#f.
• Set grob-property stencil in Section 3.1.88 [MultiMeasureRestNumber], page 483, to \#f.
• Set grob-property stencil in Section 3.1.89 [MultiMeasureRestScript], page 484, to \#f.
• Set grob-property stencil in Section 3.1.90 [RepeatTie], page 490, to \#f.
• Set grob-property stencil in Section 3.1.91 [Rest], page 491, to \#f.
• Set grob-property stencil in Section 3.1.93 [Script], page 493, to \#f.
• Set translator property autoBeaming to \#f.
• Set translator property clefGlyph to "clefs.tab".
• Set translator property clefPosition to 0.
• Set translator property createSpacing to \#t.
• Set translator property handleNegativeFrets to 'recalculate.
• Set translator property ignoreFiguredBassRest to \#f.
• Set translator property instrumentName to '().
• Set translator property localAlterations to '().
• Set translator property ottavationMarkups to:
'(4, "29")
(3, "22")
(2, "15")
(1, "8")
(-1, "8")
(-2, "15")
(-3, "22")
(-4, "29"))
• Set translator property restrainOpenStrings to \#f.
Set translator property shortInstrumentName to '().

This is not a ‘Bottom’ context; search for such a one will commence after creating an implicit context of type Section 2.1.30 [TabVoice], page 263.

Context TabStaff can contain Section 2.1.3 [CueVoice], page 63, Section 2.1.20 [NullVoice], page 184, and Section 2.1.30 [TabVoice], page 263.

This context is built from the following engraver(s):

Section 2.2.5 [Axis_group_engraver], page 316
Group all objects created in this context in a VerticalAxisGroup spanner.

Properties (read)

currentCommandColumn (graphical (layout) object)
Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

hasAxisGroup (boolean)
True if the current context is contained in an axis group.

keepAliveInterfaces (list)
A list of symbols, signifying grob interfaces that are worth keeping a staff with remove-empty set around for.

Properties (write)

hasAxisGroup (boolean)
True if the current context is contained in an axis group.

This engraver creates the following layout object(s):
Section 3.1.139 [VerticalAxisGroup], page 538.

Section 2.2.7 [Bar_engraver], page 316
Create barlines. This engraver is controlled through the whichBar property. If it has no bar line to create, it will forbid a linebreak at this point. This engraver is required to trigger the creation of clefs at the start of systems.

Properties (read)

whichBar (string)
This property is read to determine what type of bar line to create.
Example:
\set Staff.whichBar = ".|:" This will create a start-repeat bar in this staff only. Valid values are described in scm/bar-line.scm.

Properties (write)

forbidBreak (boolean)
If set to #t, prevent a line break at this point.
This engraver creates the following layout object(s):
Section 3.1.11 [BarLine], page 388.

Section 2.2.17 [Clef_engraver], page 321
Determine and set reference point for pitches.
Properties (read)

- **clefGlyph** (string)
  Name of the symbol within the music font.

- **clefPosition** (number)
  Where should the center of the clef symbol go,
  measured in half staff spaces from the center of
  the staff.

- **clefTransposition** (integer)
  Add this much extra transposition. Values of 7
  and -7 are common.

- **clefTranspositionStyle** (symbol)
  Determines the way the ClefModifier grob
  is displayed. Possible values are ‘default’,
  ‘parenthesized’ and ‘bracketed’.

- **explicitClefVisibility** (vector)
  ‘break-visibility’ function for clef changes.

- **forceClef** (boolean)
  Show clef symbol, even if it has not changed.
  Only active for the first clef after the property
  is set, not for the full staff.

This engraver creates the following layout object(s):
Section 3.1.25 [Clef], page 405, and Section 3.1.26 [ClefModifier],
page 407.

Section 2.2.19 [Collision_engraver], page 322
Collect NoteColumns, and as soon as there are two or more, put them
in a NoteCollision object.
This engraver creates the following layout object(s):
Section 3.1.80 [NoteCollision], page 475.

Section 2.2.24 [Cue_clef_engraver], page 324
Determine and set reference point for pitches in cued voices.
Properties (read)

- **clefTransposition** (integer)
  Add this much extra transposition. Values of 7
  and -7 are common.

- **cueClefGlyph** (string)
  Name of the symbol within the music font.

- **cueClefPosition** (number)
  Where should the center of the clef symbol go,
  measured in half staff spaces from the center of
  the staff.
**cueClefTransposition** (integer)
Add this much extra transposition. Values of 7 and -7 are common.

**cueClefTranspositionStyle** (symbol)
Determines the way the ClefModifier grob is displayed. Possible values are ‘default’, ‘parenthesized’ and ‘bracketed’.

**explicitCueClefVisibility** (vector)
‘break-visibility’ function for cue clef changes.

**middleCCuePosition** (number)
The position of the middle C, as determined only by the clef of the cue notes. This can be calculated by looking at **cueClefPosition** and **cueClefGlyph**.

This engraver creates the following layout object(s):
Section 3.1.26 [ClefModifier], page 407, Section 3.1.30 [CueClef], page 411, and Section 3.1.31 [CueEndClef], page 414.

**Section 2.2.27** [Dot_column_engraver], page 325
Engrave dots on dotted notes shifted to the right of the note. If omitted, then dots appear on top of the notes.
This engraver creates the following layout object(s):
Section 3.1.33 [DotColumn], page 419.

**Section 2.2.37** [Figured_bass_engraver], page 328
Make figured bass numbers.
Music types accepted:
Section 1.2.7 [bass-figure-event], page 43, and Section 1.2.54 [rest-event], page 49,
Properties (read)

**figuredBassAlterationDirection** (direction)
Where to put alterations relative to the main figure.

**figuredBassCenterContinuations** (boolean)
Whether to vertically center pairs of extender lines. This does not work with three or more lines.

**figuredBassFormatter** (procedure)
A routine generating a markup for a bass figure.

**ignoreFiguredBassRest** (boolean)
Don’t swallow rest events.

**implicitBassFigures** (list)
A list of bass figures that are not printed as numbers, but only as extender lines.
\textbf{useBassFigureExtenders} (boolean)

Whether to use extender lines for repeated bass figures.

This engraver creates the following layout object(s):

Section 3.1.13 [BassFigure], page 394, Section 3.1.14 [BassFigure-Alignment], page 394, Section 3.1.16 [BassFigureBracket], page 396, Section 3.1.17 [BassFigureContinuation], page 396, and Section 3.1.18 [BassFigureLine], page 396.

Section 2.2.38 [Figured_bass_position_engraver], page 329

Position figured bass alignments over notes.

This engraver creates the following layout object(s):

Section 3.1.15 [BassFigureAlignmentPositioning], page 395.

Section 2.2.39 [Fingering_column_engraver], page 329

Find potentially colliding scripts and put them into a \texttt{FingeringColumn} object; that will fix the collisions.

This engraver creates the following layout object(s):

Section 3.1.43 [FingeringColumn], page 431.

Section 2.2.41 [Font_size_engraver], page 330

Put \texttt{fontSize} into \texttt{font-size} grob property.

Properties (read)

\ \texttt{fontSize} (number)

The relative size of all grobs in a context.

Section 2.2.52 [Grob_pq_engraver], page 334

Administrate when certain grobs (e.g., note heads) stop playing.

Properties (read)

\ \texttt{busyGrobs} (list)

A queue of \texttt{(end-moment . grob)} cons cells. This is for internal (C++) use only. This property contains the grobs which are still busy (e.g., note heads, spanners, etc.).

Properties (write)

\ \texttt{busyGrobs} (list)

A queue of \texttt{(end-moment . grob)} cons cells. This is for internal (C++) use only. This property contains the grobs which are still busy (e.g., note heads, spanners, etc.).

Section 2.2.55 [Instrument_name_engraver], page 334

Create a system start text for instrument or vocal names.

Properties (read)

\ \texttt{currentCommandColumn} (graphical \texttt{(layout)} object)

Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

\ \texttt{instrumentName} (markup)

The name to print left of a staff. The \texttt{instrumentName} property labels
the staff in the first system, and the

shortInstrumentName property labels
following lines.

shortInstrumentName (markup)
See instrumentName.

shortVocalName (markup)
Name of a vocal line, short version.

vocalName (markup)
Name of a vocal line.

This engraver creates the following layout object(s):
Section 3.1.55 [InstrumentName], page 443.

Section 2.2.62 [Ledger_line_engraver], page 337
Create the spanner to draw ledger lines, and notices objects that need
ledger lines.
This engraver creates the following layout object(s):
Section 3.1.62 [LedgerLineSpanner], page 453.

Section 2.2.83 [Output_property_engraver], page 344
Apply a procedure to any grob acknowledged.
Music types accepted:
Section 1.2.4 [apply-output-event], page 43,
Section 2.2.90 [Piano_pedal_align_engraver], page 347
Align piano pedal symbols and brackets.
Properties (read)

  currentCommandColumn (graphical (layout)
          object)
     Grob that is X-parent to all current breakable
     (clef, key signature, etc.) items.

This engraver creates the following layout object(s):
Section 3.1.103 [SostenutoPedalLineSpanner], page 498, Section 3.1.117
[SustainPedalLineSpanner], page 512, and Section 3.1.136 [UnaCor-
daPedalLineSpanner], page 536.

Section 2.2.91 [Piano_pedal_engraver], page 347
Engrave piano pedal symbols and brackets.
Music types accepted:
Section 1.2.61 [sostenuto-event], page 49, Section 1.2.69 [sustain-event],
page 51, and Section 1.2.79 [una-corda-event], page 52,
Properties (read)

  currentCommandColumn (graphical (layout)
          object)
     Grob that is X-parent to all current breakable
     (clef, key signature, etc.) items.

  pedalSostenutoStrings (list)
     See pedalSustainStrings.

  pedalSostenutoStyle (symbol)
     See pedalSustainStyle.
pedalSustainStrings (list)
A list of strings to print for sustain-pedal. Format is (up updown down), where each of the three is the string to print when this is done with the pedal.

pedalSustainStyle (symbol)
A symbol that indicates how to print sustain pedals: text, bracket or mixed (both).

pedalUnaCordaStrings (list)
See pedalSustainStrings.

pedalUnaCordaStyle (symbol)
See pedalSustainStyle.

This engraver creates the following layout object(s):
Section 3.1.91 [PianoPedalBracket], page 486, Section 3.1.102 [SostenutoPedal], page 497, Section 3.1.116 [SustainPedal], page 511, and Section 3.1.135 [UnaCordaPedal], page 535.

Section 2.2.95 [Pure_from_neighbor_engraver], page 349
Coordinates items that get their pure heights from their neighbors.

Section 2.2.98 [Rest_collision_engraver], page 350
Handle collisions of rests.
Properties (read)

busyGrobs (list)
A queue of (end-moment . grob) cons cells. This is for internal (C++) use only. This property contains the grobs which are still busy (e.g. note heads, spanners, etc.).

This engraver creates the following layout object(s):
Section 3.1.97 [RestCollision], page 492.

Section 2.2.103 [Script_row_engraver], page 351
Determine order in horizontal side position elements.
This engraver creates the following layout object(s):
Section 3.1.100 [ScriptRow], page 494.

Section 2.2.104 [Separating_line_group_engraver], page 352
Generate objects for computing spacing parameters.
Properties (read)

createSpacing (boolean)
Create StaffSpacing objects? Should be set for staves.

Properties (write)

hasStaffSpacing (boolean)
True if the current CommandColumn contains items that will affect spacing.

This engraver creates the following layout object(s):
Section 3.1.108 [StaffSpacing], page 502.
Section 2.2.114 [Staff_collecting_engraver], page 354
Maintain the \texttt{stavesFound} variable.

Properties (read)

\texttt{stavesFound} (list of grobs)
A list of all staff-symbols found.

Properties (write)

\texttt{stavesFound} (list of grobs)
A list of all staff-symbols found.

Section 2.2.116 [Staff_symbol_engraver], page 354
Create the constellation of five (default) staff lines.

Music types accepted:
Section 1.2.65 [staff-span-event], page 50.
This engraver creates the following layout object(s):
Section 3.1.109 [StaffSymbol], page 503.

Section 2.2.122 [Tab_staff_symbol_engraver], page 357
Create a tablature staff symbol, but look at \texttt{stringTunings} for the number of lines.

Properties (read)

\texttt{stringTunings} (list)
The tablature strings tuning. It is a list of the pitches of each string (starting with the lowest numbered one).

This engraver creates the following layout object(s):
Section 3.1.109 [StaffSymbol], page 503.

Section 2.2.129 [Time_signature_engraver], page 359
Create a Section 3.1.128 \texttt{TimeSignature}, page 525, whenever \texttt{timeSignatureFraction} changes.

Music types accepted:
Section 1.2.74 [time-signature-event], page 51,

Properties (read)

\texttt{initialTimeSignatureVisibility} (vector)
break visibility for the initial time signature.

\texttt{partialBusy} (boolean)
Signal that \texttt{\partial} acts at the current timestep.

\texttt{timeSignatureFraction} (fraction, as pair)
A pair of numbers, signifying the time signature. For example, \texttt{1/4} is a \texttt{4/4} time signature.

This engraver creates the following layout object(s):
Section 3.1.128 \texttt{TimeSignature}, page 525.
2.1.30 TabVoice

Context for drawing notes in a Tab staff.

This context also accepts commands for the following context(s):
Voice.

This context creates the following layout object(s):

Section 3.1.9 [Arpeggio], page 386, Section 3.1.19 [Beam], page 397, Section 3.1.20 [BendAfter], page 399, Section 3.1.23 [BreathingSign], page 402, Section 3.1.27 [ClusterSpanner], page 409, Section 3.1.28 [ClusterSpannerBeacon], page 409, Section 3.1.29 [CombineTextScript], page 410, Section 3.1.34 [Dots], page 419, Section 3.1.35 [DoublePercentRepeat], page 420, Section 3.1.36 [DoublePercentRepeatCounter], page 421, Section 3.1.37 [DoubleRepeatSlash], page 423, Section 3.1.38 [DynamicLineSpanner], page 424, Section 3.1.39 [DynamicText], page 425, Section 3.1.40 [DynamicTextSpanner], page 427, Section 3.1.44 [Flag], page 432, Section 3.1.48 [Glissando], page 437, Section 3.1.52 [Hairpin], page 440, Section 3.1.56 [InstrumentSwitch], page 444, Section 3.1.60 [LaissezVibrerTie], page 452, Section 3.1.61 [LaissezVibrerTieColumn], page 453, Section 3.1.64 [LigatureBracket], page 456, Section 3.1.75 [MultiMeasureRest], page 468, Section 3.1.76 [MultiMeasureRestNumber], page 469, Section 3.1.77 [MultiMeasureRestScript], page 471, Section 3.1.78 [MultiMeasureRestText], page 472, Section 3.1.81 [NoteColumn], page 476, Section 3.1.84 [NoteSpacing], page 478, Section 3.1.88 [PercentRepeat], page 482, Section 3.1.89 [PercentRepeatCounter], page 483, Section 3.1.90 [PhrasingSlur], page 484, Section 3.1.93 [RepeatSlash], page 489, Section 3.1.94 [RepeatTie], page 490, Section 3.1.95 [RepeatTieColumn], page 491, Section 3.1.96 [Rest], page 491, Section 3.1.98 [Script], page 493, Section 3.1.99 [ScriptColumn], page 494, Section 3.1.101 [Slur], page 494, Section 3.1.111 [Stem], page 504, Section 3.1.112 [StemStub], page 506, Section 3.1.113 [StemTremolo], page 507, Section 3.1.123 [TabNoteHead], page 518, Section 3.1.124 [TextScript], page 519, Section 3.1.125 [TextSpanner], page 521, Section 3.1.126 [Tie], page 523, Section 3.1.127 [TieColumn], page 525, Section 3.1.132 [TrillSpanner], page 531, Section 3.1.133 [TupletBracket], page 532, Section 3.1.134 [TupletNumber], page 534, and Section 3.1.140 [VoiceFollower], page 540.

This is a ‘Bottom’ context; no contexts will be created implicitly from it.

This context cannot contain other contexts.

This context is built from the following engraver(s):

Section 2.2.3 [Arpeggio_engraver], page 315
Generate an Arpeggio symbol.
Music types accepted:
Section 1.2.5 [arpeggio-event], page 43,
This engraver creates the following layout object(s):
Section 3.1.9 [Arpeggio], page 386.

Section 2.2.4 [Auto_beam_engraver], page 315
Generate beams based on measure characteristics and observed Stems. Uses baseMoment, beatStructure, beamExceptions, measureLength, and measurePosition to decide when to start and stop a beam. Overriding beaming is done through Section 2.2.119 [Stem_engraver], page 355, properties stemLeftBeamCount and stemRightBeamCount.
Music types accepted:
Section 1.2.9 [beam-forbid-event], page 43,
Properties (read)
autoBeaming (boolean)
   If set to true then beams are generated automatically.

baseMoment (moment)
   Smallest unit of time that will stand on its own as a subdivided section.

beamExceptions (list)
   An alist of exceptions to autobeam rules that normally end on beats.

beamHalfMeasure (boolean)
   Whether to allow a beam to begin halfway through the measure in triple time, which could look like 6/8.

beatStructure (list)
   List of baseMoments that are combined to make beats.

subdivideBeams (boolean)
   If set, multiple beams will be subdivided at baseMoment positions by only drawing one beam over the beat.

This engraver creates the following layout object(s):
Section 3.1.19 [Beam], page 397.

Section 2.2.10 [Beam_engraver], page 318
Handle Beam events by engraving beams. If omitted, then notes are printed with flags instead of beams.
Music types accepted:
Section 1.2.8 [beam-event], page 43,
Properties (read)

baseMoment (moment)
   Smallest unit of time that will stand on its own as a subdivided section.

beamMelismaBusy (boolean)
   Signal if a beam is present.

beatStructure (list)
   List of baseMoments that are combined to make beats.

subdivideBeams (boolean)
   If set, multiple beams will be subdivided at baseMoment positions by only drawing one beam over the beat.

Properties (write)

forbidBreak (boolean)
   If set to #t, prevent a line break at this point.

This engraver creates the following layout object(s):
Section 3.1.19 [Beam], page 397.
Section 2.2.12 [Bend_engraver], page 319
Create fall spanners.
Music types accepted:
Section 1.2.10 [bend-after-event], page 43,
This engraver creates the following layout object(s):
Section 3.1.20 [BendAfter], page 399.

Section 2.2.14 [Breathing_sign_engraver], page 320
Create a breathing sign.
Music types accepted:
Section 1.2.14 [breathing-event], page 44,
This engraver creates the following layout object(s):
Section 3.1.23 [BreathingSign], page 402.

Section 2.2.16 [Chord_tremolo_engraver], page 321
Generate beams for tremolo repeats.
Music types accepted:
Section 1.2.76 [tremolo-span-event], page 52,
This engraver creates the following layout object(s):
Section 3.1.19 [Beam], page 397.

Section 2.2.18 [Cluster_spanner_engraver], page 321
Engrave a cluster using Spanner notation.
Music types accepted:
Section 1.2.15 [cluster-note-event], page 44,
This engraver creates the following layout object(s):
Section 3.1.27 [ClusterSpanner], page 409, and Section 3.1.28 [ClusterSpannerBeacon], page 409.

Section 2.2.28 [Dots_engraver], page 325
Create Section 3.1.34 [Dots], page 419, objects for Section 3.2.98 [rhythmic-head-interface], page 601s.
This engraver creates the following layout object(s):
Section 3.1.34 [Dots], page 419.

Section 2.2.29 [Double_percent_repeat_engraver], page 326
Make double measure repeats.
Music types accepted:
Section 1.2.19 [double-percent-event], page 44,
Properties (read)

countPercentRepeats (boolean)
If set, produce counters for percent repeats.

measureLength (moment)
Length of one measure in the current time signature.

repeatCountVisibility (procedure)
A procedure taking as arguments an integer and context, returning whether the corresponding percent repeat number should be printed when countPercentRepeats is set.
Properties (write)

**forbidBreak** (boolean)

If set to `#t`, prevent a line break at this point.

This engraver creates the following layout object(s):
Section 3.1.35 [DoublePercentRepeat], page 420, and Section 3.1.36 [DoublePercentRepeatCounter], page 421.

**Section 2.2.32 [Dynamic_align_engraver], page 327**

Align hairpins and dynamic texts on a horizontal line.

Properties (read)

**currentMusicalColumn** (graphical (layout) object)

Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).

This engraver creates the following layout object(s):
Section 3.1.38 [DynamicLineSpanner], page 424.

**Section 2.2.33 [Dynamic_engraver], page 327**

Create hairpins, dynamic texts and dynamic text spanners.

Music types accepted:
Section 1.2.1 [absolute-dynamic-event], page 42, Section 1.2.13 [break-span-event], page 44, and Section 1.2.63 [span-dynamic-event], page 50,

Properties (read)

**crescendoSpanner** (symbol)

The type of spanner to be used for crescendi. Available values are `‘hairpin’` and `‘text’`. If unset, a hairpin crescendo is used.

**crescendoText** (markup)

The text to print at start of non-hairpin crescendo, i.e., `‘cresc.’`.

**currentMusicalColumn** (graphical (layout) object)

Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).

**decrescendoSpanner** (symbol)

The type of spanner to be used for decrescendi. Available values are `‘hairpin’` and `‘text’`. If unset, a hairpin decrescendo is used.

**decrescendoText** (markup)

The text to print at start of non-hairpin decrescendo, i.e., `‘dim.’`.

This engraver creates the following layout object(s):
Section 3.1.39 [DynamicText], page 425, Section 3.1.40 [DynamicTextSpanner], page 427, and Section 3.1.52 [Hairpin], page 440.

**Section 2.2.41 [Font_size_engraver], page 330**

Put `fontSize` into `font-size` grob property.
Properties (read)

\texttt{fontSize \ (number)}
The relative size of all grobs in a context.

\textbf{Section 2.2.43 [\texttt{Forbid\_line\_break\_engraver}], page 330}
Forbid line breaks when note heads are still playing at some point.
Properties (read)

\texttt{busyGrobs \ (list)}
A queue of \((\text{end-moment} \ . \ \text{grob})\) cons cells.
This is for internal (C++) use only. This property contains the grobs which are still busy (e.g. note heads, spanners, etc.).

Properties (write)

\texttt{forbidBreak \ (boolean)}
If set to \#t, prevent a line break at this point.

\textbf{Section 2.2.45 [\texttt{Glissando\_engraver}], page 331}
Engrave glissandi.
Music types accepted:
Section 1.2.25 [glissando-event], page 45,
Properties (read)

\texttt{glissandoMap \ (list)}
A map in the form of \'((source1 \ . \ target1)\ (source2 \ . \ target2) \ (sourcec \ . \ targetn))\ showing the glissandi to be drawn for note columns.
The value \'() will default to \'((0 \ . \ 0) \ (1 \ . \ 1) \ (n \ . \ n)), where n is the minimal number of note-heads in the two note columns between which the glissandi occur.

This engraver creates the following layout object(s):
Section 3.1.48 [Glissando], page 437.

\textbf{Section 2.2.46 [\texttt{Grace\_auto\_beam\_engraver}], page 332}
Generates one autobeam group across an entire grace phrase. As usual, any manual beaming or \texttt{\noBeam} will block autobeaming, just like setting the context property `autoBeaming' to ##f.
Music types accepted:
Section 1.2.9 [beam-forbid-event], page 43,
Properties (read)

\texttt{autoBeaming \ (boolean)}
If set to true then beams are generated automatically.

This engraver creates the following layout object(s):
Section 3.1.19 [Beam], page 397.

\textbf{Section 2.2.47 [\texttt{Grace\_beam\_engraver}], page 332}
Handle Beam events by engraving beams. If omitted, then notes are printed with flags instead of beams. Only engraves beams when we are at grace points in time.
Music types accepted:
Section 1.2.8 [beam-event], page 43,
Properties (read)

\[\text{baseMoment} (\text{moment})\]
Smallest unit of time that will stand on its own as a subdivided section.

\[\text{beamMelismaBusy} (\text{boolean})\]
Signal if a beam is present.

\[\text{beatStructure} (\text{list})\]
List of baseMoments that are combined to make beats.

\[\text{subdivideBeams} (\text{boolean})\]
If set, multiple beams will be subdivided at baseMoment positions by only drawing one beam over the beat.

This engraver creates the following layout object(s):
Section 3.1.19 [Beam], page 397.

**Section 2.2.48 [Grace_engraver], page 333**
Set font size and other properties for grace notes.
Properties (read)

\[\text{graceSettings} (\text{list})\]
Overrides for grace notes. This property should be manipulated through the add-grace-property function.

**Section 2.2.52 [Grob_pq_engraver], page 334**
Administrate when certain grobs (e.g., note heads) stop playing.
Properties (read)

\[\text{busyGrobs} (\text{list})\]
A queue of (end-moment . grob) cons cells.
This is for internal (C++) use only. This property contains the grobs which are still busy (e.g. note heads, spanners, etc.).

Properties (write)

\[\text{busyGrobs} (\text{list})\]
A queue of (end-moment . grob) cons cells.
This is for internal (C++) use only. This property contains the grobs which are still busy (e.g. note heads, spanners, etc.).

**Section 2.2.56 [Instrument_switch_engraver], page 335**
Create a cue text for taking instrument.
Properties (read)

\[\text{instrumentCueName} (\text{markup})\]
The name to print if another instrument is to be taken.
This engraver creates the following layout object(s):
Section 3.1.56 [InstrumentSwitch], page 444.

Section 2.2.61 [Laissez_vibrer_engraver], page 337
Create laissez vibrer items.
Music types accepted:
Section 1.2.30 [laissez-vibrer-event], page 45,
This engraver creates the following layout object(s):
Section 3.1.60 [LaissezVibrerTie], page 452, and Section 3.1.61 [LaissezVibrerTieColumn], page 453.

Section 2.2.63 [Ligature_bracket_engraver], page 337
Handle Ligature_events by engraving Ligature brackets.
Music types accepted:
Section 1.2.32 [ligature-event], page 46,
This engraver creates the following layout object(s):
Section 3.1.64 [LigatureBracket], page 456.

Section 2.2.75 [Multi_measure_rest_engraver], page 341
Engrave multi-measure rests that are produced with ‘R’. It reads measurePosition and internalBarNumber to determine what number to print over the Section 3.1.75 [MultiMeasureRest], page 468.
Music types accepted:
Section 1.2.39 [multi-measure-articulation-event], page 46,
Section 1.2.40 [multi-measure-rest-event], page 46, and Section 1.2.41 [multi-measure-text-event], page 47,
Properties (read)

    currentCommandColumn (graphical (layout)
      object)
    Grob that is X-parent to all current breakable
    (clef, key signature, etc.) items.

    internalBarNumber (integer)
    Contains the current barnumber. This property
    is used for internal timekeeping, among others
    by the Accidental_engraver.

    measurePosition (moment)
    How much of the current measure have we had.
    This can be set manually to create incomplete
    measures.

    restNumberThreshold (number)
    If a multimeasure rest has more measures than
    this, a number is printed.

    whichBar (string)
    This property is read to determine what type
    of bar line to create.

Example:
\set Staff.whichBar = ".\:"
This will create a start-repeat bar in this staff only. Valid values are described in `scm/bar-line.scm`.

This engraver creates the following layout object(s):
Section 3.1.75 [MultiMeasureRest], page 468, Section 3.1.76 [MultiMeasureRestNumber], page 469, Section 3.1.77 [MultiMeasureRestScript], page 471, and Section 3.1.78 [MultiMeasureRestText], page 472.

**Section 2.2.77 [Note_head_line_engraver], page 343**

Engrave a line between two note heads in a staff switch if `followVoice` is set.

Properties (read)

```plaintext
followVoice (boolean)
If set, note heads are tracked across staff switches by a thin line.
```

This engraver creates the following layout object(s):
Section 3.1.140 [VoiceFollower], page 540.

**Section 2.2.81 [Note_spacing_engraver], page 344**

Generate `NoteSpacing`, an object linking horizontal lines for use in spacing.

This engraver creates the following layout object(s):
Section 3.1.84 [NoteSpacing], page 478.

**Section 2.2.83 [Output_property_engraver], page 344**

Apply a procedure to any grob acknowledged.

Music types accepted:
Section 1.2.43 [note-event], page 47, and Section 1.2.47 [part-combine-event], page 48,

Properties (read)

```plaintext
aDueText (markup)
Text to print at a unisono passage.

partCombineTextsOnNote (boolean)
Print part-combine texts only on the next note rather than immediately on rests or skips.

printPartCombineTexts (boolean)
Set ‘Solo’ and ‘A due’ texts in the part combiner?

soloIIText (markup)
The text for the start of a solo for voice ‘two’ when part-combining.

soloText (markup)
The text for the start of a solo when part-combining.
```
This engraver creates the following layout object(s):
Section 3.1.29 [CombineTextScript], page 410.

Section 2.2.88 [Percent_repeat_engraver], page 346
Make whole measure repeats.
Music types accepted:
Section 1.2.49 [percent-event], page 48,
Properties (read)

\begin{verbatim}
  countPercentRepeats (boolean)
  If set, produce counters for percent repeats.

  currentCommandColumn (graphical (layout) object)
  Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

  repeatCountVisibility (procedure)
  A procedure taking as arguments an integer and context, returning whether the corresponding percent repeat number should be printed when countPercentRepeats is set.
\end{verbatim}

This engraver creates the following layout object(s):
Section 3.1.88 [PercentRepeat], page 482, and Section 3.1.89 [PercentRepeatCounter], page 483.

Section 2.2.89 [Phrasing_slur_engraver], page 347
Print phrasing slurs. Similar to Section 2.2.106 [Slur_engraver], page 352.
Music types accepted:
Section 1.2.43 [note-event], page 47, and Section 1.2.51 [phrasing-slur-event], page 48,
This engraver creates the following layout object(s):
Section 3.1.90 [PhrasingSlur], page 484.

Section 2.2.97 [Repeat_tie_engraver], page 350
Create repeat ties.
Music types accepted:
Section 1.2.53 [repeat-tie-event], page 48,
This engraver creates the following layout object(s):
Section 3.1.94 [RepeatTie], page 490, and Section 3.1.95 [RepeatTieColumn], page 491.

Section 2.2.99 [Rest_engraver], page 350
Engrave rests.
Music types accepted:
Section 1.2.54 [rest-event], page 49,
Properties (read)

\begin{verbatim}
  middleCPosition (number)
  The place of the middle C, measured in half staff-spaces. Usually determined by looking at middleCClefPosition and middleCOffset.
\end{verbatim}
This engraver creates the following layout object(s):
Section 3.1.96 [Rest], page 491.

Section 2.2.100 [Rhythmic_column_engraver], page 351
Generate NoteColumn, an object that groups stems, note heads, and rests.
This engraver creates the following layout object(s):
Section 3.1.81 [NoteColumn], page 476.

Section 2.2.101 [Script_column_engraver], page 351
Find potentially colliding scripts and put them into a ScriptColumn object; that will fix the collisions.
This engraver creates the following layout object(s):
Section 3.1.99 [ScriptColumn], page 494.

Section 2.2.102 [Script_engraver], page 351
Handle note scripted articulations.
Music types accepted:
Section 1.2.6 [articulation-event], page 43,
Properties (read)

  scriptDefinitions (list)
  The description of scripts. This is used by the Script_engraver for typesetting note-superscripts and subscripts. See scm/script.scm for more information.

This engraver creates the following layout object(s):
Section 3.1.98 [Script], page 493.

Section 2.2.105 [Slash_repeat_engraver], page 352
Make beat repeats.
Music types accepted:
Section 1.2.52 [repeat-slash-event], page 48,
This engraver creates the following layout object(s):
Section 3.1.37 [DoubleRepeatSlash], page 423, and Section 3.1.93 [RepeatSlash], page 489.

Section 2.2.106 [Slur_engraver], page 352
Build slur grobs from slur events.
Music types accepted:
Section 1.2.43 [note-event], page 47, and Section 1.2.58 [slur-event], page 49,
Properties (read)

  doubleSlurs (boolean)
  If set, two slurs are created for every slurred note, one above and one below the chord.

  slurMelismaBusy (boolean)
  Signal if a slur is present.

This engraver creates the following layout object(s):
Section 3.1.101 [Slur], page 494.
Section 2.2.113 [Spanner_break_forbid_ engraver], page 354
Forbid breaks in certain spanners.

Section 2.2.119 [Stem_ engraver], page 355
Create stems, flags and single-stem tremolos. It also works together with the beam engraver for overriding beaming.

Music types accepted:
Section 1.2.75 [tremolo-event], page 52, and Section 1.2.78 [tuplet-span-event], page 52,

Properties (read)

\textbf{\texttt{stemLeftBeamCount}} (integer)

Specify the number of beams to draw on the left side of the next note. Overrides automatic beaming. The value is only used once, and then it is erased.

\textbf{\texttt{stemRightBeamCount}} (integer)

See \texttt{stemLeftBeamCount}.

\textbf{\texttt{whichBar}} (string)

This property is read to determine what type of bar line to create.

Example:
\begin{verbatim}
\set Staff.whichBar = ".|:
\end{verbatim}

This will create a start-repeat bar in this staff only. Valid values are described in \texttt{scm/bar-line.scm}.

This engraver creates the following layout object(s):
Section 3.1.44 [Flag], page 432, Section 3.1.111 [Stem], page 504, Section 3.1.112 [StemStub], page 506, and Section 3.1.113 [StemTremolo], page 507.

Section 2.2.121 [Tab_note_heads_ engraver], page 356
Generate one or more tablature note heads from event of type \texttt{NoteEvent}.

Music types accepted:
Section 1.2.23 [fingering-event], page 45, Section 1.2.43 [note-event], page 47, and Section 1.2.67 [string-number-event], page 51,

Properties (read)

\textbf{\texttt{defaultStrings}} (list)

A list of strings to use in calculating frets for tablatures and fretboards if no strings are provided in the notes for the current moment.

\textbf{\texttt{fretLabels}} (list)

A list of strings or Scheme-formatted markups containing, in the correct order, the labels to be used for lettered frets in tablature.

\textbf{\texttt{highStringOne}} (boolean)

Whether the first string is the string with highest pitch on the instrument. This used by the automatic string selector for tablature notation.
maximumFretStretch (number)
Don’t allocate frets further than this from specified frets.

middleCPosition (number)
The place of the middle C, measured in half staff-spaces. Usually determined by looking at middleCClefPosition and middleCOffset.

minimumFret (number)
The tablature auto string-selecting mechanism selects the highest string with a fret at least minimumFret.

noteToFretFunction (procedure)
Convert list of notes and list of defined strings to full list of strings and fret numbers. Parameters: The context, a list of note events, a list of tabstring events, and the fretboard grob if a fretboard is desired.

stringOneTopmost (boolean)
Whether the first string is printed on the top line of the tablature.

stringTunings (list)
The tablature strings tuning. It is a list of the pitches of each string (starting with the lowest numbered one).

tablatureFormat (procedure)
A function formatting a tablature note head. Called with three arguments: context, string number and, fret number. It returns the text as a markup.

tabStaffLineLayoutFunction (procedure)
A function determining the staff position of a tablature note head. Called with two arguments: the context and the string.

This engraver creates the following layout object(s):
Section 3.1.123 [TabNoteHead], page 518.

Section 2.2.123 [Tab_tie_follow_engraver], page 357
Adjust TabNoteHead properties when a tie is followed by a slur or glissando.

Section 2.2.125 [Text_engraver], page 357
Create text scripts.
Music types accepted:
Section 1.2.71 [text-script-event], page 51,
This engraver creates the following layout object(s):
Section 3.1.124 [TextScript], page 519.

Section 2.2.126 [Text_spanner_engraver], page 358
Create text spanner from an event.
Music types accepted:
Section 1.2.72 [text-span-event], page 51,
Properties (read)

\texttt{currentMusicalColumn} (graphical (layout) object)
Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).

This engraver creates the following layout object(s):
Section 3.1.125 [TextSpanner], page 521.

\textbf{Section 2.2.127 [Tie\_engraver], page 358}
Generate ties between note heads of equal pitch.
Music types accepted:
Section 1.2.73 [tie-event], page 51,
Properties (read)

\texttt{skipTypesetting} (boolean)
If true, no typesetting is done, speeding up the interpretation phase. Useful for debugging large scores.

\texttt{tieWaitForNote} (boolean)
If true, tied notes do not have to follow each other directly. This can be used for writing out arpeggios.

Properties (write)

\texttt{tieMelismaBusy} (boolean)
Signal whether a tie is present.

This engraver creates the following layout object(s):
Section 3.1.126 [Tie], page 523, and Section 3.1.127 [TieColumn], page 525.

\textbf{Section 2.2.132 [Trill\_spanner\_engraver], page 360}
Create trill spanner from an event.
Music types accepted:
Section 1.2.77 [trill-span-event], page 52,
Properties (read)

\texttt{currentCommandColumn} (graphical (layout) object)
Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

\texttt{currentMusicalColumn} (graphical (layout) object)
Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).

This engraver creates the following layout object(s):
Section 3.1.132 [TrillSpanner], page 531.
Section 2.2.133 [Tuplet_engraver], page 361
Catch tuplet events and generate appropriate bracket.
Music types accepted:
Section 1.2.78 [tuplet-span-event], page 52,
Properties (read)

\texttt{tupletFullLength} (boolean)
If set, the tuplet is printed up to the start of
the next note.

\texttt{tupletFullLengthNote} (boolean)
If set, end at the next note, otherwise end on
the matter (time signatures, etc.) before the
note.

This engraver creates the following layout object(s):
Section 3.1.133 [TupletBracket], page 532, and Section 3.1.134 [Tuplet-
Number], page 534.

2.1.31 VaticanaStaff
Same as Staff context, except that it is accommodated for typesetting Gregorian Chant in the
notational style of Editio Vaticana.

This context also accepts commands for the following context(s):
Staff.

This context creates the following layout object(s):
Section 3.1.1 [Accidental], page 377, Section 3.1.2 [AccidentalCautionary], page 378,
Section 3.1.3 [AccidentalPlacement], page 379, Section 3.1.4 [AccidentalSuggestion], page 380,
Section 3.1.11 [BarLine], page 388, Section 3.1.13 [BassFigure], page 394, Section 3.1.14
[BassFigureAlignment], page 394, Section 3.1.15 [BassFigureAlignmentPositioning], page 395,
Section 3.1.16 [BassFigureBracket], page 396, Section 3.1.17 [BassFigureContinuation],
page 396, Section 3.1.18 [BassFigureLine], page 396, Section 3.1.25 [Clef], page 405,
Section 3.1.26 [ClefModifier], page 407, Section 3.1.30 [CueClef], page 411, Section 3.1.31
[CueEndClef], page 414, Section 3.1.32 [Custos], page 417, Section 3.1.33 [DotColumn],
page 419, Section 3.1.43 [FingeringColumn], page 431, Section 3.1.55 [InstrumentName],
page 443, Section 3.1.57 [KeyCancellation], page 446, Section 3.1.58 [KeySignature],
page 448, Section 3.1.62 [LedgerLineSpanner], page 453, Section 3.1.80 [NoteCollision],
page 475, Section 3.1.85 [OttavaBracket], page 479, Section 3.1.91 [PianoPedalBracket],
page 486, Section 3.1.97 [RestCollision], page 492, Section 3.1.100 [ScriptRow], page 494,
Section 3.1.102 [SostenutoPedal], page 497, Section 3.1.103 [SostenutoPedalLineSpanner],
page 498, Section 3.1.108 [StaffSpacing], page 502, Section 3.1.109 [StaffSymbol], page 503,
Section 3.1.116 [SustainPedal], page 511, Section 3.1.117 [SustainPedalLineSpanner], page 512,
Section 3.1.135 [UnaCordaPedal], page 535, Section 3.1.136 [UnaCordaPedalLineSpanner],
page 536, and Section 3.1.139 [VerticalAxisGroup], page 538.

This context sets the following properties:
• Set grob-property glyph-name-alist in Section 3.1.1 [Accidental], page 377, to:
  '((-1/2 . "accidentals.vaticanaM1")
   (0 . "accidentals.vaticana0")
   (1/2 . "accidentals.mensural1"))
• Set grob-property glyph-name-alist in Section 3.1.58 [KeySignature], page 448, to:
  '((-1/2 . "accidentals.vaticanaM1")
(0 . "accidentals.vaticana0")
(1/2 . "accidentals.mensural1"))

- Set grob-property line-count in Section 3.1.109 [StaffSymbol], page 503, to 4.
- Set grob-property neutral-direction in Section 3.1.32 [Custos], page 417, to -1.
- Set grob-property neutral-position in Section 3.1.32 [Custos], page 417, to 3.
- Set grob-property style in Section 3.1.32 [Custos], page 417, to 'vaticana.
- Set grob-property style in Section 3.1.34 [Dots], page 419, to 'vaticana.
- Set grob-property thickness in Section 3.1.109 [StaffSymbol], page 503, to 0.6.
- Set grob-property transparent in Section 3.1.11 [BarLine], page 388, to #t.
- Set translator property clefGlyph to "clefs.vaticana.do".
- Set translator property clefPosition to 1.
- Set translator property clefTransposition to 0.
- Set translator property createSpacing to #t.
- Set translator property ignoreFiguredBassRest to #f.
- Set translator property instrumentName to ()
- Set translator property localAlterations to ()
- Set translator property middleCClefPosition to 1.
- Set translator property middleCPosition to 1.
- Set translator property ottavationMarkups to:
  '((4 . "29")
   (3 . "22")
   (2 . "15")
   (1 . "8")
   (-1 . "8")
   (-2 . "15")
   (-3 . "22")
   (-4 . "29"))
- Set translator property shortInstrumentName to '().

This is not a 'Bottom' context; search for such a one will commence after creating an implicit context of type Section 2.1.32 [VaticanaVoice], page 287.

Context VaticanaStaff can contain Section 2.1.3 [CueVoice], page 63, Section 2.1.20 [NullVoice], page 184, and Section 2.1.32 [VaticanaVoice], page 287.

This context is built from the following engraver(s):

Section 2.2.1 [Accidental_engraver], page 313
Make accidentals. Catch note heads, ties and notices key-change events.
This engraver usually lives at Staff level, but reads the settings for
Accidental at Voice level, so you can override them at Voice.
Properties (read)

accidentalGrouping (symbol)
  If set to 'voice, accidentals on the same note in
different octaves may be horizontally staggered
if in different voices.

autoAccidentals (list)
  List of different ways to typeset an accidental.
For determining when to print an accidental, several different rules are tried. The rule that gives the highest number of accidentals is used. Each entry in the list is either a symbol or a procedure.

**symbol**  
The symbol is the name of the context in which the following rules are to be applied. For example, if context is Section “Score” in *Internals Reference* then all staves share accidentals, and if context is Section “Staff” in *Internals Reference* then all voices in the same staff share accidentals, but staves do not.

**procedure**  
The procedure represents an accidental rule to be applied to the previously specified context. The procedure takes the following arguments:

- **context**  
The current context to which the rule should be applied.
- **pitch**  
The pitch of the note to be evaluated.
- **barnum**  
The current bar number.
- **measurepos**  
The current measure position.

The procedure returns a pair of booleans. The first states whether an extra natural should be added. The second states whether an accidental should be printed. (**#t**, **#f**) does not make sense.

**autoCautionaries** (list)  
List similar to **autoAccidentals**, but it controls cautionary accidentals rather than normal ones. Both lists are tried, and the one giving the most accidentals wins. In case of draw, a normal accidental is typeset.

**extraNatural** (boolean)  
Whether to typeset an extra natural sign before accidentals that reduce the effect of a previous alteration.

**harmonicAccidentals** (boolean)  
If set, harmonic notes in chords get accidentals.
internalBarNumber (integer)
Contains the current barnumber. This property is used for internal timekeeping, among others by the Accidental_engraver.

keyAlterations (list)
The current key signature. This is an alist containing (step . alter) or ((octave . step) . alter), where step is a number in the range 0 to 6 and alter a fraction, denoting alteration. For alterations, use symbols, e.g. keyAlterations = `#`((6 ,FLAT)).

localAlterations (list)
The key signature at this point in the measure. The format is the same as for keyAlterations, but can also contain ((octave . name) . (alter barnumber . measureposition)) pairs.

Properties (write)
localAlterations (list)
The key signature at this point in the measure. The format is the same as for keyAlterations, but can also contain ((octave . name) . (alter barnumber . measureposition)) pairs.

This engraver creates the following layout object(s):
Section 3.1.1 [Accidental], page 377, Section 3.1.2 [AccidentalCautionary], page 378, Section 3.1.3 [AccidentalPlacement], page 379, and Section 3.1.4 [AccidentalSuggestion], page 380.

Section 2.2.5 [Axis_group_engraver], page 316
Group all objects created in this context in a VerticalAxisGroup spanner.

Properties (read)
currentCommandColumn (graphical (layout) object)
Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

hasAxisGroup (boolean)
True if the current context is contained in an axis group.

keepAliveInterfaces (list)
A list of symbols, signifying grob interfaces that are worth keeping a staff with remove-empty set around for.

Properties (write)
hasAxisGroup (boolean)
True if the current context is contained in an axis group.

This engraver creates the following layout object(s):
Section 3.1.139 [VerticalAxisGroup], page 538.
Section 2.2.7 [Bar_engraver], page 316
Create barlines. This engraver is controlled through the `whichBar` property. If it has no bar line to create, it will forbid a linebreak at this point. This engraver is required to trigger the creation of clefs at the start of systems.

Properties (read)

`whichBar` (string)
This property is read to determine what type of bar line to create.

Example:
```
\set Staff.whichBar = ".\:"  
```
This will create a start-repeat bar in this staff only. Valid values are described in `scm/bar-line.scm`.

Properties (write)

`forbidBreak` (boolean)
If set to `#t`, prevent a line break at this point.

This engraver creates the following layout object(s):
Section 3.1.11 [BarLine], page 388.

Section 2.2.17 [Clef_engraver], page 321
Determine and set reference point for pitches.

Properties (read)

`clefGlyph` (string)
Name of the symbol within the music font.

`clefPosition` (number)
Where should the center of the clef symbol go, measured in half staff spaces from the center of the staff.

`clefTransposition` (integer)
Add this much extra transposition. Values of 7 and -7 are common.

`clefTranspositionStyle` (symbol)
Determines the way the ClefModifier grob is displayed. Possible values are ‘default’, ‘parenthesized’ and ‘bracketed’.

`explicitClefVisibility` (vector)
‘break-visibility’ function for clef changes.

`forceClef` (boolean)
Show clef symbol, even if it has not changed. Only active for the first clef after the property is set, not for the full staff.

This engraver creates the following layout object(s):
Section 3.1.25 [Clef], page 405, and Section 3.1.26 [ClefModifier], page 407.
Section 2.2.19 [Collision_engraver], page 322
Collect NoteColumns, and as soon as there are two or more, put them in a NoteCollision object.
This engraver creates the following layout object(s):
Section 3.1.80 [NoteCollision], page 475.

Section 2.2.24 [Cue_clef_engraver], page 324
Determine and set reference point for pitches in cued voices.
Properties (read)

\texttt{clefTransposition} (integer)
Add this much extra transposition. Values of 7 and -7 are common.

\texttt{cueClefGlyph} (string)
Name of the symbol within the music font.

\texttt{cueClefPosition} (number)
Where should the center of the clef symbol go, measured in half staff spaces from the center of the staff.

\texttt{cueClefTransposition} (integer)
Add this much extra transposition. Values of 7 and -7 are common.

\texttt{cueClefTranspositionStyle} (symbol)
Determines the way the ClefModifier grob is displayed. Possible values are ‘default’, ‘parenthesized’ and ‘bracketed’.

\texttt{explicitCueClefVisibility} (vector)
‘break-visibility’ function for cue clef changes.

\texttt{middleCCuePosition} (number)
The position of the middle C, as determined only by the clef of the cue notes. This can be calculated by looking at \texttt{cueClefPosition} and \texttt{cueClefGlyph}.

This engraver creates the following layout object(s):
Section 3.1.26 [ClefModifier], page 407, Section 3.1.30 [CueClef], page 411, and Section 3.1.31 [CueEndClef], page 414.

Section 2.2.25 [Custos_engraver], page 324
Engrave custodes.
This engraver creates the following layout object(s):
Section 3.1.32 [Custos], page 417.

Section 2.2.27 [Dot_column_engraver], page 325
Engrave dots on dotted notes shifted to the right of the note. If omitted, then dots appear on top of the notes.
This engraver creates the following layout object(s):
Section 3.1.33 [DotColumn], page 419.
Section 2.2.37 [Figured_bass_engraver], page 328
Make figured bass numbers.

Music types accepted:
Section 1.2.7 [bass-figure-event], page 43, and Section 1.2.54 [rest-event], page 49,

Properties (read)
- figuredBassAlterationDirection (direction)
  Where to put alterations relative to the main figure.
- figuredBassCenterContinuations (boolean)
  Whether to vertically center pairs of extender lines. This does not work with three or more lines.
- figuredBassFormatter (procedure)
  A routine generating a markup for a bass figure.
- ignoreFiguredBassRest (boolean)
  Don’t swallow rest events.
- implicitBassFigures (list)
  A list of bass figures that are not printed as numbers, but only as extender lines.
- useBassFigureExtenders (boolean)
  Whether to use extender lines for repeated bass figures.

This engraver creates the following layout object(s):
Section 3.1.13 [BassFigure], page 394, Section 3.1.14 [BassFigure-Alignment], page 394, Section 3.1.16 [BassFigureBracket], page 396, Section 3.1.17 [BassFigureContinuation], page 396, and Section 3.1.18 [BassFigureLine], page 396.

Section 2.2.38 [Figured_bass_position_engraver], page 329
Position figured bass alignments over notes.

This engraver creates the following layout object(s):
Section 3.1.15 [BassFigureAlignmentPositioning], page 395.

Section 2.2.39 [Fingering_column_engraver], page 329
Find potentially colliding scripts and put them into a FingeringColumn object; that will fix the collisions.

This engraver creates the following layout object(s):
Section 3.1.43 [FingeringColumn], page 431.

Section 2.2.41 [Font_size_engraver], page 330
Put fontSize into font-size grob property.

Properties (read)
- fontSize (number)
  The relative size of all grobs in a context.

Section 2.2.52 [Grob_pq_engraver], page 334
Administrateur when certain grobs (e.g., note heads) stop playing.
Properties (read)

**busyGrobs** (list)
A queue of \((\text{end-moment} . \text{grob})\) cons cells. This is for internal (C++) use only. This property contains the grobs which are still busy (e.g. note heads, spanners, etc.).

Properties (write)

**busyGrobs** (list)
A queue of \((\text{end-moment} . \text{grob})\) cons cells. This is for internal (C++) use only. This property contains the grobs which are still busy (e.g. note heads, spanners, etc.).

Section 2.2.55 [Instrument_name_engraver], page 334
Create a system start text for instrument or vocal names.

Properties (read)

**currentCommandColumn** (graphical (layout) object)
Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

**instrumentName** (markup)
The name to print left of a staff. The **instrumentName** property labels the staff in the first system, and the **shortInstrumentName** property labels following lines.

**shortInstrumentName** (markup)
See **instrumentName**.

**shortVocalName** (markup)
Name of a vocal line, short version.

**vocalName** (markup)
Name of a vocal line.

This engraver creates the following layout object(s):
Section 3.1.55 [InstrumentName], page 443.

Section 2.2.58 [Key_engraver], page 335
Engrave a key signature.

Music types accepted:
Section 1.2.28 [key-change-event], page 45,

Properties (read)

**createKeyOnClefChange** (boolean)
Print a key signature whenever the clef is changed.

**explicitKeySignatureVisibility** (vector)
‘break-visibility’ function for explicit key changes. ‘\override’ of the **break-visibility** property will set the
visibility for normal (i.e., at the start of the line) key signatures.

**extraNatural** (boolean)
Whether to typeset an extra natural sign before accidentals that reduce the effect of a previous alteration.

**keyAlterationOrder** (list)
An alist that defines in what order alterations should be printed. The format is \((\text{step} \ . \ \text{alter})\), where \text{step} is a number from 0 to 6 and \text{alter} from -2 (sharp) to 2 (flat).

**keyAlterations** (list)
The current key signature. This is an alist containing \((\text{step} \ . \ \text{alter})\) or \(((\text{octave} \ . \ \text{step}) \ . \ \text{alter})\), where \text{step} is a number in the range 0 to 6 and \text{alter} a fraction, denoting alteration. For alterations, use symbols, e.g. `keyAlterations = #`((6 . ,FLAT)).

**lastKeyAlterations** (list)
Last key signature before a key signature change.

**middleCClefPosition** (number)
The position of the middle C, as determined only by the clef. This can be calculated by looking at clefPosition and clefGlyph.

**printKeyCancellation** (boolean)
Print restoration alterations before a key signature change.

**Properties (write)**

**keyAlterations** (list)
The current key signature. This is an alist containing \((\text{step} \ . \ \text{alter})\) or \(((\text{octave} \ . \ \text{step}) \ . \ \text{alter})\), where \text{step} is a number in the range 0 to 6 and \text{alter} a fraction, denoting alteration. For alterations, use symbols, e.g. `keyAlterations = #`((6 . ,FLAT)).

**lastKeyAlterations** (list)
Last key signature before a key signature change.

**tonic** (pitch)
The tonic of the current scale.

This engraver creates the following layout object(s):
Section 3.1.57 [KeyCancellation], page 446, and Section 3.1.58 [KeySignature], page 448.

Section 2.2.62 [Ledger_line_engraver], page 337
Create the spanner to draw ledger lines, and notices objects that need ledger lines.
This engraver creates the following layout object(s):
Section 3.1.62 [LedgerLineSpanner], page 453.

Section 2.2.82 [Ottava_spanner_engraver], page 344
Create a text spanner when the ottavation property changes.
Properties (read)

\[\text{currentMusicalColumn} \quad (\text{graphical (layout)} \quad \text{object})\]
Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).

\[\text{middleCOffset} \quad (\text{number})\]
The offset of middle C from the position given by \text{middleCClefPosition} This is used for ottava brackets.

\[\text{ottavation} \quad (\text{markup})\]
If set, the text for an ottava spanner. Changing this creates a new text spanner.

This engraver creates the following layout object(s):
Section 3.1.85 [OttavaBracket], page 479.

Section 2.2.83 [Output_property_engraver], page 344
Apply a procedure to any grob acknowledged.
Music types accepted:
Section 1.2.4 [apply-output-event], page 43,

Section 2.2.90 [Piano_pedal_align_engraver], page 347
Align piano pedal symbols and brackets.
Properties (read)

\[\text{currentCommandColumn} \quad (\text{graphical (layout)} \quad \text{object})\]
Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

This engraver creates the following layout object(s):
Section 3.1.103 [SostenutoPedalLineSpanner], page 498, Section 3.1.117 [SustainPedalLineSpanner], page 512, and Section 3.1.136 [UnaCordaPedalLineSpanner], page 536.

Section 2.2.91 [Piano_pedal_engraver], page 347
Engrave piano pedal symbols and brackets.
Music types accepted:
Section 1.2.61 [sostenuto-event], page 49, Section 1.2.69 [sustain-event], page 51, and Section 1.2.79 [una-corda-event], page 52,
Properties (read)

\[\text{currentCommandColumn} \quad (\text{graphical (layout)} \quad \text{object})\]
Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

\[\text{pedalSostenutoStrings} \quad (\text{list})\]
See pedalSustainStrings.
pedalSostenutoStyle (symbol)
See pedalSustainStyle.

pedalSustainStrings (list)
A list of strings to print for sustain-pedal. Format is \texttt{\{up \up \down \down\}}, where each of the three is the string to print when this is done with the pedal.

pedalSustainStyle (symbol)
A symbol that indicates how to print sustain pedals: \texttt{text}, \texttt{bracket} or \texttt{mixed} (both).

pedalUnaCordaStrings (list)
See pedalSustainStrings.

pedalUnaCordaStyle (symbol)
See pedalSustainStyle.

This engraver creates the following layout object(s):
Section 3.1.91 [PianoPedalBracket], page 486, Section 3.1.102 [SostenutoPedal], page 497, Section 3.1.116 [SustainPedal], page 511, and Section 3.1.135 [UnaCordaPedal], page 535.

Section 2.2.95 [Pure_from_neighbor_engraver], page 349
Coordinates items that get their pure heights from their neighbors.

Section 2.2.98 [Rest_collision_engraver], page 350
Handle collisions of rests.

Properties (read)

\texttt{busyGrobs} (list)
A queue of \texttt{(end-moment . grob)} cons cells.
This is for internal (C++) use only. This property contains the grobs which are still busy (e.g. note heads, spanners, etc.).

This engraver creates the following layout object(s):
Section 3.1.97 [RestCollision], page 492.

Section 2.2.103 [Script_row_engraver], page 351
Determine order in horizontal side position elements.
This engraver creates the following layout object(s):
Section 3.1.100 [ScriptRow], page 494.

Section 2.2.104 [Separating_line_group_engraver], page 352
Generate objects for computing spacing parameters.

Properties (read)

\texttt{createSpacing} (boolean)
Create \texttt{StaffSpacing} objects? Should be set for staves.

Properties (write)

\texttt{hasStaffSpacing} (boolean)
True if the current \texttt{CommandColumn} contains items that will affect spacing.
This engraver creates the following layout object(s):
Section 3.1.108 [StaffSpacing], page 502.

Section 2.2.114 [Staff_collecting_engraver], page 354
Maintain the stavesFound variable.
Properties (read)

stavesFound (list of grobs)
A list of all staff-symbols found.

Properties (write)

stavesFound (list of grobs)
A list of all staff-symbols found.

Section 2.2.116 [Staff_symbol_engraver], page 354
Create the constellation of five (default) staff lines.
Music types accepted:
Section 1.2.65 [staff-span-event], page 50,
This engraver creates the following layout object(s):
Section 3.1.109 [StaffSymbol], page 503.

2.1.32 VaticanaVoice
Same as Voice context, except that it is accommodated for typesetting Gregorian Chant in the notational style of Editio Vaticana.

This context also accepts commands for the following context(s):
Voice.

This context creates the following layout object(s):

Section 3.1.9 [Arpeggio], page 386, Section 3.1.19 [Beam], page 397, Section 3.1.20 [BendAfter], page 399, Section 3.1.23 [BreathingSign], page 402, Section 3.1.27 [ClusterSpanner], page 409, Section 3.1.28 [ClusterSpannerBeacon], page 409, Section 3.1.29 [CombineTextScript], page 410, Section 3.1.33 [DotColumn], page 419, Section 3.1.34 [Dots], page 419, Section 3.1.35 [DoublePercentRepeat], page 420, Section 3.1.36 [DoublePercentRepeatCounter], page 421, Section 3.1.37 [DoubleRepeatSlash], page 423, Section 3.1.38 [DynamicLineSpanner], page 424, Section 3.1.39 [DynamicText], page 425, Section 3.1.40 [DynamicTextSpanner], page 427, Section 3.1.41 [Episema], page 429, Section 3.1.42 [Fingering], page 429, Section 3.1.48 [Glissando], page 437, Section 3.1.52 [Hairpin], page 440, Section 3.1.56 [InstrumentSwitch], page 444, Section 3.1.60 [LaissezVibreTie], page 452, Section 3.1.61 [LaissezVibreTieColumn], page 453, Section 3.1.75 [MultiMeasureRest], page 468, Section 3.1.76 [MultiMeasureRestNumber], page 469, Section 3.1.77 [MultiMeasureRestScript], page 471, Section 3.1.78 [MultiMeasureRestText], page 472, Section 3.1.81 [NoteColumn], page 476, Section 3.1.82 [NoteHead], page 477, Section 3.1.84 [NoteSpacing], page 478, Section 3.1.88 [PercentRepeat], page 482, Section 3.1.89 [PercentRepeatCounter], page 483, Section 3.1.90 [PhrasingSlur], page 484, Section 3.1.93 [RepeatSlash], page 489, Section 3.1.94 [RepeatTie], page 490, Section 3.1.95 [RepeatTieColumn], page 491, Section 3.1.96 [Rest], page 491, Section 3.1.98 [Script], page 493, Section 3.1.99 [ScriptColumn], page 494, Section 3.1.114 [StringNumber], page 508, Section 3.1.115 [StrokeFinger], page 510, Section 3.1.124 [TextScript], page 519, Section 3.1.126 [Tie], page 523, Section 3.1.127 [TieColumn], page 525, Section 3.1.129 [TrillPitchAccidental], page 528, Section 3.1.130 [TrillPitchGroup], page 529, Section 3.1.131 [TrillPitchHead], page 530, Section 3.1.132 [TrillSpanner], page 531, Section 3.1.133 [TupletBracket], page 532, Section 3.1.134 [TupletNumber], page 534, Section 3.1.137 [VaticanaLigature], page 537, and Section 3.1.140 [VoiceFollower], page 540.
This context sets the following properties:

- Set grob-property `padding` in Section 3.1.98 [Script], page 493, to 0.5.
- Set grob-property `style` in Section 3.1.82 [NoteHead], page 477, to `'vaticana.punctum`.
- Set translator property `autoBeaming` to `#f`.

This is a ‘Bottom’ context; no contexts will be created implicitly from it. This context cannot contain other contexts. This context is built from the following engraver(s):

**Section 2.2.3 [Arpeggio_engraver], page 315**
Generate an Arpeggio symbol.

Music types accepted:
Section 1.2.5 [arpeggio-event], page 43,
This engraver creates the following layout object(s):
Section 3.1.9 [Arpeggio], page 386.

**Section 2.2.4 [Auto_beam_engraver], page 315**
Generate beams based on measure characteristics and observed Stems. Uses `baseMoment`, `beatStructure`, `beamExceptions`, `measureLength`, and `measurePosition` to decide when to start and stop a beam. Overriding beaming is done through Section 2.2.119 [Stem_engraver], page 355, properties `stemLeftBeamCount` and `stemRightBeamCount`. Music types accepted:
Section 1.2.9 [beam-forbid-event], page 43,
Properties (read)

- `autoBeaming` (boolean)
  If set to true then beams are generated automatically.

- `baseMoment` (moment)
  Smallest unit of time that will stand on its own as a subdivided section.

- `beamExceptions` (list)
  An alist of exceptions to autobeam rules that normally end on beats.

- `beamHalfMeasure` (boolean)
  Whether to allow a beam to begin halfway through the measure in triple time, which could look like 6/8.

- `beatStructure` (list)
  List of `baseMoments` that are combined to make beats.

- `subdivideBeams` (boolean)
  If set, multiple beams will be subdivided at `baseMoment` positions by only drawing one beam over the beat.

This engraver creates the following layout object(s):
Section 3.1.19 [Beam], page 397.
Section 2.2.10 [Beam_engraver], page 318
Handle Beam events by engraving beams. If omitted, then notes are printed with flags instead of beams.
Music types accepted:
Section 1.2.8 [beam-event], page 43,
Properties (read)

- `baseMoment` (moment)
  Smallest unit of time that will stand on its own as a subdivided section.

- `beamMelismaBusy` (boolean)
  Signal if a beam is present.

- `beatStructure` (list)
  List of `baseMoment` s that are combined to make beats.

- `subdivideBeams` (boolean)
  If set, multiple beams will be subdivided at `baseMoment` positions by only drawing one beam over the beat.

Properties (write)

- `forbidBreak` (boolean)
  If set to #t, prevent a line break at this point.

This engraver creates the following layout object(s):
Section 3.1.19 [Beam], page 397.

Section 2.2.12 [Bend_engraver], page 319
Create fall spanners.
Music types accepted:
Section 1.2.10 [bend-after-event], page 43,
This engraver creates the following layout object(s):
Section 3.1.20 [BendAfter], page 399.

Section 2.2.14 [Breathing_sign_engraver], page 320
Create a breathing sign.
Music types accepted:
Section 1.2.14 [breathing-event], page 44,
This engraver creates the following layout object(s):
Section 3.1.23 [BreathingSign], page 402.

Section 2.2.16 [Chord_tremolo_engraver], page 321
Generate beams for tremolo repeats.
Music types accepted:
Section 1.2.76 [tremolo-span-event], page 52,
This engraver creates the following layout object(s):
Section 3.1.19 [Beam], page 397.

Section 2.2.18 [Cluster_spanner_engraver], page 321
Engrave a cluster using Spanner notation.
Music types accepted:
Section 1.2.15 [cluster-note-event], page 44, This engraver creates the following layout object(s):
Section 3.1.27 [ClusterSpanner], page 409, and Section 3.1.28 [ClusterSpannerBeacon], page 409.

Section 2.2.28 [Dots_engraver], page 325
Create Section 3.1.34 [Dots], page 419, objects for Section 3.2.98 [rhythmic-head-interface], page 601s.
This engraver creates the following layout object(s):
Section 3.1.34 [Dots], page 419.

Section 2.2.29 [Double_percent_repeat_engraver], page 326
Make double measure repeats.
Music types accepted:
Section 1.2.19 [double-percent-event], page 44,
Properties (read)

\begin{itemize}
  \item \texttt{countPercentRepeats} (boolean)
    If set, produce counters for percent repeats.
  \item \texttt{measureLength} (moment)
    Length of one measure in the current time signature.
  \item \texttt{repeatCountVisibility} (procedure)
    A procedure taking as arguments an integer and context, returning whether the corresponding percent repeat number should be printed when \texttt{countPercentRepeats} is set.
\end{itemize}

Properties (write)

\begin{itemize}
  \item \texttt{forbidBreak} (boolean)
    If set to \texttt{#t}, prevent a line break at this point.
\end{itemize}

This engraver creates the following layout object(s):
Section 3.1.35 [DoublePercentRepeat], page 420, and Section 3.1.36 [DoublePercentRepeatCounter], page 421.

Section 2.2.32 [Dynamic_align_engraver], page 327
Align hairpins and dynamic texts on a horizontal line.
Properties (read)

\begin{itemize}
  \item \texttt{currentMusicalColumn} (graphical (layout) object)
    Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).
\end{itemize}

This engraver creates the following layout object(s):
Section 3.1.38 [DynamicLineSpanner], page 424.

Section 2.2.33 [Dynamic_engraver], page 327
Create hairpins, dynamic texts and dynamic text spanners.
Music types accepted:
Section 1.2.1 [absolute-dynamic-event], page 42, Section 1.2.13 [break-span-event], page 44, and Section 1.2.63 [span-dynamic-event], page 50,

Properties (read)

\texttt{crescendoSpanner} (symbol)

The type of spanner to be used for crescendi. Available values are ‘\texttt{hairpin}’ and ‘\texttt{text}’. If unset, a hairpin crescendo is used.

\texttt{crescendoText} (markup)

The text to print at start of non-hairpin crescendo, i.e., ‘\texttt{cresc.}’.

\texttt{currentMusicalColumn} (graphical (layout) object)

Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).

\texttt{decrescendoSpanner} (symbol)

The type of spanner to be used for decrescendi. Available values are ‘\texttt{hairpin}’ and ‘\texttt{text}’. If unset, a hairpin decrescendo is used.

\texttt{decrescendoText} (markup)

The text to print at start of non-hairpin decrescendo, i.e., ‘\texttt{dim.}’.

This engraver creates the following layout object(s):

Section 3.1.39 [DynamicText], page 425, Section 3.1.40 [DynamicTextSpanner], page 427, and Section 3.1.52 [Hairpin], page 440.

Section 2.2.35 [Episema_engraver], page 328

Create an \textit{Editio Vaticana}-style episema line.

Music types accepted:

Section 1.2.21 [episema-event], page 45,

This engraver creates the following layout object(s):

Section 3.1.41 [Episema], page 429.

Section 2.2.40 [Fingering_engraver], page 329

Create fingering scripts.

Music types accepted:

Section 1.2.23 [fingering-event], page 45,

This engraver creates the following layout object(s):

Section 3.1.42 [Fingering], page 429.

Section 2.2.41 [Font_size_engraver], page 330

Put \texttt{fontSize} into \texttt{font-size} grob property.

Properties (read)

\texttt{fontSize} (number)

The relative size of all grobs in a context.

Section 2.2.43 [Forbid_line_break_engraver], page 330

Forbid line breaks when note heads are still playing at some point.
Properties (read)

**busyGrobs** (list)
A queue of \((\text{end-moment} . \text{grob})\) cons cells.
This is for internal (C++) use only. This property contains the grobs which are still busy (e.g. note heads, spanners, etc.).

Properties (write)

**forbidBreak** (boolean)
If set to \#t, prevent a line break at this point.

Section 2.2.45 [Glissando_engraver], page 331
Engrave glissandi.
Music types accepted:
Section 1.2.25 [glissando-event], page 45,
Properties (read)

**glissandoMap** (list)
A map in the form of `\(((\text{source1} . \text{target1}) (\text{source2} . \text{target2}) (\text{sourceN} . \text{targetN}))\)` showing the glissandi to be drawn for note columns.
The value `\(()\)` will default to `\(((0 . 0) (1 . 1) (n . n))\)`, where \(n\) is the minimal number of note-heads in the two note columns between which the glissandi occur.

This engraver creates the following layout object(s):
Section 3.1.48 [Glissando], page 437.

Section 2.2.46 [Grace_auto_beam_engraver], page 332
Generates one autobeam group across an entire grace phrase. As usual, any manual beaming or `\noBeam` will block autobeaming, just like setting the context property `\autoBeaming` to \###f.
Music types accepted:
Section 1.2.9 [beam-forbid-event], page 43,
Properties (read)

**autoBeaming** (boolean)
If set to true then beams are generated automatically.

This engraver creates the following layout object(s):
Section 3.1.19 [Beam], page 397.

Section 2.2.47 [Grace_beam_engraver], page 332
Handle Beam events by engraving beams. If omitted, then notes are printed with flags instead of beams. Only engraves beams when we are at grace points in time.
Music types accepted:
Section 1.2.8 [beam-event], page 43,
Properties (read)

**baseMoment** (moment)
Smallest unit of time that will stand on its own as a subdivided section.
beamMelismaBusy (boolean)
Signal if a beam is present.

beatStructure (list)
List of baseMoments that are combined to make beats.

subdivideBeams (boolean)
If set, multiple beams will be subdivided at baseMoment positions by only drawing one beam over the beat.

This engraver creates the following layout object(s):
Section 3.1.19 [Beam], page 397.

Section 2.2.48 [Grace_engraver], page 333
Set font size and other properties for grace notes.
Properties (read)

graceSettings (list)
Overrides for grace notes. This property should be manipulated through the add-grace-property function.

Section 2.2.52 [Grob_pq_engraver], page 334
Administrate when certain grobs (e.g., note heads) stop playing.
Properties (read)

busyGrobs (list)
A queue of (end-moment . grob) cons cells. This is for internal (C++) use only. This property contains the grobs which are still busy (e.g. note heads, spanners, etc.).

Properties (write)

busyGrobs (list)
A queue of (end-moment . grob) cons cells. This is for internal (C++) use only. This property contains the grobs which are still busy (e.g. note heads, spanners, etc.).

Section 2.2.56 [Instrument_switch_engraver], page 335
Create a cue text for taking instrument.
Properties (read)

instrumentCueName (markup)
The name to print if another instrument is to be taken.

This engraver creates the following layout object(s):
Section 3.1.56 [InstrumentSwitch], page 444.

Section 2.2.61 [Laissez_vibrer_engraver], page 337
Create laissez vibrer items.
Music types accepted:
Section 1.2.30 [laissez-vibrer-event], page 45,
This engraver creates the following layout object(s):
Section 3.1.60 [LaissezVibrerTie], page 452, and Section 3.1.61 [LaissezVibrerTieColumn], page 453.

Section 2.2.75 [Multi_measure_rest_engraver], page 341
Engrave multi-measure rests that are produced with ‘R’. It reads measurePosition and internalBarNumber to determine what number to print over the Section 3.1.75 [MultiMeasureRest], page 468.

Music types accepted:
Section 1.2.39 [multi-measure-articulation-event], page 46,
Section 1.2.40 [multi-measure-rest-event], page 46, and Section 1.2.41 [multi-measure-text-event], page 47,

Properties (read)

\texttt{currentCommandColumn} (graphical (layout) object)
\hspace{1cm} Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

\texttt{internalBarNumber} (integer)
\hspace{1cm} Contains the current barnumber. This property is used for internal timekeeping, among others by the Accidental_engraver.

\texttt{measurePosition} (moment)
\hspace{1cm} How much of the current measure have we had. This can be set manually to create incomplete measures.

\texttt{restNumberThreshold} (number)
\hspace{1cm} If a multimeasure rest has more measures than this, a number is printed.

\texttt{whichBar} (string)
\hspace{1cm} This property is read to determine what type of bar line to create.
Example:
\begin{verbatim}
\set Staff.whichBar = ".|:
\end{verbatim}
This will create a start-repeat bar in this staff only. Valid values are described in scm/bar-line.scm.

This engraver creates the following layout object(s):
Section 3.1.75 [MultiMeasureRest], page 468, Section 3.1.76 [MultiMeasureRestNumber], page 469, Section 3.1.77 [MultiMeasureRestScript], page 471, and Section 3.1.78 [MultiMeasureRestText], page 472.

Section 2.2.76 [New_fingering_engraver], page 342
Create fingering scripts for notes in a new chord. This engraver is ill-named, since it also takes care of articulations and harmonic note heads.

Properties (read)

\texttt{fingeringOrientations} (list)
\hspace{1cm} A list of symbols, containing ‘left’, ‘right’, ‘up’ and/or ‘down’. This list determines where
fingerings are put relative to the chord being fingered.

**harmonicDots** (boolean)
If set, harmonic notes in dotted chords get dots.

**stringNumberOrientations** (list)
See fingeringOrientations.

**strokeFingerOrientations** (list)
See fingeringOrientations.

This engraver creates the following layout object(s):
Section 3.1.42 [Fingering], page 429, Section 3.1.98 [Script], page 493,
Section 3.1.114 [StringNumber], page 508, and Section 3.1.115 [StrokeFinger], page 510.

Section 2.2.77 [Note_head_line_engraver], page 343
Engrave a line between two note heads in a staff switch if followVoice is set.

Properties (read)

**followVoice** (boolean)
If set, note heads are tracked across staff switches by a thin line.

This engraver creates the following layout object(s):
Section 3.1.140 [VoiceFollower], page 540.

Section 2.2.78 [Note_heads_engraver], page 343
Generate note heads.

Music types accepted:
Section 1.2.43 [note-event], page 47,

Properties (read)

**middleCPosition** (number)
The place of the middle C, measured in half staff-spaces. Usually determined by looking at
middleCClefPosition and middleCOffset.

**staffLineLayoutFunction** (procedure)
Layout of staff lines, traditional, or semitone.

This engraver creates the following layout object(s):
Section 3.1.82 [NoteHead], page 477.

Section 2.2.81 [Note_spacing_engraver], page 344
Generate NoteSpacing, an object linking horizontal lines for use in spacing.

This engraver creates the following layout object(s):
Section 3.1.84 [NoteSpacing], page 478.

Section 2.2.83 [Output_property_engraver], page 344
Apply a procedure to any grob acknowledged.

Music types accepted:
Section 1.2.4 [apply-output-event], page 43,
Section 2.2.87 [Part_combine_engraver], page 346
Part combine engraver for orchestral scores: Print markings ‘a2’, ‘Solo’, ‘Solo II’, and ‘unisono’.
Music types accepted:
Section 1.2.43 [note-event], page 47, and Section 1.2.47 [part-combine-event], page 48,
Properties (read)

aDueText (markup)
Text to print at a unisono passage.

partCombineTextsOnNote (boolean)
Print part-combine texts only on the next note rather than immediately on rests or skips.

printPartCombine_texts (boolean)
Set ‘Solo’ and ‘A due’ texts in the part combiner?

soloIIText (markup)
The text for the start of a solo for voice ‘two’ when part-combining.

soloText (markup)
The text for the start of a solo when part-combining.

This engraver creates the following layout object(s):
Section 3.1.29 [CombineTextScript], page 410.

Section 2.2.88 [Percent_repeat_engraver], page 346
Make whole measure repeats.
Music types accepted:
Section 1.2.49 [percent-event], page 48,
Properties (read)

countPercentRepeats (boolean)
If set, produce counters for percent repeats.

currentCommandColumn (graphical (layout) object)
Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

repeatCountVisibility (procedure)
A procedure taking as arguments an integer and context, returning whether the corresponding percent repeat number should be printed when countPercentRepeats is set.

This engraver creates the following layout object(s):
Section 3.1.88 [PercentRepeat], page 482, and Section 3.1.89 [PercentRepeatCounter], page 483.

Section 2.2.89 [Phrasing_slur_engraver], page 347
Print phrasing slurs. Similar to Section 2.2.106 [Slur_engraver], page 352.
Music types accepted:
Section 1.2.43 [note-event], page 47, and Section 1.2.51 [phrasing-slur-event], page 48,
This engraver creates the following layout object(s):
Section 3.1.90 [PhrasingSlur], page 484.

Section 2.2.94 [Pitched_trill_engraver], page 349
Print the bracketed note head after a note head with trill.
This engraver creates the following layout object(s):
Section 3.1.129 [TrillPitchAccidental], page 528, Section 3.1.130 [TrillPitchGroup], page 529, and Section 3.1.131 [TrillPitchHead], page 530.

Section 2.2.97 [Repeat_tie_engraver], page 350
Create repeat ties.
Music types accepted:
Section 1.2.53 [repeat-tie-event], page 48.
This engraver creates the following layout object(s):
Section 3.1.94 [RepeatTie], page 490, and Section 3.1.95 [RepeatTieColumn], page 491.

Section 2.2.99 [Rest_engraver], page 350
Engrave rests.
Music types accepted:
Section 1.2.54 [rest-event], page 49,
Properties (read)

\[
middleCPosition \text{ (number)}
\]

The place of the middle C, measured in half staff-spaces. Usually determined by looking at middleCClefPosition and middleCOffset.

This engraver creates the following layout object(s):
Section 3.1.96 [Rest], page 491.

Section 2.2.100 [Rhythmic_column_engraver], page 351
Generate NoteColumn, an object that groups stems, note heads, and rests.
This engraver creates the following layout object(s):
Section 3.1.81 [NoteColumn], page 476.

Section 2.2.101 [Script_column_engraver], page 351
Find potentially colliding scripts and put them into a ScriptColumn object; that will fix the collisions.
This engraver creates the following layout object(s):
Section 3.1.99 [ScriptColumn], page 494.

Section 2.2.102 [Script_engraver], page 351
Handle note scripted articulations.
Music types accepted:
Section 1.2.6 [articulation-event], page 43,
Properties (read)

`scriptDefinitions` (list)
   The description of scripts. This is used by the `Script_engraver` for typesetting note-superscripts and subscripts. See `scm/script.scm` for more information.

This engraver creates the following layout object(s):
Section 3.1.98 [Script], page 493.

**Section 2.2.105 [Slash_repeat_engraver], page 352**
Make beat repeats.
Music types accepted:
Section 1.2.52 [repeat-slash-event], page 48,
This engraver creates the following layout object(s):
Section 3.1.37 [DoubleRepeatSlash], page 423, and Section 3.1.93 [RepeatSlash], page 489.

**Section 2.2.113 [Spanner_break_forbid_engraver], page 354**
Forbid breaks in certain spanners.

**Section 2.2.125 [Text_engraver], page 357**
Create text scripts.
Music types accepted:
Section 1.2.71 [text-script-event], page 51,
This engraver creates the following layout object(s):
Section 3.1.124 [TextScript], page 519.

**Section 2.2.127 [Tie_engraver], page 358**
Generate ties between note heads of equal pitch.
Music types accepted:
Section 1.2.73 [tie-event], page 51,
Properties (read)

`skipTypesetting` (boolean)
   If true, no typesetting is done, speeding up the interpretation phase. Useful for debugging large scores.

`tieWaitForNote` (boolean)
   If true, tied notes do not have to follow each other directly. This can be used for writing out arpeggios.

Properties (write)

`tieMelismaBusy` (boolean)
   Signal whether a tie is present.

This engraver creates the following layout object(s):
Section 3.1.126 [Tie], page 523, and Section 3.1.127 [TieColumn], page 525.
Section 2.2.132 [Trill_spanner_engraver], page 360
Create trill spanner from an event.
Music types accepted:
Section 1.2.77 [trill-span-event], page 52,
Properties (read)

  currentCommandColumn (graphical (layout) object)
    Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

  currentMusicalColumn (graphical (layout) object)
    Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).

This engraver creates the following layout object(s):
Section 3.1.132 [TrillSpanner], page 531.

Section 2.2.133 [Tuplet_engraver], page 361
Catch tuplet events and generate appropriate bracket.
Music types accepted:
Section 1.2.78 [tuplet-span-event], page 52,
Properties (read)

  tupletFullLength (boolean)
    If set, the tuplet is printed up to the start of the next note.

  tupletFullLengthNote (boolean)
    If set, end at the next note, otherwise end on the matter (time signatures, etc.) before the note.

This engraver creates the following layout object(s):
Section 3.1.133 [TupletBracket], page 532, and Section 3.1.134 [Tuplet-Number], page 534.

Section 2.2.135 [Vaticana_ligature_engraver], page 361
Handle ligatures by glueing special ligature heads together.
Music types accepted:
Section 1.2.32 [ligature-event], page 46, and Section 1.2.50 [pes-or-flexa-event], page 48,
This engraver creates the following layout object(s):
Section 3.1.33 [DotColumn], page 419, and Section 3.1.137 [VaticanaLigature], page 537.

2.1.33 Voice
Corresponds to a voice on a staff. This context handles the conversion of dynamic signs, stems, beams, super- and subscripts, slurs, ties, and rests.
You have to instantiate this explicitly if you want to have multiple voices on the same staff.
This context creates the following layout object(s):
Section 3.1.9 [Arpeggio], page 386, Section 3.1.19 [Beam], page 397, Section 3.1.20 [BendAfter], page 399, Section 3.1.23 [BreathingSign], page 402, Section 3.1.27 [ClusterSpanner], page 409, Section 3.1.28 [ClusterSpannerBeacon], page 409, Section 3.1.29 [CombineTextScript], page 410, Section 3.1.34 [Dots], page 419, Section 3.1.35 [DoublePercentRepeat], page 420, Section 3.1.36 [DoublePercentRepeatCounter], page 421, Section 3.1.37 [DoubleRepeatSlash], page 423, Section 3.1.38 [DynamicLineSpanner], page 424, Section 3.1.39 [DynamicText], page 425, Section 3.1.40 [DynamicTextSpanner], page 427, Section 3.1.42 [Fingering], page 429, Section 3.1.44 [Flag], page 432, Section 3.1.48 [Glissando], page 437, Section 3.1.52 [Hairpin], page 440, Section 3.1.56 [InstrumentSwitch], page 444, Section 3.1.60 [LaissezVibrerTie], page 452, Section 3.1.61 [LaissezVibrerTieColumn], page 453, Section 3.1.64 [LigatureBracket], page 456, Section 3.1.75 [MultiMeasureRest], page 468, Section 3.1.76 [MultiMeasureRestNumber], page 469, Section 3.1.77 [MultiMeasureRestScript], page 471, Section 3.1.78 [MultiMeasureRestText], page 472, Section 3.1.81 [NoteColumn], page 476, Section 3.1.82 [NoteHead], page 477, Section 3.1.84 [NoteSpacing], page 478, Section 3.1.88 [PercentRepeat], page 482, Section 3.1.89 [PercentRepeatCounter], page 483, Section 3.1.90 [PhrasingSlur], page 484, Section 3.1.93 [RepeatSlash], page 489, Section 3.1.94 [RepeatTie], page 490, Section 3.1.95 [RepeatTieColumn], page 491, Section 3.1.96 [Rest], page 491, Section 3.1.98 [Script], page 493, Section 3.1.99 [ScriptColumn], page 494, Section 3.1.101 [Slur], page 494, Section 3.1.111 [Stem], page 504, Section 3.1.112 [StemStub], page 506, Section 3.1.113 [StemTremolo], page 507, Section 3.1.114 [StringNumber], page 508, Section 3.1.115 [StrokeFinger], page 510, Section 3.1.124 [TextScript], page 519, Section 3.1.125 [TextSpanner], page 521, Section 3.1.126 [Tie], page 523, Section 3.1.127 [TieColumn], page 525, Section 3.1.129 [TrillPitchAccidental], page 528, Section 3.1.130 [TrillPitchGroup], page 529, Section 3.1.131 [TrillPitchHead], page 530, Section 3.1.132 [TrillSpanner], page 531, Section 3.1.133 [TupletBracket], page 532, Section 3.1.134 [TupletNumber], page 534, and Section 3.1.140 [VoiceFollower], page 540.

This is a ‘Bottom’ context; no contexts will be created implicitly from it.

This context cannot contain other contexts.

This context is built from the following engraver(s):

Section 2.2.3 [Arpeggio_engraver], page 315
Generate an Arpeggio symbol.

Music types accepted:
Section 1.2.5 [arpeggio-event], page 43,
This engraver creates the following layout object(s):
Section 3.1.9 [Arpeggio], page 386.

Section 2.2.4 [Auto_beam_engraver], page 315
Generate beams based on measure characteristics and observed Stems. Uses baseMoment, beatStructure, beamExceptions, measureLength, and measurePosition to decide when to start and stop a beam. Overriding beaming is done through Section 2.2.119 [Stem_engraver], page 355, properties stemLeftBeamCount and stemRightBeamCount.

Music types accepted:
Section 1.2.9 [beam-forbid-event], page 43,
Properties (read)

autoBeaming (boolean)
If set to true then beams are generated automatically.
**baseMoment** (moment)
Smallest unit of time that will stand on its own as a subdivided section.

**beamExceptions** (list)
An alist of exceptions to autobeam rules that normally end on beats.

**beamHalfMeasure** (boolean)
Whether to allow a beam to begin halfway through the measure in triple time, which could look like 6/8.

**beatStructure** (list)
List of **baseMoments** that are combined to make beats.

**subdivideBeams** (boolean)
If set, multiple beams will be subdivided at **baseMoment** positions by only drawing one beam over the beat.

This engraver creates the following layout object(s):
Section 3.1.19 [Beam], page 397.

**Section 2.2.10 [Beam_engraver], page 318**
Handle Beam events by engraving beams. If omitted, then notes are printed with flags instead of beams.
Music types accepted:
Section 1.2.8 [beam-event], page 43,
Properties (read)

**baseMoment** (moment)
Smallest unit of time that will stand on its own as a subdivided section.

**beamMelismaBusy** (boolean)
Signal if a beam is present.

**beatStructure** (list)
List of **baseMoments** that are combined to make beats.

**subdivideBeams** (boolean)
If set, multiple beams will be subdivided at **baseMoment** positions by only drawing one beam over the beat.

Properties (write)

**forbidBreak** (boolean)
If set to #t, prevent a line break at this point.

This engraver creates the following layout object(s):
Section 3.1.19 [Beam], page 397.

**Section 2.2.12 [Bend_engraver], page 319**
Create fall spanners.
Music types accepted:
Section 1.2.10 [bend-after-event], page 43,
This engraver creates the following layout object(s):
Section 3.1.20 [BendAfter], page 399.

Section 2.2.14 [Breathing_sign_engraver], page 320
Create a breathing sign.
Music types accepted:
Section 1.2.14 [breathing-event], page 44,
This engraver creates the following layout object(s):
Section 3.1.23 [BreathingSign], page 402.

Section 2.2.16 [Chord_tremolo_engraver], page 321
Generate beams for tremolo repeats.
Music types accepted:
Section 1.2.76 [tremolo-span-event], page 52,
This engraver creates the following layout object(s):
Section 3.1.19 [Beam], page 397.

Section 2.2.18 [Cluster_spanner_engraver], page 321
Engrave a cluster using Spanner notation.
Music types accepted:
Section 1.2.15 [cluster-note-event], page 44,
This engraver creates the following layout object(s):
Section 3.1.27 [ClusterSpanner], page 409, and Section 3.1.28 [ClusterSpannerBeacon], page 409.

Section 2.2.28 [Dots_engraver], page 325
Create Section 3.1.34 [Dots], page 419, objects for Section 3.2.98 [rhythmic-head-interface], page 601s.
This engraver creates the following layout object(s):
Section 3.1.34 [Dots], page 419.

Section 2.2.29 [Double_percent_repeat_engraver], page 326
Make double measure repeats.
Music types accepted:
Section 1.2.19 [double-percent-event], page 44,
Properties (read)

  countPercentRepeats (boolean)
      If set, produce counters for percent repeats.

  measureLength (moment)
      Length of one measure in the current time signature.

  repeatCountVisibility (procedure)
      A procedure taking as arguments an integer and context, returning whether the corresponding percent repeat number should be printed when countPercentRepeats is set.
Properties (write)

forbidBreak (boolean)
   If set to \texttt{true}, prevent a line break at this point.

This engraver creates the following layout object(s):
Section 3.1.35 \texttt{[DoublePercentRepeat]}, page 420, and Section 3.1.36 \texttt{[DoublePercentRepeatCounter]}, page 421.

\textbf{Section 2.2.32 \texttt{[Dynamic\_align\_engraver], page 327}}
Align hairpins and dynamic texts on a horizontal line.

Properties (read)

currentMusicalColumn (graphical (layout) object)
   Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).

This engraver creates the following layout object(s):
Section 3.1.38 \texttt{[DynamicLineSpanner]}, page 424.

\textbf{Section 2.2.33 \texttt{[Dynamic\_engraver], page 327}}
Create hairpins, dynamic texts and dynamic text spanners.
Music types accepted:
Section 1.2.1 \texttt{[absolute-dynamic-event]}, page 42, Section 1.2.13 \texttt{[break-span-event]}, page 44, and Section 1.2.63 \texttt{[span-dynamic-event]}, page 50.

Properties (read)

crescendoSpanner (symbol)
   The type of spanner to be used for crescendi.
   Available values are \texttt{‘hairpin’} and \texttt{‘text’}. If unset, a hairpin crescendo is used.

crescendoText (markup)
   The text to print at start of non-hairpin crescendo, i.e., \texttt{‘cresc.’}.

currentMusicalColumn (graphical (layout) object)
   Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).

decrescendoSpanner (symbol)
   The type of spanner to be used for decrescendi.
   Available values are \texttt{‘hairpin’} and \texttt{‘text’}. If unset, a hairpin decrescendo is used.

decrescendoText (markup)
   The text to print at start of non-hairpin decrescendo, i.e., \texttt{‘dim.’}.

This engraver creates the following layout object(s):
Section 3.1.39 \texttt{[DynamicText]}, page 425, Section 3.1.40 \texttt{[DynamicTextSpanner]}, page 427, and Section 3.1.52 \texttt{[Hairpin]}, page 440.

\textbf{Section 2.2.40 \texttt{[Fingering\_engraver], page 329}}
Create fingering scripts.
Music types accepted:
Section 1.2.23 [fingering-event], page 45,
This engraver creates the following layout object(s):
Section 3.1.42 [Fingering], page 429.

Section 2.2.41 [Font_size_engraver], page 330
Put fontSize into font-size grob property.
Properties (read)

fontSize (number)
The relative size of all grobs in a context.

Section 2.2.43 [Forbid_line_break_engraver], page 330
Forbid line breaks when note heads are still playing at some point.
Properties (read)

busyGrobs (list)
A queue of (end-moment . grob) cons cells.
This is for internal (C++) use only. This property contains the grobs which are still busy (e.g.
note heads, spanners, etc.).

Properties (write)

forbidBreak (boolean)
If set to #t, prevent a line break at this point.

Section 2.2.45 [Glissando_engraver], page 331
Engrave glissandi.
Music types accepted:
Section 1.2.25 [glissando-event], page 45,
Properties (read)

glissandoMap (list)
A map in the form of '((source1 . target1)
(source2 . target2) (source3 . targetn)) showing the glissandi to be drawn for note columns.
The value '() will default to '((0 . 0) (1 . 1) (n . n)), where n is the minimal number of note-
heads in the two note columns between which the glissandi occur.

This engraver creates the following layout object(s):
Section 3.1.48 [Glissando], page 437.

Section 2.2.46 [Grace_auto_beam_engraver], page 332
Generates one autobeam group across an entire grace phrase. As usual,
any manual beaming or \noBeam will block autobeaming, just like setting the context property 'autoBeaming' to ##f.
Music types accepted:
Section 1.2.9 [beam-forbid-event], page 43,
Properties (read)

autoBeaming (boolean)
If set to true then beams are generated auto-
matically.
This engraver creates the following layout object(s):
Section 3.1.19 [Beam], page 397.

Section 2.2.47 [Grace_beam_engraver], page 332
Handle Beam events by engraving beams. If omitted, then notes are printed with flags instead of beams. Only engraves beams when we are at grace points in time.
Music types accepted:
Section 1.2.8 [beam-event], page 43,
Properties (read)

\texttt{baseMoment} (moment)
Smallest unit of time that will stand on its own as a subdivided section.

\texttt{beamMelismaBusy} (boolean)
Signal if a beam is present.

\texttt{beatStructure} (list)
List of \texttt{baseMoment}s that are combined to make beats.

\texttt{subdivideBeams} (boolean)
If set, multiple beams will be subdivided at \texttt{baseMoment} positions by only drawing one beam over the beat.

This engraver creates the following layout object(s):
Section 3.1.19 [Beam], page 397.

Section 2.2.48 [Grace_engraver], page 333
Set font size and other properties for grace notes.
Properties (read)

\texttt{graceSettings} (list)
Overrides for grace notes. This property should be manipulated through the \texttt{add-grace-property} function.

Section 2.2.52 [Grob_pq_engraver], page 334
Administrate when certain grobs (e.g., note heads) stop playing.
Properties (read)

\texttt{busyGrobs} (list)
A queue of \texttt{(end-moment . grob)} cons cells. This is for internal (C++) use only. This property contains the grobs which are still busy (e.g., note heads, spanners, etc.).

Properties (write)

\texttt{busyGrobs} (list)
A queue of \texttt{(end-moment . grob)} cons cells. This is for internal (C++) use only. This property contains the grobs which are still busy (e.g., note heads, spanners, etc.).
Section 2.2.56 [Instrument_switch_engraver], page 335
Create a cue text for taking instrument.

Properties (read)

\textit{instrumentCueName} (markup)

The name to print if another instrument is to be taken.

This engraver creates the following layout object(s):
Section 3.1.56 [InstrumentSwitch], page 444.

Section 2.2.61 [Laissez_vibrer_engraver], page 337
Create laissez vibrer items.
Music types accepted:
Section 1.2.30 [laissez-vibrer-event], page 45,
This engraver creates the following layout object(s):
Section 3.1.60 [LaissezVibrerTie], page 452, and Section 3.1.61 [LaissezVibrerTieColumn], page 453.

Section 2.2.63 [Ligature_bracket_engraver], page 337
Handle \textit{Ligature_events} by engraving \textit{Ligature} brackets.
Music types accepted:
Section 1.2.32 [ligature-event], page 46,
This engraver creates the following layout object(s):
Section 3.1.64 [LigatureBracket], page 456.

Section 2.2.75 [Multi_measure_rest_engraver], page 341
Engrave multi-measure rests that are produced with ‘R’. It reads \textit{measurePosition} and \textit{internalBarNumber} to determine what number to print over the Section 3.1.75 [MultiMeasureRest], page 468.
Music types accepted:
Section 1.2.39 [multi-measure-articulation-event], page 46,
Section 1.2.40 [multi-measure-rest-event], page 46, and Section 1.2.41 [multi-measure-text-event], page 47,
Properties (read)

\textit{currentCommandColumn} (graphical (layout) object)

Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

\textit{internalBarNumber} (integer)
Contains the current bar number. This property is used for internal timekeeping, among others by the \textit{Accidental_engraver}.

\textit{measurePosition} (moment)
How much of the current measure have we had. This can be set manually to create incomplete measures.

\textit{restNumberThreshold} (number)
If a multimeasure rest has more measures than this, a number is printed.
**whichBar** (string)
This property is read to determine what type of bar line to create.
Example:

```latex
\set Staff.whichBar = ".|:
```
This will create a start-repeat bar in this staff only. Valid values are described in *scm/bar-line.scm*.

This engraver creates the following layout object(s):
Section 3.1.75 [MultiMeasureRest], page 468, Section 3.1.76 [MultiMeasureRestNumber], page 469, Section 3.1.77 [MultiMeasureRestScript], page 471, and Section 3.1.78 [MultiMeasureRestText], page 472.

**Section 2.2.76 [New_fingering_engraver], page 342**
Create fingering scripts for notes in a new chord. This engraver is ill-named, since it also takes care of articulations and harmonic note heads.

Properties (read)

- **fingeringOrientations** (list)
  A list of symbols, containing ‘left’, ‘right’, ‘up’ and/or ‘down’. This list determines where fingerings are put relative to the chord being fingered.

- **harmonicDots** (boolean)
  If set, harmonic notes in dotted chords get dots.

- **stringNumberOrientations** (list)
  See fingeringOrientations.

- **strokeFingerOrientations** (list)
  See fingeringOrientations.

This engraver creates the following layout object(s):
Section 3.1.42 [Fingering], page 429, Section 3.1.98 [Script], page 493, Section 3.1.114 [StringNumber], page 508, and Section 3.1.115 [StrokeFinger], page 510.

**Section 2.2.77 [Note_head_line_engraver], page 343**
Engrave a line between two note heads in a staff switch if followVoice is set.

Properties (read)

- **followVoice** (boolean)
  If set, note heads are tracked across staff switches by a thin line.

This engraver creates the following layout object(s):
Section 3.1.140 [VoiceFollower], page 540.

**Section 2.2.78 [Note_heads_engraver], page 343**
Generate note heads.

Music types accepted:
Section 1.2.43 [note-event], page 47,
Properties (read)

middleCPosition (number)
  The place of the middle C, measured in half staff-spaces. Usually determined by looking at middleCClefPosition and middleCOffset.

staffLineLayoutFunction (procedure)
  Layout of staff lines, traditional, or semitone.

This engraver creates the following layout object(s):
Section 3.1.82 [NoteHead], page 477.

Section 2.2.81 [Note_spacing_engraver], page 344
  Generate NoteSpacing, an object linking horizontal lines for use in spacing.
  This engraver creates the following layout object(s):
  Section 3.1.84 [NoteSpacing], page 478.

Section 2.2.83 [Output_property_engraver], page 344
  Apply a procedure to any grob acknowledged.
  Music types accepted:
  Section 1.2.4 [apply-output-event], page 43,

Section 2.2.87 [Part_combine_engraver], page 346
  Part combine engraver for orchestral scores: Print markings ‘a2’, ‘Solo’, ‘Solo II’, and ‘unisono’.
  Music types accepted:
  Section 1.2.43 [note-event], page 47, and Section 1.2.47 [part-combine-event], page 48,

Properties (read)

aDueText (markup)
  Text to print at a unisono passage.

partCombineTextsOnNote (boolean)
  Print part-combine texts only on the next note rather than immediately on rests or skips.

printPartCombineTexts (boolean)
  Set ‘Solo’ and ‘A due’ texts in the part combiner?

soloIIText (markup)
  The text for the start of a solo for voice ‘two’ when part-combining.

soloText (markup)
  The text for the start of a solo when part-combining.

This engraver creates the following layout object(s):
Section 3.1.29 [CombineTextScript], page 410.

Section 2.2.88 [Percent_repeat_engraver], page 346
  Make whole measure repeats.
Music types accepted:
Section 1.2.49 [percent-event], page 48,
Properties (read)

`countPercentRepeats` (boolean)
If set, produce counters for percent repeats.

`currentCommandColumn` (graphical (layout) object)
Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

`repeatCountVisibility` (procedure)
A procedure taking as arguments an integer and context, returning whether the corresponding percent repeat number should be printed when `countPercentRepeats` is set.

This engraver creates the following layout object(s):
Section 3.1.88 [PercentRepeat], page 482, and Section 3.1.89 [PercentRepeatCounter], page 483.

Section 2.2.89 [Phrasing_slur_engraver], page 347
Print phrasing slurs. Similar to Section 2.2.106 [Slur_engraver], page 352.
Music types accepted:
Section 1.2.43 [note-event], page 47, and Section 1.2.51 [phrasing-slur-event], page 48,
This engraver creates the following layout object(s):
Section 3.1.90 [PhrasingSlur], page 484.

Section 2.2.94 [Pitched_trill_engraver], page 349
Print the bracketed note head after a note head with trill.
This engraver creates the following layout object(s):
Section 3.1.129 [TrillPitchAccidental], page 528, Section 3.1.130 [TrillPitchGroup], page 529, and Section 3.1.131 [TrillPitchHead], page 530.

Section 2.2.97 [Repeat_tie_engraver], page 350
Create repeat ties.
Music types accepted:
Section 1.2.53 [repeat-tie-event], page 48,
This engraver creates the following layout object(s):
Section 3.1.94 [RepeatTie], page 490, and Section 3.1.95 [RepeatTieColumn], page 491.

Section 2.2.99 [Rest_engraver], page 350
Engrave rests.
Music types accepted:
Section 1.2.54 [rest-event], page 49,
Properties (read)

`middleCPosition` (number)
The place of the middle C, measured in half staff-spaces. Usually determined by looking at middleCClefPosition and middleCOffset.
This engraver creates the following layout object(s):
Section 3.1.96 [Rest], page 491.

Section 2.2.100 [Rhythmic_column_engraver], page 351
Generate NoteColumn, an object that groups stems, note heads, and rests.
This engraver creates the following layout object(s):
Section 3.1.81 [NoteColumn], page 476.

Section 2.2.101 [Script_column_engraver], page 351
Find potentially colliding scripts and put them into a ScriptColumn object; that will fix the collisions.
This engraver creates the following layout object(s):
Section 3.1.99 [ScriptColumn], page 494.

Section 2.2.102 [Script_engraver], page 351
Handle note scripted articulations.
Music types accepted:
Section 1.2.6 [articulation-event], page 43,
Properties (read)

\[
\text{scriptDefinitions} \ (\text{list})
\]
   The description of scripts. This is used by the \text{Script_engraver} for typesetting note-superscripts and subscripts. See \text{scm/script.scm} for more information.
This engraver creates the following layout object(s):
Section 3.1.98 [Script], page 493.

Section 2.2.105 [Slash_repeat_engraver], page 352
Make beat repeats.
Music types accepted:
Section 1.2.52 [repeat-slash-event], page 48,
This engraver creates the following layout object(s):
Section 3.1.37 [DoubleRepeatSlash], page 423, and Section 3.1.93 [RepeatSlash], page 489.

Section 2.2.106 [Slur_engraver], page 352
Build slur grobs from slur events.
Music types accepted:
Section 1.2.43 [note-event], page 47, and Section 1.2.58 [slur-event], page 49,
Properties (read)

\[
\text{doubleSlurs} \ (\text{boolean})
\]
   If set, two slurs are created for every slurred note, one above and one below the chord.

\[
\text{slurMelismaBusy} \ (\text{boolean})
\]
   Signal if a slur is present.
This engraver creates the following layout object(s):
Section 3.1.101 [Slur], page 494.
Section 2.2.113 [Spanner_break_forbid_engraver], page 354
Forbid breaks in certain spanners.

Section 2.2.119 [Stem_engraver], page 355
Create stems, flags and single-stem tremolos. It also works together with the beam engraver for overriding beaming.

Music types accepted:
Section 1.2.75 [tremolo-event], page 52, and Section 1.2.78 [tuplet-span-event], page 52,

Properties (read)

stemLeftBeamCount (integer)
Specify the number of beams to draw on the left side of the next note. Overrides automatic beaming. The value is only used once, and then it is erased.

stemRightBeamCount (integer)
See stemLeftBeamCount.

whichBar (string)
This property is read to determine what type of bar line to create.
Example:
\set Staff.whichBar = ".|:
This will create a start-repeat bar in this staff only. Valid values are described in scm/bar-line.scm.

This engraver creates the following layout object(s):
Section 3.1.44 [Flag], page 432, Section 3.1.111 [Stem], page 504, Section 3.1.112 [StemStub], page 506, and Section 3.1.113 [StemTremolo], page 507.

Section 2.2.125 [Text_engraver], page 357
Create text scripts.

Music types accepted:
Section 1.2.71 [text-script-event], page 51,

This engraver creates the following layout object(s):
Section 3.1.124 [TextScript], page 519.

Section 2.2.126 [Text_spanner_engraver], page 358
Create text spanner from an event.

Music types accepted:
Section 1.2.72 [text-span-event], page 51,

Properties (read)

currentMusicalColumn (graphical (layout) object)
Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).

This engraver creates the following layout object(s):
Section 3.1.125 [TextSpanner], page 521.
Section 2.2.127 [Tie_engraver], page 358
Generate ties between note heads of equal pitch.
Music types accepted:
Section 1.2.73 [tie-event], page 51,
Properties (read)

skipTypesetting (boolean)
If true, no typesetting is done, speeding up
the interpretation phase. Useful for debugging
large scores.

tieWaitForNote (boolean)
If true, tied notes do not have to follow each
other directly. This can be used for writing out
arpeggios.

Properties (write)

tieMelismaBusy (boolean)
Signal whether a tie is present.

This engraver creates the following layout object(s):
Section 3.1.126 [Tie], page 523, and Section 3.1.127 [TieColumn],
page 525.

Section 2.2.132 [Trill_spanner_engraver], page 360
Create trill spanner from an event.
Music types accepted:
Section 1.2.77 [trill-span-event], page 52,
Properties (read)

currentCommandColumn (graphical (layout)
object)
Grob that is X-parent to all current breakable
(clef, key signature, etc.) items.

currentMusicalColumn (graphical (layout)
object)
Grob that is X-parent to all non-breakable
items (note heads, lyrics, etc.).

This engraver creates the following layout object(s):
Section 3.1.132 [TrillSpanner], page 531.

Section 2.2.133 [Tuplet_engraver], page 361
Catch tuplet events and generate appropriate bracket.
Music types accepted:
Section 1.2.78 [tuplet-span-event], page 52,
Properties (read)

tupletFullLength (boolean)
If set, the tuplet is printed up to the start of
the next note.

tupletFullLengthNote (boolean)
If set, end at the next note, otherwise end on
the matter (time signatures, etc.) before the
note.
This engraver creates the following layout object(s):
Section 3.1.133 [TupletBracket], page 532, and Section 3.1.134 [Tuplet-Number], page 534.

2.2 Engravers and Performers

See Section “Modifying context plug-ins” in Notation Reference.

2.2.1 Accidental engraver

Make accidentals. Catch note heads, ties and notices key-change events. This engraver usually lives at Staff level, but reads the settings for Accidental at Voice level, so you can `override` them at Voice.

Properties (read)

- `accidentalGrouping` (symbol)
  If set to 'voice, accidentals on the same note in different octaves may be horizontally staggered if in different voices.

- `autoAccidentals` (list)
  List of different ways to typeset an accidental.
  For determining when to print an accidental, several different rules are tried. The rule that gives the highest number of accidentals is used. Each entry in the list is either a symbol or a procedure.

  - `symbol` The symbol is the name of the context in which the following rules are to be applied. For example, if context is Section “Score” in Internals Reference then all staves share accidentals, and if context is Section “Staff” in Internals Reference then all voices in the same staff share accidentals, but staves do not.

  - `procedure` The procedure represents an accidental rule to be applied to the previously specified context.

    The procedure takes the following arguments:

    - `context` The current context to which the rule should be applied.
    - `pitch` The pitch of the note to be evaluated.
    - `barnum` The current bar number.
    - `measurepos` The current measure position.

    The procedure returns a pair of booleans. The first states whether an extra natural should be added. The second states whether an accidental should be printed. (`#t . #f`) does not make sense.

- `autoCautionaries` (list)
  List similar to `autoAccidentals`, but it controls cautionary accidentals rather than normal ones. Both lists are tried, and the one giving the most accidentals wins. In case of draw, a normal accidental is typeset.

- `extraNatural` (boolean)
  Whether to typeset an extra natural sign before accidentals that reduce the effect of a previous alteration.
harmonicAccidentals (boolean)
If set, harmonic notes in chords get accidentals.

internalBarNumber (integer)
Contains the current barnumber. This property is used for internal
timekeeping, among others by the Accidental_engraver.

keyAlterations (list)
The current key signature. This is an alist containing (step . alter)
or ((octave . step) . alter), where step is a number in the range
0 to 6 and alter a fraction, denoting alteration. For alterations, use
symbols, e.g. keyAlterations = #=((6 . ,FLAT)).

localAlterations (list)
The key signature at this point in the measure. The format is the
same as for keyAlterations, but can also contain ((octave . name) .
(alter barnumber . measureposition)) pairs.

Properties (write)

localAlterations (list)
The key signature at this point in the measure. The format is the
same as for keyAlterations, but can also contain ((octave . name) .
(alter barnumber . measureposition)) pairs.

This engraver creates the following layout object(s):

Section 3.1.1 [Accidental], page 377, Section 3.1.2 [AccidentalCautionary], page 378,
Section 3.1.3 [AccidentalPlacement], page 379, and Section 3.1.4 [AccidentalSuggestion],
page 380.

Accidental_engraver is part of the following context(s): Section 2.1.12 [GregorianTran-
scriptionStaff], page 106, Section 2.1.14 [KievanStaff], page 130, Section 2.1.17 [Mensural-
Staff], page 157, Section 2.1.22 [PetrucciStaff], page 188, Section 2.1.27 [Staff], page 240, and
Section 2.1.31 [VaticanaStaff], page 276.

2.2.2 Ambitus_engraver
Create an ambitus.

Properties (read)

keyAlterations (list)
The current key signature. This is an alist containing (step . alter)
or ((octave . step) . alter), where step is a number in the range
0 to 6 and alter a fraction, denoting alteration. For alterations, use
symbols, e.g. keyAlterations = #=((6 . ,FLAT)).

middleCClefPosition (number)
The position of the middle C, as determined only by the clef. This can be
calculated by looking at clefPosition and clefGlyph.

middleCCuePosition (number)
The position of the middle C, as determined only by the clef of the
cue notes. This can be calculated by looking at cueClefPosition and
cueClefGlyph.

middleCOffset (number)
The offset of middle C from the position given by middleCClefPosition
This is used for ottava brackets.
**middleCPosition** (number)

The place of the middle C, measured in half staff-spaces. Usually determined by looking at **middleCClefPosition** and **middleCOffset**.

**staffLineLayoutFunction** (procedure)

Layout of staff lines, *traditional*, or *semitone*.

This engraver creates the following layout object(s):

- Section 3.1.3 [AccidentalPlacement], page 379
- Section 3.1.5 [Ambitus], page 382
- Section 3.1.6 [AmbitusAccidental], page 383
- Section 3.1.7 [AmbitusLine], page 384
- Section 3.1.8 [AmbitusNoteHead], page 385

**Ambitus_engraver** is not part of any context.

### 2.2.3 Arpeggio_engraver

Generate an Arpeggio symbol.

Music types accepted:

- Section 1.2.5 [arpeggio-event], page 43

This engraver creates the following layout object(s):

- Section 3.1.9 [Arpeggio], page 386

**Arpeggio_engraver** is part of the following context(s):

- Section 2.1.3 [CueVoice], page 63
- Section 2.1.13 [GregorianTranscriptionVoice], page 117
- Section 2.1.15 [KievanVoice], page 141
- Section 2.1.18 [MensuralVoice], page 169
- Section 2.1.23 [PetrucciVoice], page 199
- Section 2.1.30 [TabVoice], page 263
- Section 2.1.32 [VaticanaVoice], page 287
- Section 2.1.33 [Voice], page 299

### 2.2.4 Auto_beam_engraver

Generate beams based on measure characteristics and observed Stems. Uses **baseMoment**, **beatStructure**, **beamExceptions**, **measureLength**, and **measurePosition** to decide when to start and stop a beam. Overriding beaming is done through Section 2.2.119 [Stem_engraver], page 355, properties **stemLeftBeamCount** and **stemRightBeamCount**.

Music types accepted:

- Section 1.2.9 [beam-forbid-event], page 43

Properties (read)

- **autoBeaming** (boolean)
  
  If set to true then beams are generated automatically.

- **baseMoment** (moment)
  
  Smallest unit of time that will stand on its own as a subdivided section.

- **beamExceptions** (list)
  
  An alist of exceptions to autobeam rules that normally end on beats.

- **beamHalfMeasure** (boolean)
  
  Whether to allow a beam to begin halfway through the measure in triple time, which could look like 6/8.

- **beatStructure** (list)
  
  List of **baseMoments** that are combined to make beats.

- **subdivideBeams** (boolean)
  
  If set, multiple beams will be subdivided at **baseMoment** positions by only drawing one beam over the beat.
This engraver creates the following layout object(s):
Section 3.1.19 [Beam], page 397.

Auto_beam_engraver is part of the following context(s): Section 2.1.3 [CueVoice], page 63,
Section 2.1.6 [DrumVoice], page 83, Section 2.1.13 [GregorianTranscriptionVoice], page 117,
Section 2.1.15 [KievanVoice], page 141, Section 2.1.18 [MensuralVoice], page 169, Section 2.1.23
[PetrucciVoice], page 199, Section 2.1.30 [TabVoice], page 263, Section 2.1.32 [VaticanaVoice],
page 287, and Section 2.1.33 [Voice], page 299.

2.2.5 Axis_group_engraver
Group all objects created in this context in a VerticalAxisGroup spanner.

Properties (read)

```plaintext
currentCommandColumn (graphical (layout) object)
   Grob that is X-parent to all current breakable (clef, key signature, etc.)
   items.

hasAxisGroup (boolean)
   True if the current context is contained in an axis group.

keepAliveInterfaces (list)
   A list of symbols, signifying grob interfaces that are worth keeping a
   staff with remove-empty set around for.
```

Properties (write)

```plaintext
hasAxisGroup (boolean)
   True if the current context is contained in an axis group.
```

This engraver creates the following layout object(s):
Section 3.1.139 [VerticalAxisGroup], page 538.

Axis_group_engraver is part of the following context(s): Section 2.1.2 [ChordNames],
page 60, Section 2.1.5 [DrumStaff], page 76, Section 2.1.7 [Dynamics], page 95, Section 2.1.8
[FiguredBass], page 99, Section 2.1.9 [FretBoards], page 101, Section 2.1.12 [GregorianTranscrip-
tionStaff], page 106, Section 2.1.14 [KievanStaff], page 130, Section 2.1.16 [Lyrics], page 155,
Section 2.1.17 [MensuralStaff], page 157, Section 2.1.19 [NoteNames], page 182, Section 2.1.21
[OneStaff], page 187, Section 2.1.22 [PetrucciStaff], page 188, Section 2.1.25 [RhythmicStaff],
page 215, Section 2.1.27 [Staff], page 240, Section 2.1.29 [TabStaff], page 253, and Section 2.1.31
[VaticanaStaff], page 276.

2.2.6 Balloon_engraver
Create balloon texts.

Music types accepted:
Section 1.2.3 [annotate-output-event], page 43,

This engraver creates the following layout object(s):
Section 3.1.10 [BalloonTextItem], page 388.

Balloon_engraver is not part of any context.

2.2.7 Bar_engraver
Create barlines. This engraver is controlled through the whichBar property. If it has no bar
line to create, it will forbid a linebreak at this point. This engraver is required to trigger the
creation of clefs at the start of systems.
Properties (read)

whichBar (string)
This property is read to determine what type of bar line to create.
Example:
\set Staff.whichBar = ".|:
This will create a start-repeat bar in this staff only. Valid values are described in scm/bar-line.scm.

Properties (write)

forbidBreak (boolean)
If set to #t, prevent a line break at this point.

This engraver creates the following layout object(s):
Section 3.1.11 [BarLine], page 388.

Bar_engraver is part of the following context(s): Section 2.1.5 [DrumStaff], page 76, Section 2.1.7 [Dynamics], page 95, Section 2.1.12 [GregorianTranscriptionStaff], page 106, Section 2.1.14 [KievanStaff], page 130, Section 2.1.17 [MensuralStaff], page 157, Section 2.1.22 [PetrucciStaff], page 188, Section 2.1.25 [RhythmicStaff], page 215, Section 2.1.27 [Staff], page 240, Section 2.1.29 [TabStaff], page 253, and Section 2.1.31 [VaticanaStaff], page 276.

2.2.8 Bar_number_engraver
A bar number is created whenever measurePosition is zero and when there is a bar line (i.e., when whichBar is set). It is put on top of all staves, and appears only at the left side of the staff. The staves are taken from stavesFound, which is maintained by Section 2.2.114 [Staff_collecting_engraver], page 354.

Music types accepted:
Section 1.2.2 [alternative-event], page 42,

Properties (read)

alternativeNumberingStyle (symbol)
The style of an alternative’s bar numbers. Can be numbers for going back to the same number or numbers-with-letters for going back to the same number with letter suffixes. No setting will not go back in measure-number time.

barNumberFormatter (procedure)
A procedure that takes a bar number, measure position, and alternative number and returns a markup of the bar number to print.

barNumberVisibility (procedure)
A procedure that takes a bar number and a measure position and returns whether the corresponding bar number should be printed. Note that the actual print-out of bar numbers is controlled with the break-visibility property.
The following procedures are predefined:
all-bar-numbers-visible
Enable bar numbers for all bars, including the first one and broken bars (which get bar numbers in parentheses).

first-bar-number-invisible
Enable bar numbers for all bars (including broken bars) except the first one. If the first bar is broken, it doesn’t get a bar number either.
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first-bar-number-invisible-save-broken-bars
Enable bar numbers for all bars (including broken bars) except the first one. A broken first bar gets a bar number.

first-bar-number-invisible-and-no-parenthesized-bar-numbers
Enable bar numbers for all bars except the first bar and broken bars. This is the default.

(every-nth-bar-number-visible n)
Assuming n is value 2, for example, this enables bar numbers for bars 2, 4, 6, etc.

(modulo-bar-number-visible n m)
If bar numbers 1, 4, 7, etc., should be enabled, n (the modulo) must be set to 3 and m (the division remainder) to 1.

currentBarNumber (integer)
Contains the current barnumber. This property is incremented at every bar line.

stavesFound (list of grobs)
A list of all staff-symbols found.

whichBar (string)
This property is read to determine what type of bar line to create.
Example:
\set Staff.whichBar = ".|:
This will create a start-repeat bar in this staff only. Valid values are described in scm/bar-line.scm.

Properties (write)
currentBarNumber (integer)
Contains the current barnumber. This property is incremented at every bar line.

This engraver creates the following layout object(s):
Section 3.1.12 [BarNumber], page 392.

Bar_number_engraver is part of the following context(s): Section 2.1.26 [Score], page 219.

2.2.9 Beam_collision_engraver
Help beams avoid colliding with notes and clefs in other voices.

Beam_collision_engraver is part of the following context(s): Section 2.1.26 [Score], page 219.

2.2.10 Beam_engraver
Handle Beam events by engraving beams. If omitted, then notes are printed with flags instead of beams.

Music types accepted:
Section 1.2.8 [beam-event], page 43,

Properties (read)
baseMoment (moment)
Smallest unit of time that will stand on its own as a subdivided section.
beamMelismaBusy (boolean)
  Signal if a beam is present.

beatStructure (list)
  List of baseMoments that are combined to make beats.

subdivideBeams (boolean)
  If set, multiple beams will be subdivided at baseMoment positions by only drawing one beam over the beat.

Properties (write)

forbidBreak (boolean)
  If set to \#t, prevent a line break at this point.

This engraver creates the following layout object(s):

   Section 3.1.19 [Beam], page 397.

Beam_engraver is part of the following context(s): Section 2.1.3 [CueVoice], page 63, Section 2.1.6 [DrumVoice], page 83, Section 2.1.13 [GregorianTranscriptionVoice], page 117, Section 2.1.15 [KievanVoice], page 141, Section 2.1.18 [MensuralVoice], page 169, Section 2.1.20 [NullVoice], page 184, Section 2.1.23 [PetrucciVoice], page 199, Section 2.1.30 [TabVoice], page 263, Section 2.1.32 [VaticanaVoice], page 287, and Section 2.1.33 [Voice], page 299.

2.2.11 Beam_performer

Music types accepted:

   Section 1.2.8 [beam-event], page 43,

Beam_performer is not part of any context.

2.2.12 Bend_engraver

Create fall spanners.

Music types accepted:

   Section 1.2.10 [bend-after-event], page 43,

This engraver creates the following layout object(s):

   Section 3.1.20 [BendAfter], page 399.

Bend_engraver is part of the following context(s): Section 2.1.3 [CueVoice], page 63, Section 2.1.6 [DrumVoice], page 83, Section 2.1.13 [GregorianTranscriptionVoice], page 117, Section 2.1.15 [KievanVoice], page 141, Section 2.1.18 [MensuralVoice], page 169, Section 2.1.23 [PetrucciVoice], page 199, Section 2.1.30 [TabVoice], page 263, Section 2.1.32 [VaticanaVoice], page 287, and Section 2.1.33 [Voice], page 299.

2.2.13 Break_align_engraver

Align grobs with corresponding break-align-symbols into groups, and order the groups according to breakAlignOrder. The left edge of the alignment gets a separate group, with a symbol left-edge.

This engraver creates the following layout object(s):

   Section 3.1.21 [BreakAlignGroup], page 400, Section 3.1.22 [BreakAlignment], page 400, and Section 3.1.63 [LeftEdge], page 454.

Break_align_engraver is part of the following context(s): Section 2.1.26 [Score], page 219.
2.2.14 Breathing_sign_engraver

Create a breathing sign.

Music types accepted:

Section 1.2.14 [breathing-event], page 44,
This engraver creates the following layout object(s):
Section 3.1.23 [BreathingSign], page 402.

Breathing_sign_engraver is part of the following context(s): Section 2.1.3 [CueVoice], page 63, Section 2.1.6 [DrumVoice], page 83, Section 2.1.13 [GregorianTranscriptionVoice], page 117, Section 2.1.15 [KievanVoice], page 141, Section 2.1.18 [MensuralVoice], page 169, Section 2.1.23 [PetrucciVoice], page 199, Section 2.1.30 [TabVoice], page 263, Section 2.1.32 [VaticanaVoice], page 287, and Section 2.1.33 [Voice], page 299.

2.2.15 Chord_name_engraver

Catch note and rest events and generate the appropriate chordname.

Music types accepted:

Section 1.2.43 [note-event], page 47, and Section 1.2.54 [rest-event], page 49,
Properties (read)

chordChanges (boolean)
   Only show changes in chords scheme?

chordNameExceptions (list)
   An alist of chord exceptions. Contains (chord . markup) entries.

chordNameExceptions (list)
   An alist of chord exceptions. Contains (chord . markup) entries.

chordNameFunction (procedure)
   The function that converts lists of pitches to chord names.

chordNoteNamer (procedure)
   A function that converts from a pitch object to a text markup. Used for single pitches.

chordRootNamer (procedure)
   A function that converts from a pitch object to a text markup. Used for chords.

lastChord (markup)
   Last chord, used for detecting chord changes.

majorSevenSymbol (markup)
   How should the major 7th be formatted in a chord name?

noChordSymbol (markup)
   Markup to be displayed for rests in a ChordNames context.

Properties (write)

lastChord (markup)
   Last chord, used for detecting chord changes.

This engraver creates the following layout object(s):
Section 3.1.24 [ChordName], page 404.
Chord_name_engraver is part of the following context(s): Section 2.1.2 [ChordNames], page 60.
2.2.16 Chord_tremolo_engraver

Generate beams for tremolo repeats.

Music types accepted:
Section 1.2.76 [tremolo-span-event], page 52,
This engraver creates the following layout object(s):
Section 3.1.19 [Beam], page 397.

Chord_tremolo_engraver is part of the following context(s): Section 2.1.3 [CueVoice],
page 63, Section 2.1.6 [DrumVoice], page 83, Section 2.1.13 [GregorianTranscriptionVoice],
page 117, Section 2.1.15 [KievanVoice], page 141, Section 2.1.18 [MensuralVoice], page 169,
Section 2.1.23 [PetrucciVoice], page 199, Section 2.1.30 [TabVoice], page 263, Section 2.1.32
[VaticanaVoice], page 287, and Section 2.1.33 [Voice], page 299.

2.2.17 Clef_engraver

Determine and set reference point for pitches.

Properties (read)

clefGlyph (string)
   Name of the symbol within the music font.

clefPosition (number)
   Where should the center of the clef symbol go, measured in half staff
   spaces from the center of the staff.

clefTransposition (integer)
   Add this much extra transposition. Values of 7 and -7 are common.

clefTranspositionStyle (symbol)
   Determines the way the ClefModifier grob is displayed. Possible values
   are 'default', 'parenthesized' and 'bracketed'.

explicitClefVisibility (vector)
   'break-visibility' function for clef changes.

forceClef (boolean)
   Show clef symbol, even if it has not changed. Only active for the first
   clef after the property is set, not for the full staff.

This engraver creates the following layout object(s):
Section 3.1.25 [Clef], page 405, and Section 3.1.26 [ClefModifier], page 407.

Clef_engraver is part of the following context(s): Section 2.1.5 [DrumStaff], page 76,
Section 2.1.12 [GregorianTranscriptionStaff], page 106, Section 2.1.14 [KievanStaff], page 130,
Section 2.1.17 [MensuralStaff], page 157, Section 2.1.22 [PetrucciStaff], page 188, Section 2.1.27
[Staff], page 240, Section 2.1.29 [TabStaff], page 253, and Section 2.1.31 [VaticanaStaff],
page 276.

2.2.18 Cluster_spanner_engraver

Engrave a cluster using Spanner notation.

Music types accepted:
Section 1.2.15 [cluster-note-event], page 44,
This engraver creates the following layout object(s):
Section 3.1.27 [ClusterSpanner], page 409, and Section 3.1.28 [ClusterSpannerBeacon],
page 409.
Cluster_spanner_engraver is part of the following context(s): Section 2.1.3 [CueVoice], page 63, Section 2.1.13 [GregorianTranscriptionVoice], page 117, Section 2.1.15 [KievanVoice], page 141, Section 2.1.18 [MensuralVoice], page 169, Section 2.1.23 [PetrucciVoice], page 199, Section 2.1.30 [TabVoice], page 263, Section 2.1.32 [VaticanaVoice], page 287, and Section 2.1.33 [Voice], page 299.

2.2.19 Collision_engraver

Collect NoteColumns, and as soon as there are two or more, put them in a NoteCollision object.

This engraver creates the following layout object(s):

Section 3.1.80 [NoteCollision], page 475.

Collision_engraver is part of the following context(s): Section 2.1.5 [DrumStaff], page 76, Section 2.1.12 [GregorianTranscriptionStaff], page 106, Section 2.1.14 [KievanStaff], page 130, Section 2.1.17 [MensuralStaff], page 157, Section 2.1.22 [PetrucciStaff], page 188, Section 2.1.27 [Staff], page 240, Section 2.1.29 [TabStaff], page 253, and Section 2.1.31 [VaticanaStaff], page 276.

2.2.20 Completion_heads_engraver

This engraver replaces Note_heads_engraver. It plays some trickery to break long notes and automatically tie them into the next measure.

Music types accepted:
Section 1.2.43 [note-event], page 47,

Properties (read)

completionFactor (an exact rational or procedure)

When Completion_heads_engraver and Completion_rest_engraver need to split a note or rest with a scaled duration, such as c2*3, this specifies the scale factor to use for the newly-split notes and rests created by the engraver.

If #f, the completion engraver uses the scale-factor of each duration being split.

If set to a callback procedure, that procedure is called with the context of the completion engraver, and the duration to be split.

completionUnit (moment)

Sub-bar unit of completion.

measureLength (moment)

Length of one measure in the current time signature.

measurePosition (moment)

How much of the current measure have we had. This can be set manually to create incomplete measures.

middleCPosition (number)

The place of the middle C, measured in half staff-spaces. Usually determined by looking at middleCClefPosition and middleCOffset.

timing (boolean)

Keep administration of measure length, position, bar number, etc.? Switch off for cadenzas.

Properties (write)

completionBusy (boolean)

Whether a completion-note head is playing.
This engraver creates the following layout object(s):

Section 3.1.82 [NoteHead], page 477, Section 3.1.126 [Tie], page 523, and Section 3.1.127 [TieColumn], page 525.

Completion_heads_engraver is not part of any context.

### 2.2.21 Completion_rest_engraver

This engraver replaces Rest_engraver. It plays some trickery to break long rests into the next measure.

- **Music types accepted:**
  - Section 1.2.54 [rest-event], page 49,

- **Properties (read)**
  - **completionFactor** (an exact rational or procedure)
    - When Completion_heads_engraver and Completion_rest_engraver need to split a note or rest with a scaled duration, such as $c2\times3$, this specifies the scale factor to use for the newly-split notes and rests created by the engraver.
    - If $\#f$, the completion engraver uses the scale-factor of each duration being split.
    - If set to a callback procedure, that procedure is called with the context of the completion engraver, and the duration to be split.

  - **completionUnit** (moment)
    - Sub-bar unit of completion.

  - **measureLength** (moment)
    - Length of one measure in the current time signature.

  - **measurePosition** (moment)
    - How much of the current measure have we had. This can be set manually to create incomplete measures.

  - **middleCPosition** (number)
    - The place of the middle C, measured in half staff-spaces. Usually determined by looking at middleCClefPosition and middleCOffset.

- **Properties (write)**
  - **restCompletionBusy** (boolean)
    - Signal whether a completion-rest is active.

This engraver creates the following layout object(s):

- Section 3.1.96 [Rest], page 491.

Completion_rest_engraver is not part of any context.

### 2.2.22 Concurrent_hairpin_engraver

Collect concurrent hairpins.

- Concurrent_hairpin_engraver is part of the following context(s): Section 2.1.26 [Score], page 219.

### 2.2.23 Control_track_performer

Control_track_performer is not part of any context.
### 2.2.24 Cue_clef_engraver

Determine and set reference point for pitches in cued voices.

**Properties (read)**

- **clefTransposition (integer)**
  
  Add this much extra transposition. Values of 7 and -7 are common.

- **cueClefGlyph (string)**
  
  Name of the symbol within the music font.

- **cueClefPosition (number)**
  
  Where should the center of the clef symbol go, measured in half staff spaces from the center of the staff.

- **cueClefTransposition (integer)**
  
  Add this much extra transposition. Values of 7 and -7 are common.

- **cueClefTranspositionStyle (symbol)**
  
  Determines the way the ClefModifier grob is displayed. Possible values are ‘default’, ‘parenthesized’ and ‘bracketed’.

- **explicitCueClefVisibility (vector)**
  
  ‘break-visibility’ function for cue clef changes.

- **middleCCuePosition (number)**
  
  The position of the middle C, as determined only by the clef of the cue notes. This can be calculated by looking at `cueClefPosition` and `cueClefGlyph`.

This engraver creates the following layout object(s):

- Section 3.1.26 [ClefModifier], page 407, Section 3.1.30 [CueClef], page 411, and Section 3.1.31 [CueEndClef], page 414.

**Cue_clef_engraver** is part of the following context(s): Section 2.1.5 [DrumStaff], page 76, Section 2.1.12 [GregorianTranscriptionStaff], page 106, Section 2.1.14 [KievanStaff], page 130, Section 2.1.17 [MensuralStaff], page 157, Section 2.1.22 [PetrucciStaff], page 188, Section 2.1.27 [Staff], page 240, Section 2.1.29 [TabStaff], page 253, and Section 2.1.31 [VaticanaStaff], page 276.

### 2.2.25 Custos_engraver

Engrave custodes.

This engraver creates the following layout object(s):

- Section 3.1.32 [Custos], page 417.

**Custos_engraver** is part of the following context(s): Section 2.1.17 [MensuralStaff], page 157, Section 2.1.22 [PetrucciStaff], page 188, and Section 2.1.31 [VaticanaStaff], page 276.

### 2.2.26 Default_bar_line_engraver

This engraver determines what kind of automatic bar lines should be produced, and sets `whichBar` accordingly. It should be at the same level as Section 2.2.131 [Timing_translator], page 359.

**Properties (read)**

- **automaticBars (boolean)**
  
  If set to false then bar lines will not be printed automatically; they must be explicitly created with a `\bar` command. Unlike the `\cadenzaOn` keyword, measures are still counted. Bar line generation will resume according to that count if this property is unset.
barAlways (boolean)
If set to true a bar line is drawn after each note.

defaultBarType (string)
Set the default type of bar line. See whichBar for information on available bar types.
This variable is read by Section “Timing_translator” in Internals Reference at Section “Score” in Internals Reference level.

measureLength (moment)
Length of one measure in the current time signature.

measurePosition (moment)
How much of the current measure have we had. This can be set manually to create incomplete measures.

timing (boolean)
Keep administration of measure length, position, bar number, etc.? Switch off for cadenzas.

whichBar (string)
This property is read to determine what type of bar line to create.
Example:
\set Staff.whichBar = ".\|:\"
This will create a start-repeat bar in this staff only. Valid values are described in scm/bar-line.scm.

Default_bar_line_engraver is part of the following context(s): Section 2.1.26 [Score], page 219.

2.2.27 Dot_column_engraver
Engrave dots on dotted notes shifted to the right of the note. If omitted, then dots appear on top of the notes.

This engraver creates the following layout object(s):
Section 3.1.33 [DotColumn], page 419.

Dot_column_engraver is part of the following context(s): Section 2.1.5 [DrumStaff], page 76, Section 2.1.12 [GregorianTranscriptionStaff], page 106, Section 2.1.14 [KievanStaff], page 130, Section 2.1.17 [MensuralStaff], page 157, Section 2.1.22 [PetrucciStaff], page 188, Section 2.1.25 [RhythmicStaff], page 215, Section 2.1.27 [Staff], page 240, Section 2.1.29 [TabStaff], page 253, and Section 2.1.31 [VaticanaStaff], page 276.

2.2.28 Dots_engraver
Create Section 3.1.34 [Dots], page 419, objects for Section 3.2.98 [rhythmic-head-interface], page 601s.

This engraver creates the following layout object(s):
Section 3.1.34 [Dots], page 419.

Dots_engraver is part of the following context(s): Section 2.1.3 [CueVoice], page 63, Section 2.1.6 [DrumVoice], page 83, Section 2.1.13 [GregorianTranscriptionVoice], page 117, Section 2.1.15 [KievanVoice], page 141, Section 2.1.18 [MensuralVoice], page 169, Section 2.1.23 [PetrucciVoice], page 199, Section 2.1.30 [TabVoice], page 263, Section 2.1.32 [VaticanaVoice], page 287, and Section 2.1.33 [Voice], page 299.
2.2.29 Double_percent_repeat_engraver

Make double measure repeats.

Music types accepted:
Section 1.2.19 [double-percent-event], page 44,

Properties (read)

countPercentRepeats (boolean)
    If set, produce counters for percent repeats.

measureLength (moment)
    Length of one measure in the current time signature.

repeatCountVisibility (procedure)
    A procedure taking as arguments an integer and context, returning whether the corresponding percent repeat number should be printed when countPercentRepeats is set.

Properties (write)

forbidBreak (boolean)
    If set to #t, prevent a line break at this point.

This engraver creates the following layout object(s):
Section 3.1.35 [DoublePercentRepeat], page 420, and Section 3.1.36 [DoublePercentRepeat-Counter], page 421.

Double_percent_repeat_engraver is part of the following context(s): Section 2.1.3 [CueVoice], page 63, Section 2.1.6 [DrumVoice], page 83, Section 2.1.13 [GregorianTranscriptionVoice], page 117, Section 2.1.15 [KievanVoice], page 141, Section 2.1.18 [MensuralVoice], page 169, Section 2.1.23 [PetrucciVoice], page 199, Section 2.1.30 [TabVoice], page 263, Section 2.1.32 [VaticanaVoice], page 287, and Section 2.1.33 [Voice], page 299.

2.2.30 Drum_note_performer

Play drum notes.

Music types accepted:
Section 1.2.43 [note-event], page 47,

Drum_note_performer is not part of any context.

2.2.31 Drum_notes_engraver

Generate drum note heads.

Music types accepted:
Section 1.2.43 [note-event], page 47,

Properties (read)

drumStyleTable (hash table)
    A hash table which maps drums to layout settings. Predefined values: 'drums-style', 'agostini-drums-style', 'timbales-style', 'congas-style', 'bongos-style', and 'percussion-style'.
    The layout style is a hash table, containing the drum-pitches (e.g., the symbol 'hihat') as keys, and a list (notehead-style script vertical-position) as values.

This engraver creates the following layout object(s):
Section 3.1.82 [NoteHead], page 477, and Section 3.1.98 [Script], page 493.

Drum_notes_engraver is part of the following context(s): Section 2.1.6 [DrumVoice], page 83.
2.2.32 Dynamic_align_engraver
Align hairpins and dynamic texts on a horizontal line.

Properties (read)

\texttt{currentMusicalColumn} (graphical (layout) object)
Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).

This engraver creates the following layout object(s):
Section 3.1.38 \{DynamicLineSpanner\}, page 424.

\texttt{Dynamic_align_engraver} is part of the following context(s): Section 2.1.3 \{CueVoice\}, page 63, Section 2.1.6 \{DrumVoice\}, page 83, Section 2.1.7 \{Dynamics\}, page 95, Section 2.1.13 \{GregorianTranscriptionVoice\}, page 117, Section 2.1.15 \{KievanVoice\}, page 141, Section 2.1.18 \{MensuralVoice\}, page 169, Section 2.1.23 \{PetrucciVoice\}, page 199, Section 2.1.30 \{TabVoice\}, page 263, Section 2.1.32 \{VaticanaVoice\}, page 287, and Section 2.1.33 \{Voice\}, page 299.

2.2.33 Dynamic_engraver
Create hairpins, dynamic texts and dynamic text spanners.

Music types accepted:
Section 1.2.1 \{absolute-dynamic-event\}, page 42, Section 1.2.13 \{break-span-event\}, page 44, and Section 1.2.63 \{span-dynamic-event\}, page 50.

Properties (read)

\texttt{crescendoSpanner} (symbol)
The type of spanner to be used for crescendi. Available values are ‘hairpin’ and ‘text’. If unset, a hairpin crescendo is used.

\texttt{crescendoText} (markup)
The text to print at start of non-hairpin crescendo, i.e., ‘\textit{cresc}.’.

\texttt{currentMusicalColumn} (graphical (layout) object)
Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).

\texttt{decrescendoSpanner} (symbol)
The type of spanner to be used for decrescendi. Available values are ‘hairpin’ and ‘text’. If unset, a hairpin decrescendo is used.

\texttt{decrescendoText} (markup)
The text to print at start of non-hairpin decrescendo, i.e., ‘\textit{dim}.’.

This engraver creates the following layout object(s):
Section 3.1.39 \{DynamicText\}, page 425, Section 3.1.40 \{DynamicTextSpanner\}, page 427, and Section 3.1.52 \{Hairpin\}, page 440.

\texttt{Dynamic_engraver} is part of the following context(s): Section 2.1.3 \{CueVoice\}, page 63, Section 2.1.6 \{DrumVoice\}, page 83, Section 2.1.7 \{Dynamics\}, page 95, Section 2.1.13 \{GregorianTranscriptionVoice\}, page 117, Section 2.1.15 \{KievanVoice\}, page 141, Section 2.1.18 \{MensuralVoice\}, page 169, Section 2.1.23 \{PetrucciVoice\}, page 199, Section 2.1.30 \{TabVoice\}, page 263, Section 2.1.32 \{VaticanaVoice\}, page 287, and Section 2.1.33 \{Voice\}, page 299.

2.2.34 Dynamic_performer
Music types accepted:
Section 1.2.1 \{absolute-dynamic-event\}, page 42, Section 1.2.17 \{crescendo-event\}, page 44, and Section 1.2.18 \{decrescendo-event\}, page 44,
Properties (read)

**dynamicAbsoluteVolumeFunction** (procedure)
A procedure that takes one argument, the text value of a dynamic event, and returns the absolute volume of that dynamic event.

**instrumentEqualizer** (procedure)
A function taking a string (instrument name), and returning a \((\min, \max)\) pair of numbers for the loudness range of the instrument.

**midiInstrument** (string)
Name of the MIDI instrument to use.

**midiMaximumVolume** (number)
Analogous to **midiMinimumVolume**.

**midiMinimumVolume** (number)
Set the minimum loudness for MIDI. Ranges from 0 to 1.

**Dynamic_performer** is not part of any context.

### 2.2.35 Episema_engraver
Create an *Editio Vaticana*-style episema line.

Music types accepted:
- Section 1.2.21 [episema-event], page 45,
- This engraver creates the following layout object(s):
  - Section 3.1.41 [Episema], page 429.

**Episema_engraver** is part of the following context(s): Section 2.1.13 [GregorianTranscriptionVoice], page 117, and Section 2.1.32 [VaticanaVoice], page 287.

### 2.2.36 Extender_engraver
Create lyric extenders.

Music types accepted:
- Section 1.2.16 [completize-extender-event], page 44, and Section 1.2.22 [extender-event], page 45,
- Properties (read)
  - **extendersOverRests** (boolean)
    Whether to continue extenders as they cross a rest.

This engraver creates the following layout object(s):
- Section 3.1.65 [LyricExtender], page 458.

**Extender_engraver** is part of the following context(s): Section 2.1.16 [Lyrics], page 155.

### 2.2.37 Figured_bass_engraver
Make figured bass numbers.

Music types accepted:
- Section 1.2.7 [bass-figure-event], page 43, and Section 1.2.54 [rest-event], page 49,
- Properties (read)
  - **figuredBassAlterationDirection** (direction)
    Where to put alterations relative to the main figure.
figuredBassCenterContinuations (boolean)
Whether to vertically center pairs of extender lines. This does not work
with three or more lines.

figuredBassFormatter (procedure)
A routine generating a markup for a bass figure.

ignoreFiguredBassRest (boolean)
Don’t swallow rest events.

implicitBassFigures (list)
A list of bass figures that are not printed as numbers, but only as
extender lines.

useBassFigureExtenders (boolean)
Whether to use extender lines for repeated bass figures.

This engraver creates the following layout object(s):
Section 3.1.13 [BassFigure], page 394, Section 3.1.14 [BassFigureAlignment], page 394,
Section 3.1.16 [BassFigureBracket], page 396, Section 3.1.17 [BassFigureContinuation], page 396,
and Section 3.1.18 [BassFigureLine], page 396.

Figured_bass_engraver is part of the following context(s): Section 2.1.5 [DrumStaff],
page 76, Section 2.1.8 [FiguredBass], page 99, Section 2.1.12 [GregorianTranscriptionStaff],
page 106, Section 2.1.14 [KievanStaff], page 130, Section 2.1.17 [MensuralStaff], page 157,
Section 2.1.22 [PetrucciStaff], page 188, Section 2.1.27 [Staff], page 240, Section 2.1.29 [Tab-
Staff], page 253, and Section 2.1.31 [VaticanaStaff], page 276.

2.2.38 Figured_bass_position_engraver
Position figured bass alignments over notes.

This engraver creates the following layout object(s):
Section 3.1.15 [BassFigureAlignmentPositioning], page 395.

Figured_bass_position_engraver is part of the following context(s): Section 2.1.5 [DrumStaff],
page 76, Section 2.1.12 [GregorianTranscriptionStaff], page 106, Section 2.1.14 [KievanStaff],
page 130, Section 2.1.17 [MensuralStaff], page 157, Section 2.1.22 [PetrucciStaff], page 188,
Section 2.1.27 [Staff], page 240, Section 2.1.29 [TabStaff], page 253, and Section 2.1.31 [VaticanaStaff],
page 276.

2.2.39 Fingering_column_engraver
Find potentially colliding scripts and put them into a FingeringColumn object; that will fix the
collisions.

This engraver creates the following layout object(s):
Section 3.1.43 [FingeringColumn], page 431.

Fingering_column_engraver is part of the following context(s): Section 2.1.5 [DrumStaff],
page 76, Section 2.1.12 [GregorianTranscriptionStaff], page 106, Section 2.1.14 [KievanStaff],
page 130, Section 2.1.17 [MensuralStaff], page 157, Section 2.1.22 [PetrucciStaff], page 188,
Section 2.1.27 [Staff], page 240, Section 2.1.29 [TabStaff], page 253, and Section 2.1.31 [VaticanaStaff],
page 276.

2.2.40 Fingering_engraver
Create fingering scripts.

Music types accepted:
Section 1.2.23 [fingering-event], page 45,
This engraver creates the following layout object(s):
Section 3.1.42 [Fingering], page 429.

Fingering_engraver is part of the following context(s): Section 2.1.3 [CueVoice], page 63, Section 2.1.13 [GregorianTranscriptionVoice], page 117, Section 2.1.15 [KievanVoice], page 141, Section 2.1.18 [MensuralVoice], page 169, Section 2.1.23 [PetrucciVoice], page 199, Section 2.1.32 [VaticanaVoice], page 287, and Section 2.1.33 [Voice], page 299.

2.2.41 Font_size_engraver
Put fontSize into font-size grob property.

Properties (read)

fontSize (number)
The relative size of all grobs in a context.

Font_size_engraver is part of the following context(s): Section 2.1.3 [CueVoice], page 63, Section 2.1.5 [DrumStaff], page 76, Section 2.1.6 [DrumVoice], page 83, Section 2.1.7 [Dynamics], page 95, Section 2.1.9 [FretBoards], page 101, Section 2.1.12 [GregorianTranscriptionStaff], page 106, Section 2.1.13 [GregorianTranscriptionVoice], page 117, Section 2.1.14 [KievanStaff], page 130, Section 2.1.15 [KievanVoice], page 141, Section 2.1.16 [Lyrics], page 155, Section 2.1.17 [MensuralStaff], page 157, Section 2.1.18 [MensuralVoice], page 169, Section 2.1.22 [PetrucciStaff], page 188, Section 2.1.23 [PetrucciVoice], page 199, Section 2.1.25 [RhythmicStaff], page 215, Section 2.1.27 [Staff], page 240, Section 2.1.29 [TabStaff], page 253, Section 2.1.30 [TabVoice], page 263, Section 2.1.31 [VaticanaStaff], page 276, Section 2.1.32 [VaticanaVoice], page 287, and Section 2.1.33 [Voice], page 299.

2.2.42 Footnote_engraver
Create footnote texts.

Properties (read)

currentMusicalColumn (graphical (layout) object)
Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).

This engraver creates the following layout object(s):
Section 3.1.45 [FootnoteItem], page 433, and Section 3.1.46 [FootnoteSpanner], page 434.

Footnote_engraver is part of the following context(s): Section 2.1.26 [Score], page 219.

2.2.43 Forbid_line_break_engraver
Forbid line breaks when note heads are still playing at some point.

Properties (read)

busyGrobs (list)
A queue of (end-moment . grob) cons cells. This is for internal (C++) use only. This property contains the grobs which are still busy (e.g. note heads, spanners, etc.).

Properties (write)

forbidBreak (boolean)
If set to #t, prevent a line break at this point.

Forbid_line_break_engraver is part of the following context(s): Section 2.1.3 [CueVoice], page 63, Section 2.1.6 [DrumVoice], page 83, Section 2.1.13 [GregorianTranscriptionVoice], page 117, Section 2.1.15 [KievanVoice], page 141, Section 2.1.18 [MensuralVoice], page 169, Section 2.1.23 [PetrucciVoice], page 199, Section 2.1.30 [TabVoice], page 263, Section 2.1.32 [VaticanaVoice], page 287, and Section 2.1.33 [Voice], page 299.
2.2.44 Fretboard_engraver

Generate fret diagram from one or more events of type NoteEvent.

Music types accepted:

Section 1.2.23 [fingering-event], page 45, Section 1.2.43 [note-event], page 47, and Section 1.2.67 [string-number-event], page 51,

Properties (read)

chordChanges (boolean)
Only show changes in chords scheme?

defaultStrings (list)
A list of strings to use in calculating frets for tablatures and fretboards if no strings are provided in the notes for the current moment.

highStringOne (boolean)
Whether the first string is the string with highest pitch on the instrument. This used by the automatic string selector for tablature notation.

maximumFretStretch (number)
Don’t allocate frets further than this from specified frets.

minimumFret (number)
The tablature auto string-selecting mechanism selects the highest string with a fret at least minimumFret.

noteToFretFunction (procedure)
Convert list of notes and list of defined strings to full list of strings and fret numbers. Parameters: The context, a list of note events, a list of tabstring events, and the fretboard grob if a fretboard is desired.

predefinedDiagramTable (hash table)
The hash table of predefined fret diagrams to use in FretBoards.

stringTunings (list)
The tablature strings tuning. It is a list of the pitches of each string (starting with the lowest numbered one).

tablatureFormat (procedure)
A function formatting a tablature note head. Called with three arguments: context, string number and, fret number. It returns the text as a markup.

This engraver creates the following layout object(s):

Section 3.1.47 [FretBoard], page 435.

Fretboard_engraver is part of the following context(s): Section 2.1.9 [FretBoards], page 101.

2.2.45 Glissando_engraver

Engrave glissandi.

Music types accepted:

Section 1.2.25 [glissando-event], page 45,

Properties (read)

glissandoMap (list)
A map in the form of `'((source1 . target1) (source2 . target2) (sourceN . targetN)) showing the glissandi to be drawn for note columns. The value `'(()) will default to `'((0 . 0) (1 . 1) (n . n)), where n is the
minimal number of note-heads in the two note columns between which the glissandi occur.

This engraver creates the following layout object(s):
Section 3.1.48 [Glissando], page 437.

Glissando_engraver is part of the following context(s): Section 2.1.3 [CueVoice], page 63, Section 2.1.13 [GregorianTranscriptionVoice], page 117, Section 2.1.15 [KievanVoice], page 141, Section 2.1.18 [MensuralVoice], page 169, Section 2.1.23 [PetrucciVoice], page 199, Section 2.1.30 [TabVoice], page 263, Section 2.1.32 [VaticanaVoice], page 287, and Section 2.1.33 [Voice], page 299.

2.2.46 Grace_auto_beam_engraver
Generates one autobeam group across an entire grace phrase. As usual, any manual beaming or \noBeam will block autobeaming, just like setting the context property 'autoBeaming' to ##f.

Music types accepted:
Section 1.2.9 [beam-forbid-event], page 43,
Properties (read)

autoBeaming (boolean)
If set to true then beams are generated automatically.

This engraver creates the following layout object(s):
Section 3.1.19 [Beam], page 397.

Grace_auto_beam_engraver is part of the following context(s): Section 2.1.3 [CueVoice], page 63, Section 2.1.6 [DrumVoice], page 83, Section 2.1.13 [GregorianTranscriptionVoice], page 117, Section 2.1.15 [KievanVoice], page 141, Section 2.1.18 [MensuralVoice], page 169, Section 2.1.23 [PetrucciVoice], page 199, Section 2.1.30 [TabVoice], page 263, Section 2.1.32 [VaticanaVoice], page 287, and Section 2.1.33 [Voice], page 299.

2.2.47 Grace_beam_engraver
Handle Beam events by engraving beams. If omitted, then notes are printed with flags instead of beams. Only engraves beams when we are at grace points in time.

Music types accepted:
Section 1.2.8 [beam-event], page 43,
Properties (read)

baseMoment (moment)
Smallest unit of time that will stand on its own as a subdivided section.

beamMelismaBusy (boolean)
Signal if a beam is present.

beatStructure (list)
List of baseMoments that are combined to make beats.

subdivideBeams (boolean)
If set, multiple beams will be subdivided at baseMoment positions by only drawing one beam over the beat.

This engraver creates the following layout object(s):
Section 3.1.19 [Beam], page 397.

Grace_beam_engraver is part of the following context(s): Section 2.1.3 [CueVoice], page 63, Section 2.1.6 [DrumVoice], page 83, Section 2.1.13 [GregorianTranscriptionVoice], page 117,
2.2.48 Grace_engraver
Set font size and other properties for grace notes.

Properties (read)

graceSettings (list)
Overrides for grace notes. This property should be manipulated through the add-grace-property function.

Grace_engraver is part of the following context(s): Section 2.1.3 [CueVoice], page 63, Section 2.1.6 [DrumVoice], page 83, Section 2.1.13 [GregorianTranscriptionVoice], page 117, Section 2.1.15 [KievanVoice], page 141, Section 2.1.18 [MensuralVoice], page 169, Section 2.1.23 [PetrucciVoice], page 199, Section 2.1.30 [TabVoice], page 263, Section 2.1.32 [VaticanaVoice], page 287, and Section 2.1.33 [Voice], page 299.

2.2.49 Grace_spacing_engraver
Bookkeeping of shortest starting and playing notes in grace note runs.

Properties (read)

currentMusicalColumn (graphical (layout) object)
Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).

This engraver creates the following layout object(s):
Section 3.1.49 [GraceSpacing], page 438.

Grace_spacing_engraver is part of the following context(s): Section 2.1.26 [Score], page 219.

2.2.50 Grid_line_span_engraver
This engraver makes cross-staff lines: It catches all normal lines and draws a single span line across them.

This engraver creates the following layout object(s):
Section 3.1.50 [GridLine], page 438.

Grid_line_span_engraver is not part of any context.

2.2.51 Grid_point_engraver
Generate grid points.

Properties (read)

gridInterval (moment)
Interval for which to generate GridPoints.

This engraver creates the following layout object(s):
Section 3.1.51 [GridPoint], page 439.

Grid_point_engraver is not part of any context.
2.2.52 Grob_pq_engraver

Administrate when certain grobs (e.g., note heads) stop playing.

Properties (read)

busyGrobs (list)
A queue of \(\text{end-moment . grob}\) cons cells. This is for internal (C++) use only. This property contains the grobs which are still busy (e.g. note heads, spanners, etc.).

Properties (write)

busyGrobs (list)
A queue of \(\text{end-moment . grob}\) cons cells. This is for internal (C++) use only. This property contains the grobs which are still busy (e.g. note heads, spanners, etc.).

Grob_pq_engraver is part of the following context(s): Section 2.1.3 [CueVoice], page 63, Section 2.1.5 [DrumStaff], page 76, Section 2.1.6 [DrumVoice], page 83, Section 2.1.12 [GregorianTranscriptionStaff], page 106, Section 2.1.13 [GregorianTranscriptionVoice], page 117, Section 2.1.14 [KievanStaff], page 130, Section 2.1.15 [KievanVoice], page 141, Section 2.1.17 [MensuralStaff], page 157, Section 2.1.18 [MensuralVoice], page 169, Section 2.1.20 [NullVoice], page 184, Section 2.1.22 [PetrucciStaff], page 188, Section 2.1.23 [PetrucciVoice], page 199, Section 2.1.27 [Staff], page 240, Section 2.1.29 [TabStaff], page 253, Section 2.1.30 [TabVoice], page 263, Section 2.1.31 [VaticanaStaff], page 276, Section 2.1.32 [VaticanaVoice], page 287, and Section 2.1.33 [Voice], page 299.

2.2.53 Horizontal_bracket_engraver

Create horizontal brackets over notes for musical analysis purposes.

Music types accepted:
Section 1.2.44 [note-grouping-event], page 48,
This engraver creates the following layout object(s):
Section 3.1.53 [HorizontalBracket], page 441, and Section 3.1.54 [HorizontalBracketText], page 442.

Horizontal_bracket_engraver is not part of any context.

2.2.54 Hyphen_engraver

Create lyric hyphens, vowel transitions and distance constraints between words.

Music types accepted:
Section 1.2.27 [hyphen-event], page 45, and Section 1.2.81 [vowel-transition-event], page 52,
This engraver creates the following layout object(s):
Section 3.1.66 [LyricHyphen], page 458, Section 3.1.67 [LyricSpace], page 459, and Section 3.1.143 [VowelTransition], page 544.

Hyphen_engraver is part of the following context(s): Section 2.1.16 [Lyrics], page 155.

2.2.55 Instrument_name_engraver

Create a system start text for instrument or vocal names.

Properties (read)

currentCommandColumn (graphical (layout) object)
Grob that is X-parent to all current breakable (clef, key signature, etc.) items.
instrumentName (markup)
The name to print left of a staff. The instrumentName property labels the staff in the first system, and the shortInstrumentName property labels following lines.

shortInstrumentName (markup)
See instrumentName.

shortVocalName (markup)
Name of a vocal line, short version.

goalName (markup)
Name of a vocal line.

This engraver creates the following layout object(s):
Section 3.1.55 [InstrumentName], page 443.

Instrument_name_engraver is part of the following context(s): Section 2.1.1 [ChoirStaff], page 59, Section 2.1.5 [DrumStaff], page 76, Section 2.1.9 [FretBoards], page 101, Section 2.1.11 [GrandStaff], page 104, Section 2.1.12 [GregorianTranscriptionStaff], page 106, Section 2.1.14 [KievanStaff], page 130, Section 2.1.16 [Lyrics], page 155, Section 2.1.17 [MensuralStaff], page 157, Section 2.1.22 [PetrucciStaff], page 188, Section 2.1.24 [PianoStaff], page 212, Section 2.1.25 [RhythmicStaff], page 215, Section 2.1.27 [Staff], page 240, Section 2.1.28 [StaffGroup], page 251, Section 2.1.29 [TabStaff], page 253, and Section 2.1.31 [VaticanaStaff], page 276.

2.2.56 Instrument_switch_engraver
Create a cue text for taking instrument.

Properties (read)

    instrumentCueName (markup)
The name to print if another instrument is to be taken.

This engraver creates the following layout object(s):
Section 3.1.56 [InstrumentSwitch], page 444.

Instrument_switch_engraver is part of the following context(s): Section 2.1.3 [CueVoice], page 63, Section 2.1.6 [DrumVoice], page 83, Section 2.1.13 [GregorianTranscriptionVoice], page 117, Section 2.1.15 [KievanVoice], page 141, Section 2.1.18 [MensuralVoice], page 169, Section 2.1.23 [PetrucciVoice], page 199, Section 2.1.30 [TabVoice], page 263, Section 2.1.32 [VaticanaVoice], page 287, and Section 2.1.33 [Voice], page 299.

2.2.57 Keep_alive_together_engraver
This engraver collects all Hara_kiri_group_spanners that are created in contexts at or below its own. These spanners are then tied together so that one will be removed only if all are removed. For example, if a StaffGroup uses this engraver, then the staves in the group will all be visible as long as there is a note in at least one of them.

Keep_alive_together_engraver is part of the following context(s): Section 2.1.24 [PianoStaff], page 212.

2.2.58 Key_engraver
Engrave a key signature.

Music types accepted:
Section 1.2.28 [key-change-event], page 45,
Properties (read)

createKeyOnClefChange (boolean)
  Print a key signature whenever the clef is changed.

explicitKeySignatureVisibility (vector)
  ‘break-visibility’ function for explicit key changes. ‘\override’ of
  the break-visibility property will set the visibility for normal (i.e.,
  at the start of the line) key signatures.

extraNatural (boolean)
  Whether to typeset an extra natural sign before accidentals that reduce
  the effect of a previous alteration.

keyAlterationOrder (list)
  An alist that defines in what order alterations should be printed. The
  format is (step . alter), where step is a number from 0 to 6 and alter
  from -2 (sharp) to 2 (flat).

keyAlterations (list)
  The current key signature. This is an alist containing (step . alter)
  or ((octave . step) . alter), where step is a number in the range
  0 to 6 and alter a fraction, denoting alteration. For alterations, use
  symbols, e.g. keyAlterations = #\'(6 . ,FLAT)).

lastKeyAlterations (list)
  Last key signature before a key signature change.

middleCClefPosition (number)
  The position of the middle C, as determined only by the clef. This can
  be calculated by looking at clefPosition and clefGlyph.

printKeyCancellation (boolean)
  Print restoration alterations before a key signature change.

Properties (write)

keyAlterations (list)
  The current key signature. This is an alist containing (step . alter)
  or ((octave . step) . alter), where step is a number in the range
  0 to 6 and alter a fraction, denoting alteration. For alterations, use
  symbols, e.g. keyAlterations = #\'(6 . ,FLAT)).

lastKeyAlterations (list)
  Last key signature before a key signature change.

tonic (pitch)
  The tonic of the current scale.

This engraver creates the following layout object(s):

Section 3.1.57 [KeyCancellation], page 446, and Section 3.1.58 [KeySignature], page 448.

Key_engraver is part of the following context(s): Section 2.1.12 [GregorianTranscriptionStaff], page 106, Section 2.1.14 [KievanStaff], page 130, Section 2.1.17 [MensuralStaff], page 157, Section 2.1.22 [PetrucciStaff], page 188, Section 2.1.27 [Staff], page 240, and Section 2.1.31 [VaticanaStaff], page 276.
2.2.59 **Key_performer**

Music types accepted:

- Section 1.2.28 [key-change-event], page 45,
- Properties (read)
  
  \[\text{instrumentTransposition} (\text{pitch})\]

  Define the transposition of the instrument. Its value is the pitch that
  sounds when the instrument plays written middle C. This is used to
  transpose the MIDI output, and "quotes."

**Key_performer** is not part of any context.

2.2.60 **Kievan_ligature_engraver**

Handle **Kievan_ligature_events** by glueing Kievan heads together.

Music types accepted:

- Section 1.2.32 [ligature-event], page 46,
- This engraver creates the following layout object(s):
  - Section 3.1.59 [KievanLigature], page 451.

**Kievan_ligature_engraver** is part of the following context(s): Section 2.1.15 [KievanVoice], page 141.

2.2.61 **Laissez_vibrer_engraver**

Create laissez vibrer items.

Music types accepted:

- Section 1.2.30 [laissez-vibrer-event], page 45,
- This engraver creates the following layout object(s):
  - Section 3.1.60 [LaissezVibrerTie], page 452, and Section 3.1.61 [LaissezVibrerTieColumn], page 453.

**Laissez_vibrer_engraver** is part of the following context(s): Section 2.1.3 [CueVoice], page 63, Section 2.1.6 [DrumVoice], page 83, Section 2.1.13 [GregorianTranscriptionVoice], page 117, Section 2.1.15 [KievanVoice], page 141, Section 2.1.18 [MensuralVoice], page 169, Section 2.1.23 [PetrucciVoice], page 199, Section 2.1.30 [TabVoice], page 263, Section 2.1.32 [VaticanaVoice], page 287, and Section 2.1.33 [Voice], page 299.

2.2.62 **Ledger_line_engraver**

Create the spanner to draw ledger lines, and notices objects that need ledger lines.

This engraver creates the following layout object(s):

- Section 3.1.62 [LedgerLineSpanner], page 453.

**Ledger_line_engraver** is part of the following context(s): Section 2.1.5 [DrumStaff], page 76, Section 2.1.12 [GregorianTranscriptionStaff], page 106, Section 2.1.14 [KievanStaff], page 130, Section 2.1.17 [MensuralStaff], page 157, Section 2.1.22 [PetrucciStaff], page 188, Section 2.1.25 [RhythmicStaff], page 215, Section 2.1.27 [Staff], page 240, Section 2.1.29 [TabStaff], page 253, and Section 2.1.31 [VaticanaStaff], page 276.

2.2.63 **Ligature_bracket_engraver**

Handle **Ligature_events** by engraving Ligature brackets.

Music types accepted:

- Section 1.2.32 [ligature-event], page 46,
This engraver creates the following layout object(s):
Section 3.1.64 [LigatureBracket], page 456.

**Ligature_bracket_engraver** is part of the following context(s): Section 2.1.3 [CueVoice], page 63, Section 2.1.13 [GregorianTranscriptionVoice], page 117, Section 2.1.30 [TabVoice], page 263, and Section 2.1.33 [Voice], page 299.

### 2.2.64 Lyric_engraver

Engrave text for lyrics.

**Music types accepted:**
Section 1.2.34 [lyric-event], page 46,

**Properties (read)**

- `ignoreMelismata` (boolean)
  Ignored melismata for this Section “Lyrics” in *Internals Reference* line.

- `lyricMelismaAlignment` (number)
  Alignment to use for a melisma syllable.

- `searchForVoice` (boolean)
  Signal whether a search should be made of all contexts in the context hierarchy for a voice to provide rhythms for the lyrics.

This engraver creates the following layout object(s):
Section 3.1.68 [LyricText], page 460.

**Lyric_engraver** is part of the following context(s): Section 2.1.16 [Lyrics], page 155.

### 2.2.65 Lyric_performer

**Music types accepted:**
Section 1.2.34 [lyric-event], page 46,

**Lyric_performer** is not part of any context.

### 2.2.66 Mark_engraver

Create **RehearsalMark** objects. It puts them on top of all staves (which is taken from the property `stavesFound`). If moving this engraver to a different context, Section 2.2.114 [Staff_collecting_engraver], page 354, must move along, otherwise all marks end up on the same Y location.

**Music types accepted:**
Section 1.2.35 [mark-event], page 46,

**Properties (read)**

- `markFormatter` (procedure)
  A procedure taking as arguments the context and the rehearsal mark. It should return the formatted mark as a markup object.

- `rehearsalMark` (integer)
  The last rehearsal mark printed.

- `stavesFound` (list of grobs)
  A list of all staff-symbols found.

This engraver creates the following layout object(s):
Section 3.1.92 [RehearsalMark], page 487.

**Mark_engraver** is part of the following context(s): Section 2.1.26 [Score], page 219.
2.2.67 Measure_counter_engraver

This engraver numbers ranges of measures, which is useful in parts as an aid for counting repeated measures. There is no requirement that the affected measures be repeated, however. The user delimits the area to receive a count with `\startMeasureCount` and `\stopMeasureCount`.

Music types accepted:
Section 1.2.36 [measure-counter-event], page 46,
Properties (read)
- `currentBarNumber` (integer)
  Contains the current bar number. This property is incremented at every bar line.
- `currentCommandColumn` (graphical (layout) object)
  Grob that is X-parent to all current breakable (clef, key signature, etc.) items.
- `measurePosition` (moment)
  How much of the current measure have we had. This can be set manually to create incomplete measures.

This engraver creates the following layout object(s):
Section 3.1.69 [MeasureCounter], page 462.
Measure_counter_engraver is not part of any context.

2.2.68 Measure_grouping_engraver

Create `MeasureGrouping` to indicate beat subdivision.
Properties (read)
- `baseMoment` (moment)
  Smallest unit of time that will stand on its own as a subdivided section.
- `beatStructure` (list)
  List of `baseMoment`s that are combined to make beats.
- `currentMusicalColumn` (graphical (layout) object)
  Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).
- `measurePosition` (moment)
  How much of the current measure have we had. This can be set manually to create incomplete measures.

This engraver creates the following layout object(s):
Section 3.1.70 [MeasureGrouping], page 463.
Measure_grouping_engraver is not part of any context.

2.2.69 Measure_spanner_engraver

This engraver creates spanners bounded by the columns that start and end measures in response to `\startMeasureSpanner` and `\stopMeasureSpanner`.

Music types accepted:
Section 1.2.37 [measure-spanner-event], page 46,
Properties (read)
- `currentCommandColumn` (graphical (layout) object)
  Grob that is X-parent to all current breakable (clef, key signature, etc.) items.
measurePosition (moment)

How much of the current measure have we had. This can be set manually to create incomplete measures.

This engraver creates the following layout object(s):
Section 3.1.71 [MeasureSpanner], page 464.
Measure_spanner_engraver is not part of any context.

2.2.70 Melody_engraver

Create information for context dependent typesetting decisions.

This engraver creates the following layout object(s):
Section 3.1.72 [MelodyItem], page 465.
Melody_engraver is not part of any context.

2.2.71 Mensural_ligature_engraver

Handle Mensural_ligature_events by gluing special ligature heads together.

Music types accepted:
Section 1.2.32 [ligature-event], page 46,
This engraver creates the following layout object(s):
Section 3.1.73 [MensuralLigature], page 466.
Mensural_ligature_engraver is part of the following context(s): Section 2.1.18 [MensuralVoice], page 169, and Section 2.1.23 [PetrucciVoice], page 199.

2.2.72 Merge_rests_engraver

Engraver to merge rests in multiple voices on the same staff. This works by gathering all rests at a time step. If they are all of the same length and there are at least two they are moved to the correct location as if there were one voice.

Properties (read)

suspendRestMerging (boolean)

When using the Merge_rests_engraver do not merge rests when this is set to true.

Merge_rests_engraver is not part of any context.

2.2.73 Metronome_mark_engraver

Engrave metronome marking. This delegates the formatting work to the function in the metronomeMarkFormatter property. The mark is put over all staves. The staves are taken from the stavesFound property, which is maintained by Section 2.2.114 [Staff_collecting_engraver], page 354.

Music types accepted:
Section 1.2.70 [tempo-change-event], page 51,
Properties (read)

currentCommandColumn (graphical (layout) object)

Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

currentMusicalColumn (graphical (layout) object)

Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).
metronomeMarkFormatter (procedure)
   How to produce a metronome markup. Called with two arguments: a
   TempoChangeEvent and context.

stavesFound (list of grobs)
   A list of all staff-symbols found.

tempoHideNote (boolean)
   Hide the note = count in tempo marks.

This engraver creates the following layout object(s):
Section 3.1.74 [MetronomeMark], page 466.
Metronome_mark_engraver is part of the following context(s): Section 2.1.26 [Score],
page 219.

2.2.74 Midi_control_change_performer
This performer listens to SetProperty events on context properties for generating MIDI control
changes and prepares them for MIDI output.
Properties (read)

midiBalance (number)
   Stereo balance for the MIDI channel associated with the current con-
   text. Ranges from -1 to 1, where the values -1 (#LEFT), 0 (#CENTER)
   and 1 (#RIGHT) correspond to leftmost emphasis, center balance, and
   rightmost emphasis, respectively.

midiChorusLevel (number)
   Chorus effect level for the MIDI channel associated with the current
   context. Ranges from 0 to 1 (0=off, 1=full effect).

midiExpression (number)
   Expression control for the MIDI channel associated with the current
   context. Ranges from 0 to 1 (0=off, 1=full effect).

midiPanPosition (number)
   Pan position for the MIDI channel associated with the current context.
   Ranges from -1 to 1, where the values -1 (#LEFT), 0 (#CENTER) and 1
   (#RIGHT) correspond to hard left, center, and hard right, respectively.

midiReverbLevel (number)
   Reverb effect level for the MIDI channel associated with the current
   context. Ranges from 0 to 1 (0=off, 1=full effect).

Midi_control_change_performer is not part of any context.

2.2.75 Multi_measure_rest_engraver
Engrave multi-measure rests that are produced with 'R'. It reads measurePosition and
internalBarNumber to determine what number to print over the Section 3.1.75 [MultiMea-
sureRest], page 468.

Music types accepted:
Section 1.2.39 [multi-measure-articulation-event], page 46, Section 1.2.40 [multi-measure-rest-
event], page 46, and Section 1.2.41 [multi-measure-text-event], page 47,
Properties (read)

currentCommandColumn (graphical (layout) object)
   Grob that is X-parent to all current breakable (clef, key signature, etc.)
   items.
internalBarNumber (integer)
Contains the current barnumber. This property is used for internal
timekeeping, among others by the Accidental_ engraver.

measurePosition (moment)
How much of the current measure have we had. This can be set manually
to create incomplete measures.

restNumberThreshold (number)
If a multimeasure rest has more measures than this, a number is printed.

whichBar (string)
This property is read to determine what type of bar line to create.
Example:
\set Staff.whichBar = "\.:"
This will create a start-repeat bar in this staff only. Valid values are
described in scm/bar-line.scm.

This engraver creates the following layout object(s):
Section 3.1.75 [MultiMeasureRest], page 468, Section 3.1.76 [MultiMeasureRestNumber],
page 469, Section 3.1.77 [MultiMeasureRestScript], page 471, and Section 3.1.78 [MultiMea-
sureRestText], page 472.

Multi_measure_rest_engraver is part of the following context(s): Section 2.1.3 [CueVoice],
page 63, Section 2.1.6 [DrumVoice], page 83, Section 2.1.13 [GregorianTranscriptionVoice],
page 117, Section 2.1.15 [KievanVoice], page 141, Section 2.1.18 [MensuralVoice], page 169,
Section 2.1.23 [PetrucciVoice], page 199, Section 2.1.30 [TabVoice], page 263, Section 2.1.32
[VaticanaVoice], page 287, and Section 2.1.33 [Voice], page 299.

2.2.76 New_fingering_engraver
Create fingering scripts for notes in a new chord. This engraver is ill-named, since it also takes
care of articulations and harmonic note heads.

Properties (read)

fingeringOrientations (list)
A list of symbols, containing ‘left’, ‘right’, ‘up’ and/or ‘down’. This
list determines where fingerings are put relative to the chord being fin-
gered.

harmonicDots (boolean)
If set, harmonic notes in dotted chords get dots.

stringNumberOrientations (list)
See fingeringOrientations.

strokeFingerOrientations (list)
See fingeringOrientations.

This engraver creates the following layout object(s):
Section 3.1.42 [Fingering], page 429, Section 3.1.98 [Script], page 493, Section 3.1.114
[StringNumber], page 508, and Section 3.1.115 [StrokeFinger], page 510.

New_fingering_engraver is part of the following context(s): Section 2.1.3 [CueVoice],
page 63, Section 2.1.13 [GregorianTranscriptionVoice], page 117, Section 2.1.15 [KievanVoice],
page 141, Section 2.1.18 [MensuralVoice], page 169, Section 2.1.23 [PetrucciVoice], page 199,
Section 2.1.32 [VaticanaVoice], page 287, and Section 2.1.33 [Voice], page 299.
2.2.77 Note_head_line_engraver

Engrave a line between two note heads in a staff switch if followVoice is set.

Properties (read)

followVoice (boolean)
If set, note heads are tracked across staff switches by a thin line.

This engraver creates the following layout object(s):
Section 3.1.140 [VoiceFollower], page 540.

Note_head_line_engraver is part of the following context(s): Section 2.1.3 [CueVoice], page 63, Section 2.1.13 [GregorianTranscriptionVoice], page 117, Section 2.1.15 [KievanVoice], page 141, Section 2.1.18 [MensuralVoice], page 169, Section 2.1.23 [PetrucciVoice], page 199, Section 2.1.30 [TabVoice], page 263, Section 2.1.32 [VaticanaVoice], page 287, and Section 2.1.33 [Voice], page 299.

2.2.78 Note_heads_engraver

Generate note heads.

Music types accepted:
Section 1.2.43 [note-event], page 47,

Properties (read)

middleCPosition (number)
The place of the middle C, measured in half staff-spaces. Usually determined by looking at middleCClefPosition and middleCOffset.

staffLineLayoutFunction (procedure)
Layout of staff lines, traditional, or semitone.

This engraver creates the following layout object(s):
Section 3.1.82 [NoteHead], page 477.

Note_heads_engraver is part of the following context(s): Section 2.1.3 [CueVoice], page 63, Section 2.1.13 [GregorianTranscriptionVoice], page 117, Section 2.1.15 [KievanVoice], page 141, Section 2.1.18 [MensuralVoice], page 169, Section 2.1.20 [NullVoice], page 184, Section 2.1.23 [PetrucciVoice], page 199, Section 2.1.32 [VaticanaVoice], page 287, and Section 2.1.33 [Voice], page 299.

2.2.79 Note_name_engraver

Print pitches as words.

Music types accepted:
Section 1.2.43 [note-event], page 47,

Properties (read)

noteNameFunction (procedure)
Function used to convert pitches into strings and markups.

noteNameSeparator (string)
String used to separate simultaneous NoteName objects.

printAccidentalNames (boolean or symbol)
Print accidentals in the NoteNames context.

printNotesLanguage (string)
Use a specific language in the NoteNames context.
**printOctaveNames** (boolean or symbol)

Print octave marks in the **NoteNames** context.

This engraver creates the following layout object(s):

Section 3.1.83 [NoteName], page 478.

**Note_name_engraver** is part of the following context(s): Section 2.1.19 [NoteNames], page 182.

### 2.2.80 Note_performer

Music types accepted:

Section 1.2.6 [articulation-event], page 43, Section 1.2.14 [breathing-event], page 44, Section 1.2.43 [note-event], page 47, and Section 1.2.73 [tie-event], page 51.

**Note_performer** is not part of any context.

### 2.2.81 Note_spacing_engraver

Generate **NoteSpacing**, an object linking horizontal lines for use in spacing.

This engraver creates the following layout object(s):

Section 3.1.84 [NoteSpacing], page 478.

**Note_spacing_engraver** is part of the following context(s): Section 2.1.3 [CueVoice], page 63, Section 2.1.6 [DrumVoice], page 83, Section 2.1.13 [GregorianTranscriptionVoice], page 117, Section 2.1.15 [KievanVoice], page 141, Section 2.1.18 [MensuralVoice], page 169, Section 2.1.23 [PetrucciVoice], page 199, Section 2.1.30 [TabVoice], page 263, Section 2.1.32 [VaticanaVoice], page 287, and Section 2.1.33 [Voice], page 299.

### 2.2.82 Ottava_spanner_engraver

Create a text spanner when the ottavation property changes.

Properties (read)

**currentMusicalColumn** (graphical (layout) object)

Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).

**middleCOffset** (number)

The offset of middle C from the position given by **middleCClefPosition**

This is used for ottava brackets.

**ottavation** (markup)

If set, the text for an ottava spanner. Changing this creates a new text spanner.

This engraver creates the following layout object(s):

Section 3.1.85 [OttavaBracket], page 479.

**Ottava_spanner_engraver** is part of the following context(s): Section 2.1.12 [GregorianTranscriptionStaff], page 106, Section 2.1.14 [KievanStaff], page 130, Section 2.1.17 [MensuralStaff], page 157, Section 2.1.22 [PetrucciStaff], page 188, Section 2.1.27 [Staff], page 240, and Section 2.1.31 [VaticanaStaff], page 276.

### 2.2.83 Output_property_engraver

Apply a procedure to any grob acknowledged.

Music types accepted:

Section 1.2.4 [apply-output-event], page 43,
2.2.84 Page_turn_engraver

Decide where page turns are allowed to go.

Music types accepted:
Section 1.2.12 [break-event], page 44,

Properties (read)

minimumPageTurnLength (moment)
Minimum length of a rest for a page turn to be allowed.

minimumRepeatLengthForPageTurn (moment)
Minimum length of a repeated section for a page turn to be allowed within that section.

Page_turn_engraver is not part of any context.

2.2.85 Paper_column_engraver

Take care of generating columns.

This engraver decides whether a column is breakable. The default is that a column is always breakable. However, every Bar_engraver that does not have a barline at a certain point will set forbidBreaks in the score context to stop line breaks. In practice, this means that you can make a break point by creating a bar line (assuming that there are no beams or notes that prevent a break point).

Music types accepted:
Section 1.2.12 [break-event], page 44, and Section 1.2.29 [label-event], page 45,

Properties (read)

forbidBreak (boolean)
If set to #t, prevent a line break at this point.

Properties (write)

currentCommandColumn (graphical (layout) object)
Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

currentMusicalColumn (graphical (layout) object)
Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).

forbidBreak (boolean)
If set to #t, prevent a line break at this point.
This engraver creates the following layout object(s):
Section 3.1.79 [NonMusicalPaperColumn], page 474, and Section 3.1.86 [PaperColumn], page 480.

Paper_column_engraver is part of the following context(s): Section 2.1.26 [Score], page 219.

2.2.86 Parenthesis_engraver

Parenthesize objects whose music cause has the parenthesize property.
This engraver creates the following layout object(s):
Section 3.1.87 [ParenthesesItem], page 481.

Parenthesis_engraver is part of the following context(s): Section 2.1.26 [Score], page 219.

2.2.87 Part_combine_engraver

Part combine engraver for orchestral scores: Print markings ‘a2’, ‘Solo’, ‘Solo II’, and ‘unisono’.
Music types accepted:
Section 1.2.43 [note-event], page 47, and Section 1.2.47 [part-combine-event], page 48,
Properties (read)
aDueText (markup)
Text to print at a unisono passage.

partCombineTextsOnNote (boolean)
Print part-combine texts only on the next note rather than immediately on rests or skips.

printPartCombineTexts (boolean)
Set ‘Solo’ and ‘A due’ texts in the part combiner?

soloIIIText (markup)
The text for the start of a solo for voice ‘two’ when part-combining.

soloText (markup)
The text for the start of a solo when part-combining.

This engraver creates the following layout object(s):
Section 3.1.29 [CombineTextScript], page 410.

Part_combine_engraver is part of the following context(s): Section 2.1.3 [CueVoice], page 63, Section 2.1.6 [DrumVoice], page 83, Section 2.1.13 [GregorianTranscriptionVoice], page 117, Section 2.1.15 [KievanVoice], page 141, Section 2.1.18 [MensuralVoice], page 169, Section 2.1.23 [PetrucciVoice], page 199, Section 2.1.30 [TabVoice], page 263, Section 2.1.32 [VaticanaVoice], page 287, and Section 2.1.33 [Voice], page 299.

2.2.88 Percent_repeat_engraver

Make whole measure repeats.
Music types accepted:
Section 1.2.49 [percent-event], page 48,
Properties (read)
countPercentRepeats (boolean)
If set, produce counters for percent repeats.
currentCommandColumn (graphical (layout) object)
Grob that is X-parent to all current breakable (clef, key signature, etc.) items.
repeatCountVisibility (procedure)

A procedure taking as arguments an integer and context, returning whether the corresponding percent repeat number should be printed when `countPercentRepeats` is set.

This engraver creates the following layout object(s):

Section 3.1.88 [PercentRepeat], page 482, and Section 3.1.89 [PercentRepeatCounter], page 483.

`Percent_repeat_engraver` is part of the following context(s): Section 2.1.3 [CueVoice], page 63, Section 2.1.6 [DrumVoice], page 83, Section 2.1.13 [GregorianTranscriptionVoice], page 117, Section 2.1.15 [KievanVoice], page 141, Section 2.1.18 [MensuralVoice], page 169, Section 2.1.23 [PetrucciVoice], page 199, Section 2.1.30 [TabVoice], page 263, Section 2.1.32 [VaticanaVoice], page 287, and Section 2.1.33 [Voice], page 299.

2.2.89 Phrasing_slur_engraver

Print phrasing slurs. Similar to Section 2.2.106 [Slur_engraver], page 352.

Music types accepted:

Section 1.2.43 [note-event], page 47, and Section 1.2.51 [phrasing-slur-event], page 48,

This engraver creates the following layout object(s):

Section 3.1.90 [PhrasingSlur], page 484.

`Phrasing_slur_engraver` is part of the following context(s): Section 2.1.3 [CueVoice], page 63, Section 2.1.6 [DrumVoice], page 83, Section 2.1.13 [GregorianTranscriptionVoice], page 117, Section 2.1.15 [KievanVoice], page 141, Section 2.1.18 [MensuralVoice], page 169, Section 2.1.23 [PetrucciVoice], page 199, Section 2.1.30 [TabVoice], page 263, Section 2.1.32 [VaticanaVoice], page 287, and Section 2.1.33 [Voice], page 299.

2.2.90 Piano_pedal_align_engraver

Align piano pedal symbols and brackets.

Properties (read)

`currentCommandColumn` (graphical (layout) object)

Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

This engraver creates the following layout object(s):

Section 3.1.103 [SostenutoPedalLineSpanner], page 498, Section 3.1.117 [SustainPedalLineSpanner], page 512, and Section 3.1.136 [UnaCordaPedalLineSpanner], page 536.

`Piano_pedal_align_engraver` is part of the following context(s): Section 2.1.5 [DrumStaff], page 76, Section 2.1.12 [GregorianTranscriptionStaff], page 106, Section 2.1.14 [KievanStaff], page 130, Section 2.1.17 [MensuralStaff], page 157, Section 2.1.22 [PetrucciStaff], page 188, Section 2.1.27 [Staff], page 240, Section 2.1.29 [TabStaff], page 253, and Section 2.1.31 [VaticanaStaff], page 276.

2.2.91 Piano_pedal_engraver

Engrave piano pedal symbols and brackets.

Music types accepted:

Section 1.2.61 [sostenuto-event], page 49, Section 1.2.69 [sustain-event], page 51, and Section 1.2.79 [una-corda-event], page 52,
Properties (read)

```
currentCommandColumn (graphical (layout) object)
    Grob that is X-parent to all current breakable (clef, key signature, etc.)
    items.

pedalSostenutoStrings (list)
    See pedalSustainStrings.

pedalSostenutoStyle (symbol)
    See pedalSustainStyle.

pedalSustainStrings (list)
    A list of strings to print for sustain-pedal. Format is (up updown down),
    where each of the three is the string to print when this is done with the
    pedal.

pedalSustainStyle (symbol)
    A symbol that indicates how to print sustain pedals: text, bracket or
    mixed (both).

pedalUnaCordaStrings (list)
    See pedalSustainStrings.

pedalUnaCordaStyle (symbol)
    See pedalSustainStyle.
```

This engraver creates the following layout object(s):

- Section 3.1.91 [PianoPedalBracket], page 486, Section 3.1.102 [SostenutoPedal], page 497,
  Section 3.1.116 [SustainPedal], page 511, and Section 3.1.135 [UnaCordaPedal], page 535.

```
Piano_pedal_engraver is part of the following context(s): Section 2.1.7 [Dynamics], page 95,
Section 2.1.12 [GregorianTranscriptionStaff], page 106, Section 2.1.14 [KievanStaff], page 130,
Section 2.1.17 [MensuralStaff], page 157, Section 2.1.22 [PetrucciStaff], page 188, Section 2.1.27
[Staff], page 240, Section 2.1.29 [TabStaff], page 253, and Section 2.1.31 [VaticanaStaff],
page 276.
```

### 2.2.92 Piano_pedal_performer

Music types accepted:

- Section 1.2.61 [sostenuto-event], page 49, Section 1.2.69 [sustain-event], page 51, and
  Section 1.2.79 [una-corda-event], page 52.

```
Piano_pedal_performer is not part of any context.
```

### 2.2.93 Pitch_squash_engraver

Set the vertical position of note heads to squashedPosition, if that property is set. This can
be used to make a single-line staff demonstrating the rhythm of a melody.

Properties (read)

```
squashedPosition (integer)
    Vertical position of squashing for Section “Pitch_squash_engraver” in
    Internals Reference.
```

```
Pitch_squash_engraver is part of the following context(s): Section 2.1.20 [NullVoice],
page 184, and Section 2.1.25 [RhythmicStaff], page 215.
```
2.2.94 Pitched_trill_engraver

Print the bracketed note head after a note head with trill.

This engraver creates the following layout object(s):

Section 3.1.129 [TrillPitchAccidental], page 528, Section 3.1.130 [TrillPitchGroup], page 529, and Section 3.1.131 [TrillPitchHead], page 530.

Pitched_trill_engraver is part of the following context(s): Section 2.1.3 [CueVoice], page 63, Section 2.1.6 [DrumVoice], page 83, Section 2.1.13 [GregorianTranscriptionVoice], page 117, Section 2.1.15 [KievanVoice], page 141, Section 2.1.18 [MensuralVoice], page 169, Section 2.1.23 [PetrucciVoice], page 199, Section 2.1.32 [VaticanaVoice], page 287, and Section 2.1.33 [Voice], page 299.

2.2.95 Pure_from_neighbor_engraver

Coordinates items that get their pure heights from their neighbors.

Pure_from_neighbor_engraver is part of the following context(s): Section 2.1.5 [DrumStaff], page 76, Section 2.1.12 [GregorianTranscriptionStaff], page 106, Section 2.1.14 [KievanStaff], page 130, Section 2.1.16 [Lyrics], page 155, Section 2.1.17 [MensuralStaff], page 157, Section 2.1.22 [PetrucciStaff], page 188, Section 2.1.27 [Staff], page 240, Section 2.1.29 [TabStaff], page 253, and Section 2.1.31 [VaticanaStaff], page 276.

2.2.96 Repeat_acknowledge_engraver

Acknowledge repeated music, and convert the contents of repeatCommands into an appropriate setting for whichBar.

Properties (read)

\[
\begin{align*}
\text{doubleRepeatSegnoType} & \quad (\text{string}) \\
& \quad \text{Set the default bar line for the combinations double repeat with segno.} \\
& \quad \text{Default is ‘:\|-.S.|:’.} \\
\text{doubleRepeatType} & \quad (\text{string}) \\
& \quad \text{Set the default bar line for double repeats.} \\
\text{endRepeatSegnoType} & \quad (\text{string}) \\
& \quad \text{Set the default bar line for the combinations ending of repeat with segno.} \\
& \quad \text{Default is ‘:\|-.S’.} \\
\text{endRepeatType} & \quad (\text{string}) \\
& \quad \text{Set the default bar line for the ending of repeats.} \\
\text{repeatCommands} & \quad (\text{list}) \\
& \quad \text{This property is a list of commands of the form (list ‘volta \(x\)), where} \\
& \quad \text{\(x\) is a string or \#f. ‘end-repeat’ is also accepted as a command.} \\
\text{segnoType} & \quad (\text{string}) \\
& \quad \text{Set the default bar line for a requested segno. Default is ‘S’.} \\
\text{startRepeatSegnoType} & \quad (\text{string}) \\
& \quad \text{Set the default bar line for the combinations beginning of repeat with} \\
& \quad \text{segno. Default is ‘S.|:’.} \\
\text{startRepeatType} & \quad (\text{string}) \\
& \quad \text{Set the default bar line for the beginning of repeats.} \\
\text{whichBar} & \quad (\text{string}) \\
& \quad \text{This property is read to determine what type of bar line to create.}
\end{align*}
\]
Example:

```
\set Staff.whichBar = ".|:
```

This will create a start-repeat bar in this staff only. Valid values are described in `scm/bar-line.scm`.

*Repeat_acknowledge_engraver* is part of the following context(s): Section 2.1.26 [Score], page 219.

### 2.2.97 Repeat_tie_engraver

Create repeat ties.

Music types accepted:

Section 1.2.53 [repeat-tie-event], page 48,

This engraver creates the following layout object(s):

Section 3.1.94 [RepeatTie], page 490, and Section 3.1.95 [RepeatTieColumn], page 491.

*Repeat_tie_engraver* is part of the following context(s): Section 2.1.3 [CueVoice], page 63, Section 2.1.6 [DrumVoice], page 83, Section 2.1.13 [GregorianTranscriptionVoice], page 117, Section 2.1.15 [KievanVoice], page 141, Section 2.1.18 [MensuralVoice], page 169, Section 2.1.23 [PetrucciVoice], page 199, Section 2.1.30 [TabVoice], page 263, Section 2.1.32 [VaticanaVoice], page 287, and Section 2.1.33 [Voice], page 299.

### 2.2.98 Rest_collision_engraver

Handle collisions of rests.

Properties (read)

- `busyGrobs` (list)
  
  A queue of `(end-moment . grob)` cons cells. This is for internal (C++) use only. This property contains the grobs which are still busy (e.g. note heads, spanners, etc.).

This engraver creates the following layout object(s):

Section 3.1.97 [RestCollision], page 492.

*Rest_collision_engraver* is part of the following context(s): Section 2.1.5 [DrumStaff], page 76, Section 2.1.12 [GregorianTranscriptionStaff], page 106, Section 2.1.14 [KievanStaff], page 130, Section 2.1.17 [MensuralStaff], page 157, Section 2.1.22 [PetrucciStaff], page 188, Section 2.1.27 [Staff], page 240, Section 2.1.29 [TabStaff], page 253, and Section 2.1.31 [VaticanaStaff], page 276.

### 2.2.99 Rest_engraver

Engrave rests.

Music types accepted:

Section 1.2.54 [rest-event], page 49,

Properties (read)

- `middleCCPosition` (number)

  The place of the middle C, measured in half staff-spaces. Usually determined by looking at `middleCClefPosition` and `middleCOffset`.

This engraver creates the following layout object(s):

Section 3.1.96 [Rest], page 491.

*Rest_engraver* is part of the following context(s): Section 2.1.3 [CueVoice], page 63, Section 2.1.6 [DrumVoice], page 83, Section 2.1.13 [GregorianTranscriptionVoice], page 117,
2.2.100 Rhythmic_column_engraver

Generate NoteColumn, an object that groups stems, note heads, and rests.

This engraver creates the following layout object(s):
Section 3.1.81 [NoteColumn], page 476.

Rhythmic_column_engraver is part of the following context(s): Section 2.1.3 [CueVoice], page 63, Section 2.1.6 [DrumVoice], page 83, Section 2.1.13 [GregorianTranscriptionVoice], page 117, Section 2.1.15 [KievanVoice], page 141, Section 2.1.18 [MensuralVoice], page 169, Section 2.1.23 [PetrucciVoice], page 199, Section 2.1.30 [TabVoice], page 263, Section 2.1.32 [VaticanaVoice], page 287, and Section 2.1.33 [Voice], page 299.

2.2.101 Script_column_engraver

Find potentially colliding scripts and put them into a ScriptColumn object; that will fix the collisions.

This engraver creates the following layout object(s):
Section 3.1.99 [ScriptColumn], page 494.

Script_column_engraver is part of the following context(s): Section 2.1.3 [CueVoice], page 63, Section 2.1.6 [DrumVoice], page 83, Section 2.1.13 [GregorianTranscriptionVoice], page 117, Section 2.1.15 [KievanVoice], page 141, Section 2.1.18 [MensuralVoice], page 169, Section 2.1.23 [PetrucciVoice], page 199, Section 2.1.30 [TabVoice], page 263, Section 2.1.32 [VaticanaVoice], page 287, and Section 2.1.33 [Voice], page 299.

2.2.102 Script_engraver

Handle note scripted articulations.

Music types accepted:
Section 1.2.6 [articulation-event], page 43,
Properties (read)

scriptDefinitions (list)

The description of scripts. This is used by the Script_engraver for typesetting note-superscripts and subscripts. See scm/script.scm for more information.

This engraver creates the following layout object(s):
Section 3.1.98 [Script], page 493.

Script_engraver is part of the following context(s): Section 2.1.3 [CueVoice], page 63, Section 2.1.6 [DrumVoice], page 83, Section 2.1.7 [Dynamics], page 95, Section 2.1.13 [GregorianTranscriptionVoice], page 117, Section 2.1.15 [KievanVoice], page 141, Section 2.1.18 [MensuralVoice], page 169, Section 2.1.23 [PetrucciVoice], page 199, Section 2.1.30 [TabVoice], page 263, Section 2.1.32 [VaticanaVoice], page 287, and Section 2.1.33 [Voice], page 299.

2.2.103 Script_row_engraver

Determine order in horizontal side position elements.

This engraver creates the following layout object(s):
Section 3.1.100 [ScriptRow], page 494.

Script_row_engraver is part of the following context(s): Section 2.1.5 [DrumStaff], page 76, Section 2.1.12 [GregorianTranscriptionStaff], page 106, Section 2.1.14 [KievanStaff], page 130,
Section 2.1.17 [MensuralStaff], page 157, Section 2.1.22 [PetrucciStaff], page 188, Section 2.1.27 [Staff], page 240, Section 2.1.29 [TabStaff], page 253, and Section 2.1.31 [VaticanaStaff], page 276.

2.2.104 **Separating_line_group_engraver**

Generate objects for computing spacing parameters.

Properties (read)

- `createSpacing` (boolean)
  - Create `StaffSpacing` objects? Should be set for staves.

Properties (write)

- `hasStaffSpacing` (boolean)
  - True if the current `CommandColumn` contains items that will affect spacing.

This engraver creates the following layout object(s):

Section 3.1.108 [StaffSpacing], page 502.

**Separating_line_group_engraver** is part of the following context(s): Section 2.1.2 [Chord-Names], page 60, Section 2.1.5 [DrumStaff], page 76, Section 2.1.8 [FiguredBass], page 99, Section 2.1.9 [FretBoards], page 101, Section 2.1.12 [GregorianTranscriptionStaff], page 106, Section 2.1.14 [KievanStaff], page 130, Section 2.1.17 [MensuralStaff], page 157, Section 2.1.19 [NoteNames], page 182, Section 2.1.22 [PetrucciStaff], page 188, Section 2.1.25 [RhythmicStaff], page 215, Section 2.1.27 [Staff], page 240, Section 2.1.29 [TabStaff], page 253, and Section 2.1.31 [VaticanaStaff], page 276.

2.2.105 **Slash_repeat_engraver**

Make beat repeats.

Music types accepted:

- Section 1.2.52 [repeat-slash-event], page 48,

This engraver creates the following layout object(s):

Section 3.1.37 [DoubleRepeatSlash], page 423, and Section 3.1.93 [RepeatSlash], page 489.

**Slash_repeat_engraver** is part of the following context(s): Section 2.1.3 [CueVoice], page 63, Section 2.1.6 [DrumVoice], page 83, Section 2.1.13 [GregorianTranscriptionVoice], page 117, Section 2.1.15 [KievanVoice], page 141, Section 2.1.18 [MensuralVoice], page 169, Section 2.1.23 [PetrucciVoice], page 199, Section 2.1.30 [TabVoice], page 263, Section 2.1.32 [VaticanaVoice], page 287, and Section 2.1.33 [Voice], page 299.

2.2.106 **Slur_engraver**

Build slur grobs from slur events.

Music types accepted:

- Section 1.2.43 [note-event], page 47, and Section 1.2.58 [slur-event], page 49,

Properties (read)

- `doubleSlurs` (boolean)
  - If set, two slurs are created for every slurred note, one above and one below the chord.

- `slurMelismaBusy` (boolean)
  - Signal if a slur is present.
This engraver creates the following layout object(s):
Section 3.1.101 [Slur], page 494.

Slur_engraver is part of the following context(s): Section 2.1.3 [CueVoice], page 63, Section 2.1.6 [DrumVoice], page 83, Section 2.1.13 [GregorianTranscriptionVoice], page 117, Section 2.1.15 [KievanVoice], page 141, Section 2.1.20 [NullVoice], page 184, Section 2.1.23 [PetrucciVoice], page 199, Section 2.1.30 [TabVoice], page 263, and Section 2.1.33 [Voice], page 299.

2.2.107 Slur_performer

Music types accepted:
Section 1.2.58 [slur-event], page 49,
Slur_performer is not part of any context.

2.2.108 Spacing_engraver

Make a SpacingSpanner and do bookkeeping of shortest starting and playing notes.
Music types accepted:
Section 1.2.62 [spacing-section-event], page 49,
Properties (read)

   currentCommandColumn (graphical (layout) object)
   Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

   currentMusicalColumn (graphical (layout) object)
   Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).

   proportionalNotationDuration (moment)
   Global override for shortest-playing duration. This is used for switching on proportional notation.

This engraver creates the following layout object(s):
Section 3.1.104 [SpacingSpanner], page 499.
Spacing_engraver is part of the following context(s): Section 2.1.26 [Score], page 219.

2.2.109 Span_arpeggio_engraver

Make arpeggios that span multiple staves.
Properties (read)

   connectArpeggios (boolean)
   If set, connect arpeggios across piano staff.

This engraver creates the following layout object(s):
Section 3.1.9 [Arpeggio], page 386.
Span_arpeggio_engraver is part of the following context(s): Section 2.1.11 [GrandStaff], page 104, Section 2.1.24 [PianoStaff], page 212, and Section 2.1.28 [StaffGroup], page 251.

2.2.110 Span_bar_engraver

Make cross-staff bar lines: It catches all normal bar lines and draws a single span bar across them.
This engraver creates the following layout object(s):
Section 3.1.105 [SpanBar], page 500.
**Span_bar_engraver** is part of the following context(s): Section 2.1.11 [GrandStaff], page 104, Section 2.1.24 [PianoStaff], page 212, and Section 2.1.28 [StaffGroup], page 251.

### 2.2.111 Span_bar_stub_engraver

Make stubs for span bars in all contexts that the span bars cross.

This engraver creates the following layout object(s):

- Section 3.1.106 [SpanBarStub], page 501.

**Span_bar_stub_engraver** is part of the following context(s): Section 2.1.11 [GrandStaff], page 104, Section 2.1.24 [PianoStaff], page 212, and Section 2.1.28 [StaffGroup], page 251.

### 2.2.112 Span_stem_engraver

Connect cross-staff stems to the stems above in the system.

This engraver creates the following layout object(s):

- Section 3.1.111 [Stem], page 504.

**Span_stem_engraver** is not part of any context.

### 2.2.113 Spanner_break_forbid_engraver

Forbid breaks in certain spanners.

**Spanner_break_forbid_engraver** is part of the following context(s): Section 2.1.3 [CueVoice], page 63, Section 2.1.6 [DrumVoice], page 83, Section 2.1.13 [GregorianTranscriptionVoice], page 117, Section 2.1.15 [KievanVoice], page 141, Section 2.1.18 [MensuralVoice], page 169, Section 2.1.23 [PetrucciVoice], page 199, Section 2.1.30 [TabVoice], page 263, Section 2.1.32 [VaticanaVoice], page 287, and Section 2.1.33 [Voice], page 299.

### 2.2.114 Staff_collecting_engraver

Maintain the `stavesFound` variable.

Properties (read)

- `stavesFound` (list of grobs)
  A list of all staff-symbols found.

Properties (write)

- `stavesFound` (list of grobs)
  A list of all staff-symbols found.

**Staff_collecting_engraver** is part of the following context(s): Section 2.1.5 [DrumStaff], page 76, Section 2.1.12 [GregorianTranscriptionStaff], page 106, Section 2.1.14 [KievanStaff], page 130, Section 2.1.17 [MensuralStaff], page 157, Section 2.1.22 [PetrucciStaff], page 188, Section 2.1.26 [Score], page 219, Section 2.1.27 [Staff], page 240, Section 2.1.29 [TabStaff], page 253, and Section 2.1.31 [VaticanaStaff], page 276.

### 2.2.115 Staff_performer

Staff_performer is not part of any context.

### 2.2.116 Staff_symbol_engraver

Create the constellation of five (default) staff lines.

Music types accepted:

- Section 1.2.65 [staff-span-event], page 50,

This engraver creates the following layout object(s):

- Section 3.1.109 [StaffSymbol], page 503.
Staff_symbol_engraver is part of the following context(s): Section 2.1.5 [DrumStaff], page 76, Section 2.1.12 [GregorianTranscriptionStaff], page 106, Section 2.1.14 [KievanStaff], page 130, Section 2.1.17 [MensuralStaff], page 157, Section 2.1.22 [PetrucciStaff], page 188, Section 2.1.25 [RhythmicStaff], page 215, Section 2.1.27 [Staff], page 240, Section 2.1.29 [TabStaff], page 253, and Section 2.1.31 [VaticanaStaff], page 276.

2.2.117 Stanza_number_align_engraver

This engraver ensures that stanza numbers are neatly aligned.

Stanza_number_align_engraver is part of the following context(s): Section 2.1.26 [Score], page 219.

2.2.118 Stanza_number_engraver

Engrave stanza numbers.

Properties (read)

- stanza (markup)
  Stanza ‘number’ to print before the start of a verse. Use in Lyrics context.

This engraver creates the following layout object(s):
Section 3.1.110 [StanzaNumber], page 503.

Stanza_number_engraver is part of the following context(s): Section 2.1.16 [Lyrics], page 155.

2.2.119 Stem_engraver

Create stems, flags and single-stem tremolos. It also works together with the beam engraver for overriding beaming.

Music types accepted:
Section 1.2.75 [tremolo-event], page 52, and Section 1.2.78 [tuplet-span-event], page 52.

Properties (read)

- stemLeftBeamCount (integer)
  Specify the number of beams to draw on the left side of the next note.
  Overrides automatic beaming. The value is only used once, and then it is erased.

- stemRightBeamCount (integer)
  See stemLeftBeamCount.

- whichBar (string)
  This property is read to determine what type of bar line to create.
  Example:
  \\set Staff.whichBar = ".|:
  This will create a start-repeat bar in this staff only. Valid values are described in scm/bar-line.scm.

This engraver creates the following layout object(s):
Section 3.1.44 [Flag], page 432, Section 3.1.111 [Stem], page 504, Section 3.1.112 [StemStub], page 506, and Section 3.1.113 [StemTremolo], page 507.

Stem_engraver is part of the following context(s): Section 2.1.3 [CueVoice], page 63, Section 2.1.6 [DrumVoice], page 83, Section 2.1.13 [GregorianTranscriptionVoice], page 117, Section 2.1.15 [KievanVoice], page 141, Section 2.1.18 [MensuralVoice], page 169, Section 2.1.23 [PetrucciVoice], page 199, Section 2.1.30 [TabVoice], page 263, and Section 2.1.33 [Voice], page 299.
2.2.120 System_start_delimiter_engraver

Create a system start delimiter (i.e., a SystemStartBar, SystemStartBrace, SystemStartBracket or SystemStartSquare spanner).

Properties (read)

- currentCommandColumn (graphical (layout) object)
  Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

- systemStartDelimiter (symbol)
  Which grob to make for the start of the system/staff? Set to SystemStartBrace, SystemStartBracket or SystemStartBar.

- systemStartDelimiterHierarchy (pair)
  A nested list, indicating the nesting of a start delimiters.

This engraver creates the following layout object(s):
Section 3.1.119 [SystemStartBar], page 514, Section 3.1.120 [SystemStartBrace], page 515, Section 3.1.121 [SystemStartBracket], page 516, and Section 3.1.122 [SystemStartSquare], page 517.

System_start_delimiter_engraver is part of the following context(s): Section 2.1.1 [ChoirStaff], page 59, Section 2.1.11 [GrandStaff], page 104, Section 2.1.24 [PianoStaff], page 212, Section 2.1.26 [Score], page 219, and Section 2.1.28 [StaffGroup], page 251.

2.2.121 Tab_note_heads_engraver

Generate one or more tablature note heads from event of type NoteEvent.

Music types accepted:
Section 1.2.23 [fingering-event], page 45, Section 1.2.43 [note-event], page 47, and Section 1.2.67 [string-number-event], page 51,

Properties (read)

- defaultStrings (list)
  A list of strings to use in calculating frets for tablatures and fretboards if no strings are provided in the notes for the current moment.

- fretLabels (list)
  A list of strings or Scheme-formatted markups containing, in the correct order, the labels to be used for lettered frets in tablature.

- highStringOne (boolean)
  Whether the first string is the string with highest pitch on the instrument. This used by the automatic string selector for tablature notation.

- maximumFretStretch (number)
  Don’t allocate frets further than this from specified frets.

- middleCPosition (number)
  The place of the middle C, measured in half staff-spaces. Usually determined by looking at middleCClefPosition and middleCOffset.

- minimumFret (number)
  The tablature auto string-selecting mechanism selects the highest string with a fret at least minimumFret.

- noteToFretFunction (procedure)
  Convert list of notes and list of defined strings to full list of strings and fret numbers. Parameters: The context, a list of note events, a list of tabstring events, and the fretboard grob if a fretboard is desired.
stringOneTopmost (boolean)
  Whether the first string is printed on the top line of the tablature.

stringTunings (list)
  The tablature strings tuning. It is a list of the pitches of each string
  (starting with the lowest numbered one).

tablatureFormat (procedure)
  A function formatting a tablature note head. Called with three argu-
  ments: context, string number and, fret number. It returns the text as
  a markup.

tabStaffLineLayoutFunction (procedure)
  A function determining the staff position of a tablature note head. Called with two arguments: the context and the string.

This engraver creates the following layout object(s):
Section 3.1.123 [TabNoteHead], page 518.
Tab_note_heads_engraver is part of the following context(s): Section 2.1.30 [TabVoice], page 263.

2.2.122 Tab_staff_symbol_engraver
Create a tablature staff symbol, but look at stringTunings for the number of lines.

  Properties (read)
  
  stringTunings (list)
    The tablature strings tuning. It is a list of the pitches of each string
    (starting with the lowest numbered one).

    This engraver creates the following layout object(s):
    Section 3.1.109 [StaffSymbol], page 503.
    Tab_staff_symbol_engraver is part of the following context(s): Section 2.1.29 [TabStaff], page 253.

2.2.123 Tab_tie_follow_engraver
Adjust TabNoteHead properties when a tie is followed by a slur or glissando.

    Tab_tie_follow_engraver is part of the following context(s): Section 2.1.30 [TabVoice], page 263.

2.2.124 Tempo_performer
Properties (read)

  tempoWholesPerMinute (moment)
    The tempo in whole notes per minute.

    Tempo_performer is not part of any context.

2.2.125 Text_engraver
Create text scripts.

    Music types accepted:
    Section 1.2.71 [text-script-event], page 51,
    This engraver creates the following layout object(s):
    Section 3.1.124 [TextScript], page 519.
**Text_engraver** is part of the following context(s): Section 2.1.3 [CueVoice], page 63, Section 2.1.6 [DrumVoice], page 83, Section 2.1.7 [Dynamics], page 95, Section 2.1.13 [GregorianTranscriptionVoice], page 117, Section 2.1.15 [KievanVoice], page 141, Section 2.1.18 [MensuralVoice], page 169, Section 2.1.23 [PetrucciVoice], page 199, Section 2.1.30 [TabVoice], page 263, Section 2.1.32 [VaticanaVoice], page 287, and Section 2.1.33 [Voice], page 299.

### 2.2.126 Text_spanner_engraver

Create text spanner from an event.

Music types accepted:

Section 1.2.72 [text-span-event], page 51,

Properties (read)

- `currentMusicalColumn` (graphical (layout) object)
  Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).

This engraver creates the following layout object(s):

Section 3.1.125 [TextSpanner], page 521.

**Text_spanner_engraver** is part of the following context(s): Section 2.1.3 [CueVoice], page 63, Section 2.1.6 [DrumVoice], page 83, Section 2.1.7 [Dynamics], page 95, Section 2.1.13 [GregorianTranscriptionVoice], page 117, Section 2.1.15 [KievanVoice], page 141, Section 2.1.18 [MensuralVoice], page 169, Section 2.1.23 [PetrucciVoice], page 199, Section 2.1.30 [TabVoice], page 263, and Section 2.1.33 [Voice], page 299.

### 2.2.127 Tie_engraver

Generate ties between note heads of equal pitch.

Music types accepted:

Section 1.2.73 [tie-event], page 51,

Properties (read)

- `skipTypesetting` (boolean)
  If true, no typesetting is done, speeding up the interpretation phase. Useful for debugging large scores.

- `tieWaitForNote` (boolean)
  If true, tied notes do not have to follow each other directly. This can be used for writing out arpeggios.

Properties (write)

- `tieMelismaBusy` (boolean)
  Signal whether a tie is present.

This engraver creates the following layout object(s):

Section 3.1.126 [Tie], page 523, and Section 3.1.127 [TieColumn], page 525.

**Tie_engraver** is part of the following context(s): Section 2.1.3 [CueVoice], page 63, Section 2.1.6 [DrumVoice], page 83, Section 2.1.13 [GregorianTranscriptionVoice], page 117, Section 2.1.15 [KievanVoice], page 141, Section 2.1.18 [MensuralVoice], page 169, Section 2.1.19 [NoteNames], page 182, Section 2.1.20 [NullVoice], page 184, Section 2.1.23 [PetrucciVoice], page 199, Section 2.1.30 [TabVoice], page 263, Section 2.1.32 [VaticanaVoice], page 287, and Section 2.1.33 [Voice], page 299.
2.2.128 Tie_performer
Generate ties between note heads of equal pitch.

Music types accepted:
Section 1.2.73 [tie-event], page 51,
Properties (read)

tieWaitForNote (boolean)
If true, tied notes do not have to follow each other directly. This can be used for writing out arpeggios.

Properties (write)

tieMelismaBusy (boolean)
Signal whether a tie is present.

Tie_performer is not part of any context.

2.2.129 Time_signature_engraver
Create a Section 3.1.128 [TimeSignature], page 525, whenever timeSignatureFraction changes.

Music types accepted:
Section 1.2.74 [time-signature-event], page 51,
Properties (read)

initialTimeSignatureVisibility (vector)
break visibility for the initial time signature.

partialBusy (boolean)
Signal that \partial acts at the current timestep.

timeSignatureFraction (fraction, as pair)
A pair of numbers, signifying the time signature. For example, '(4 . 4) is a 4/4 time signature.

This engraver creates the following layout object(s):
Section 3.1.128 [TimeSignature], page 525.

Time_signature_engraver is part of the following context(s): Section 2.1.5 [DrumStaff], page 76, Section 2.1.12 [GregorianTranscriptionStaff], page 106, Section 2.1.17 [MensuralStaff], page 157, Section 2.1.22 [PetrucciStaff], page 188, Section 2.1.25 [RhythmicStaff], page 215, Section 2.1.27 [Staff], page 240, and Section 2.1.29 [TabStaff], page 253.

2.2.130 Time_signature_performer
Time_signature_performer is not part of any context.

2.2.131 Timing_translator
This engraver adds the alias Timing to its containing context. Responsible for synchronizing timing information from staves. Normally in Score. In order to create polyrhythmic music, this engraver should be removed from Score and placed in Staff.

Properties (read)

baseMoment (moment)
Smallest unit of time that will stand on its own as a subdivided section.

currentBarNumber (integer)
Contains the current bar number. This property is incremented at every bar line.
**internalBarNumber** (integer)
Contains the current bar number. This property is used for internal timekeeping, among others by the `Accidental_ engraver`.

**measureLength** (moment)
Length of one measure in the current time signature.

**measurePosition** (moment)
How much of the current measure have we had. This can be set manually to create incomplete measures.

**timeSignatureFraction** (fraction, as pair)
A pair of numbers, signifying the time signature. For example, `(4 . 4)` is a 4/4 time signature.

**Properties (write)**

**baseMoment** (moment)
Smallest unit of time that will stand on its own as a subdivided section.

**currentBarNumber** (integer)
Contains the current bar number. This property is incremented at every bar line.

**internalBarNumber** (integer)
Contains the current bar number. This property is used for internal timekeeping, among others by the `Accidental_ engraver`.

**measureLength** (moment)
Length of one measure in the current time signature.

**measurePosition** (moment)
How much of the current measure have we had. This can be set manually to create incomplete measures.

**timeSignatureFraction** (fraction, as pair)
A pair of numbers, signifying the time signature. For example, `(4 . 4)` is a 4/4 time signature.

**Timing_translator** is part of the following context(s): Section 2.1.26 [Score], page 219.

### 2.2.132 Trill_spanner_engraver

Create trill spanner from an event.

Music types accepted:
Section 1.2.77 [trill-span-event], page 52,

Properties (read)

**currentCommandColumn** (graphical (layout) object)
Grob that is X-parent to all current breakable (clef, key signature, etc.) items.

**currentMusicalColumn** (graphical (layout) object)
Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).

This engraver creates the following layout object(s):
Section 3.1.132 [TrillSpanner], page 531.

**Trill_spanner_engraver** is part of the following context(s): Section 2.1.3 [CueVoice], page 63, Section 2.1.6 [DrumVoice], page 83, Section 2.1.13 [GregorianTranscriptionVoice],
2.2.133 Tuplet_engraver

Catch tuplet events and generate appropriate bracket.

Music types accepted:

Section 1.2.78 [tuplet-span-event], page 52,

Properties (read)

\texttt{tupletFullLength} (boolean)
  If set, the tuplet is printed up to the start of the next note.

\texttt{tupletFullLengthNote} (boolean)
  If set, end at the next note, otherwise end on the matter (time signatures, etc.) before the note.

This engraver creates the following layout object(s):

Section 3.1.133 [TupletBracket], page 532, and Section 3.1.134 [TupletNumber], page 534.

\texttt{Tuplet_engraver} is part of the following context(s): Section 2.1.3 [CueVoice], page 63, Section 2.1.6 [DrumVoice], page 83, Section 2.1.13 [GregorianTranscriptionVoice], page 117, Section 2.1.15 [KievanVoice], page 141, Section 2.1.18 [MensuralVoice], page 169, Section 2.1.23 [PetrucciVoice], page 199, Section 2.1.30 [TabVoice], page 263, Section 2.1.32 [VaticanaVoice], page 287, and Section 2.1.33 [Voice], page 299.

2.2.134 Tweak_engraver

Read the \texttt{tweaks} property from the originating event, and set properties.

\texttt{Tweak_engraver} is part of the following context(s): Section 2.1.26 [Score], page 219.

2.2.135 Vaticana_ligature_engraver

Handle ligatures by glueing special ligature heads together.

Music types accepted:

Section 1.2.32 [ligature-event], page 46, and Section 1.2.50 [pes-or-flexa-event], page 48.

This engraver creates the following layout object(s):

Section 3.1.33 [DotColumn], page 419, and Section 3.1.137 [VaticanaLigature], page 537.

\texttt{Vaticana_ligature_engraver} is part of the following context(s): Section 2.1.32 [VaticanaVoice], page 287.

2.2.136 Vertical_align_engraver

Catch groups (staves, lyrics lines, etc.) and stack them vertically.

Properties (read)

\texttt{alignAboveContext} (string)
  Where to insert newly created context in vertical alignment.

\texttt{alignBelowContext} (string)
  Where to insert newly created context in vertical alignment.

\texttt{hasAxisGroup} (boolean)
  True if the current context is contained in an axis group.
This engraver creates the following layout object(s):

Section 3.1.138 [VerticalAlignment], page 538.

**Vertical_align_engraver** is part of the following context(s): Section 2.1.1 [ChoirStaff], page 59, Section 2.1.11 [GrandStaff], page 104, Section 2.1.24 [PianoStaff], page 212, Section 2.1.26 [Score], page 219, and Section 2.1.28 [StaffGroup], page 251.

### 2.2.137 Volta_engraver

Make volta brackets.

Properties (read)

- `repeatCommands` (list)
  - This property is a list of commands of the form (list 'volta x), where x is a string or #f. 'end-repeat is also accepted as a command.

- `stavesFound` (list of grobs)
  - A list of all staff-symbols found.

- `voltaSpannerDuration` (moment)
  - This specifies the maximum duration to use for the brackets printed for \alternative. This can be used to shrink the length of brackets in the situation where one alternative is very large.

This engraver creates the following layout object(s):

Section 3.1.141 [VoltaBracket], page 541, and Section 3.1.142 [VoltaBracketSpanner], page 542.

**Volta_engraver** is part of the following context(s): Section 2.1.26 [Score], page 219.

### 2.3 Tunable context properties

- `accidentalGrouping` (symbol)
  - If set to 'voice, accidentals on the same note in different octaves may be horizontally staggered if in different voices.

- `additionalBassStrings` (list)
  - The additional tablature bass-strings, which will not get a separate line in TabStaff.
  - It is a list of the pitches of each string (starting with the lowest numbered one).

- `additionalPitchPrefix` (string)
  - Text with which to prefix additional pitches within a chord name.

- `aDueText` (markup)
  - Text to print at a unisono passage.

- `alignAboveContext` (string)
  - Where to insert newly created context in vertical alignment.

- `alignBassFigureAccidentals` (boolean)
  - If true, then the accidentals are aligned in bass figure context.

- `alignBelowContext` (string)
  - Where to insert newly created context in vertical alignment.

- `alternativeNumberingStyle` (symbol)
  - The style of an alternative's bar numbers. Can be numbers for going back to the same number or numbers-with-letters for going back to the same number with letter suffixes. No setting will not go back in measure-number time.
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alternativeRestores (symbol list)
Timing variables that are restored to their value at the start of the first alternative in subsequent alternatives.

associatedVoice (string)
Name of the context (see associatedVoiceType for its type, usually Voice) that has the melody for this Lyrics line.

associatedVoiceType (symbol)
Type of the context that has the melody for this Lyrics line.

autoAccidentals (list)
List of different ways to typeset an accidental.
For determining when to print an accidental, several different rules are tried. The rule that gives the highest number of accidentals is used.
Each entry in the list is either a symbol or a procedure.

symbol
The symbol is the name of the context in which the following rules are to be applied. For example, if context is Section “Score” in Internals Reference then all staves share accidentals, and if context is Section “Staff” in Internals Reference then all voices in the same staff share accidentals, but staves do not.

procedure
The procedure represents an accidental rule to be applied to the previously specified context.
The procedure takes the following arguments:
context
The current context to which the rule should be applied.
pitch
The pitch of the note to be evaluated.
barnum
The current bar number.
measurepos
The current measure position.
The procedure returns a pair of booleans. The first states whether an extra natural should be added. The second states whether an accidental should be printed. (#t . #f) does not make sense.

autoBeamCheck (procedure)
A procedure taking three arguments, context, dir [start/stop (-1 or 1)], and test [shortest note in the beam]. A non-#f return value starts or stops the auto beam.

autoBeaming (boolean)
If set to true then beams are generated automatically.

autoCautionaries (list)
List similar to autoAccidentals, but it controls cautionary accidentals rather than normal ones. Both lists are tried, and the one giving the most accidentals wins. In case of draw, a normal accidental is typeset.

automaticBars (boolean)
If set to false then bar lines will not be printed automatically; they must be explicitly created with a \bar command. Unlike the \cadenzaOn keyword, measures are still counted. Bar line generation will resume according to that count if this property is unset.

barAlways (boolean)
If set to true a bar line is drawn after each note.
barCheckSynchronize (boolean)
    If true then reset measurePosition when finding a bar check.

barNumberFormatter (procedure)
    A procedure that takes a bar number, measure position, and alternative number
    and returns a markup of the bar number to print.

barNumberVisibility (procedure)
    A procedure that takes a bar number and a measure position and returns whether
    the corresponding bar number should be printed. Note that the actual print-out of
    bar numbers is controlled with the break-visibility property.

The following procedures are predefined:

all-bar-numbers-visible
    Enable bar numbers for all bars, including the first one and broken bars
    (which get bar numbers in parentheses).

first-bar-number-invisible
    Enable bar numbers for all bars (including broken bars) except the first
    one. If the first bar is broken, it doesn’t get a bar number either.

first-bar-number-invisible-save-broken-bars
    Enable bar numbers for all bars (including broken bars) except the first
    one. A broken first bar gets a bar number.

first-bar-number-invisible-and-no-parenthesized-bar-numbers
    Enable bar numbers for all bars except the first bar and broken bars.
    This is the default.

(every-nth-bar-number-visible n)
    Assuming n is value 2, for example, this enables bar numbers for bars
    2, 4, 6, etc.

(modulo-bar-number-visible n m)
    If bar numbers 1, 4, 7, etc., should be enabled, n (the modulo) must be
    set to 3 and m (the division remainder) to 1.

baseMoment (moment)
    Smallest unit of time that will stand on its own as a subdivided section.

bassFigureFormatFunction (procedure)
    A procedure that is called to produce the formatting for a BassFigure grob. It
    takes a list of BassFigureEvents, a context, and the grob to format.

beamExceptions (list)
    An alist of exceptions to autobeam rules that normally end on beats.

beamHalfMeasure (boolean)
    Whether to allow a beam to begin halfway through the measure in triple time, which
    could look like 6/8.

beatStructure (list)
    List of baseMoments that are combined to make beats.

chordChanges (boolean)
    Only show changes in chords scheme?

chordNameExceptions (list)
    An alist of chord exceptions. Contains (chord . markup) entries.
chordNameExceptionsFull (list)
   An alist of full chord exceptions. Contains (chord . markup) entries.

chordNameExceptionsPartial (list)
   An alist of partial chord exceptions. Contains (chord . (prefix-markup suffix-markup)) entries.

chordNameFunction (procedure)
   The function that converts lists of pitches to chord names.

chordNameLowercaseMinor (boolean)
   Downcase roots of minor chords?

chordNameSeparator (markup)
   The markup object used to separate parts of a chord name.

chordNoteNamer (procedure)
   A function that converts from a pitch object to a text markup. Used for single pitches.

chordPrefixSpacer (number)
   The space added between the root symbol and the prefix of a chord name.

chordRootNamer (procedure)
   A function that converts from a pitch object to a text markup. Used for chords.

clefGlyph (string)
   Name of the symbol within the music font.

clefPosition (number)
   Where should the center of the clef symbol go, measured in half staff spaces from the center of the staff.

clefTransposition (integer)
   Add this much extra transposition. Values of 7 and -7 are common.

clefTranspositionFormatter (procedure)
   A procedure that takes the Transposition number as a string and the style as a symbol and returns a markup.

clefTranspositionStyle (symbol)
   Determines the way the ClefModifier grob is displayed. Possible values are 'default', 'parenthesized' and 'bracketed'.

completionBusy (boolean)
   Whether a completion-note head is playing.

completionFactor (an exact rational or procedure)
   When Completion_heads_engraver and Completion_rest_engraver need to split a note or rest with a scaled duration, such as c2*3, this specifies the scale factor to use for the newly-split notes and rests created by the engraver.
   If #f, the completion engraver uses the scale-factor of each duration being split.
   If set to a callback procedure, that procedure is called with the context of the completion engraver, and the duration to be split.

completionUnit (moment)
   Sub-bar unit of completion.

connectArpeggios (boolean)
   If set, connect arpeggios across piano staff.
countPercentRepeats (boolean)
If set, produce counters for percent repeats.

createKeyOnClefChange (boolean)
Print a key signature whenever the clef is changed.

createSpacing (boolean)
Create StaffSpacing objects? Should be set for staves.

crescendoSpanner (symbol)
The type of spanner to be used for crescendi. Available values are 'hairpin' and 'text'. If unset, a hairpin crescendo is used.

crescendoText (markup)
The text to print at start of non-hairpin crescendo, i.e., 'cresc.'.

cueClefGlyph (string)
Name of the symbol within the music font.

cueClefPosition (number)
Where should the center of the clef symbol go, measured in half staff spaces from the center of the staff.

cueClefTransposition (integer)
Add this much extra transposition. Values of 7 and -7 are common.

cueClefTranspositionFormatter (procedure)
A procedure that takes the Transposition number as a string and the style as a symbol and returns a markup.

cueClefTranspositionStyle (symbol)
Determines the way the ClefModifier grob is displayed. Possible values are 'default', 'parenthesized' and 'bracketed'.

currentBarNumber (integer)
Contains the current barnumber. This property is incremented at every bar line.

decrescendoSpanner (symbol)
The type of spanner to be used for decrescendi. Available values are 'hairpin' and 'text'. If unset, a hairpin decrescendo is used.

decrescendoText (markup)
The text to print at start of non-hairpin decrescendo, i.e., 'dim.'.

defaultBarType (string)
Set the default type of bar line. See whichBar for information on available bar types.
This variable is read by Section “Timing translator” in Internals Reference at Section “Score” in Internals Reference level.

defaultStrings (list)
A list of strings to use in calculating frets for tablatures and fretboards if no strings are provided in the notes for the current moment.

doubleRepeatSegnoType (string)
Set the default bar line for the combinations double repeat with segno. Default is ‘:|.S.::’.

doubleRepeatType (string)
Set the default bar line for double repeats.
doubleSlurs (boolean)
If set, two slurs are created for every slurred note, one above and one below the chord.

drumPitchTable (hash table)
A table mapping percussion instruments (symbols) to pitches.

drumStyleTable (hash table)
A hash table which maps drums to layout settings. Predefined values:
The layout style is a hash table, containing the drum-pitches (e.g., the symbol ‘hihat’) as keys, and a list (notehead-style script vertical-position) as values.

donRepeatSegnoType (string)
Set the default bar line for the combinations ending of repeat with segno. Default is ‘:|.S’.

donRepeatType (string)
Set the default bar line for the ending of repeats.

explicitClefVisibility (vector)
‘break-visibility’ function for clef changes.

explicitCueClefVisibility (vector)
‘break-visibility’ function for cue clef changes.

explicitKeySignatureVisibility (vector)
‘break-visibility’ function for explicit key changes. ‘\override’ of the break-visibility property will set the visibility for normal (i.e., at the start of the line) key signatures.

extendersOverRests (boolean)
Whether to continue extenders as they cross a rest.

extraNatural (boolean)
Whether to typeset an extra natural sign before accidentals that reduce the effect of a previous alteration.

figuredBassAlterationDirection (direction)
Where to put alterations relative to the main figure.

figuredBassCenterContinuations (boolean)
Whether to vertically center pairs of extender lines. This does not work with three or more lines.

figuredBassFormatter (procedure)
A routine generating a markup for a bass figure.

figuredBassPlusDirection (direction)
Where to put plus signs relative to the main figure.

figuringOrientations (list)
A list of symbols, containing ‘left’, ‘right’, ‘up’ and/or ‘down’. This list determines where fingerings are put relative to the chord being fingered.

firstClef (boolean)
If true, create a new clef when starting a staff.
followVoice (boolean)
    If set, note heads are tracked across staff switches by a thin line.

fontSize (number)
    The relative size of all grobs in a context.

forbidBreak (boolean)
    If set to #t, prevent a line break at this point.

forceClef (boolean)
    Show clef symbol, even if it has not changed. Only active for the first clef after the
    property is set, not for the full staff.

fretLabels (list)
    A list of strings or Scheme-formatted markups containing, in the correct order, the
    labels to be used for lettered frets in tablature.

glissandoMap (list)
    A map in the form of '((source1 . target1) (source2 . target2) (source3 . target3))
    showing the glissandi to be drawn for note columns. The value '()' will default to
    '((0 . 0) (1 . 1) (n . n)), where n is the minimal number of note-heads in the two
    note columns between which the glissandi occur.

gridInterval (moment)
    Interval for which to generate GridPoints.

handleNegativeFrets (symbol)
    How the automatic fret calculator should handle calculated negative frets. Values
    include 'ignore, to leave them out of the diagram completely, 'include, to include
    them as calculated, and 'recalculate, to ignore the specified string and find a
    string where they will fit with a positive fret number.

harmonicAccidentals (boolean)
    If set, harmonic notes in chords get accidentals.

harmonicDots (boolean)
    If set, harmonic notes in dotted chords get dots.

highStringOne (boolean)
    Whether the first string is the string with highest pitch on the instrument. This
    used by the automatic string selector for tablature notation.

ignoreBarChecks (boolean)
    Ignore bar checks.

ignoreBarNumberChecks (boolean)
    Ignore bar number checks.

ignoreFiguredBassRest (boolean)
    Don’t swallow rest events.

ignoreMelismata (boolean)
    Ignore melismata for this Section “Lyrics” in Internals Reference line.

implicitBassFigures (list)
    A list of bass figures that are not printed as numbers, but only as extender lines.

includeGraceNotes (boolean)
    Do not ignore grace notes for Section “Lyrics” in Internals Reference.

initialTimeSignatureVisibility (vector)
    break visibility for the initial time signature.
**instrumentCueName** (markup)
The name to print if another instrument is to be taken.

**instrumentEqualizer** (procedure)
A function taking a string (instrument name), and returning a \((\text{min} . \text{max})\) pair of numbers for the loudness range of the instrument.

**instrumentName** (markup)
The name to print left of a staff. The **instrumentName** property labels the staff in the first system, and the **shortInstrumentName** property labels following lines.

**instrumentTransposition** (pitch)
Define the transposition of the instrument. Its value is the pitch that sounds when the instrument plays written middle C. This is used to transpose the MIDI output, and \quotes.

**internalBarNumber** (integer)
Contains the current bar number. This property is used for internal timekeeping, among others by the Accidental_engraver.

**keepAliveInterfaces** (list)
A list of symbols, signifying grob interfaces that are worth keeping a staff with remove-empty set around for.

**keyAlterationOrder** (list)
An alist that defines in what order alterations should be printed. The format is \((\text{step} . \text{alter})\), where \text{step} is a number from 0 to 6 and \text{alter} from -2 (sharp) to 2 (flat).

**keyAlterations** (list)
The current key signature. This is an alist containing \((\text{step} . \text{alter})\) or \((\text{octave} \cdot \text{step} . \text{alter})\), where \text{step} is a number in the range 0 to 6 and \text{alter} a fraction, denoting alteration. For alterations, use symbols, e.g. \text{keyAlterations = \#\`((6 . ,FLAT))}.

**lyricMelismaAlignment** (number)
Alignment to use for a melisma syllable.

**magnifyStaffValue** (positive number)
The most recent value set with \magnifyStaff.

**majorSevenSymbol** (markup)
How should the major 7th be formatted in a chord name?

**markFormatter** (procedure)
A procedure taking as arguments the context and the rehearsal mark. It should return the formatted mark as a markup object.

**maximumFretStretch** (number)
Don’t allocate frets further than this from specified frets.

**measureLength** (moment)
Length of one measure in the current time signature.

**measurePosition** (moment)
How much of the current measure have we had. This can be set manually to create incomplete measures.

**melismaBusyProperties** (list)
A list of properties (symbols) to determine whether a melisma is playing. Setting this property will influence how lyrics are aligned to notes. For example,
if set to '(melismaBusy beamMelismaBusy), only manual melismata and manual beams are considered. Possible values include melismaBusy, slurMelismaBusy, tieMelismaBusy, and beamMelismaBusy.

**metronomeMarkFormatter**(procedure)
How to produce a metronome markup. Called with two arguments: a TempoChangeEvent and context.

**middleCClefPosition**(number)
The position of the middle C, as determined only by the clef. This can be calculated by looking at clefPosition and clefGlyph.

**middleCCuePosition**(number)
The position of the middle C, as determined only by the clef of the cue notes. This can be calculated by looking at cueClefPosition and cueClefGlyph.

**middleCOffset**(number)
The offset of middle C from the position given by middleCClefPosition. This is used for ottava brackets.

**middleCPosition**(number)
The place of the middle C, measured in half staff-spaces. Usually determined by looking at middleCClefPosition and middleCOffset.

**midiBalance**(number)
Stereo balance for the MIDI channel associated with the current context. Ranges from -1 to 1, where the values -1 (#LEFT), 0 (#CENTER) and 1 (#RIGHT) correspond to leftmost emphasis, center balance, and rightmost emphasis, respectively.

**midiChannelMapping**(symbol)
How to map MIDI channels: per staff (default), instrument or voice.

**midiChorusLevel**(number)
Chorus effect level for the MIDI channel associated with the current context. Ranges from 0 to 1 (0=off, 1=full effect).

**midiExpression**(number)
Expression control for the MIDI channel associated with the current context. Ranges from 0 to 1 (0=off, 1=full effect).

**midiInstrument**(string)
Name of the MIDI instrument to use.

**midiMaximumVolume**(number)
Analogous to midiMinimumVolume.

**midiMergeUnisons**(boolean)
If true, output only one MIDI note-on event when notes with the same pitch, in the same MIDI-file track, overlap.

**midiMinimumVolume**(number)
Set the minimum loudness for MIDI. Ranges from 0 to 1.

**midiPanPosition**(number)
Pan position for the MIDI channel associated with the current context. Ranges from -1 to 1, where the values -1 (#LEFT), 0 (#CENTER) and 1 (#RIGHT) correspond to hard left, center, and hard right, respectively.

**midiReverbLevel**(number)
Reverb effect level for the MIDI channel associated with the current context. Ranges from 0 to 1 (0=off, 1=full effect).
minimumFret (number)
The tablature auto string-selecting mechanism selects the highest string with a fret at least minimumFret.

minimumPageTurnLength (moment)
Minimum length of a rest for a page turn to be allowed.

minimumRepeatLengthForPageTurn (moment)
Minimum length of a repeated section for a page turn to be allowed within that section.

minorChordModifier (markup)
Markup displayed following the root for a minor chord

noChordSymbol (markup)
Markup to be displayed for rests in a ChordNames context.

noteNameFunction (procedure)
Function used to convert pitches into strings and markups.

noteNameSeparator (string)
String used to separate simultaneous NoteName objects.

noteToFretFunction (procedure)
Convert list of notes and list of defined strings to full list of strings and fret numbers. Parameters: The context, a list of note events, a list of tabstring events, and the fretboard grob if a fretboard is desired.

nullAccidentals (boolean)
The Accidental_engraver generates no accidentals for notes in contexts were this is set. In addition to supressing the printed accidental, this option removes any effect the note would have had on accidentals in other voices.

ottavation (markup)
If set, the text for an ottava spanner. Changing this creates a new text spanner.

ottavationMarkups (list)
An alist defining the markups used for ottava brackets. It contains entries of the form (number of octaves . markup).

output (music output)
The output produced by a score-level translator during music interpretation.

partCombineForced (symbol)
Override for the partCombine decision. Can be apart, chords, unisono, solo1, or solo2.

partCombineTextsOnNote (boolean)
Print part-combine texts only on the next note rather than immediately on rests or skips.

pedalSostenutoStrings (list)
See pedalSustainStrings.

pedalSostenutoStyle (symbol)
See pedalSustainStyle.

pedalSustainStrings (list)
A list of strings to print for sustain-pedal. Format is (up updown down), where each of the three is the string to print when this is done with the pedal.
pedalSustainStyle (symbol)
   A symbol that indicates how to print sustain pedals: text, bracket or mixed (both).

pedalUnaCordaStrings (list)
   See pedalSustainStrings.

pedalUnaCordaStyle (symbol)
   See pedalSustainStyle.

predefinedDiagramTable (hash table)
   The hash table of predefined fret diagrams to use in FretBoards.

printAccidentalNames (boolean or symbol)
   Print accidentals in the NoteNames context.

printKeyCancellation (boolean)
   Print restoration alterations before a key signature change.

printNotesLanguage (string)
   Use a specific language in the NoteNames context.

printOctaveNames (boolean or symbol)
   Print octave marks in the NoteNames context.

printPartCombineTexts (boolean)
   Set ‘Solo’ and ‘A due’ texts in the part combiner?

proportionalNotationDuration (moment)
   Global override for shortest-playing duration. This is used for switching on proportional notation.

rehearsalMark (integer)
   The last rehearsal mark printed.

repeatCommands (list)
   This property is a list of commands of the form (list 'volta x), where x is a string or #f. 'end-repeat is also accepted as a command.

repeatCountVisibility (procedure)
   A procedure taking as arguments an integer and context, returning whether the corresponding percent repeat number should be printed when countPercentRepeats is set.

restCompletionBusy (boolean)
   Signal whether a completion-rest is active.

restNumberThreshold (number)
   If a multimeasure rest has more measures than this, a number is printed.

restrainOpenStrings (boolean)
   Exclude open strings from the automatic fret calculator.

searchForVoice (boolean)
   Signal whether a search should be made of all contexts in the context hierarchy for a voice to provide rhythms for the lyrics.

segnoType (string)
   Set the default bar line for a requested segno. Default is ‘S’.

shapeNoteStyles (vector)
   Vector of symbols, listing style for each note head relative to the tonic (qv.) of the scale.
shortInstrumentName (markup)
    See instrumentName.

shortVocalName (markup)
    Name of a vocal line, short version.

skipBars (boolean)
    If set to true, then skip the empty bars that are produced by multimeasure notes and rests. These bars will not appear on the printed output. If not set (the default), multimeasure notes and rests expand into their full length, printing the appropriate number of empty bars so that synchronization with other voices is preserved.
    
    \{
    r1 r1*3 R1*3
    \set Score.skipBars= ##t
    r1*3 R1*3
    \}

skipTypesetting (boolean)
    If true, no typesetting is done, speeding up the interpretation phase. Useful for debugging large scores.

slashChordSeparator (markup)
    The markup object used to separate a chord name from its root note in case of inversions or slash chords.

soloIIIText (markup)
    The text for the start of a solo for voice ‘two’ when part-combining.

soloText (markup)
    The text for the start of a solo when part-combining.

squaredPosition (integer)
    Vertical position of squashing for Section “Pitch_squash_engraver” in Internals Reference.

staffLineLayoutFunction (procedure)
    Layout of staff lines, traditional, or semitone.

stanza (markup)
    Stanza ‘number’ to print before the start of a verse. Use in Lyrics context.

startRepeatSegnoType (string)
    Set the default bar line for the combinations beginning of repeat with segno. Default is ‘S. I.’.

startRepeatType (string)
    Set the default bar line for the beginning of repeats.

stemLeftBeamCount (integer)
    Specify the number of beams to draw on the left side of the next note. Overrides automatic beaming. The value is only used once, and then it is erased.

stemRightBeamCount (integer)
    See stemLeftBeamCount.

strictBeatBeaming (boolean)
    Should partial beams reflect the beat structure even if it causes flags to hang out?

stringNumberOrientations (list)
    See fingeringOrientations.
stringOneTopmost (boolean)
Whether the first string is printed on the top line of the tablature.

stringTunings (list)
The tablature strings tuning. It is a list of the pitches of each string (starting with the lowest numbered one).

strokeFingerOrientations (list)
See fingerOrientations.

subdivideBeams (boolean)
If set, multiple beams will be subdivided at baseMoment positions by only drawing one beam over the beat.

suggestAccidentals (boolean or symbol)
If set to #t, accidentals are typeset as suggestions above the note. Setting it to 'cautionary only applies that to cautionary accidentals.

supportNonIntegerFret (boolean)
If set in Score the TabStaff will print micro-tones as ‘2\frac{1}{2}’.

suspendRestMerging (boolean)
When using the Merge_rest engraver do not merge rests when this is set to true.

systemStartDelimiter (symbol)
Which grob to make for the start of the system/staff? Set to SystemStartBrace, SystemStartBracket or SystemStartBar.

systemStartDelimiterHierarchy (pair)
A nested list, indicating the nesting of a start delimiters.

tablatureFormat (procedure)
A function formatting a tablature note head. Called with three arguments: context, string number and, fret number. It returns the text as a markup.

tabStaffLineLayoutFunction (procedure)
A function determining the staff position of a tablature note head. Called with two arguments: the context and the string.

tempoHideNote (boolean)
Hide the note = count in tempo marks.

tempoWholesPerMinute (moment)
The tempo in whole notes per minute.

tieWaitForNote (boolean)
If true, tied notes do not have to follow each other directly. This can be used for writing out arpeggios.

timeSignatureFraction (fraction, as pair)
A pair of numbers, signifying the time signature. For example, '(4 . 4) is a 4/4 time signature.

timeSignatureSettings (list)
A nested alist of settings for time signatures. Contains elements for various time signatures. The element for each time signature contains entries for baseMoment, beatStructure, and beamExceptions.

timing (boolean)
Keep administration of measure length, position, bar number, etc.? Switch off for cadenzas.
tonic (pitch)
The tonic of the current scale.

topLevelAlignment (boolean)
If true, the Vertical_align_engraver will create a VerticalAlignment; otherwise, it will create a StaffGrouper.

tupletFullLength (boolean)
If set, the tuplet is printed up to the start of the next note.

tupletFullLengthNote (boolean)
If set, end at the next note, otherwise end on the matter (time signatures, etc.) before the note.

tupletSpannerDuration (moment)
Normally, a tuplet bracket is as wide as the \times expression that gave rise to it. By setting this property, you can make brackets last shorter.

\{ 
  \set tupletSpannerDuration = #(ly:make-moment 1 4) 
  \times 2/3 { c8 c c c c c } 
\}

useBassFigureExtenders (boolean)
Whether to use extender lines for repeated bass figures.

vocalName (markup)
Name of a vocal line.

voltaSpannerDuration (moment)
This specifies the maximum duration to use for the brackets printed for \alternative. This can be used to shrink the length of brackets in the situation where one alternative is very large.

whichBar (string)
This property is read to determine what type of bar line to create.
Example:
\set Staff.whichBar = ".|:
This will create a start-repeat bar in this staff only. Valid values are described in scm/bar-line.scm.

2.4 Internal context properties

associatedVoiceContext (context)
The context object of the Voice that has the melody for this Lyrics.

barCheckLastFail (moment)
Where in the measure did the last barcheck fail?

beamMelismaBusy (boolean)
Signal if a beam is present.

busyGros (list)
A queue of (end-moment . grob) cons cells. This is for internal (C++) use only. This property contains the grobs which are still busy (e.g. note heads, spanners, etc.).

currentCommandColumn (graphical (layout) object)
Grob that is X-parent to all current breakable (clef, key signature, etc.) items.
currentMusicalColumn (graphical (layout) object)
   Grob that is X-parent to all non-breakable items (note heads, lyrics, etc.).

dynamicAbsoluteVolumeFunction (procedure)
   A procedure that takes one argument, the text value of a dynamic event, and returns
   the absolute volume of that dynamic event.

finalizations (list)
   A list of expressions to evaluate before proceeding to next time step. This is an
   internal variable.

graceSettings (list)
   Overrides for grace notes. This property should be manipulated through the
   add-grace-property function.

hasAxisGroup (boolean)
   True if the current context is contained in an axis group.

hasStaffSpacing (boolean)
   True if the current CommandColumn contains items that will affect spacing.

lastChord (markup)
   Last chord, used for detecting chord changes.

lastKeyAlterations (list)
   Last key signature before a key signature change.

localAlterations (list)
   The key signature at this point in the measure. The format is the same as for
   keyAlterations, but can also contain ((octave . name) . (alter barnumber .
   measureposition)) pairs.

melismaBusy (boolean)
   Signifies whether a melisma is active. This can be used to signal melismas on top
   of those automatically detected.

partialBusy (boolean)
   Signal that \partial acts at the current timestep.

quotedCueEventTypes (list)
   A list of symbols, representing the event types that should be duplicated for
   \cueDuring commands.

quotedEventTypes (list)
   A list of symbols, representing the event types that should be duplicated
   for \quoteDuring commands. This is also a fallback for \cueDuring if
   quotedCueEventTypes is not set

rootSystem (graphical (layout) object)
   The System object.

scriptDefinitions (list)
   The description of scripts. This is used by the Script_engraver for typesetting
   note-superscripts and subscripts. See scm/script.scm for more information.

slurMelismaBusy (boolean)
   Signal if a slur is present.

stavesFound (list of grobs)
   A list of all staff-symbols found.

tieMelismaBusy (boolean)
   Signal whether a tie is present.
3 Backend

3.1 All layout objects

3.1.1 Accidental

Accidental objects are created by: Section 2.2.1 [Accidental engraver], page 313.

Standard settings:

after-line-breaking (boolean):
  ly:accidental-interface::remove-tied
  Dummy property, used to trigger callback for after-line-breaking.

alteration (number):
  accidental-interface::calc-alteration
  Alteration numbers for accidental.

avoid-slur (symbol):
  'inside
  Method of handling slur collisions. Choices are inside, outside, around, and ignore. inside adjusts the slur if needed to keep the grob inside the slur. outside moves the grob vertically to the outside of the slur. around moves the grob vertically to the outside of the slur only if there is a collision. ignore does not move either. In grobs whose notational significance depends on vertical position (such as accidentals, clefs, etc.), outside and around behave like ignore.

extra-spacing-width (pair of numbers):
  '(-0.2 . 0.0)
  In the horizontal spacing problem, we pad each item by this amount (by adding the ‘car’ on the left side of the item and adding the ‘cdr’ on the right side of the item). In order to make a grob take up no horizontal space at all, set this to (+inf.0 . -inf.0).

glyph-name (string):
  accidental-interface::glyph-name
  The glyph name within the font.
  In the context of (span) bar lines, glyph-name represents a processed form of glyph, where decisions about line breaking etc. are already taken.

glyph-name-alist (list):
  '((0 . "accidentals.natural")
    (-1/2 . "accidentals.flat")
    (1/2 . "accidentals.sharp")
    (1 . "accidentals.doublesharp")
    (-1 . "accidentals.flatflat")
    (3/4
      "accidentals.sharp.slashslash.stemstemstem")
    (1/4 . "accidentals.sharp.slashslash.stem")
    (-1/4 . "accidentals.mirroredflat")
    (-3/4 . "accidentals.mirroredflat.flat"))

An alist of key-string pairs.
horizontal-skylines (pair of skylines):

Two skylines, one to the left and one to the right of this grob.

stencil (stencil):

The symbol to print.

vertical-skylines (pair of skylines):

Two skylines, one above and one below this grob.

X-offset (number):

The horizontal amount that this object is moved relative to its X-parent.

Y-extent (pair of numbers):

Extent (size) in the Y direction, measured in staff-space units, relative to object’s reference point.

This object supports the following interface(s): Section 3.2.1 [accidental-interface], page 545, Section 3.2.36 [font-interface], page 565, Section 3.2.45 [grob-interface], page 570, Section 3.2.50 [inline-accidental-interface], page 577, and Section 3.2.52 [item-interface], page 579.

3.1.2 AccidentalCautionary

AccidentalCautionary objects are created by: Section 2.2.1 [Accidental_engraver], page 313.

Standard settings:

after-line-breaking (boolean):

Dummy property, used to trigger callback for after-line-breaking.

alteration (number):

Alteration numbers for accidental.

avoid-slur (symbol):

Method of handling slur collisions. Choices are inside, outside, around, and ignore. inside adjusts the slur if needed to keep the grob inside the slur. outside moves the grob vertically to the outside of the slur. around moves the grob vertically to the outside of the slur only if there is a collision. ignore does not move either. In grobs whose notational significance depends on vertical position (such as accidentals, clefs, etc.), outside and around behave like ignore.

glyph-name-alist (list):

'((0 . "accidentals.natural")
 (-1/2 . "accidentals.flat")
)
An alist of key-string pairs.

parenthesized (boolean):
   #t
   Parenthesize this grob.

stencil (stencil):
   ly:accidental-interface::print
   The symbol to print.

X-offset (number):
   ly:grob::x-parent-positioning
   The horizontal amount that this object is moved relative to its X-parent.

Y-extent (pair of numbers):
   #<unpure-pure-container #<primitive-procedure
   ly:accidental-interface::height> >
   Extent (size) in the Y direction, measured in staff-space units, relative
to object’s reference point.

This object supports the following interface(s): Section 3.2.1 [accident-al-interface], page 545, Section 3.2.36 [font-interface], page 565, Section 3.2.45 [grob-interface], page 570, Section 3.2.50 [inline-accidental-interface], page 577, and Section 3.2.52 [item-interface], page 579.

3.1.3 AccidentalPlacement

AccidentalPlacement objects are created by: Section 2.2.1 [Accidental_engraver], page 313, and Section 2.2.2 [Ambitus_engraver], page 314.

Standard settings:

direction (direction):
   -1
   If side-axis is 0 (or X), then this property determines whether the
   object is placed LEFT, CENTER or RIGHT with respect to the other object.
   Otherwise, it determines whether the object is placed UP, CENTER or
   DOWN. Numerical values may also be used: UP=1, DOWN=-1, LEFT=-1,
   RIGHT=1, CENTER=0.

right-padding (dimension, in staff space):
   0.15
   Space to insert on the right side of an object (e.g., between note and its
   accidentals).

script-priority (number):
   -100
   A key for determining the order of scripts in a stack, by being added to
   the position of the script in the user input, the sum being the overall
   priority. Smaller means closer to the head.
X-extent (pair of numbers):
  ly:axis-group-interface::width
  Extent (size) in the X direction, measured in staff-space units, relative
to object’s reference point.

This object supports the following interface(s): Section 3.2.2 [accidental-placement-interface],
page 546, Section 3.2.45 [grob-interface], page 570, and Section 3.2.52 [item-interface], page 579.

3.1.4 AccidentalSuggestion
AccidentalSuggestion objects are created by: Section 2.2.1 [Accidental_ engraver], page 313.
Standard settings:

  after-line-breaking (boolean):
    ly:accidental-interface::remove-tied
    Dummy property, used to trigger callback for after-line-breaking.

  alteration (number):
    accidental-interface::calc-alteration
    Alteration numbers for accidental.

  direction (direction):
    1
    If side-axis is 0 (or X), then this property determines whether the
    object is placed LEFT, CENTER or RIGHT with respect to the other object.
    Otherwise, it determines whether the object is placed UP, CENTER or
    DOWN. Numerical values may also be used: UP=1, DOWN=-1, LEFT=-1,
    RIGHT=1, CENTER=0.

  font-size (number):
    -2
    The font size, compared to the ‘normal’ size. 0 is style-sheet’s normal
    size, -1 is smaller, +1 is bigger. Each step of 1 is approximately 12%
    larger; 6 steps are exactly a factor 2 larger. If the context property
    fontSize is set, its value is added to this before the glyph is printed.
    Fractional values are allowed.

  glyph-name-alist (list):
    '((0 . "accidentals.natural")
     (-1/2 . "accidentals.flat")
     (1/2 . "accidentals.sharp")
     (1 . "accidentals.doublesharp")
     (-1 . "accidentals.flatflat")
     (3/4
      . "accidentals.sharp.slashslash.stemstemstem")
     (1/4 . "accidentals.sharp.slashslash.stem")
     (-1/4 . "accidentals.mirroredflat")
     (-3/4 . "accidentals.mirroredflat.flat"))
    An alist of key-string pairs.

  outside-staff.priority (number):
    0
    If set, the grob is positioned outside the staff in such a way as to avoid
    all collisions. In case of a potential collision, the grob with the smaller
    outside-staff.priority is closer to the staff.
**parent-alignment-X** (number):

0

Specify on which point of the parent the object is aligned. The value 
-1 means aligned on parent’s left edge, 0 on center, and 1 right edge, 
in X direction. Other numerical values may also be specified - the unit 
is half the parent’s width. If unset, the value from **self-alignment-X** 
property will be used.

**script-priority** (number):

0

A key for determining the order of scripts in a stack, by being added to 
the position of the script in the user input, the sum being the overall 
priority. Smaller means closer to the head.

**self-alignment-X** (number):

0

Specify alignment of an object. The value -1 means left aligned, 0 cen-
tered, and 1 right-aligned in X direction. Other numerical values may 
also be specified - the unit is half the object width.

**side-axis** (number):

1

If the value is X (or equivalently 0), the object is placed horizontally 
next to the other object. If the value is Y or 1, it is placed vertically.

**staff-padding** (dimension, in staff space):

0.25

Maintain this much space between reference points and the staff. Its 
effect is to align objects of differing sizes (like the dynamics p and f) on 
their baselines.

**stencil** (stencil):

ly:accidental-interface::print

The symbol to print.

**X-offset** (number):

ly:self-alignment-interface::aligned-on-x-parent

The horizontal amount that this object is moved relative to its X-parent.

**Y-extent** (pair of numbers):

#<unpure-pure-container #<primitive-procedure 
ly:accidental-interface::height> >

Extent (size) in the Y direction, measured in staff-space units, relative 
to object’s reference point.

**Y-offset** (number):

#<unpure-pure-container #<primitive-procedure ly:side-
position-interface::y-aligned-side> #<primitive-procedure 
ly:side-position-interface::pure-y-aligned-side> >

The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): Section 3.2.1 [accidental-interface], page 545, 
Section 3.2.3 [accidental-suggestion-interface], page 546, Section 3.2.36 [font-interface], page 565, 
Section 3.2.45 [grob-interface], page 570, Section 3.2.52 [item-interface], page 579, Section 3.2.85 
[outside-staff-interface], page 596, Section 3.2.100 [script-interface], page 602, Section 3.2.101 
[self-alignment-interface], page 603, and Section 3.2.105 [side-position-interface], page 606.
3.1.5 Ambitus

Ambitus objects are created by: Section 2.2.2 [Ambitus engraver], page 314.

Standard settings:

- **axes (list):**
  - '(0 1)
  - List of axis numbers. In the case of alignment grobs, this should contain only one number.

- **break-align-symbol (symbol):**
  - 'ambitus
  - This key is used for aligning, ordering, and spacing breakable items. See Section “break-alignment-interface” in Internals Reference.

- **break-visibility (vector):**
  - #(#f #f #t)
  - A vector of 3 booleans, #((end-of-line unbroken begin-of-line). #t means visible, #f means killed.

- **non-musical (boolean):**
  - #t
  - True if the grob belongs to a NonMusicalPaperColumn.

- **space-alist (list):**
  - '(((cue-end-clef extra-space . 0.5)
    (clef extra-space . 1.15)
    (cue-clef extra-space . 0.5)
    (key-signature extra-space . 1.15)
    (staff-bar extra-space . 1.15)
    (time-signature extra-space . 1.15)
    (right-edge extra-space . 0.5)
    (first-note extra-space . 1.15))
  - An alist that specifies distances from this grob to other breakable items, using the format:
    - '#((break-align-symbol . (spacing-style . space))
      (break-align-symbol . (spacing-style . space))
      ...
    )
  - Standard choices for break-align-symbol are listed in Section “break-alignment-interface” in Internals Reference. Additionally, three special break-align symbols available to space-alist are:
    - **first-note**
      - used when the grob is just left of the first note on a line
    - **next-note**
      - used when the grob is just left of any other note; if not set, the value of first-note gets used
    - **right-edge**
      - used when the grob is the last item on the line (only compatible with the extra-space spacing style)
Choices for \textit{spacing-style} are:

- \textit{extra-space}
  
  Put this much space between the two grobs. The space is stretchable when paired with \textit{first-note} or \textit{next-note}; otherwise it is fixed.

- \textit{minimum-space}
  
  Put at least this much space between the left sides of both grobs, without allowing them to collide. The space is stretchable when paired with \textit{first-note} or \textit{next-note}; otherwise it is fixed. Not compatible with \textit{right-edge}.

- \textit{fixed-space}
  
  Only compatible with \textit{first-note} and \textit{next-note}. Put this much fixed space between the grob and the note.

- \textit{minimum-fixed-space}
  
  Only compatible with \textit{first-note} and \textit{next-note}. Put at least this much fixed space between the left side of the grob and the left side of the note, without allowing them to collide.

- \textit{semi-fixed-space}
  
  Only compatible with \textit{first-note} and \textit{next-note}. Put this much space between the grob and the note, such that half of the space is fixed and half is stretchable.

Rules for this spacing are much more complicated than this. See [Wanske] page 126–134, [Ross] page 143–147.

\textbf{X-extent} (pair of numbers):

\texttt{ly:axis-group-interface::width}

Extent (size) in the X direction, measured in staff-space units, relative to object’s reference point.

\textbf{Y-extent} (pair of numbers):

\texttt{#<unpure-pure-container #<primitive-procedure ly:axis-group-interface::height> #<primitive-procedure ly:axis-group-interface::pure-height> >}

Extent (size) in the Y direction, measured in staff-space units, relative to object’s reference point.

This object supports the following interface(s): Section 3.2.5 [ambitus-interface], page 547, Section 3.2.7 [axis-group-interface], page 549, Section 3.2.15 [break-aligned-interface], page 556, Section 3.2.45 [grob-interface], page 570, and Section 3.2.52 [item-interface], page 579.

\textbf{3.1.6 AmbitusAccidental}

AmbitusAccidental objects are created by: Section 2.2.2 [Ambitus_ engraver], page 314.

Standard settings:

\textbf{direction} (direction):

\texttt{-1}
If `side-axis` is 0 (or X), then this property determines whether the object is placed LEFT, CENTER or RIGHT with respect to the other object. Otherwise, it determines whether the object is placed UP, CENTER or DOWN. Numerical values may also be used: UP=1, DOWN=-1, LEFT=-1, RIGHT=1, CENTER=0.

`glyph-name-alist` (list):
'((0 . "accidentals.natural")
 (-1/2 . "accidentals.flat")
 (1/2 . "accidentals.sharp")
 (1 . "accidentals.doublesharp")
 (-1 . "accidentals.flatflat")
 (3/4
   "accidentals.sharp.slashslash.stemstemstem")
 (1/4 . "accidentals.sharp.slashslash.stem")
 (-1/4 . "accidentals.mirroredflat")
 (-3/4 . "accidentals.mirroredflat.flat"))

An alist of key-string pairs.

`padding` (dimension, in staff space):
0.5
Add this much extra space between objects that are next to each other.

`side-axis` (number):
0
If the value is X (or equivalently 0), the object is placed horizontally next to the other object. If the value is Y or 1, it is placed vertically.

`stencil` (stencil):
ly:accidental-interface::print
The symbol to print.

`X-offset` (number):
ly:grob::x-parent-positioning
The horizontal amount that this object is moved relative to its X-parent.

`Y-extent` (pair of numbers):
#<unpure-pure-container #<primitive-procedure
ly:accidental-interface::height> >
Extent (size) in the Y direction, measured in staff-space units, relative to object’s reference point.

This object supports the following interface(s): Section 3.2.1 [accidental-interface], page 545, Section 3.2.15 [break-aligned-interface], page 556, Section 3.2.36 [font-interface], page 565, Section 3.2.45 [grob-interface], page 570, Section 3.2.52 [item-interface], page 579, and Section 3.2.105 [side-position-interface], page 606.

### 3.1.7 AmbitusLine

AmbitusLine objects are created by: Section 2.2.2 [Ambitus_engraver], page 314.

Standard settings:

`gap` (dimension, in staff space):
ambitus-line::calc-gap
Size of a gap in a variable symbol.
length-fraction (number):
0.7
Multiplier for lengths. Used for determining ledger lines and stem lengths.

maximum-gap (number):
0.45
Maximum value allowed for gap property.

stencil (stencil):
ambitus::print
The symbol to print.

thickness (number):
2
For grobs made up of lines, this is the thickness of the line. For slurs and ties, this is the distance between the two arcs of the curve's outline at its thickest point, not counting the diameter of the virtual "pen" that draws the arcs. This property is expressed as a multiple of the current staff-line thickness (i.e. the visual output is influenced by changes to \texttt{Staff.StaffSymbol.thickness}).

X-offset (number):
ly:self-alignment-interface::centered-on-x-parent
The horizontal amount that this object is moved relative to its X-parent.

This object supports the following interface(s): Section 3.2.5 [ambitus-interface], page 547, Section 3.2.36 [font-interface], page 565, Section 3.2.45 [grob-interface], page 570, and Section 3.2.52 [item-interface], page 579.

3.1.8 AmbitusNoteHead

AmbitusNoteHead objects are created by: Section 2.2.2 [Ambitus_engraver], page 314.

Standard settings:

duration-log (integer):
2
The 2-log of the note head duration, i.e., 0 = whole note, 1 = half note, etc.

glyph-name (string):
note-head::calc-glyph-name
The glyph name within the font.
In the context of (span) bar lines, \texttt{glyph-name} represents a processed form of \texttt{glyph}, where decisions about line breaking etc. are already taken.

ignore-ambitus (boolean):
#t
If set, don't consider this notehead for ambitus calculation.

stencil (stencil):
ly:note-head::print
The symbol to print.
Y-extent (pair of numbers):
#<unpure-pure-container #<primitive-procedure
ly:grob::stencil-height>
Extent (size) in the Y direction, measured in staff-space units, relative
to object’s reference point.

Y-offset (number):
#<unpure-pure-container #<primitive-procedure
ly:staff-symbol-referencer::callback>
The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): Section 3.2.5 [ambitus-interface], page 547,
Section 3.2.36 [font-interface], page 565, Section 3.2.45 [grob-interface], page 570, Section 3.2.52
[item-interface], page 579, Section 3.2.57 [ledgered-interface], page 583, Section 3.2.78 [note-
head-interface], page 593, Section 3.2.98 [rhythmic-head-interface], page 601, and Section 3.2.116
[staff-symbol-referencer-interface], page 616.

3.1.9 Arpeggio
Arpeggio objects are created by: Section 2.2.3 [Arpeggio engraver], page 315, and Section 2.2.109
[Span_arpeggio engraver], page 353.
Standard settings:

direction (direction):
-1
If side-axis is 0 (or X), then this property determines whether the
object is placed LEFT, CENTER or RIGHT with respect to the other object.
Otherwise, it determines whether the object is placed UP, CENTER or
DOWN. Numerical values may also be used: UP=1, DOWN=-1, LEFT=-1,
RIGHT=1, CENTER=0.

line-thickness (number):
1
For slurs and ties, this is the diameter of the virtual “pen” that
draws the two arcs of the curve’s outline, which intersect at the end-
points. This property is expressed as a multiple of the current staff-
line thickness (i.e. the visual output is influenced by changes to
Staff.StaffSymbol.thickness).

padding (dimension, in staff space):
0.5
Add this much extra space between objects that are next to each other.

positions (pair of numbers):
ly:arpeggio::calc-positions
Pair of staff coordinates (left . right), where both left and right are
in staff-space units of the current staff. For slurs, this value selects
which slur candidate to use; if extreme positions are requested, the
closest one is taken.

protrusion (number):
0.4
In an arpeggio bracket, the length of the horizontal edges.

script-priority (number):
0
A key for determining the order of scripts in a stack, by being added to the position of the script in the user input, the sum being the overall priority. Smaller means closer to the head.

**side-axis** (number):

0

If the value is X (or equivalently 0), the object is placed horizontally next to the other object. If the value is Y or 1, it is placed vertically.

**staff-position** (number):

0.0

Vertical position, measured in half staff spaces, counted from the middle line.

**stencil** (stencil):

ly:arpeggio::print

The symbol to print.

**thickness** (number):

1

For grobs made up of lines, this is the thickness of the line. For slurs and ties, this is the distance between the two arcs of the curve’s outline at its thickest point, not counting the diameter of the virtual “pen” that draws the arcs. This property is expressed as a multiple of the current staff-line thickness (i.e. the visual output is influenced by changes to \texttt{Staff.StaffSymbol.thickness}).

**X-extent** (pair of numbers):

ly:arpeggio::width

Extent (size) in the X direction, measured in staff-space units, relative to object’s reference point.

**X-offset** (number):

ly:side-position-interface::x-aligned-side

The horizontal amount that this object is moved relative to its X-parent.

**Y-extent** (pair of numbers):

<unpure-pure-container #<primitive-procedure ly:grob::stencil-height> #<primitive-procedure ly:arpeggio::pure-height> >

Extent (size) in the Y direction, measured in staff-space units, relative to object’s reference point.

**Y-offset** (number):

<unpure-pure-container #<primitive-procedure ly:staff-symbol-referencer::callback> >

The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): Section 3.2.6 [arpeggio-interface], page 548, Section 3.2.36 [font-interface], page 565, Section 3.2.45 [grob-interface], page 570, Section 3.2.52 [item-interface], page 579, Section 3.2.105 [side-position-interface], page 606, and Section 3.2.116 [staff-symbol-referencer-interface], page 616.
3.1.10 BalloonTextItem

BalloonTextItem objects are created by: Section 2.2.6 [Balloon engraver], page 316.

Standard settings:

- **annotation-balloon** (boolean):
  
  ```lisp
  #t
  ```

  Print the balloon around an annotation.

- **annotation-line** (boolean):
  
  ```lisp
  #t
  ```

  Print the line from an annotation to the grob that it annotates.

- **extra-spacing-width** (pair of numbers):
  
  ```lisp
  (+inf.0 . -inf.0)
  ```

  In the horizontal spacing problem, we pad each item by this amount (by adding the ‘car’ on the left side of the item and adding the ‘cdr’ on the right side of the item). In order to make a grob take up no horizontal space at all, set this to (+inf.0 . -inf.0).

- **stencil** (stencil):
  
  ```lisp
  ly:balloon-interface::print
  ```

  The symbol to print.

- **text** (markup):
  
  ```lisp
  #<procedure #f (grob)>
  ```

  Text markup. See Section “Formatting text” in Notation Reference.

- **X-offset** (number):
  
  ```lisp
  #<procedure #f (grob)>
  ```

  The horizontal amount that this object is moved relative to its X-parent.

- **Y-extent** (pair of numbers):
  
  ```lisp
  ly:grob::stencil-height
  ```

  Extent (size) in the Y direction, measured in staff-space units, relative to object’s reference point.

- **Y-offset** (number):
  
  ```lisp
  #<procedure #f (grob)>
  ```

  The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): Section 3.2.8 [balloon-interface], page 551, Section 3.2.36 [font-interface], page 565, Section 3.2.45 [grob-interface], page 570, Section 3.2.52 [item-interface], page 579, and Section 3.2.126 [text-interface], page 622.

3.1.11 BarLine

BarLine objects are created by: Section 2.2.7 [Bar engraver], page 316.

Standard settings:

- **allow-span-bar** (boolean):
  
  ```lisp
  #t
  ```

  If false, no inter-staff bar line will be created below this bar line.

- **bar-extent** (pair of numbers):
  
  ```lisp
  ly:bar-line::calc-bar-extent
  ```
The Y-extent of the actual bar line. This may differ from Y-extent because it does not include the dots in a repeat bar line.

break-align-anchor (number):
   ly:bar-line::calc-anchor
   Grobs aligned to this breakable item will have their X-offsets shifted by this number. In bar lines, for example, this is used to position grobs relative to the (visual) center of the bar line.

break-align-symbol (symbol):
   'staff-bar
   This key is used for aligning, ordering, and spacing breakable items. See Section “break-alignment-interface” in Internals Reference.

break-visibility (vector):
   bar-line::calc-break-visibility
   A vector of 3 booleans, #(end-of-line unbroken begin-of-line). #t means visible, #f means killed.

extra-spacing-height (pair of numbers):
   pure-from-neighbor-interface::account-for-span-bar
   In the horizontal spacing problem, we increase the height of each item by this amount (by adding the ‘car’ to the bottom of the item and adding the ‘cdr’ to the top of the item). In order to make a grob infinitely high (to prevent the horizontal spacing problem from placing any other grobs above or below this grob), set this to (-inf.0 . +inf.0).

gap (dimension, in staff space):
   0.4
   Size of a gap in a variable symbol.

glyph (string):
   "|"
   A string determining what ‘style’ of glyph is typeset. Valid choices depend on the function that is reading this property.
   In combination with (span) bar lines, it is a string resembling the bar line appearance in ASCII form.

glyph-name (string):
   bar-line::calc-glyph-name
   The glyph name within the font.
   In the context of (span) bar lines, glyph-name represents a processed form of glyph, where decisions about line breaking etc. are already taken.

hair-thickness (number):
   1.9
   Thickness of the thin line in a bar line, expressed as a multiple of the default staff-line thickness (i.e. the visual output is not influenced by changes to Staff.StaffSymbol.thickness).

kern (dimension, in staff space):
   3.0
The space between individual elements in any compound bar line, expressed as a multiple of the default staff-line thickness (i.e. the visual output is \textit{not} influenced by changes to \texttt{Staff.StaffSymbol.thickness}).

\textbf{layer (integer):}

\[0\]

An integer which determines the order of printing objects. Objects with the lowest value of layer are drawn first, then objects with progressively higher values are drawn, so objects with higher values overwrite objects with lower values. By default most objects are assigned a layer value of 1.

\textbf{non-musical (boolean):}

\[\#t\]

True if the grob belongs to a \texttt{NonMusicalPaperColumn}.

\textbf{rounded (boolean)}

Decide whether lines should be drawn rounded or not.

\textbf{segno-kern (number):}

\[3.0\]

The space between the two thin lines of the segno bar line symbol, expressed as a multiple of the default staff-line thickness (i.e. the visual output is \textit{not} influenced by changes to \texttt{Staff.StaffSymbol.thickness}).

\textbf{space-alist (list)}:

\[
'((\text{ambitus extra-space} . 1.0)
 (\text{time-signature extra-space} . 0.75)
 (\text{custos minimum-space} . 2.0)
 (\text{clef extra-space} . 1.0)
 (\text{key-signature extra-space} . 1.0)
 (\text{key-cancellation extra-space} . 1.0)
 (\text{first-note fixed-space} . 1.3)
 (\text{next-note semi-fixed-space} . 0.9)
 (\text{right-edge extra-space} . 0.0))
'
\]

An alist that specifies distances from this grob to other breakable items, using the format:

\[
'((\text{break-align-symbol} . (\text{spacing-style} . \text{space}))
 (\text{break-align-symbol} . (\text{spacing-style} . \text{space}))
 ...)
'
\]

Standard choices for \texttt{break-align-symbol} are listed in Section “break-alignment-interface” in Internals Reference. Additionally, three special break-align symbols available to \texttt{space-alist} are:

\textbf{first-note}

used when the grob is just left of the first note on a line

\textbf{next-note}

used when the grob is just left of any other note; if not set, the value of \texttt{first-note} gets used
right-edge
used when the grob is the last item on the line
(only compatible with the extra-space spacing style)

Choices for spacing-style are:

extra-space
Put this much space between the two grobs. The space is stretchable when paired with
first-note or next-note; otherwise it is fixed.

minimum-space
Put at least this much space between the left
sides of both grobs, without allowing them to
collide. The space is stretchable when paired
with first-note or next-note; otherwise it is
fixed. Not compatible with right-edge.

fixed-space
Only compatible with first-note and
next-note. Put this much fixed space between
the grob and the note.

minimum-fixed-space
Only compatible with first-note and
next-note. Put at least this much fixed space
between the left side of the grob and the left
side of the note, without allowing them to
collide.

semi-fixed-space
Only compatible with first-note and
next-note. Put this much space between the
grob and the note, such that half of the space
is fixed and half is stretchable.

Rules for this spacing are much more complicated than this. See

stencil (stencil):
ly:bar-line::print
The symbol to print.

thick-thickness (number):
6.0
Thickness of the thick line in a bar line, expressed as a multiple of the
default staff-line thickness (i.e. the visual output is not influenced by
changes to Staff.StaffSymbol.thickness).

Y-extent (pair of numbers):
#<unpure-pure-container #<primitive-procedure
ly:grob::stencil-height> >
Extent (size) in the Y direction, measured in staff-space units, relative
to object’s reference point.
This object supports the following interface(s): Section 3.2.9 [bar-line-interface], page 551, Section 3.2.15 [break-aligned-interface], page 556, Section 3.2.36 [font-interface], page 565, Section 3.2.45 [grob-interface], page 570, Section 3.2.52 [item-interface], page 579, and Section 3.2.94 [pure-from-neighbor-interface], page 600.

### 3.1.12 BarNumber

BarNumber objects are created by: Section 2.2.8 [Bar number engraver], page 317.

Standard settings:

**after-line-breaking** (boolean):

```
ly:side-position-interface::move-to-extremal-staff
```

Dummy property, used to trigger callback for after-line-breaking.

**break-align-symbols** (list):

```
'(left-edge staff-bar)
```

A list of *break-align symbols* that determines which breakable items to align this to. If the grob selected by the first symbol in the list is invisible due to break-visibility, we will align to the next grob (and so on). Choices are listed in Section “break-alignment-interface” in Internals Reference.

**break-visibility** (vector):

```
#(#f #f #t)
```

A vector of 3 booleans, #(*end-of-line unbroken begin-of-line*). #t means visible, #f means killed.

**direction** (direction):

1

If side-axis is 0 (or X), then this property determines whether the object is placed LEFT, CENTER or RIGHT with respect to the other object. Otherwise, it determines whether the object is placed UP, CENTER or DOWN. Numerical values may also be used: UP=1, DOWN=-1, LEFT=-1, RIGHT=1, CENTER=0.

**extra-spacing-width** (pair of numbers):

```
'(+inf.0 . -inf.0)
```

In the horizontal spacing problem, we pad each item by this amount (by adding the ‘car’ on the left side of the item and adding the ‘cdr’ on the right side of the item). In order to make a grob take up no horizontal space at all, set this to (+inf.0 . -inf.0).

**font-family** (symbol):

```
'roman
```

The font family is the broadest category for selecting text fonts. Options include: sans, roman.

**font-size** (number):

-2

The font size, compared to the ‘normal’ size. 0 is style-sheet’s normal size, -1 is smaller, +1 is bigger. Each step of 1 is approximately 12% larger; 6 steps are exactly a factor 2 larger. If the context property fontSize is set, its value is added to this before the glyph is printed. Fractional values are allowed.
horizon-padding (number):
0.05
The amount to pad the axis along which a Skyline is built for the side-position-interface.

non-musical (boolean):
#t
True if the grob belongs to a NonMusicalPaperColumn.

outside-staff-priority (number):
100
If set, the grob is positioned outside the staff in such a way as to avoid all collisions. In case of a potential collision, the grob with the smaller outside-staff-priority is closer to the staff.

padding (dimension, in staff space):
1.0
Add this much extra space between objects that are next to each other.

self-alignment-X (number):
1
Specify alignment of an object. The value -1 means left aligned, 0 centered, and 1 right-aligned in X direction. Other numerical values may also be specified - the unit is half the object width.

side-axis (number):
1
If the value is X (or equivalently 0), the object is placed horizontally next to the other object. If the value is Y or 1, it is placed vertically.

stencil (stencil):
ly:text-interface::print
The symbol to print.

X-offset (number):
self-alignment-interface::self-aligned-on-breakable
The horizontal amount that this object is moved relative to its X-parent.

Y-extent (pair of numbers):
#<unpure-pure-container #<primitive-procedure
ly:grob::stencil-height> >
Extent (size) in the Y direction, measured in staff-space units, relative to object’s reference point.

Y-offset (number):
#<unpure-pure-container #<primitive-procedure ly:side-position-interface::y-aligned-side> #<primitive-procedure
ly:side-position-interface::pure-y-aligned-side> >
The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): Section 3.2.14 [break-alignable-interface], page 556, Section 3.2.36 [font-interface], page 565, Section 3.2.45 [grob-interface], page 570, Section 3.2.52 [item-interface], page 579, Section 3.2.85 [outside-staff-interface], page 596, Section 3.2.101 [self-alignment-interface], page 603, Section 3.2.105 [side-position-interface], page 606, and Section 3.2.126 [text-interface], page 622.
3.1.13 BassFigure

BassFigure objects are created by: Section 2.2.37 [Figured_bass_engraver], page 328.

Standard settings:

```plaintext
stencil (stencil):
  ly: text-interface::print
  The symbol to print.
```

```plaintext
Y-extent (pair of numbers):
  #<unpure-pure-container #<primitive-procedure
  ly: grob::stencil-height> >
  Extent (size) in the Y direction, measured in staff-space units, relative
to object’s reference point.
```

This object supports the following interface(s): Section 3.2.11 [bass-figure-interface], page 552, Section 3.2.36 [font-interface], page 565, Section 3.2.45 [grob-interface], page 570, Section 3.2.52 [item-interface], page 579, Section 3.2.97 [rhythmic-grob-interface], page 601, and Section 3.2.126 [text-interface], page 622.

3.1.14 BassFigureAlignment

BassFigureAlignment objects are created by: Section 2.2.37 [Figured_bass_engraver], page 328.

Standard settings:

```plaintext
axes (list):
  '(1)
  List of axis numbers. In the case of alignment grobs, this should contain
  only one number.
```

```plaintext
padding (dimension, in staff space):
  0.2
  Add this much extra space between objects that are next to each other.
```

```plaintext
stacking-dir (direction):
  -1
  Stack objects in which direction?
```

```plaintext
X-extent (pair of numbers):
  ly: axis-group-interface::width
  Extent (size) in the X direction, measured in staff-space units, relative
to object’s reference point.
```

```plaintext
Y-extent (pair of numbers):
  #<unpure-pure-container #<primitive-procedure ly: axis-
  group-interface::height> #<primitive-procedure ly: axis-
  group-interface::pure-height> >
  Extent (size) in the Y direction, measured in staff-space units, relative
to object’s reference point.
```

This object supports the following interface(s): Section 3.2.4 [align-interface], page 547, Section 3.2.7 [axis-group-interface], page 549, Section 3.2.10 [bass-figure-alignment-interface], page 552, Section 3.2.45 [grob-interface], page 570, and Section 3.2.112 [spanner-interface], page 612.
3.1.15 BassFigureAlignmentPositioning

BassFigureAlignmentPositioning objects are created by: Section 2.2.38 [Figured_bass_position_engraver], page 329.

Standard settings:

- **axes** (list):
  
  `(1)`
  
  List of axis numbers. In the case of alignment grobs, this should contain only one number.

- **direction** (direction):
  
  `1`
  
  If `side-axis` is 0 (or X), then this property determines whether the object is placed **LEFT**, **CENTER** or **RIGHT** with respect to the other object. Otherwise, it determines whether the object is placed **UP**, **CENTER** or **DOWN**. Numerical values may also be used: **UP**=1, **DOWN**=-1, **LEFT**=-1, **RIGHT**=1, **CENTER**=0.

- **padding** (dimension, in staff space):

  `0.5`

  Add this much extra space between objects that are next to each other.

- **side-axis** (number):

  `1`

  If the value is X (or equivalently 0), the object is placed horizontally next to the other object. If the value is Y or 1, it is placed vertically.

- **staff-padding** (dimension, in staff space):

  `1.0`

  Maintain this much space between reference points and the staff. Its effect is to align objects of differing sizes (like the dynamics p and f) on their baselines.

- **X-extent** (pair of numbers):

  `ly:axis-group-interface::width`

  Extent (size) in the X direction, measured in staff-space units, relative to object’s reference point.

- **Y-extent** (pair of numbers):

  `
  #<unpure-pure-container #<primitive-procedure ly:axis-group-interface::height> #<primitive-procedure ly:axis-group-interface::pure-height> >`

  Extent (size) in the Y direction, measured in staff-space units, relative to object’s reference point.

- **Y-offset** (number):

  `
  #<unpure-pure-container #<primitive-procedure ly:side-position-interface::y-aligned-side> #<primitive-procedure ly:side-position-interface::pure-y-aligned-side> >`

  The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): Section 3.2.7 [axis-group-interface], page 549, Section 3.2.45 [grob-interface], page 570, Section 3.2.85 [outside-staff-interface], page 596, Section 3.2.105 [side-position-interface], page 606, and Section 3.2.112 [spanner-interface], page 612.
3.1.16 BassFigureBracket

BassFigureBracket objects are created by: Section 2.2.37 [Figured_bass_engraver], page 328.

Standard settings:

edge-height (pair):
   '(0.2 . 0.2)
   A pair of numbers specifying the heights of the vertical edges: (left-height . right-height).

stencil (stencil):
   ly:enclosing-bracket::print
   The symbol to print.

X-extent (pair of numbers):
   ly:enclosing-bracket::width
   Extent (size) in the X direction, measured in staff-space units, relative
to object’s reference point.

This object supports the following interface(s): Section 3.2.30 [enclosing-bracket-interface],
page 562, Section 3.2.45 [grob-interface], page 570, and Section 3.2.52 [item-interface], page 579.

3.1.17 BassFigureContinuation

BassFigureContinuation objects are created by: Section 2.2.37 [Figured_bass_engraver],
page 328.

Standard settings:

stencil (stencil):
   ly:figured-bass-continuation::print
   The symbol to print.

Y-offset (number):
   ly:figured-bass-continuation::center-on-figures
   The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): Section 3.2.32 [figured-bass-continuation-
interface], page 563, Section 3.2.45 [grob-interface], page 570, and Section 3.2.112 [spanner-
interface], page 612.

3.1.18 BassFigureLine

BassFigureLine objects are created by: Section 2.2.37 [Figured_bass_engraver], page 328.

Standard settings:

axes (list):
   '(1)
   List of axis numbers. In the case of alignment grobs, this should contain
only one number.

vertical-skylines (pair of skylines):
   ly:axis-group-interface::calc-skylines
   Two skylines, one above and one below this grob.

X-extent (pair of numbers):
   ly:axis-group-interface::width
   Extent (size) in the X direction, measured in staff-space units, relative
to object’s reference point.
Y-extent (pair of numbers):

Extent (size) in the Y direction, measured in staff-space units, relative to object’s reference point.

This object supports the following interface(s): Section 3.2.7 [axis-group-interface], page 549, Section 3.2.45 [grob-interface], page 570, Section 3.2.84 [outside-staff-axis-group-interface], page 595, and Section 3.2.112 [spanner-interface], page 612.

3.1.19 Beam

Beam objects are created by: Section 2.2.4 [Auto_beam-engraver], page 315, Section 2.2.10 [Beam_engraver], page 318, Section 2.2.16 [Chord_tremolo_engraver], page 321, Section 2.2.46 [Grace_auto_beam_engraver], page 332, and Section 2.2.47 [Grace_beam_engraver], page 332.

Standard settings:

\texttt{auto-knee-gap} (dimension, in staff space):

5.5

If a gap is found between note heads where a horizontal beam fits and it is larger than this number, make a kneed beam.

\texttt{beam-thickness} (dimension, in staff space):

0.48

Beam thickness, measured in \texttt{staff-space} units.

\texttt{beamed-stem-shorten} (list):

'\{1.0 0.5 0.25\}

How much to shorten beamed stems, when their direction is forced. It is a list, since the value is different depending on the number of flags and beams.

\texttt{beaming} (pair):

\texttt{ly:beam::calc-beaming}

Pair of number lists. Each number list specifies which beams to make. 0 is the central beam, 1 is the next beam toward the note, etc. This information is used to determine how to connect the beaming patterns from stem to stem inside a beam.

\texttt{clip-edges} (boolean):

\texttt{#t}

Allow outward pointing beamlets at the edges of beams?

\texttt{collision-interfaces} (list):

'\{beam-interface
clef-interface
clef-modifier-interface
flag-interface
inline-accidental-interface
key-signature-interface
note-head-interface
stem-interface
time-signature-interface\}

A list of interfaces for which automatic beam-collision resolution is run.
damping (number):
  1
  Amount of beam slope damping.

details (list):
  '((secondary-beam-demerit . 10)
   (stem-length-demerit-factor . 5)
   (region-size . 2)
   (beam-eps . 0.001)
   (stem-length-limit-penalty . 5000)
   (damping-direction-penalty . 800)
   (hint-direction-penalty . 20)
   (musical-direction-factor . 400)
   (ideal-slope-factor . 10)
   (collision-penalty . 500)
   (collision-padding . 0.35)
   (round-to-zero-slope . 0.02))
A list of parameters for detailed grob behavior. More information on the allowed parameters for a grob can be found by looking at the top of the Internals Reference page for each interface having a details property.

direction (direction):
  ly:beam::calc-direction
  If side-axis is 0 (or X), then this property determines whether the object is placed LEFT, CENTER or RIGHT with respect to the other object. Otherwise, it determines whether the object is placed UP, CENTER or DOWN. Numerical values may also be used: UP=1, DOWN=-1, LEFT=-1, RIGHT=1, CENTER=0.

font-family (symbol):
  'roman
  The font family is the broadest category for selecting text fonts. Options include: sans, roman.

gap (dimension, in staff space):
  0.8
  Size of a gap in a variable symbol.

neutral-direction (direction):
  -1
  Which direction to take in the center of the staff.

normalized-endpoints (pair):
  ly:spanner::calc-normalized-endpoints
  Represents left and right placement over the total spanner, where the width of the spanner is normalized between 0 and 1.

positions (pair of numbers):
  beam::place-broken-parts-individually
  Pair of staff coordinates (left . right), where both left and right are in staff-space units of the current staff. For slurs, this value selects which slur candidate to use; if extreme positions are requested, the closest one is taken.
stencil (stencil):
   ly:beam::print
   The symbol to print.

transparent (boolean):
   #<procedure #f (grob)>
   This makes the grob invisible.

vertical-skylines (pair of skylines):
   #<unpure-pure-container #<primitive-procedure
   ly:grob::vertical-skylines-from-stencil> #<primitive-
   procedure ly:grob::pure-simple-vertical-skylines-from-
   extents> >
   Two skylines, one above and one below this grob.

X-positions (pair of numbers):
   ly:beam::calc-x-positions
   Pair of X staff coordinates of a spanner in the form (left . right),
   where both left and right are in staff-space units of the current staff.

This object supports the following interface(s): Section 3.2.12 [beam-interface], page 553,
Section 3.2.36 [font-interface], page 565, Section 3.2.45 [grob-interface], page 570, Section 3.2.112
[spanner-interface], page 612, Section 3.2.115 [staff-symbol-referencer-interface], page 616, and
Section 3.2.135 [unbreakable-spanner-interface], page 629.

3.1.20 BendAfter

BendAfter objects are created by: Section 2.2.12 [Bend_engraver], page 319.

Standard settings:

minimum-length (dimension, in staff space):
   0.5
   Try to make a spanner at least this long, normally in the horizontal
direction. This requires an appropriate callback for the springs-and-
rods property. If added to a Tie, this sets the minimum distance be-
tween noteheads.

stencil (stencil):
   bend::print
   The symbol to print.

thickness (number):
   2.0
   For grobs made up of lines, this is the thickness of the line. For slurs
and ties, this is the distance between the two arcs of the curve’s outline
at its thickest point, not counting the diameter of the virtual “pen” that
draws the arcs. This property is expressed as a multiple of the current
staff-line thickness (i.e. the visual output is influenced by changes to
Staff.StaffSymbol.thickness).

This object supports the following interface(s): Section 3.2.13 [bend-after-interface], page 555,
Section 3.2.45 [grob-interface], page 570, and Section 3.2.112 [spanner-interface], page 612.
3.1.21 BreakAlignGroup

BreakAlignGroup objects are created by: Section 2.2.13 [Break_align_engraver], page 319.

Standard settings:

axes (list):
    '0
    List of axis numbers. In the case of alignment grobs, this should contain only one number.

break-align-anchor (number):
    ly:break-aligned-interface::calc-average-anchor
    Grobs aligned to this breakable item will have their X-offsets shifted by this number. In bar lines, for example, this is used to position grobs relative to the (visual) center of the bar line.

break-align-anchor-alignment (number):
    ly:break-aligned-interface::calc-joint-anchor-alignment
    Read by ly:break-aligned-interface::calc-extent-aligned-anchor for aligning an anchor to a grob’s extent.

break-visibility (vector):
    ly:break-aligned-interface::calc-break-visibility
    A vector of 3 booleans, #(end-of-line unbroken begin-of-line). #t means visible, #f means killed.

X-extent (pair of numbers):
    ly:axis-group-interface::width
    Extent (size) in the X direction, measured in staff-space units, relative to object’s reference point.

This object supports the following interface(s): Section 3.2.7 [axis-group-interface], page 549, Section 3.2.15 [break-aligned-interface], page 556, Section 3.2.45 [grob-interface], page 570, and Section 3.2.52 [item-interface], page 579.

3.1.22 BreakAlignment

BreakAlignment objects are created by: Section 2.2.13 [Break_align_engraver], page 319.

Standard settings:

axes (list):
    '0
    List of axis numbers. In the case of alignment grobs, this should contain only one number.

break-align-orders (vector):
    #((left-edge
      cue-end-clef
      ambitus
      breathing-sign
      clef
      cue-clef
      staff-bar
      key-cancellation
      key-signature
      time-signature
      ...)}
custos)
(left-edge
  cue-end-clef
  ambitus
  breathing-sign
  clef
  cue-clef
  staff-bar
  key-cancellation
  key-signature
  time-signature
  custos)
(left-edge
  ambitus
  breathing-sign
  clef
  key-cancellation
  key-signature
  time-signature
  staff-bar
  cue-clef
  custos))

This is a vector of 3 lists: #(end-of-line unbroken start-of-line). Each list contains break-align symbols that specify an order of breakable items (see Section “break-alignment-interface” in Internals Reference).

For example, this places time signatures before clefs:

```latex
\override Score.BreakAlignment.break-align-orders = #(make-vector 3 '(left-edge
  cue-end-clef
  ambitus
  breathing-sign
  time-signature
  clef
  cue-clef
  staff-bar
  key-cancellation
  key-signature
  custos))
```

**non-musical** (boolean):

`#t`

True if the grob belongs to a NonMusicalPaperColumn.

**stacking-dir** (direction):

`1`

Stack objects in which direction?

**X-extent** (pair of numbers):

`ly:axis-group-interface::width`

Extent (size) in the X direction, measured in staff-space units, relative to object’s reference point.
This object supports the following interface(s): Section 3.2.7 [axis-group-interface], page 549, Section 3.2.16 [break-alignment-interface], page 558, Section 3.2.45 [grob-interface], page 570, and Section 3.2.52 [item-interface], page 579.

3.1.23 BreathingSign

BreathingSign objects are created by: Section 2.2.14 [Breathing_sign_engraver], page 320.

Standard settings:

break-align-symbol (symbol):
   'breathing-sign
   This key is used for aligning, ordering, and spacing breakable items. See Section “break-alignment-interface” in Internals Reference.

break-visibility (vector):
   #(t t f)
   A vector of 3 booleans, #(end-of-line unbroken begin-of-line). t means visible, f means killed.

non-musical (boolean):
   t
   True if the grob belongs to a NonMusicalPaperColumn.

space-alist (list):
   '((ambitus extra-space . 2.0)
    (custos minimum-space . 1.0)
    (key-signature minimum-space . 1.5)
    (time-signature minimum-space . 1.5)
    (staff-bar minimum-space . 1.5)
    (clef minimum-space . 2.0)
    (cue-clef minimum-space . 2.0)
    (cue-end-clef minimum-space . 2.0)
    (first-note fixed-space . 1.0)
    (right-edge extra-space . 0.1))

An alist that specifies distances from this grob to other breakable items, using the format:

'((break-align-symbol . (spacing-style . space))
 (break-align-symbol . (spacing-style . space))
 ...)

Standard choices for break-align-symbol are listed in Section “break-alignment-interface” in Internals Reference. Additionally, three special break-align symbols available to space-alist are:

first-note
   used when the grob is just left of the first note on a line

next-note
   used when the grob is just left of any other note; if not set, the value of first-note gets used

right-edge
   used when the grob is the last item on the line (only compatible with the extra-space spacing style)
Choices for `spacing-style` are:

- **extra-space**
  Put this much space between the two grobs. The space is stretchable when paired with `first-note` or `next-note`; otherwise it is fixed.

- **minimum-space**
  Put at least this much space between the left sides of both grobs, without allowing them to collide. The space is stretchable when paired with `first-note` or `next-note`; otherwise it is fixed. Not compatible with `right-edge`.

- **fixed-space**
  Only compatible with `first-note` and `next-note`. Put this much fixed space between the grob and the note.

- **minimum-fixed-space**
  Only compatible with `first-note` and `next-note`. Put at least this much fixed space between the left side of the grob and the left side of the note, without allowing them to collide.

- **semi-fixed-space**
  Only compatible with `first-note` and `next-note`. Put this much space between the grob and the note, such that half of the space is fixed and half is stretchable.

Rules for this spacing are much more complicated than this. See [Wanske] page 126–134, [Ross] page 143–147.

**stencil** (stencil):
- `ly:text-interface::print`
  The symbol to print.

**text** (markup):
- `'(\#<procedure musicglyph-markup (layout props glyph-name)>
  "scripts.rcomma")`
  Text markup. See Section “Formatting text” in Notation Reference.

**Y-extent** (pair of numbers):
- `#<unpure-pure-container #<primitive-procedure `ly:grob::stencil-height>>`
  Extent (size) in the Y direction, measured in staff-space units, relative to object’s reference point.

**Y-offset** (number):
- `ly:breathing-sign::offset-callback`
  The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): Section 3.2.15 [break-aligned-interface], page 556, Section 3.2.17 [breathing-sign-interface], page 559, Section 3.2.36 [font-interface], page 565, Section 3.2.45 [grob-interface], page 570, Section 3.2.52 [item-interface], page 579, Section 3.2.85 [outside-staff-interface], page 596, and Section 3.2.126 [text-interface], page 622.
### 3.1.24 ChordName

ChordName objects are created by: Section 2.2.15 [Chord_name engraver], page 320.

Standard settings:

- **after-line-breaking** (boolean):
  - `ly:chord-name::after-line-breaking`
  
  Dummy property, used to trigger callback for `after-line-breaking`.

- **extra-spacing-height** (pair of numbers):
  - `'(0.2 . -0.2)`
  
  In the horizontal spacing problem, we increase the height of each item by this amount (by adding the ‘car’ to the bottom of the item and adding the ‘cdr’ to the top of the item). In order to make a grob infinitely high (to prevent the horizontal spacing problem from placing any other grobs above or below this grob), set this to `(-inf.0 . +inf.0)`.

- **extra-spacing-width** (pair of numbers):
  - `'(0.5 . -0.5)`
  
  In the horizontal spacing problem, we pad each item by this amount (by adding the ‘car’ on the left side of the item and adding the ‘cdr’ on the right side of the item). In order to make a grob take up no horizontal space at all, set this to `(+inf.0 . -inf.0)`.

- **font-family** (symbol):
  - `'sans`
  
  The font family is the broadest category for selecting text fonts. Options include: `sans`, `roman`.

- **font-size** (number):
  - `1.5`
  
  The font size, compared to the ‘normal’ size. 0 is style-sheet’s normal size, -1 is smaller, +1 is bigger. Each step of 1 is approximately 12% larger; 6 steps are exactly a factor 2 larger. If the context property `fontSize` is set, its value is added to this before the glyph is printed. Fractional values are allowed.

- **stencil** (stencil):
  - `ly:text-interface::print`
  
  The symbol to print.

- **word-space** (dimension, in staff space):
  - `0.0`
  
  Space to insert between words in texts.

- **Y-extent** (pair of numbers):
  
  Extent (size) in the Y direction, measured in staff-space units, relative to object’s reference point.

This object supports the following interface(s): Section 3.2.18 [chord-name-interface], page 559, Section 3.2.36 [font-interface], page 565, Section 3.2.45 [grob-interface], page 570, Section 3.2.52 [item-interface], page 579, Section 3.2.85 [outside-staff-interface], page 596, Section 3.2.97 [rhythmic-grob-interface], page 601, and Section 3.2.126 [text-interface], page 622.
3.1.25 Clef

Clef objects are created by: Section 2.2.17 [Clef engraver], page 321.

Standard settings:

avoid-slur (symbol):

'inside

Method of handling slur collisions. Choices are inside, outside, around, and ignore. inside adjusts the slur if needed to keep the grob inside the slur. outside moves the grob vertically to the outside of the slur. around moves the grob vertically to the outside of the slur only if there is a collision. ignore does not move either. In grobs whose notational significance depends on vertical position (such as accidentals, clefs, etc.), outside and around behave like ignore.

break-align-anchor (number):

ly:break-aligned-interface::calc-extent-aligned-anchor

Grobs aligned to this breakable item will have their X-offsets shifted by this number. In bar lines, for example, this is used to position grobs relative to the (visual) center of the bar line.

break-align-anchor-alignment (number):

1

Read by ly:break-aligned-interface::calc-extent-aligned-anchor for aligning an anchor to a grob’s extent.

break-align-symbol (symbol):

'clef

This key is used for aligning, ordering, and spacing breakable items. See Section “break-alignment-interface” in Internals Reference.

break-visibility (vector):

#(#f #f #t)

A vector of 3 booleans, #(end-of-line unbroken begin-of-line). #t means visible, #f means killed.

extra-spacing-height (pair of numbers):

pure-from-neighbor-interface::extra-spacing-height-at-beginning-of-line

In the horizontal spacing problem, we increase the height of each item by this amount (by adding the ‘car’ to the bottom of the item and adding the ‘cdr’ to the top of the item). In order to make a grob infinitely high (to prevent the horizontal spacing problem from placing any other grobs above or below this grob), set this to (-inf.0 . +inf.0).

glyph-name (string):

ly:clef::calc-glyph-name

The glyph name within the font.

In the context of (span) bar lines, glyph-name represents a processed form of glyph, where decisions about line breaking etc. are already taken.

non-musical (boolean):

#t

True if the grob belongs to a NonMusicalPaperColumn.
space-alist (list):
  '((cue-clef extra-space . 2.0)
  (staff-bar extra-space . 0.7)
  (ambitus extra-space . 1.15)
  (key-cancellation minimum-space . 3.5)
  (key-signature minimum-space . 3.5)
  (time-signature minimum-space . 4.2)
  (first-note minimum-fixed-space . 5.0)
  (next-note extra-space . 1.0)
  (right-edge extra-space . 0.5))

An alist that specifies distances from this grob to other breakable items, using the format:

  '((break-align-symbol . (spacing-style . space))
  (break-align-symbol . (spacing-style . space))
  ...)  

Standard choices for break-align-symbol are listed in Section “break-alignment-interface” in Internals Reference. Additionally, three special break-align symbols available to space-alist are:

first-note
  used when the grob is just left of the first note on a line

next-note
  used when the grob is just left of any other note; if not set, the value of first-note gets used

right-edge
  used when the grob is the last item on the line (only compatible with the extra-space spacing style)

Choices for spacing-style are:

extra-space
  Put this much space between the two grobs. The space is stretchable when paired with first-note or next-note; otherwise it is fixed.

minimum-space
  Put at least this much space between the left sides of both grobs, without allowing them to collide. The space is stretchable when paired with first-note or next-note; otherwise it is fixed. Not compatible with right-edge.

fixed-space
  Only compatible with first-note and next-note. Put this much fixed space between the grob and the note.

minimum-fixed-space
  Only compatible with first-note and next-note. Put at least this much fixed space between the left side of the grob and the left
side of the note, without allowing them to collide.

**semi-fixed-space**

Only compatible with first-note and next-note. Put this much space between the grob and the note, such that half of the space is fixed and half is stretchable.

Rules for this spacing are much more complicated than this. See [Wanske] page 126–134, [Ross] page 143–147.

**Stencil**

\[
\text{stencil (stencil):} \\
\text{ly:clef::print} \\
The symbol to print.
\]

**Vertical Skyline**

\[
\text{vertical-skylines (pair of skylines):} \\
\text{#<unpure-pure-container #<primitive-procedure cy:grob::vertical-skylines-from-stencil> >} \\
\text{Two skylines, one above and one below this grob.}
\]

**Y-Extent**

\[
\text{Y-extent (pair of numbers):} \\
\text{#<unpure-pure-container #<primitive-procedure cy:grob::stencil-height> >} \\
\text{Extent (size) in the Y direction, measured in staff-space units, relative to object’s reference point.}
\]

**Y-Offset**

\[
\text{Y-offset (number):} \\
\text{#<unpure-pure-container #<primitive-procedure cy:staff-symbol-referencer::callback> >} \\
\text{The vertical amount that this object is moved relative to its Y-parent.}
\]

This object supports the following interface(s): Section 3.2.15 [break-aligned-interface], page 556, Section 3.2.19 [clef-interface], page 559, Section 3.2.36 [font-interface], page 565, Section 3.2.45 [grob-interface], page 570, Section 3.2.52 [item-interface], page 579, Section 3.2.94 [pure-from-neighbor-interface], page 600, and Section 3.2.116 [staff-symbol-referencer-interface], page 616.

### 3.1.26 ClefModifier

ClefModifier objects are created by: Section 2.2.17 [Clef engraver], page 321, and Section 2.2.24 [Cue_clef_engraver], page 324.

Standard settings:

**Break-Visibility**

\[
\text{break-visibility (vector):} \\
\text{#<procedure #f (grob)>} \\
\text{A vector of 3 booleans, #(end-of-line unbroken begin-of-line). #t means visible, #f means killed.}
\]

**Clef-Alignments**

\[
\text{clef-alignments (list):} \\
'(\text{(G -0.2 . 0.1) (F -0.3 . -0.2) (C 0 . 0)}) \\
\text{An alist of parent-alignments that should be used for clef modifiers with various clefs}
\]

**Color**

\[
\text{color (color):} \\
\text{#<procedure #f (grob)>} \\
\text{The color of this grob.}
\]
font-shape (symbol):
  'italic
  Select the shape of a font. Choices include upright, italic, caps.

text-size (number):
  -4
  The font size, compared to the ‘normal’ size. 0 is style-sheet’s normal size, -1 is smaller, +1 is bigger. Each step of 1 is approximately 12% larger; 6 steps are exactly a factor 2 larger. If the context property fontSize is set, its value is added to this before the glyph is printed. Fractional values are allowed.

parent-alignment-X (number):
  ly:clef-modifier::calc-parent-alignment
  Specify on which point of the parent the object is aligned. The value -1 means aligned on parent’s left edge, 0 on center, and 1 right edge, in X direction. Other numerical values may also be specified - the unit is half the parent’s width. If unset, the value from self-alignment-X property will be used.

self-alignment-X (number):
  0
  Specify alignment of an object. The value -1 means left aligned, 0 centered, and 1 right-aligned in X direction. Other numerical values may also be specified - the unit is half the object width.

staff-padding (dimension, in staff space):
  0.7
  Maintain this much space between reference points and the staff. Its effect is to align objects of differing sizes (like the dynamics p and f) on their baselines.

stencil (stencil):
  ly:text-interface::print
  The symbol to print.

transparent (boolean):
  #<procedure #f (grob)>
  This makes the grob invisible.

vertical-skylines (pair of skylines):
  #<unpure-pure-container #<primitive-procedure
  ly:grob::vertical-skylines-from-stencil> >
  Two skylines, one above and one below this grob.

X-offset (number):
  ly:self-alignment-interface::aligned-on-x-parent
  The horizontal amount that this object is moved relative to its X-parent.

Y-extent (pair of numbers):
  #<unpure-pure-container #<primitive-procedure
  ly:grob::stencil-height> >
  Extent (size) in the Y direction, measured in staff-space units, relative to object’s reference point.
Y-offset (number):

The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): Section 3.2.20 [clef-modifier-interface], page 559, Section 3.2.36 [font-interface], page 565, Section 3.2.45 [grob-interface], page 570, Section 3.2.52 [item-interface], page 579, Section 3.2.85 [outside-staff-interface], page 596, Section 3.2.101 [self-alignment-interface], page 603, Section 3.2.105 [side-position-interface], page 606, and Section 3.2.126 [text-interface], page 622.

3.1.27 ClusterSpanner

ClusterSpanner objects are created by: Section 2.2.18 [Cluster_spanner_ engraver], page 321.

Standard settings:

minimum-length (dimension, in staff space):

0.0

Try to make a spanner at least this long, normally in the horizontal direction. This requires an appropriate callback for the springs-and-rods property. If added to a Tie, this sets the minimum distance between noteheads.

padding (dimension, in staff space):

0.25

Add this much extra space between objects that are next to each other.

springs-and-rods (boolean):

ly:spanner::set-spacing-rods

Dummy variable for triggering spacing routines.

stencil (stencil):

ly:cluster::print

The symbol to print.

style (symbol):

'ramp

This setting determines in what style a grob is typeset. Valid choices depend on the stencil callback reading this property.

This object supports the following interface(s): Section 3.2.22 [cluster-interface], page 560, Section 3.2.45 [grob-interface], page 570, and Section 3.2.112 [spanner-interface], page 612.

3.1.28 ClusterSpannerBeacon

ClusterSpannerBeacon objects are created by: Section 2.2.18 [Cluster_spanner_ engraver], page 321.

Standard settings:

Y-extent (pair of numbers):

ly:cluster-beacon::height

Extent (size) in the Y direction, measured in staff-space units, relative to object’s reference point.

This object supports the following interface(s): Section 3.2.21 [cluster-beacon-interface], page 560, Section 3.2.45 [grob-interface], page 570, Section 3.2.52 [item-interface], page 579, and Section 3.2.97 [rhythmic-grob-interface], page 601.
3.1.29 CombineTextScript

CombineTextScript objects are created by: Section 2.2.87 [Part_combine_engraver], page 346.

Standard settings:

avoid-slap (symbol):
  'outside
Method of handling slur collisions. Choices are inside, outside, around, and ignore. inside adjusts the slur if needed to keep the grob inside the slur. outside moves the grob vertically to the outside of the slur. around moves the grob vertically to the outside of the slur only if there is a collision. ignore does not move either. In grobs whose notational significance depends on vertical position (such as accidentals, clefs, etc.), outside and around behave like ignore.

baseline-skip (dimension, in staff space):
  2
Distance between base lines of multiple lines of text.

direction (direction):
  1
If side-axis is 0 (or X), then this property determines whether the object is placed LEFT, CENTER or RIGHT with respect to the other object. Otherwise, it determines whether the object is placed UP, CENTER or DOWN. Numerical values may also be used: UP=1, DOWN=-1, LEFT=-1, RIGHT=1, CENTER=0.

extra-spacing-width (pair of numbers):
  '(+inf.0 . -inf.0)
In the horizontal spacing problem, we pad each item by this amount (by adding the ‘car’ on the left side of the item and adding the ‘cdr’ on the right side of the item). In order to make a grob take up no horizontal space at all, set this to (+inf.0 . -inf.0).

font-series (symbol):
  'bold
Select the series of a font. Choices include medium, bold, bold-narrow, etc.

outside-staff-priority (number):
  450
If set, the grob is positioned outside the staff in such a way as to avoid all collisions. In case of a potential collision, the grob with the smaller outside-staff-priority is closer to the staff.

padding (dimension, in staff space):
  0.5
Add this much extra space between objects that are next to each other.

parent-alignment-X (number)
Specify on which point of the parent the object is aligned. The value -1 means aligned on parent’s left edge, 0 on center, and 1 right edge, in X direction. Other numerical values may also be specified - the unit is half the parent’s width. If unset, the value from self-alignment-X property will be used.
script-priority (number):
  200
  A key for determining the order of scripts in a stack, by being added to
  the position of the script in the user input, the sum being the overall
  priority. Smaller means closer to the head.

self-alignment-X (number)
  Specify alignment of an object. The value -1 means left aligned, 0 cen-
  tered, and 1 right-aligned in X direction. Other numerical values may
  also be specified - the unit is half the object width.

side-axis (number):
  1
  If the value is X (or equivalently 0), the object is placed horizontally
  next to the other object. If the value is Y or 1, it is placed vertically.

staff-padding (dimension, in staff space):
  0.5
  Maintain this much space between reference points and the staff. Its
  effect is to align objects of differing sizes (like the dynamics p and f) on
  their baselines.

stencil (stencil):
  ly:text-interface::print
  The symbol to print.

X-offset (number):
  ly:self-alignment-interface::aligned-on-x-parent
  The horizontal amount that this object is moved relative to its X-parent.

Y-extent (pair of numbers):
  #<unpure-pure-container #<primitive-procedure
   ly:grob::stencil-height> >
  Extent (size) in the Y direction, measured in staff-space units, relative
  to object's reference point.

Y-offset (number):
  #<unpure-pure-container #<primitive-procedure ly:side-
   position-interface::y-aligned-side> #<primitive-procedure
   ly:side-position-interface::pure-y-aligned-side> >
  The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): Section 3.2.36 [fon
t-font-interface], page 565, Section 3.2.45 [gro
b-interface], page 570, Section 3.2.52 [item-interface], page 579, Section 3.2.85
 [outside-staff-interface], page 596, Section 3.2.101 [self-alignment-interface], page 603,
Section 3.2.105 [side-position-interface], page 606, Section 3.2.126 [text-interface], page 622,
and Section 3.2.127 [text-script-interface], page 623.

3.1.30 CueClef

CueClef objects are created by: Section 2.2.24 [Cue
l-clef-engraver], page 324.

Standard settings:

avoid-slur (symbol):
  'inside
Method of handling slur collisions. Choices are inside, outside, around, and ignore. inside adjusts the slur if needed to keep the grob inside the slur. outside moves the grob vertically to the outside of the slur. around moves the grob vertically to the outside of the slur only if there is a collision. ignore does not move either. In grobs whose notational significance depends on vertical position (such as accidentals, clefs, etc.), outside and around behave like ignore.

**break-align-anchor (number):**

ly:break-aligned-interface::calc-extent-aligned-anchor

Grobs aligned to this breakable item will have their X-offsets shifted by this number. In bar lines, for example, this is used to position grobs relative to the (visual) center of the bar line.

**break-align-symbol (symbol):**

'cue-clef

This key is used for aligning, ordering, and spacing breakable items. See Section “break-alignment-interface” in Internals Reference.

**break-visibility (vector):**

#(#f #f #t)

A vector of 3 booleans, #(end-of-line unbroken begin-of-line). #t means visible, #f means killed.

**extra-spacing-height (pair of numbers):**

pure-from-neighbor-interface::extra-spacing-height-at-beginning-of-line

In the horizontal spacing problem, we increase the height of each item by this amount (by adding the ‘car’ to the bottom of the item and adding the ‘cdr’ to the top of the item). In order to make a grob infinitely high (to prevent the horizontal spacing problem from placing any other grobs above or below this grob), set this to (-inf.0 . +inf.0).

**font-size (number):**

-4

The font size, compared to the ‘normal’ size. 0 is style-sheet’s normal size, -1 is smaller, +1 is bigger. Each step of 1 is approximately 12% larger; 6 steps are exactly a factor 2 larger. If the context property fontSize is set, its value is added to this before the glyph is printed. Fractional values are allowed.

**full-size-change (boolean):**

#t

Don’t make a change clef smaller.

**glyph-name (string):**

ly:clef::calc-glyph-name

The glyph name within the font.

In the context of (span) bar lines, glyph-name represents a processed form of glyph, where decisions about line breaking etc. are already taken.

**non-musical (boolean):**

#t

True if the grob belongs to a NonMusicalPaperColumn.
An alist that specifies distances from this grob to other breakable items, using the format:

```
((break-align-symbol . (spacing-style . space))
  (break-align-symbol . (spacing-style . space))
  ...)
```

Standard choices for break-align-symbol are listed in Section “break-alignment-interface” in Internals Reference. Additionally, three special break-align symbols available to space-alist are:

- **first-note**
  used when the grob is just left of the first note on a line

- **next-note**
  used when the grob is just left of any other note; if not set, the value of first-note gets used

- **right-edge**
  used when the grob is the last item on the line (only compatible with the extra-space spacing style)

Choices for spacing-style are:

- **extra-space**
  Put this much space between the two grobs. The space is stretchable when paired with first-note or next-note; otherwise it is fixed.

- **minimum-space**
  Put at least this much space between the left sides of both grobs, without allowing them to collide. The space is stretchable when paired with first-note or next-note; otherwise it is fixed. Not compatible with right-edge.

- **fixed-space**
  Only compatible with first-note and next-note. Put this much fixed space between the grob and the note.

- **minimum-fixed-space**
  Only compatible with first-note and next-note. Put at least this much fixed space between the left side of the grob and the left
side of the note, without allowing them to collide.

**semi-fixed-space**

Only compatible with first-note and next-note. Put this much space between the grob and the note, such that half of the space is fixed and half is stretchable.

Rules for this spacing are much more complicated than this. See [Wanske] page 126–134, [Ross] page 143–147.

**stencil** (stencil):

    ly:clef::print

The symbol to print.

**vertical-skylines** (pair of skylines):

    ly:grob::vertical-skylines-from-stencil

Two skylines, one above and one below this grob.

**Y-extent** (pair of numbers):

    ly:grob::stencil-height

Extent (size) in the Y direction, measured in staff-space units, relative to object’s reference point.

**Y-offset** (number):

    ly:staff-symbol-referencer::callback

The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): Section 3.2.15 [break-aligned-interface], page 556, Section 3.2.19 [clef-interface], page 559, Section 3.2.36 [font-interface], page 565, Section 3.2.45 [grob-interface], page 570, Section 3.2.52 [item-interface], page 579, Section 3.2.94 [pure-from-neighbor-interface], page 600, and Section 3.2.116 [staff-symbol-referencer-interface], page 616.

### 3.1.31 CueEndClef

CueEndClef objects are created by: Section 2.2.24 [Cue_clef engraver], page 324.

Standard settings:

**avoid-slur** (symbol):

    'inside

Method of handling slur collisions. Choices are inside, outside, around, and ignore. **inside** adjusts the slur if needed to keep the grob inside the slur. **outside** moves the grob vertically to the outside of the slur. **around** moves the grob vertically to the outside of the slur only if there is a collision. **ignore** does not move either. In grobs whose notational significance depends on vertical position (such as accidentals, clefs, etc.), outside and around behave like ignore.

**break-align-anchor** (number):

    ly:break-aligned-interface::calc-extent-aligned-anchor

Grobs aligned to this breakable item will have their X-offsets shifted by this number. In bar lines, for example, this is used to position grobs relative to the (visual) center of the bar line.
break-align-symbol (symbol):
  'cue-end-clef
  This key is used for aligning, ordering, and spacing breakable items. See Section “break-alignment-interface” in Internals Reference.

break-visibility (vector):
  (#t #t #f)
  A vector of 3 booleans, (#(end-of-line unbroken begin-of-line). #t means visible, #f means killed.

extra-spacing-height (pair of numbers):
  pure-from-neighbor-interface::extra-spacing-height-at-beginning-of-line
  In the horizontal spacing problem, we increase the height of each item by this amount (by adding the ‘car’ to the bottom of the item and adding the ‘cdr’ to the top of the item). In order to make a grob infinitely high (to prevent the horizontal spacing problem from placing any other grobs above or below this grob), set this to (-inf.0 . +inf.0).

font-size (number):
  -4
  The font size, compared to the ‘normal’ size. 0 is style-sheet’s normal size, -1 is smaller, +1 is bigger. Each step of 1 is approximately 12% larger; 6 steps are exactly a factor 2 larger. If the context property fontSize is set, its value is added to this before the glyph is printed. Fractional values are allowed.

full-size-change (boolean):
  #t
  Don’t make a change clef smaller.

glyph-name (string):
  ly:clef::calc-glyph-name
  The glyph name within the font.
  In the context of (span) bar lines, glyph-name represents a processed form of glyph, where decisions about line breaking etc. are already taken.

non-musical (boolean):
  #t
  True if the grob belongs to a NonMusicalPaperColumn.

space-alist (list):
  '(((clef extra-space . 0.7)
      (cue-clef extra-space . 0.7)
      (staff-bar extra-space . 0.7)
      (key-cancellation minimum-space . 3.5)
      (key-signature minimum-space . 3.5)
      (time-signature minimum-space . 4.2)
      (first-note minimum-fixed-space . 5.0)
      (next-note extra-space . 1.0)
      (right-edge extra-space . 0.5))
  An alist that specifies distances from this grob to other breakable items, using the format:
    '(((break-align-symbol . (spacing-style . space))
(break-align-symbol . (spacing-style . space))

Standard choices for break-align-symbol are listed in Section “break-alignment-interface” in Internals Reference. Additionally, three special break-align symbols available to space-alist are:

**first-note**

used when the grob is just left of the first note on a line

**next-note**

used when the grob is just left of any other note;
if not set, the value of first-note gets used

**right-edge**

used when the grob is the last item on the line
(only compatible with the extra-space spacing style)

Choices for spacing-style are:

**extra-space**

Put this much space between the two grobs. The space is stretchable when paired with first-note or next-note; otherwise it is fixed.

**minimum-space**

Put at least this much space between the left sides of both grobs, without allowing them to collide. The space is stretchable when paired with first-note or next-note; otherwise it is fixed. Not compatible with right-edge.

**fixed-space**

Only compatible with first-note and next-note. Put this much fixed space between the grob and the note.

**minimum-fixed-space**

Only compatible with first-note and next-note. Put at least this much fixed space between the left side of the grob and the left side of the note, without allowing them to collide.

**semi-fixed-space**

Only compatible with first-note and next-note. Put this much space between the grob and the note, such that half of the space is fixed and half is stretchable.

Rules for this spacing are much more complicated than this. See [Wanske] page 126–134, [Ross] page 143–147.

**stencil (stencil):**

**ly:clef::print**

The symbol to print.
Y-extent (pair of numbers):

\[
\text{Y-extent} \text{ (pair of numbers)}: \\
\text{#<unpure-pure-container #<primitive-procedure ly:grob::stencil-height> >} \\
\text{Extent (size) in the Y direction, measured in staff-space units, relative} \\
to object’s reference point.
\]

Y-offset (number):

\[
\text{Y-offset (number)}: \\
\text{#<unpure-pure-container #<primitive-procedure ly:staff-} \\
symbol-referencer::callback> > \\
\text{The vertical amount that this object is moved relative to its Y-parent.}
\]

This object supports the following interface(s): Section 3.2.15 [break-aligned-interface], page 556, Section 3.2.19 [clef-interface], page 559, Section 3.2.36 [font-interface], page 565, Section 3.2.45 [grob-interface], page 570, Section 3.2.52 [item-interface], page 579, Section 3.2.94 [pure-from-neighbor-interface], page 600, and Section 3.2.116 [staff-symbol-referencer-interface], page 616.

3.1.32 Custos

Custos objects are created by: Section 2.2.25 [Custos engraver], page 324.

Standard settings:

- **break-align-symbol (symbol):**
  
  'custos
  
  This key is used for aligning, ordering, and spacing breakable items. See
  Section “break-alignment-interface” in Internals Reference.

- **break-visibility (vector):**
  
  #( #t #f #t)
  
  A vector of 3 booleans, #(end-of-line unbroken begin-of-line). #t
  means visible, #f means killed.

- **neutral-direction (direction):**
  
  ~1
  
  Which direction to take in the center of the staff.

- **non-musical (boolean):**
  
  #t
  
  True if the grob belongs to a NonMusicalPaperColumn.

- **space-alist (list):**
  
  '((first-note minimum-fixed-space . 0.0)
   (right-edge extra-space . 0.1))
  
  An alist that specifies distances from this grob to other breakable items,
  using the format:

  '((break-align-symbol . (spacing-style . space))
   (break-align-symbol . (spacing-style . space))
   ...
  )

  Standard choices for break-align-symbol are listed in Section “break-
  alignment-interface” in Internals Reference. Additionally, three special
  break-align symbols available to space-alist are:

  - **first-note**
    
    used when the grob is just left of the first note
    on a line
next-note
used when the grob is just left of any other note;
if not set, the value of first-note gets used

right-edge
used when the grob is the last item on the line
(only compatible with the extra-space spacing style)

Choices for spacing-style are:

extra-space
Put this much space between the two grobs.
The space is stretchable when paired with first-note or next-note; otherwise it is fixed.

minimum-space
Put at least this much space between the left sides of both grobs, without allowing them to collide. The space is stretchable when paired with first-note or next-note; otherwise it is fixed. Not compatible with right-edge.

fixed-space
Only compatible with first-note and next-note. Put this much fixed space between the grob and the note.

minimum-fixed-space
Only compatible with first-note and next-note. Put at least this much fixed space between the left side of the grob and the left side of the note, without allowing them to collide.

semi-fixed-space
Only compatible with first-note and next-note. Put this much space between the grob and the note, such that half of the space is fixed and half is stretchable.

Rules for this spacing are much more complicated than this. See [Wanske] page 126–134, [Ross] page 143–147.

stencil (stencil):
ly:custos::print
The symbol to print.

style (symbol):
'vaticana
This setting determines in what style a grob is typeset. Valid choices depend on the stencil callback reading this property.

Y-offset (number):
#<unpure-pure-container #<primitive-procedure ly:staff-symbol-referrer::callback> >
The vertical amount that this object is moved relative to its Y-parent.
This object supports the following interface(s): Section 3.2.15 [break-aligned-interface], page 556, Section 3.2.23 [custos-interface], page 560, Section 3.2.36 [font-interface], page 565, Section 3.2.45 [grob-interface], page 570, Section 3.2.52 [item-interface], page 579, and Section 3.2.116 [staff-symbol-referencer-interface], page 616.

3.1.33 DotColumn

DotColumn objects are created by: Section 2.2.27 [Dot_column_engraver], page 325, and Section 2.2.135 [Vaticana_ligature_engraver], page 361.

Standard settings:

- **axes** (list):
  - '()' (0)
    - List of axis numbers. In the case of alignment grobs, this should contain only one number.

- **chord-dots-limit** (integer):
  - 3
    - Limits the column of dots on each chord to the height of the chord plus **chord-dots-limit** staff-positions.

- **direction** (direction):
  - 1
    - If **side-axis** is 0 (or X), then this property determines whether the object is placed LEFT, CENTER or RIGHT with respect to the other object. Otherwise, it determines whether the object is placed UP, CENTER or DOWN. Numerical values may also be used: UP=1, DOWN=-1, LEFT=-1, RIGHT=1, CENTER=0.

- **X-extent** (pair of numbers):
  - ly:axis-group-interface::width
    - Extent (size) in the X direction, measured in staff-space units, relative to object’s reference point.

This object supports the following interface(s): Section 3.2.7 [axis-group-interface], page 549, Section 3.2.24 [dot-column-interface], page 561, Section 3.2.45 [grob-interface], page 570, and Section 3.2.52 [item-interface], page 579.

3.1.34 Dots

Dots objects are created by: Section 2.2.28 [Dots_engraver], page 325.

Standard settings:

- **avoid-slur** (symbol):
  - 'inside
    - Method of handling slur collisions. Choices are inside, outside, around, and ignore. *inside* adjusts the slur if needed to keep the grob inside the slur. *outside* moves the grob vertically to the outside of the slur. *around* moves the grob vertically to the outside of the slur only if there is a collision. *ignore* does not move either. In grobs whose notational significance depends on vertical position (such as accidentals, clefs, etc.), *outside* and *around* behave like *ignore*.

- **dot-count** (integer):
  - dots::calc-dot-count
    - The number of dots.
extra-spacing-height (pair of numbers):
'(0.5 . 0.5)
In the horizontal spacing problem, we increase the height of each item by this amount (by adding the ‘car’ to the bottom of the item and adding the ‘cdr’ to the top of the item). In order to make a grob infinitely high (to prevent the horizontal spacing problem from placing any other grobs above or below this grob), set this to (-inf.0 . +inf.0).

extra-spacing-width (pair of numbers):
'(0.0 . 0.2)
In the horizontal spacing problem, we pad each item by this amount (by adding the ‘car’ on the left side of the item and adding the ‘cdr’ on the right side of the item). In order to make a grob take up no horizontal space at all, set this to (+inf.0 . -inf.0).

staff-position (number):
dots::calc-staff-position
Vertical position, measured in half staff spaces, counted from the middle line.

stencil (stencil):
ly:dots::print
The symbol to print.

Y-extent (pair of numbers):
#<unpure-pure-container #<primitive-procedure
ly:grob::stencil-height> >
Extent (size) in the Y direction, measured in staff-space units, relative to object’s reference point.

This object supports the following interface(s): Section 3.2.25 [dots-interface], page 561, Section 3.2.36 [font-interface], page 565, Section 3.2.45 [grob-interface], page 570, Section 3.2.52 [item-interface], page 579, and Section 3.2.116 [staff-symbol-referencer-interface], page 616.

3.1.35 DoublePercentRepeat
DoublePercentRepeat objects are created by: Section 2.2.29 [Double_percent_repeat_engraver], page 326.

Standard settings:

break-align-symbol (symbol):
'staff-bar
This key is used for aligning, ordering, and spacing breakable items. See Section “break-alignment-interface” in Internals Reference.

break-visibility (vector):
#(#t #t #f)
A vector of 3 booleans, #(end-of-line unbroken begin-of-line). #t means visible, #f means killed.

dot-negative-kern (number):
0.75
The space to remove between a dot and a slash in percent repeat glyphs. Larger values bring the two elements closer together.
font-encoding (symbol):
  'fetaMusic
  The font encoding is the broadest category for selecting a font. Currently, only LilyPond’s system fonts (Emmentaler) are using this property. Available values are fetaMusic (Emmentaler), fetaBraces, fetaText (Emmentaler).

non-musical (boolean):
  #t
  True if the grob belongs to a NonMusicalPaperColumn.

slash-negative-kern (number):
  1.6
  The space to remove between slashes in percent repeat glyphs. Larger values bring the two elements closer together.

slope (number):
  1.0
  The slope of this object.

stencil (stencil):
  ly:percent-repeat-item-interface::double-percent
  The symbol to print.

thickness (number):
  0.48
  For grobs made up of lines, this is the thickness of the line. For slurs and ties, this is the distance between the two arcs of the curve’s outline at its thickest point, not counting the diameter of the virtual “pen” that draws the arcs. This property is expressed as a multiple of the current staff-line thickness (i.e., the visual output is influenced by changes to Staff.StaffSymbol.thickness).

Y-extent (pair of numbers):
  #<unpure-pure-container #<primitive-procedure
   ly:grob::stencil-height> >
  Extent (size) in the Y direction, measured in staff-space units, relative to object’s reference point.

This object supports the following interface(s): Section 3.2.15 [break-aligned-interface], page 556, Section 3.2.36 [font-interface], page 565, Section 3.2.45 [grob-interface], page 570, Section 3.2.52 [item-interface], page 579, Section 3.2.88 [percent-repeat-interface], page 598, and Section 3.2.89 [percent-repeat-item-interface], page 599.

3.1.36 DoublePercentRepeatCounter
DoublePercentRepeatCounter objects are created by: Section 2.2.29 [Double_percent_repeat_engraver], page 326.

Standard settings:

direction (direction):
  1
  If side-axis is 0 (or X), then this property determines whether the object is placed LEFT, CENTER or RIGHT with respect to the other object. Otherwise, it determines whether the object is placed UP, CENTER or
Numerical values may also be used: \( \text{UP}=1, \text{DOWN}=-1, \text{LEFT}=-1, \text{RIGHT}=1, \text{CENTER}=0 \).

**font-encoding** (symbol):

\texttt{fetaText}

The font encoding is the broadest category for selecting a font. Currently, only Lilypond’s system fonts (Emmentaler) are using this property. Available values are \texttt{fetaMusic} (Emmentaler), \texttt{fetaBraces}, \texttt{fetaText} (Emmentaler).

**font-size** (number):

\(-2\)

The font size, compared to the ‘normal’ size. 0 is style-sheet’s normal size, \(-1\) is smaller, \(+1\) is bigger. Each step of 1 is approximately 12\% larger; 6 steps are exactly a factor 2 larger. If the context property \texttt{fontSize} is set, its value is added to this before the glyph is printed. Fractional values are allowed.

**padding** (dimension, in staff space):

\(0.2\)

Add this much extra space between objects that are next to each other.

**parent-alignment-X** (number):

0

Specify on which point of the parent the object is aligned. The value \(-1\) means aligned on parent’s left edge, 0 on center, and 1 right edge, in X direction. Other numerical values may also be specified - the unit is half the parent’s width. If unset, the value from \texttt{self-alignment-X} property will be used.

**self-alignment-X** (number):

0

Specify alignment of an object. The value \(-1\) means left aligned, 0 centered, and 1 right-aligned in X direction. Other numerical values may also be specified - the unit is half the object width.

**side-axis** (number):

1

If the value is \(X\) (or equivalently \(0\)), the object is placed horizontally next to the other object. If the value is \(Y\) or 1, it is placed vertically.

**staff-padding** (dimension, in staff space):

\(0.25\)

Maintain this much space between reference points and the staff. Its effect is to align objects of differing sizes (like the dynamics \(p\) and \(f\)) on their baselines.

**stencil** (stencil):

\texttt{ly:text-interface::print}

The symbol to print.

**X-offset** (number):

\texttt{ly:self-alignment-interface::aligned-on-x-parent}

The horizontal amount that this object is moved relative to its X-parent.
Y-extent (pair of numbers):

`#<unpure-pure-container #<primitive-procedure ly:grob::stencil-height> >`

Extent (size) in the Y direction, measured in staff-space units, relative to object’s reference point.

Y-offset (number):

`#<unpure-pure-container #<primitive-procedure ly:side-position-interface::y-aligned-side> #<primitive-procedure ly:side-position-interface::pure-y-aligned-side> >`

The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): Section 3.2.36 [font-interface], page 565, Section 3.2.45 [grob-interface], page 570, Section 3.2.52 [item-interface], page 579, Section 3.2.85 [outside-staff-interface], page 596, Section 3.2.88 [percent-repeat-interface], page 598, Section 3.2.89 [percent-repeat-item-interface], page 599, Section 3.2.101 [self-alignment-interface], page 603, Section 3.2.105 [side-position-interface], page 606, and Section 3.2.126 [text-interface], page 622.

### 3.1.37 DoubleRepeatSlash

DoubleRepeatSlash objects are created by: Section 2.2.105 [Slash_repeat_engraver], page 352.

Standard settings:

- **dot-negative-kern** (number):
  - 0.75
  - The space to remove between a dot and a slash in percent repeat glyphs. Larger values bring the two elements closer together.

- **font-encoding** (symbol):
  - 'fetaMusic
  - The font encoding is the broadest category for selecting a font. Currently, only LilyPond’s system fonts (Emmentaler) are using this property. Available values are fetaMusic (Emmentaler), fetaBraces, fetaText (Emmentaler).

- **slash-negative-kern** (number):
  - 1.6
  - The space to remove between slashes in percent repeat glyphs. Larger values bring the two elements closer together.

- **slope** (number):
  - 1.0
  - The slope of this object.

- **stencil** (stencil):
  - ly:percent-repeat-item-interface::beat-slash
  - The symbol to print.

- **thickness** (number):
  - 0.48
  - For grobs made up of lines, this is the thickness of the line. For slurs and ties, this is the distance between the two arcs of the curve’s outline at its thickest point, not counting the diameter of the virtual “pen” that draws the arcs. This property is expressed as a multiple of the current...
staff-line thickness (i.e. the visual output is influenced by changes to \texttt{Staff.StaffSymbol.thickness}).

**Y-extent** (pair of numbers):

\begin{verbatim}
#<unpure-pure-container #<primitive-procedure
ly:grob::stencil-height> >
\end{verbatim}

Extent (size) in the Y direction, measured in staff-space units, relative to object’s reference point.

This object supports the following interface(s): Section 3.2.36 [font-interface], page 565, Section 3.2.45 [grob-interface], page 570, Section 3.2.52 [item-interface], page 579, Section 3.2.85 [outside-staff-interface], page 596, Section 3.2.88 [percent-repeat-interface], page 598, Section 3.2.89 [percent-repeat-item-interface], page 599, and Section 3.2.97 [rhythmic-grob-interface], page 601.

### 3.1.38 DynamicLineSpanner

DynamicLineSpanner objects are created by: Section 2.2.32 [Dynamic_align_ engraver], page 327.

Standard settings:

- **axes** (list):
  \begin{verbatim}
  '1
  \end{verbatim}

  List of axis numbers. In the case of alignment grobs, this should contain only one number.

- **direction** (direction):
  \begin{verbatim}
  -1
  \end{verbatim}

  If \texttt{side-axis} is 0 (or X), then this property determines whether the object is placed \texttt{LEFT}, \texttt{CENTER} or \texttt{RIGHT} with respect to the other object. Otherwise, it determines whether the object is placed \texttt{UP}, \texttt{CENTER} or \texttt{DOWN}. Numerical values may also be used: \texttt{UP}=1, \texttt{DOWN}=-1, \texttt{LEFT}=-1, \texttt{RIGHT}=1, \texttt{CENTER}=0.

- **minimum-space** (dimension, in staff space):
  \begin{verbatim}
  1.2
  \end{verbatim}

  Minimum distance that the victim should move (after padding).

- **outside-staff-priority** (number):
  \begin{verbatim}
  250
  \end{verbatim}

  If set, the grob is positioned outside the staff in such a way as to avoid all collisions. In case of a potential collision, the grob with the smaller \texttt{outside-staff-priority} is closer to the staff.

- **padding** (dimension, in staff space):
  \begin{verbatim}
  0.6
  \end{verbatim}

  Add this much extra space between objects that are next to each other.

- **side-axis** (number):
  \begin{verbatim}
  1
  \end{verbatim}

  If the value is X (or equivalently 0), the object is placed horizontally next to the other object. If the value is Y or 1, it is placed vertically.

- **slur-padding** (number):
  \begin{verbatim}
  0.3
  \end{verbatim}

  Extra distance between slur and script.
staff-padding (dimension, in staff space):
0.1
Maintain this much space between reference points and the staff. Its
effect is to align objects of differing sizes (like the dynamics p and f) on
their baselines.

vertical-skylines (pair of skylines):
<unpure-pure-container <$primitive-procedure
ly:grob::vertical-skylines-from-element-stencils>
<$primitive-procedure ly:grob::pure-vertical-skylines-from-
element-stencils> >
Two skylines, one above and one below this grob.

X-extent (pair of numbers):
ly:axis-group-interface::width
Extent (size) in the X direction, measured in staff-space units, relative
to object’s reference point.

Y-extent (pair of numbers):
<unpure-pure-container <$primitive-procedure ly:axis-
group-interface::height> <$primitive-procedure
ly:axis-group-interface::pure-height> >
Extent (size) in the Y direction, measured in staff-space units, relative
to object’s reference point.

Y-offset (number):
<unpure-pure-container <$primitive-procedure ly:side-
position-interface::y-aligned-side> <$primitive-procedure
ly:side-position-interface::pure-y-aligned-side> >
The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): Section 3.2.7 [axis-group-interface], page 549,
Section 3.2.26 [dynamic-interface], page 562, Section 3.2.27 [dynamic-line-spanner-interface],
page 562, Section 3.2.45 [grob-interface], page 596, Section 3.2.85 [outside-staff-interface],
page 596, Section 3.2.105 [side-position-interface], page 606, and Section 3.2.112 [spanner-
interface], page 612.

3.1.39 DynamicText
DynamicText objects are created by: Section 2.2.33 [Dynamic_engraver], page 327.

Standard settings:

direction (direction):
ly:script-interface::calc-direction
If side-axis is 0 (or X), then this property determines whether the
object is placed LEFT, CENTER or RIGHT with respect to the other object.
Otherwise, it determines whether the object is placed UP, CENTER or
DOWN. Numerical values may also be used: UP=1, DOWN=-1, LEFT=-1,
RIGHT=1, CENTER=0.

extra-spacing-width (pair of numbers):
'(+inf.0 . -inf.0)
In the horizontal spacing problem, we pad each item by this amount (by
adding the ‘car’ on the left side of the item and adding the ‘cdr’ on the
right side of the item). In order to make a grob take up no horizontal
space at all, set this to (+inf.0 . -inf.0).
font-encoding (symbol):
  'fetaText
  The font encoding is the broadest category for selecting a font. Currently, only Lilypond’s system fonts (Emmentaler) are using this property. Available values are fetaMusic (Emmentaler), fetaBraces, fetaText (Emmentaler).

font-series (symbol):
  'bold
  Select the series of a font. Choices include medium, bold, bold-narrow, etc.

font-shape (symbol):
  'italic
  Select the shape of a font. Choices include upright, italic, caps.

parent-alignment-X (number):
  0
  Specify on which point of the parent the object is aligned. The value -1 means aligned on parent’s left edge, 0 on center, and 1 right edge, in X direction. Other numerical values may also be specified - the unit is half the parent’s width. If unset, the value from self-alignment-X property will be used.

right-padding (dimension, in staff space):
  0.5
  Space to insert on the right side of an object (e.g., between note and its accidentals).

self-alignment-X (number):
  0
  Specify alignment of an object. The value -1 means left aligned, 0 centered, and 1 right-aligned in X direction. Other numerical values may also be specified - the unit is half the object width.

stencil (stencil):
  ly:text-interface::print
  The symbol to print.

vertical-skylines (pair of skylines):
  #<unpure-pure-container #<primitive-procedure
    ly:grob::vertical-skylines-from-stencil> >
  Two skylines, one above and one below this grob.

X-align-on-main-noteheads (boolean):
  #t
  If true, this grob will ignore suspended noteheads when aligning itself on NoteColumn.

X-offset (number):
  ly:self-alignment-interface::aligned-on-x-parent
  The horizontal amount that this object is moved relative to its X-parent.

Y-extent (pair of numbers):
  #<unpure-pure-container #<primitive-procedure
    ly:grob::stencil-height> >
Extent (size) in the Y direction, measured in staff-space units, relative to object’s reference point.

Y-offset (number):

```lisp
#<unpure-pure-container #<procedure #f (grob)> >
```

The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): Section 3.2.26 [dynamic-interface], page 562, Section 3.2.28 [dynamic-text-interface], page 562, Section 3.2.36 [font-interface], page 565, Section 3.2.45 [grob-interface], page 570, Section 3.2.52 [item-interface], page 579, Section 3.2.85 [outside-staff-interface], page 596, Section 3.2.100 [script-interface], page 602, Section 3.2.101 [self-alignment-interface], page 603, and Section 3.2.126 [text-interface], page 622.

### 3.1.40 DynamicTextSpanner

DynamicTextSpanner objects are created by: Section 2.2.33 [Dynamic engraver], page 327.

Standard settings:

- **before-line-breaking** (boolean):
  - dynamic-text-spanner::before-line-breaking
    Dummy property, used to trigger a callback function.

- **bound-details** (list):
  ```lisp
  '((right (attach-dir . -1)
    (Y . 0)
    (padding . 0.75))
  (right-broken (attach-dir . 1) (padding . 0.0))
  (left (attach-dir . -1)
    (Y . 0)
    (stencil-offset -0.75 . -0.5)
    (padding . 0.75))
  (left-broken (attach-dir . 1)))
  An alist of properties for determining attachments of spanners to edges.

- **dash-fraction** (number):
  0.2
  Size of the dashes, relative to dash-period. Should be between 0.1 and 1.0 (continuous line). If set to 0.0, a dotted line is produced.

- **dash-period** (number):
  3.0
  The length of one dash together with whitespace. If negative, no line is drawn at all.

- **font-shape** (symbol):
  'italic
  Select the shape of a font. Choices include upright, italic, caps.

- **font-size** (number):
  1
  The font size, compared to the ‘normal’ size. 0 is style-sheet’s normal size, -1 is smaller, +1 is bigger. Each step of 1 is approximately 12% larger; 6 steps are exactly a factor 2 larger. If the context property fontSize is set, its value is added to this before the glyph is printed. Fractional values are allowed.
left-bound-info (list):
  ly:line-spanner::calc-left-bound-info-and-text
An alist of properties for determining attachments of spanners to edges.

minimum-length (dimension, in staff space):
  2.0
Try to make a spanner at least this long, normally in the horizontal
direction. This requires an appropriate callback for the springs-and-
rods property. If added to a Tie, this sets the minimum distance be-
tween noteheads.

minimum-Y-extent (pair of numbers):
  '(-1 . 1)
Minimum size of an object in Y dimension, measured in staff-space
units.

right-bound-info (list):
  ly:line-spanner::calc-right-bound-info
An alist of properties for determining attachments of spanners to edges.

skyline-horizontal-padding (number):
  0.2
For determining the vertical distance between two staves, it is possible to
have a configuration which would result in a tight interleaving of grobs
from the top staff and the bottom staff. The larger this parameter is,
the farther apart the staves are placed in such a configuration.

springs-and-rods (boolean):
  ly:spanner::set-spacing-rods
Dummy variable for triggering spacing routines.

stencil (stencil):
  ly:line-spanner::print
The symbol to print.

style (symbol):
  'dashed-line
This setting determines in what style a grob is typeset. Valid choices
depend on the stencil callback reading this property.

vertical-skylines (pair of skylines):
  #(unpure-pure-container #<primitive-procedure
  ly:grob::vertical-skylines-from-stencil> #<primitive-
  procedure ly:grob::pure-simple-vertical-skylines-from-
  extents> >
Two skylines, one above and one below this grob.

This object supports the following interface(s): Section 3.2.26 [dynamic-interface], page 562,
Section 3.2.29 [dynamic-text-spanner-interface], page 562, Section 3.2.36 [font-interface],
page 565, Section 3.2.45 [grob-interface], page 570, Section 3.2.61 [line-interface], page 583,
Section 3.2.62 [line-spanner-interface], page 584, Section 3.2.112 [spanner-interface], page 612,
and Section 3.2.126 [text-interface], page 622.
3.1.41 Episema

Episema objects are created by: Section 2.2.35 [Episema_engraver], page 328.

Standard settings:

```lisp
bound-details (list):
  '((left (Y . 0) (padding . 0) (attach-dir . -1))
    (right (Y . 0) (padding . 0) (attach-dir . 1)))

An alist of properties for determining attachments of spanners to edges.
```

```lisp
direction (direction):
  1

If side-axis is 0 (or X), then this property determines whether the object is placed LEFT, CENTER or RIGHT with respect to the other object. Otherwise, it determines whether the object is placed UP, CENTER or DOWN. Numerical values may also be used: UP=1, DOWN=-1, LEFT=-1, RIGHT=1, CENTER=0.
```

```lisp
left-bound-info (list):
  ly:line-spanner::calc-left-bound-info

An alist of properties for determining attachments of spanners to edges.
```

```lisp
right-bound-info (list):
  ly:line-spanner::calc-right-bound-info

An alist of properties for determining attachments of spanners to edges.
```

```lisp
side-axis (number):
  1

If the value is X (or equivalently 0), the object is placed horizontally next to the other object. If the value is Y or 1, it is placed vertically.
```

```lisp
stencil (stencil):
  ly:line-spanner::print

The symbol to print.
```

```lisp
style (symbol):
  'line

This setting determines in what style a grob is typeset. Valid choices depend on the stencil callback reading this property.
```

```lisp
Y-offset (number):
  #<unpure-pure-container #<primitive-procedure ly:side-position-interface::y-aligned-side> #<primitive-procedure ly:side-position-interface::pure-y-aligned-side> >

The vertical amount that this object is moved relative to its Y-parent.
```

This object supports the following interface(s): Section 3.2.31 [episema-interface], page 563, Section 3.2.36 [font-interface], page 565, Section 3.2.45 [grob-interface], page 570, Section 3.2.61 [line-interface], page 583, Section 3.2.62 [line-spanner-interface], page 584, Section 3.2.105 [side-position-interface], page 606, and Section 3.2.112 [spanner-interface], page 612.

3.1.42 Fingering

Fingering objects are created by: Section 2.2.40 [Fingering_engraver], page 329, and Section 2.2.76 [New_fingering_engraver], page 342.
Standard settings:

**add-stem-support** (boolean):
- only-if-beamed

If set, the Stem object is included in this script’s support.

**avoid-slur** (symbol):
- 'around

Method of handling slur collisions. Choices are inside, outside, around, and ignore. inside adjusts the slur if needed to keep the grob inside the slur. outside moves the grob vertically to the outside of the slur. around moves the grob vertically to the outside of the slur only if there is a collision. ignore does not move either. In grobs whose notational significance depends on vertical position (such as accidentals, clefs, etc.), outside and around behave like ignore.

**direction** (direction):
- ly:script-interface::calc-direction

If side-axis is 0 (or X), then this property determines whether the object is placed LEFT, CENTER or RIGHT with respect to the other object. Otherwise, it determines whether the object is placed UP, CENTER or DOWN. Numerical values may also be used: UP=1, DOWN=-1, LEFT=-1, RIGHT=1, CENTER=0.

**font-encoding** (symbol):
- 'fetaText

The font encoding is the broadest category for selecting a font. Currently, only LilyPond’s system fonts (Emmentaler) are using this property. Available values are fetaMusic (Emmentaler), fetaBraces, fetaText (Emmentaler).

**font-size** (number):
- -5

The font size, compared to the ‘normal’ size. 0 is style-sheet’s normal size, -1 is smaller, +1 is bigger. Each step of 1 is approximately 12% larger; 6 steps are exactly a factor 2 larger. If the context property fontSize is set, its value is added to this before the glyph is printed. Fractional values are allowed.

**padding** (dimension, in staff space):
- 0.5

Add this much extra space between objects that are next to each other.

**parent-alignment-X** (number):
- 0

Specify on which point of the parent the object is aligned. The value -1 means aligned on parent’s left edge, 0 on center, and 1 right edge, in X direction. Other numerical values may also be specified - the unit is half the parent’s width. If unset, the value from self-alignment-X property will be used.

**parent-alignment-Y** (number):
- 0

Like parent-alignment-X but for the Y axis.
script-priority (number):
100
A key for determining the order of scripts in a stack, by being added to the position of the script in the user input, the sum being the overall priority. Smaller means closer to the head.

self-alignment-X (number):
0
Specify alignment of an object. The value -1 means left aligned, 0 centered, and 1 right-aligned in X direction. Other numerical values may also be specified - the unit is half the object width.

self-alignment-Y (number):
0
Like self-alignment-X but for the Y axis.

slur-padding (number):
0.2
Extra distance between slur and script.

staff-padding (dimension, in staff space):
0.5
Maintain this much space between reference points and the staff. Its effect is to align objects of differing sizes (like the dynamics p and f) on their baselines.

stencil (stencil):
ly:text-interface::print
The symbol to print.

text (markup):
fingering::calc-text
Text markup. See Section “Formatting text” in Notation Reference.

Y-extent (pair of numbers):
#<unpure-pure-container #<primitive-procedure
ly:grob::stencil-height> >
Extent (size) in the Y direction, measured in staff-space units, relative to object’s reference point.

This object supports the following interface(s): Section 3.2.33 [fingering-interface], page 564, Section 3.2.36 [font-interface], page 565, Section 3.2.45 [grob-interface], page 570, Section 3.2.52 [item-interface], page 579, Section 3.2.85 [outside-staff-interface], page 596, Section 3.2.101 [self-alignment-interface], page 603, Section 3.2.105 [side-position-interface], page 606, Section 3.2.126 [text-interface], page 622, and Section 3.2.127 [text-script-interface], page 623.

3.1.43 FingeringColumn
FingeringColumn objects are created by: Section 2.2.39 [Fingering_column_ engraver], page 329.

Standard settings:

padding (dimension, in staff space):
0.2
Add this much extra space between objects that are next to each other.
snap-radius (number):
0.3
The maximum distance between two objects that will cause them to snap to alignment along an axis.

This object supports the following interface(s): Section 3.2.34 [fingering-column-interface], page 564, Section 3.2.45 [grob-interface], page 570, and Section 3.2.52 [item-interface], page 579.

3.1.44 Flag
Flag objects are created by: Section 2.2.119 [Stem engraver], page 355.

Standard settings:

color (color):
    #<procedure #f (grob)>
The color of this grob.

glyph-name (string):
    ly:flag::glyph-name
    The glyph name within the font.
    In the context of (span) bar lines, glyph-name represents a processed form of glyph, where decisions about line breaking etc. are already taken.

stencil (stencil):
    ly:flag::print
    The symbol to print.

transparent (boolean):
    #<procedure #f (grob)>
    This makes the grob invisible.

vertical-skylines (pair of skylines):
    #<unpure-pure-container #<primitive-procedure ly:grob::vertical-skylines-from-stencil> >
    Two skylines, one above and one below this grob.

X-extent (pair of numbers):
    ly:flag::width
    Extent (size) in the X direction, measured in staff-space units, relative to object’s reference point.

X-offset (number):
    ly:flag::calc-x-offset
    The horizontal amount that this object is moved relative to its X-parent.

Y-extent (pair of numbers):
    #<unpure-pure-container #<primitive-procedure ly:grob::stencil-height> >
    Extent (size) in the Y direction, measured in staff-space units, relative to object’s reference point.

Y-offset (number):
    #<unpure-pure-container #<primitive-procedure ly:flag::calc-y-offset> #<primitive-procedure ly:flag::pure-calc-y-offset> >
    The vertical amount that this object is moved relative to its Y-parent.
This object supports the following interface(s): Section 3.2.35 [flag-interface], page 564, Section 3.2.36 [font-interface], page 565, Section 3.2.45 [grob-interface], page 570, and Section 3.2.52 [item-interface], page 579.

3.1.45 FootnoteItem

FootnoteItem objects are created by: Section 2.2.42 [Footnote_engraver], page 330.

Standard settings:

- **annotation-balloon** (boolean)
  Print the balloon around an annotation.

- **annotation-line** (boolean):
  
  \#t

  Print the line from an annotation to the grob that it annotates.

- **automatically-numbered** (boolean):
  
  `<procedure #f (grob)>`

  If set, footnotes are automatically numbered.

- **break-visibility** (vector):
  
  `<procedure #f (grob)>`

  A vector of 3 booleans, `#(end-of-line unbroken begin-of-line)`. \#t means visible, \#f means killed.

- **footnote** (boolean):
  
  \#t

  Should this be a footnote or in-note?

- **footnote-text** (markup):
  
  `<procedure #f (grob)>`

  A footnote for the grob.

- **stencil** (stencil):
  
  `ly:balloon-interface::print`

  The symbol to print.

- **text** (markup):
  
  `<procedure #f (grob)>`

  Text markup. See Section “Formatting text” in Notation Reference.

- **X-extent** (pair of numbers)
  Extent (size) in the X direction, measured in staff-space units, relative to object’s reference point.

- **X-offset** (number):
  
  `<procedure #f (grob)>`

  The horizontal amount that this object is moved relative to its X-parent.

- **Y-extent** (pair of numbers)
  Extent (size) in the Y direction, measured in staff-space units, relative to object’s reference point.

- **Y-offset** (number):
  
  `<procedure #f (grob)>`

  The vertical amount that this object is moved relative to its Y-parent.
This object supports the following interface(s): Section 3.2.8 [balloon-interface], page 551, Section 3.2.36 [font-interface], page 565, Section 3.2.37 [footnote-interface], page 566, Section 3.2.45 [grob-interface], page 570, Section 3.2.52 [item-interface], page 579, and Section 3.2.126 [text-interface], page 622.

### 3.1.46 FootnoteSpanner

FootnoteSpanner objects are created by: Section 2.2.42 [Footnote engraver], page 330.

Standard settings:

- **annotation-balloon** (boolean)
  - Print the balloon around an annotation.

- **annotation-line** (boolean):
  - `#t`
  - Print the line from an annotation to the grob that it annotates.

- **automatically-numbered** (boolean):
  - `<procedure #f (grob)>`
  - If set, footnotes are automatically numbered.

- **footnote** (boolean):
  - `#t`
  - Should this be a footnote or in-note?

- **footnote-text** (markup):
  - `<procedure #f (grob)>`
  - A footnote for the grob.

- **stencil** (stencil):
  - `ly:balloon-interface::print-spanner`
  - The symbol to print.

- **text** (markup):
  - `<procedure #f (grob)>`
  - Text markup. See Section “Formatting text” in *Notation Reference*.

- **X-extent** (pair of numbers)
  - Extent (size) in the X direction, measured in staff-space units, relative to object’s reference point.

- **X-offset** (number):
  - `<procedure #f (grob)>`
  - The horizontal amount that this object is moved relative to its X-parent.

- **Y-extent** (pair of numbers)
  - Extent (size) in the Y direction, measured in staff-space units, relative to object’s reference point.

- **Y-offset** (number):
  - `<procedure #f (grob)>`
  - The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): Section 3.2.8 [balloon-interface], page 551, Section 3.2.36 [font-interface], page 565, Section 3.2.37 [footnote-interface], page 566, Section 3.2.38 [footnote-spanner-interface], page 566, Section 3.2.45 [grob-interface], page 570, Section 3.2.112 [spanner-interface], page 612, and Section 3.2.126 [text-interface], page 622.
3.1.47 FretBoard

FretBoard objects are created by: Section 2.2.44 [Fretboard_engraver], page 331.

Standard settings:

**after-line-breaking** (boolean):

    ly:chord-name::after-line-breaking

Dummy property, used to trigger callback for after-line-breaking.

**extra-spacing-height** (pair of numbers):

    '(.2 . -.2)

In the horizontal spacing problem, we increase the height of each item by this amount (by adding the ‘car’ to the bottom of the item and adding the ‘cdr’ to the top of the item). In order to make a grob infinitely high (to prevent the horizontal spacing problem from placing any other grobs above or below this grob), set this to (-inf.0 . +inf.0).

**extra-spacing-width** (pair of numbers):

    '(-.5 . .5)

In the horizontal spacing problem, we pad each item by this amount (by adding the ‘car’ on the left side of the item and adding the ‘cdr’ on the right side of the item). In order to make a grob take up no horizontal space at all, set this to (+inf.0 . -inf.0).

**fret-diagram-details** (list):

    '((finger-code . below-string))

An alist of detailed grob properties for fret diagrams. Each alist entry consists of a (property . value) pair. The properties which can be included in fret-diagram-details include the following:

- **barre-type** – Type of barre indication used. Choices include curved, straight, and none. Default curved.
- **capo-thickness** – Thickness of capo indicator, in multiples of fret-space. Default value 0.5.
- **dot-color** – Color of dots. Options include black and white. Default black.
- **dot-label-font-mag** – Magnification for font used to label fret dots. Default value 1.
- **dot-position** – Location of dot in fret space. Default 0.6 for dots without labels, 0.95-dot-radius for dots with labels.
- **dot-radius** – Radius of dots, in terms of fret spaces. Default value 0.425 for labeled dots, 0.25 for unlabeled dots.
- **finger-code** – Code for the type of fingering indication used. Options include none, in-dot, and below-string. Default none for markup fret diagrams, below-string for FretBoards fret diagrams.
- **fret-count** – The number of frets. Default 4.
- **fret-distance** – Multiplier to adjust the distance between frets. Default 1.0.
- **fret-label-custom-format** – The format string to be used label the lowest fret number, when number-type equals to custom. Default "-a".
• **fret-label-font-mag** – The magnification of the font used to label the lowest fret number. Default 0.5.
• **fret-label-vertical-offset** – The offset of the fret label from the center of the fret in direction parallel to strings. Default 0.
• **fret-label-horizontal-offset** – The offset of the fret label from the center of the fret in direction orthogonal to strings. Default 0.
• **handedness** – Print the fret-diagram left- or right-handed. -1, LEFT for left; 1, RIGHT for right. Default RIGHT.
• **paren-padding** – The padding for the parenthesis. Default 0.05.
• **label-dir** – Side to which the fret label is attached. -1, LEFT, or DOWN for left or down; 1, RIGHT, or UP for right or up. Default RIGHT.
• **mute-string** – Character string to be used to indicate muted string. Default "x".
• **number-type** – Type of numbers to use in fret label. Choices include roman-lower, roman-upper, arabic and custom. In the later case, the format string is supplied by the fret-label-custom-format property. Default roman-lower.
• **open-string** – Character string to be used to indicate open string. Default "o".
• **orientation** – Orientation of fret-diagram. Options include normal, landscape, and opposing-landscape. Default normal.
• **string-count** – The number of strings. Default 6.
• **string-distance** – Multiplier to adjust the distance between strings. Default 1.0.
• **string-label-font-mag** – The magnification of the font used to label fingerings at the string, rather than in the dot. Default value 0.6 for normal orientation, 0.5 for landscape and opposing-landscape.
• **string-thickness-factor** – Factor for changing thickness of each string in the fret diagram. Thickness of string k is given by thickness * (1+string-thickness-factor) ^ (k-1). Default 0.
• **top-fret-thickness** – The thickness of the top fret line, as a multiple of the standard thickness. Default value 3.
• **xo-font-magnification** – Magnification used for mute and open string indicators. Default value 0.5.
• **xo-padding** – Padding for open and mute indicators from top fret. Default value 0.25.

**stencil (stencil):**

```
fret-board::calc-stencil
```

The symbol to print.

**Y-extent (pair of numbers):**

```
#<unpure-pure-container #<primitive-procedure
ly:grob::stencil-height> >
```

Extent (size) in the Y direction, measured in staff-space units, relative to object’s reference point.
This object supports the following interface(s): Section 3.2.18 [chord-name-interface], page 559, Section 3.2.36 [font-interface], page 565, Section 3.2.39 [fret-diagram-interface], page 567, Section 3.2.45 [grob-interface], page 570, Section 3.2.52 [item-interface], page 579, Section 3.2.85 [outside-staff-interface], page 596, and Section 3.2.97 [rhythmic-grob-interface], page 601.

### 3.1.48 Glissando

Glissando objects are created by: Section 2.2.45 [Glissando_engraver], page 331.

Standard settings:

- **after-line-breaking** (boolean):`ly:spanner::kill-zero-spanned-time`
  Dummy property, used to trigger callback for after-line-breaking.

- **bound-details** (list):
  `(right (attach-dir . -1)
   (end-on-accidental . #t)
   (padding . 0.5))
  (left (attach-dir . 1)
   (padding . 0.5)
   (start-at-dot . #t)))`
  An alist of properties for determining attachments of spanners to edges.

- **gap** (dimension, in staff space):
  `0.5`
  Size of a gap in a variable symbol.

- **left-bound-info** (list):
  `ly:line-spanner::calc-left-bound-info`
  An alist of properties for determining attachments of spanners to edges.

- **normalized-endpoints** (pair):
  `ly:spanner::calc-normalized-endpoints`
  Represents left and right placement over the total spanner, where the width of the spanner is normalized between 0 and 1.

- **right-bound-info** (list):
  `ly:line-spanner::calc-right-bound-info`
  An alist of properties for determining attachments of spanners to edges.

- **simple-Y** (boolean):
  `#t`
  Should the Y placement of a spanner disregard changes in system heights?

- **stencil** (stencil):
  `ly:line-spanner::print`
  The symbol to print.

- **style** (symbol):
  `'line`
  This setting determines in what style a grob is typeset. Valid choices depend on the stencil callback reading this property.
vertical-skylines (pair of skylines):

```lilypond
#<unpure-pure-container #<primitive-procedure
ly:grob::vertical-skylines-from-stencil> #<primitive-
procedure ly:grob::pure-simple-vertical-skylines-from-
extents> >
```

Two skylines, one above and one below this grob.

X-extent (pair of numbers)
Extent (size) in the X direction, measured in staff-space units, relative
to object’s reference point.

Y-extent (pair of numbers)
Extent (size) in the Y direction, measured in staff-space units, relative
to object’s reference point.

zigzag-width (dimension, in staff space):

```
0.75
```

The width of one zigzag squiggle. This number is adjusted slightly
so that the glissando line can be constructed from a whole number of
squiggles.

This object supports the following interface(s): Section 3.2.40 [gli-
sando-interface], page 569, Section 3.2.45 [grob-interface], page 570, Section 3.2.61 [line-interface], page 583,
Section 3.2.62 [line-spanner-interface], page 584, Section 3.2.112 [spanner-interface], page 612,
and Section 3.2.135 [unbreakable-spanner-interface], page 629.

### 3.1.49 GraceSpacing

GraceSpacing objects are created by: Section 2.2.49 [Grace
spacing engraver], page 333.

Standard settings:

```lilypond
common-shortest-duration (moment):
grace-spacing::calc-shortest-duration
```

The most common shortest note length. This is used in spacing. En-
larging this sets the score tighter.

```lilypond
shortest-duration-space (number):
1.6
```

Start with this multiple of spacing-increment space for the shortest
duration. See also Section “spacing-spanner-interface” in Internals Ref-
erence.

```lilypond
spacing-increment (dimension, in staff space):
0.8
```

The unit of length for note-spacing. Typically, the width of a note head.
See also Section “spacing-spanner-interface” in Internals Reference.

This object supports the following interface(s): Section 3.2.41 [grace-spacing-interface],
page 569, Section 3.2.45 [grob-interface], page 570, Section 3.2.109 [spacing-options-interface],
page 611, and Section 3.2.112 [spanner-interface], page 612.

### 3.1.50 GridLine

GridLine objects are created by: Section 2.2.50 [Grid_line-span
engraver], page 333.

Standard settings:

```lilypond
layer (integer):
0
```

This object supports the following interface(s): Section 3.2.41 [grace-spacing-interface],
page 569, Section 3.2.45 [grob-interface], page 570, Section 3.2.109 [spacing-options-interface],
page 611, and Section 3.2.112 [spanner-interface], page 612.
An integer which determines the order of printing objects. Objects with the lowest value of layer are drawn first, then objects with progressively higher values are drawn, so objects with higher values overwrite objects with lower values. By default most objects are assigned a layer value of 1.

**parent-alignment-X (number):**

0

Specify on which point of the parent the object is aligned. The value -1 means aligned on parent’s left edge, 0 on center, and 1 right edge, in X direction. Other numerical values may also be specified - the unit is half the parent’s width. If unset, the value from **self-alignment-X** property will be used.

**self-alignment-X (number):**

0

Specify alignment of an object. The value -1 means left aligned, 0 centered, and 1 right-aligned in X direction. Other numerical values may also be specified - the unit is half the object width.

**stencil (stencil):**

`ly:grid-line-interface::print`

The symbol to print.

**X-extent (pair of numbers):**

`ly:grid-line-interface::width`

Extent (size) in the X direction, measured in staff-space units, relative to object’s reference point.

**X-offset (number):**

`ly:self-alignment-interface::aligned-on-x-parent`

The horizontal amount that this object is moved relative to its X-parent.

This object supports the following interface(s): Section 3.2.43 [grid-line-interface], page 570, Section 3.2.45 [grob-interface], page 570, Section 3.2.52 [item-interface], page 579, and Section 3.2.101 [self-alignment-interface], page 603.

### 3.1.51 GridPoint

GridPoint objects are created by: Section 2.2.51 [Grid_point_engraver], page 333.

Standard settings:

**X-extent (pair of numbers):**

`'(0 . 0)`

Extent (size) in the X direction, measured in staff-space units, relative to object’s reference point.

**Y-extent (pair of numbers):**

`'(0 . 0)`

Extent (size) in the Y direction, measured in staff-space units, relative to object’s reference point.

This object supports the following interface(s): Section 3.2.44 [grid-point-interface], page 570, Section 3.2.45 [grob-interface], page 570, and Section 3.2.52 [item-interface], page 579.
3.1.52 Hairpin

Hairpin objects are created by: Section 2.2.33 [Dynamic engraver], page 327.

Standard settings:

- **after-line-breaking** (boolean):
  - `ly:spanner::kill-zero-spanned-time`
  - Dummy property, used to trigger callback for `after-line-breaking`.

- **bound-padding** (number):
  - 1.0
  - The amount of padding to insert around spanner bounds.

- **broken-bound-padding** (number):
  - `ly:hairpin::broken-bound-padding`
  - The amount of padding to insert when a spanner is broken at a line break.

- **circled-tip** (boolean)
  - Put a circle at start/end of hairpins (al/del niente).

- **grow-direction** (direction):
  - `hairpin::calc-grow-direction`
  - Crescendo or decrescendo?

- **height** (dimension, in staff space):
  - 0.6666
  - Height of an object in `staff-space` units.

- **minimum-length** (dimension, in staff space):
  - 2.0
  - Try to make a spanner at least this long, normally in the horizontal direction. This requires an appropriate callback for the `springs-and-rods` property. If added to a `Tie`, this sets the minimum distance between noteheads.

- **self-alignment-Y** (number):
  - 0
  - Like `self-alignment-X` but for the Y axis.

- **springs-and-rods** (boolean):
  - `ly:spanner::set-spacing-rods`
  - Dummy variable for triggering spacing routines.

- **stencil** (stencil):
  - `ly:hairpin::print`
  - The symbol to print.

- **thickness** (number):
  - 1.0
  - For grobs made up of lines, this is the thickness of the line. For slurs and ties, this is the distance between the two arcs of the curve’s outline at its thickest point, not counting the diameter of the virtual “pen” that draws the arcs. This property is expressed as a multiple of the current `staff-line thickness` (i.e. the visual output is influenced by changes to `Staff.StaffSymbol.thickness`).
to-barline (boolean):
  #t
  If true, the spanner will stop at the bar line just before it would otherwise stop.

vertical-skylines (pair of skylines):
  #unpure-pure-container #primitive-procedure ly:grob::vertical-skylines-from-stencil #primitive-procedure ly:grob::pure-simple-vertical-skylines-from-extents
  Two skylines, one above and one below this grob.

Y-extent (pair of numbers):
  #unpure-pure-container #primitive-procedure ly:grob::stencil-height #primitive-procedure ly:hairpin::pure-height
  Extent (size) in the Y direction, measured in staff-space units, relative to object’s reference point.

Y-offset (number):
  #unpure-pure-container #primitive-procedure ly:self-alignment-interface::y-aligned-on-self #primitive-procedure ly:self-alignment-interface::pure-y-aligned-on-self
  The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): Section 3.2.26 [dynamic-interface], page 562, Section 3.2.45 [grob-interface], page 570, Section 3.2.46 [hairpin-interface], page 575, Section 3.2.61 [line-interface], page 583, Section 3.2.85 [outside-staff-interface], page 596, Section 3.2.101 [self-alignment-interface], page 603, and Section 3.2.112 [spanner-interface], page 612.

3.1.53 HorizontalBracket

HorizontalBracket objects are created by: Section 2.2.53 [Horizontal_bracket_engraver], page 334.

Standard settings:

  bracket-flare (pair of numbers):
  (0.5, 0.5)
  A pair of numbers specifying how much edges of brackets should slant outward. Value 0.0 means straight edges.

  connect-to-neighbor (pair):
  ly:tuplet-bracket::calc-connect-to-neighbors
  Pair of booleans, indicating whether this grob looks as a continued break.

  direction (direction):
  -1
  If side-axis is 0 (or X), then this property determines whether the object is placed LEFT, CENTER or RIGHT with respect to the other object. Otherwise, it determines whether the object is placed UP, CENTER or DOWN. Numerical values may also be used: UP=1, DOWN=-1, LEFT=-1, RIGHT=1, CENTER=0.
padding (dimension, in staff space):
  0.2
  Add this much extra space between objects that are next to each other.

side-axis (number):
  1
  If the value is X (or equivalently 0), the object is placed horizontally
  next to the other object. If the value is Y or 1, it is placed vertically.

staff-padding (dimension, in staff space):
  0.2
  Maintain this much space between reference points and the staff. Its
  effect is to align objects of differing sizes (like the dynamics p and f) on
  their baselines.

stencil (stencil):
  ly:horizontal-bracket::print
  The symbol to print.

thickness (number):
  1.0
  For grobs made up of lines, this is the thickness of the line. For slurs
  and ties, this is the distance between the two arcs of the curve's outline
  at its thickest point, not counting the diameter of the virtual “pen” that
  draws the arcs. This property is expressed as a multiple of the current
  staff-line thickness (i.e. the visual output is influenced by changes to
  Staff.StaffSymbol.thickness).

Y-offset (number):
  #<unpure-pure-container #<primitive-procedure ly:side-
  position-interface::y-aligned-side> #<primitive-procedure
  ly:side-position-interface::pure-y-aligned-side> >
  The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): Section 3.2.45 [grob-interface], page 570,
Section 3.2.48 [horizontal-bracket-interface], page 576, Section 3.2.61 [line-interface], page 583,
Section 3.2.85 [outside-staff-interface], page 596, Section 3.2.105 [side-position-interface],
page 606, and Section 3.2.112 [spanner-interface], page 612.

3.1.54 HorizontalBracketText

HorizontalBracketText objects are created by: Section 2.2.53 [Horizontal_bracket_engraver],
page 334.

Standard settings:

direction (direction):
  ly:horizontal-bracket-text::calc-direction
  If side-axis is 0 (or X), then this property determines whether the
  object is placed LEFT, CENTER or RIGHT with respect to the other object.
  Otherwise, it determines whether the object is placed UP, CENTER or
  DOWN. Numerical values may also be used: UP=1, DOWN=-1, LEFT=-1,
  RIGHT=1, CENTER=0.

font-size (number):
  -1
The font size, compared to the ‘normal’ size. 0 is style-sheet’s normal size, -1 is smaller, +1 is bigger. Each step of 1 is approximately 12% larger; 6 steps are exactly a factor 2 larger. If the context property `fontSize` is set, its value is added to this before the glyph is printed. Fractional values are allowed.

padding (dimension, in staff space):
  0.5
  Add this much extra space between objects that are next to each other.

parent-alignment-X (number):
  0
  Specify on which point of the parent the object is aligned. The value -1 means aligned on parent’s left edge, 0 on center, and 1 right edge, in X direction. Other numerical values may also be specified - the unit is half the parent’s width. If unset, the value from `self-alignment-X` property will be used.

self-alignment-X (number):
  0
  Specify alignment of an object. The value -1 means left aligned, 0 centered, and 1 right-aligned in X direction. Other numerical values may also be specified - the unit is half the object width.

direction (direction):
  -1

This object supports the following interface(s): Section 3.2.36 [font-interface], page 565, Section 3.2.45 [grob-interface], page 570, Section 3.2.49 [horizontal-bracket-text-interface], page 577, Section 3.2.85 [outside-staff-interface], page 596, Section 3.2.101 [self-alignment-interface], page 603, Section 3.2.105 [side-position-interface], page 606, Section 3.2.112 [spanner-interface], page 612, and Section 3.2.126 [text-interface], page 622.

3.1.55 InstrumentName

InstrumentName objects are created by: Section 2.2.55 [Instrument_name engraver], page 334.

Standard settings:

direction (direction):
  -1
If \texttt{side-axis} is 0 (or X), then this property determines whether the object is placed \texttt{LEFT}, \texttt{CENTER} or \texttt{RIGHT} with respect to the other object. Otherwise, it determines whether the object is placed \texttt{UP}, \texttt{-CENTER} or \texttt{DOWN}. Numerical values may also be used: \texttt{UP=1}, \texttt{DOWN=-1}, \texttt{LEFT=-1}, \texttt{RIGHT=1}, \texttt{CENTER=0}.

\texttt{padding} (dimension, in staff space):

\begin{verbatim}
0.3
\end{verbatim}

Add this much extra space between objects that are next to each other.

\texttt{self-alignment-X} (number):

\begin{verbatim}
0
\end{verbatim}

Specify alignment of an object. The value -1 means left aligned, 0 centered, and 1 right-aligned in X direction. Other numerical values may also be specified - the unit is half the object width.

\texttt{self-alignment-Y} (number):

\begin{verbatim}
0
\end{verbatim}

Like \texttt{self-alignment-X} but for the Y axis.

\texttt{stencil} (stencil):

\begin{verbatim}
system-start-text::print
\end{verbatim}

The symbol to print.

\texttt{X-offset} (number):

\begin{verbatim}
system-start-text::calc-x-offset
\end{verbatim}

The horizontal amount that this object is moved relative to its X-parent.

\texttt{Y-offset} (number):

\begin{verbatim}
system-start-text::calc-y-offset
\end{verbatim}

The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): Section 3.2.36 [font-interface], page 565, Section 3.2.45 [grob-interface], page 570, Section 3.2.101 [self-alignment-interface], page 603, Section 3.2.105 [side-position-interface], page 606, Section 3.2.112 [spanner-interface], page 612, Section 3.2.124 [system-start-text-interface], page 621, and Section 3.2.126 [text-interface], page 622.

\section*{3.1.56 InstrumentSwitch}

InstrumentSwitch objects are created by: Section 2.2.56 [Instrument_switch_engraver], page 335.

Standard settings:

\texttt{direction} (direction):

\begin{verbatim}
1
\end{verbatim}

If \texttt{side-axis} is 0 (or X), then this property determines whether the object is placed \texttt{LEFT}, \texttt{CENTER} or \texttt{RIGHT} with respect to the other object. Otherwise, it determines whether the object is placed \texttt{UP}, \texttt{CENTER} or \texttt{DOWN}. Numerical values may also be used: \texttt{UP=1}, \texttt{DOWN=-1}, \texttt{LEFT=-1}, \texttt{RIGHT=1}, \texttt{CENTER=0}.

\texttt{extra-spacing-width} (pair of numbers):

\begin{verbatim}
'(+\infty.0 . -\infty.0)
\end{verbatim}

In the horizontal spacing problem, we pad each item by this amount (by adding the ‘car’ on the left side of the item and adding the ‘cdr’ on the right side of the item). In order to make a grob take up no horizontal space at all, set this to \texttt{(+\infty.0 . -\infty.0)}. 

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outside-staff-priority (number):
  500
  If set, the grob is positioned outside the staff in such a way as to avoid all collisions. In case of a potential collision, the grob with the smaller outside-staff-priority is closer to the staff.

padding (dimension, in staff space):
  0.5
  Add this much extra space between objects that are next to each other.

parent-alignment-X (number)
  Specify on which point of the parent the object is aligned. The value -1 means aligned on parent’s left edge, 0 on center, and 1 right edge, in X direction. Other numerical values may also be specified - the unit is half the parent’s width. If unset, the value from self-alignment-X property will be used.

self-alignment-X (number):
  -1
  Specify alignment of an object. The value -1 means left aligned, 0 centered, and 1 right-aligned in X direction. Other numerical values may also be specified - the unit is half the object width.

side-axis (number):
  1
  If the value is X (or equivalently 0), the object is placed horizontally next to the other object. If the value is Y or 1, it is placed vertically.

staff-padding (dimension, in staff space):
  0.5
  Maintain this much space between reference points and the staff. Its effect is to align objects of differing sizes (like the dynamics p and f) on their baselines.

stencil (stencil):
  ly:text-interface::print
  The symbol to print.

X-offset (number):
  ly:self-alignment-interface::aligned-on-x-parent
  The horizontal amount that this object is moved relative to its X-parent.

Y-extent (pair of numbers):
  #<unpure-pure-container #<primitive-procedure
   ly:grob::stencil-height> >
  Extent (size) in the Y direction, measured in staff-space units, relative to object’s reference point.

Y-offset (number):
  #<unpure-pure-container #<primitive-procedure
   ly:side-position-interface::y-aligned-side> #<primitive-procedure
   ly:side-position-interface::pure-y-aligned-side> >
  The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): Section 3.2.36 [font-interface], page 565, Section 3.2.45 [grob-interface], page 570, Section 3.2.52 [item-interface], page 579, Section 3.2.85
3.1.57 KeyCancellation

KeyCancellation objects are created by: Section 2.2.58 [Key_engraver], page 335.

Standard settings:

**break-align-symbol (symbol):**

`'key-cancellation`

This key is used for aligning, ordering, and spacing breakable items. See Section “break-alignment-interface” in Internals Reference.

**break-visibility (vector):**

`#(#t #t #f)`

A vector of 3 booleans, `#(end-of-line unbroken begin-of-line).` #t means visible, #f means killed.

**extra-spacing-height (pair of numbers):**

`pure-from-neighbor-interface::extra-spacing-height-including-staff`

In the horizontal spacing problem, we increase the height of each item by this amount (by adding the ‘car’ to the bottom of the item and adding the ‘cdr’ to the top of the item). In order to make a grob infinitely high (to prevent the horizontal spacing problem from placing any other grobs above or below this grob), set this to `(-inf.0 . +inf.0)`.

**extra-spacing-width (pair of numbers):**

`'(0.0 . 1.0)`

In the horizontal spacing problem, we pad each item by this amount (by adding the ‘car’ on the left side of the item and adding the ‘cdr’ on the right side of the item). In order to make a grob take up no horizontal space at all, set this to `(+inf.0 . -inf.0)`.

**flat-positions (list):**

`'(2 3 4 2 1 2 1)`

Flats in key signatures are placed within the specified ranges of staff-positions. The general form is a list of pairs, with one pair for each type of clef, in order of the staff-position at which each clef places C: (alto treble tenor soprano baritone mezzosoprano bass). If the list contains a single element it applies for all clefs. A single number in place of a pair sets accidentals within the octave ending at that staff-position.

**glyph-name-alist (list):**

`'((0 . "accidentals.natural"))`

An alist of key-string pairs.

**non-musical (boolean):**

`#t`

True if the grob belongs to a NonMusicalPaperColumn.

**sharp-positions (list):**

`'(4 5 4 2 3 2 3)`

Sharps in key signatures are placed within the specified ranges of staff-positions. The general form is a list of pairs, with one pair for each type
of clef, in order of the staff-position at which each clef places C: (alto
treble tenor soprano baritone mezzosoprano bass). If the list con-
tains a single element it applies for all clefs. A single number in place of
a pair sets accidentals within the octave ending at that staff-position.

**space-alist** (list):

```
'((time-signature extra-space . 1.25)
 (staff-bar extra-space . 0.6)
 (key-signature extra-space . 0.5)
 (cue-clef extra-space . 0.5)
 (right-edge extra-space . 0.5)
 (first-note fixed-space . 2.5)
 (custos extra-space . 1.0))
```

An alist that specifies distances from this grob to other breakable items,
using the format:

```
'((break-align-symbol . (spacing-style . space))
 (break-align-symbol . (spacing-style . space))
 ...)
```

Standard choices for `break-align-symbol` are listed in Section “break-
alignment-interface” in Internals Reference. Additionally, three special
break-align symbols available to `space-alist` are:

- **first-note**
  used when the grob is just left of the first note
  on a line

- **next-note**
  used when the grob is just left of any other note;
  if not set, the value of `first-note` gets used

- **right-edge**
  used when the grob is the last item on the line
  (only compatible with the `extra-space` spacing style)

Choices for `spacing-style` are:

- **extra-space**
  Put this much space between the two grobs.
  The space is stretchable when paired with `first-note` or `next-note`; otherwise it is fixed.

- **minimum-space**
  Put at least this much space between the left sides of both grobs, without allowing them to collide. The space is stretchable when paired with `first-note` or `next-note`; otherwise it is fixed. Not compatible with `right-edge`.

- **fixed-space**
  Only compatible with `first-note` and `next-note`. Put this much fixed space between the grob and the note.
minimum-fixed-space
Only compatible with first-note and next-note. Put at least this much fixed space between the left side of the grob and the left side of the note, without allowing them to collide.

semi-fixed-space
Only compatible with first-note and next-note. Put this much space between the grob and the note, such that half of the space is fixed and half is stretchable.

Rules for this spacing are much more complicated than this. See [Wanske] page 126–134, [Ross] page 143–147.

stencil (stencil):
ly:key-signature-interface::print
The symbol to print.

vertical-skylines (pair of skylines):
#<unpure-pure-container #<primitive-procedure
ly:grob::vertical-skylines-from-stencil> >
Two skylines, one above and one below this grob.

Y-extent (pair of numbers):
#<unpure-pure-container #<primitive-procedure
ly:grob::stencil-height> >
Extent (size) in the Y direction, measured in staff-space units, relative to object’s reference point.

Y-offset (number):
#<unpure-pure-container #<primitive-procedure ly:staff-symbol-referencer::callback> >
The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): Section 3.2.15 [break-aligned-interface], page 556, Section 3.2.36 [font-interface], page 565, Section 3.2.45 [grob-interface], page 570, Section 3.2.52 [item-interface], page 579, Section 3.2.53 [key-cancellation-interface], page 581, Section 3.2.54 [key-signature-interface], page 581, Section 3.2.94 [pure-from-neighbor-interface], page 600, and Section 3.2.116 [staff-symbol-referencer-interface], page 616.

3.1.58 KeySignature
KeySignature objects are created by: Section 2.2.58 [Key_ engraver], page 335.

Standard settings:

avoid-slur (symbol):
'inside
Method of handling slur collisions. Choices are inside, outside, around, and ignore. inside adjusts the slur if needed to keep the grob inside the slur. outside moves the grob vertically to the outside of the slur. around moves the grob vertically to the outside of the slur only if there is a collision. ignore does not move either. In grobs whose notational significance depends on vertical position (such as accidentals, clefs, etc.), outside and around behave like ignore.
break-align-anchor (number):

ly:break-aligned-interface::calc-extent-aligned-anchor

Grobs aligned to this breakable item will have their X-offsets shifted by this number. In bar lines, for example, this is used to position grobs relative to the (visual) center of the bar line.

break-align-anchor-alignment (number):

1

Read by ly:break-aligned-interface::calc-extent-aligned-anchor for aligning an anchor to a grob’s extent.

break-align-symbol (symbol):

'key-signature

This key is used for aligning, ordering, and spacing breakable items. See Section “break-alignment-interface” in Internals Reference.

break-visibility (vector):

#(#f #f #t)

A vector of 3 booleans, #(end-of-line unbroken begin-of-line). #t means visible, #f means killed.

extra-spacing-height (pair of numbers):

pure-from-neighbor-interface::extra-spacing-height-including-staff

In the horizontal spacing problem, we increase the height of each item by this amount (by adding the ‘car’ to the bottom of the item and adding the ‘cdr’ to the top of the item). In order to make a grob infinitely high (to prevent the horizontal spacing problem from placing any other grobs above or below this grob), set this to (-inf.0 . +inf.0).

extra-spacing-width (pair of numbers):

'(#0.0 . 1.0)

In the horizontal spacing problem, we pad each item by this amount (by adding the ‘car’ on the left side of the item and adding the ‘cdr’ on the right side of the item). In order to make a grob take up no horizontal space at all, set this to (+inf.0 . -inf.0).

flat-positions (list):

'(2 3 4 2 1 2 1)

Flats in key signatures are placed within the specified ranges of staff-positions. The general form is a list of pairs, with one pair for each type of clef, in order of the staff-position at which each clef places C: (alto treble tenor soprano baritone mezzosoprano bass). If the list contains a single element it applies for all clefs. A single number in place of a pair sets accidentals within the octave ending at that staff-position.

glyph-name-alist (list):

'((0 . "accidentals.natural")
  (-1/2 . "accidentals.flat")
  (1/2 . "accidentals.sharp")
  (1 . "accidentals.doublesharp")
  (-1 . "accidentals.flatflat")
  (3/4 .
  .


"accidentals.sharp.slashslash.stemstemstem")
(1/4 . "accidentals.sharp.slashslash.stem")
(-1/4 . "accidentals.mirroredflat")
(-3/4 . "accidentals.mirroredflat.flat")

An alist of key-string pairs.

non-musical (boolean):
 #t
 True if the grob belongs to a NonMusicalPaperColumn.

sharp-positions (list):
 '(4 5 4 2 3 2 3)
 Sharps in key signatures are placed within the specified ranges of staff-positions. The general form is a list of pairs, with one pair for each type of clef, in order of the staff-position at which each clef places C: (alto treble tenor soprano baritone mezzosoprano bass). If the list contains a single element it applies for all clefs. A single number in place of a pair sets accidentals within the octave ending at that staff-position.

space-alist (list):
 '((ambitus extra-space . 1.15)
  (time-signature extra-space . 1.15)
  (staff-bar extra-space . 1.1)
  (cue-clef extra-space . 0.5)
  (right-edge extra-space . 0.5)
  (first-note fixed-space . 2.5))

An alist that specifies distances from this grob to other breakable items, using the format:

'((break-align-symbol . (spacing-style . space))
 (break-align-symbol . (spacing-style . space))
 ...)

Standard choices for break-align-symbol are listed in Section “break-alignment-interface” in Internals Reference. Additionally, three special break-align symbols available to space-alist are:

first-note
 used when the grob is just left of the first note on a line

next-note
 used when the grob is just left of any other note; if not set, the value of first-note gets used

right-edge
 used when the grob is the last item on the line (only compatible with the extra-space spacing style)

Choices for spacing-style are:

extra-space
 Put this much space between the two grobs. The space is stretchable when paired with first-note or next-note; otherwise it is fixed.
minimum-space
Put at least this much space between the left sides of both grobs, without allowing them to collide. The space is stretchable when paired with first-note or next-note; otherwise it is fixed. Not compatible with right-edge.

fixed-space
Only compatible with first-note and next-note. Put this much fixed space between the grob and the note.

minimum-fixed-space
Only compatible with first-note and next-note. Put at least this much fixed space between the left side of the grob and the left side of the note, without allowing them to collide.

semi-fixed-space
Only compatible with first-note and next-note. Put this much space between the grob and the note, such that half of the space is fixed and half is stretchable.

Rules for this spacing are much more complicated than this. See [Wanske] page 126–134, [Ross] page 143–147.

stencil (stencil):
  ly:key-signature-interface::print
The symbol to print.

vertical-skylines (pair of skylines):
  #<unpure-pure-container #<primitive-procedure
  ly:grob::vertical-skylines-from-stencil> >
Two skylines, one above and one below this grob.

Y-extent (pair of numbers):
  #<unpure-pure-container #<primitive-procedure
  ly:grob::stencil-height> >
Extent (size) in the Y direction, measured in staff-space units, relative to object’s reference point.

Y-offset (number):
  #<unpure-pure-container #<primitive-procedure ly:staff-
  symbol-referencer::callback> >
The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): Section 3.2.15 [break-aligned-interface], page 556, Section 3.2.36 [font-interface], page 565, Section 3.2.45 [grob-interface], page 570, Section 3.2.52 [item-interface], page 579, Section 3.2.54 [key-signature-interface], page 581, Section 3.2.94 [pure-from-neighbor-interface], page 600, and Section 3.2.116 [staff-symbol-referencer-interface], page 616.

3.1.59 KievanLigature
KievanLigature objects are created by: Section 2.2.60 [Kievan_ligature_engraver], page 337.
Standard settings:

padding (dimension, in staff space):
  0.5
  Add this much extra space between objects that are next to each other.

springs-and-rods (boolean):
  ly:spanner::set-spacing-rods
  Dummy variable for triggering spacing routines.

stencil (stencil):
  ly:kievan-ligature::print
  The symbol to print.

This object supports the following interface(s): Section 3.2.36 [font-interface], page 565, Section 3.2.45 [grob-interface], page 570, Section 3.2.55 [kievan-ligature-interface], page 582, and Section 3.2.112 [spanner-interface], page 612.

3.1.60 LaissezVibrerTie

LaissezVibrerTie objects are created by: Section 2.2.61 [Laissez_vibrer_ engraver], page 337.

Standard settings:

control-points (list of number pairs):
  ly:semi-tie::calc-control-points
  List of offsets (number pairs) that form control points for the tie, slur, or bracket shape. For Béziers, this should list the control points of a third-order Bézier curve.

details (list):
  '((ratio . 0.333) (height-limit . 1.0))
  A list of parameters for detailed grob behavior. More information on the allowed parameters for a grob can be found by looking at the top of the Internals Reference page for each interface having a details property.

direction (direction):
  ly:tie::calc-direction
  If side-axis is 0 (or X), then this property determines whether the object is placed LEFT, CENTER or RIGHT with respect to the other object. Otherwise, it determines whether the object is placed UP, CENTER or DOWN. Numerical values may also be used: UP=1, DOWN=-1, LEFT=-1, RIGHT=1, CENTER=0.

extra-spacing-height (pair of numbers):
  '(-0.5 . 0.5)
  In the horizontal spacing problem, we increase the height of each item by this amount (by adding the ‘car’ to the bottom of the item and adding the ‘cdr’ to the top of the item). In order to make a grob infinitely high (to prevent the horizontal spacing problem from placing any other grobs above or below this grob), set this to (-inf.0 . +inf.0).

head-direction (direction):
  -1
  Are the note heads left or right in a semitie?
stencil (stencil):
   laissez-vibrer::print
   The symbol to print.

thickness (number):
   1.0
   For grobs made up of lines, this is the thickness of the line. For slurs
   and ties, this is the distance between the two arcs of the curve's outline
   at its thickest point, not counting the diameter of the virtual "pen" that
draws the arcs. This property is expressed as a multiple of the current
staff-line thickness (i.e. the visual output is influenced by changes to
Staff.StaffSymbol.thickness).

vertical-skylines (pair of skylines):
   #<unpure-pure-container #<primitive-procedure
      ly:grob::vertical-skylines-from-stencil> >
   Two skylines, one above and one below this grob.

Y-extent (pair of numbers):
   #<unpure-pure-container #<primitive-procedure
      ly:grob::stencil-height> >
   Extent (size) in the Y direction, measured in staff-space units, relative
to object’s reference point.

This object supports the following interface(s): Section 3.2.45 [grob-interface], page 570,
Section 3.2.52 [item-interface], page 579, and Section 3.2.103 [semi-tie-interface], page 604.

3.1.61 LaissezVibrerTieColumn
LaissezVibrerTieColumn objects are created by: Section 2.2.61 [Laissez_vibrer_engraver],
page 337.
   Standard settings:

   head-direction (direction):
      ly:semi-tie-column::calc-head-direction
      Are the note heads left or right in a semitie?

   X-extent (pair of numbers)
      Extent (size) in the X direction, measured in staff-space units, relative
to object’s reference point.

   Y-extent (pair of numbers)
      Extent (size) in the Y direction, measured in staff-space units, relative
to object’s reference point.

   This object supports the following interface(s): Section 3.2.45 [grob-interface], page 570,
   Section 3.2.52 [item-interface], page 579, and Section 3.2.102 [semi-tie-column-interface],
   page 604.

3.1.62 LedgerLineSpanner
LedgerLineSpanner objects are created by: Section 2.2.62 [Ledger_line_engraver], page 337.
   Standard settings:

   layer (integer):
      0
An integer which determines the order of printing objects. Objects with the lowest value of layer are drawn first, then objects with progressively higher values are drawn, so objects with higher values overwrite objects with lower values. By default most objects are assigned a layer value of 1.

**length-fraction** (number):

```
0.25
```

Multiplier for lengths. Used for determining ledger lines and stem lengths.

**minimum-length-fraction** (number):

```
0.25
```

Minimum length of ledger line as fraction of note head size.

**springs-and-rods** (boolean):

```
ly:ledger-line-spanner::set-spacing-rods
```

Dummy variable for triggering spacing routines.

**stencil** (stencil):

```
ly:ledger-line-spanner::print
```

The symbol to print.

**vertical-skylines** (pair of skylines):

```
#<unpure-pure-container #<primitive-procedure
ly:grob::vertical-skylines-from-stencil> #<primitive-
procedure ly:grob::pure-simple-vertical-skylines-from-
extents> >
```

Two skylines, one above and one below this grob.

**X-extent** (pair of numbers)

Extent (size) in the X direction, measured in staff-space units, relative to object’s reference point.

**Y-extent** (pair of numbers)

Extent (size) in the Y direction, measured in staff-space units, relative to object’s reference point.

This object supports the following interface(s): Section 3.2.45 [grob-interface], page 570, Section 3.2.56 [ledger-line-spanner-interface], page 582, and Section 3.2.112 [spanner-interface], page 612.

### 3.1.63 LeftEdge

LeftEdge objects are created by: Section 2.2.13 [Break_align_ engraver], page 319.

Standard settings:

**break-align-anchor** (number):

```
ly:break-aligned-interface::calc-extent-aligned-anchor
```

Grobs aligned to this breakable item will have their X-offsets shifted by this number. In bar lines, for example, this is used to position grobs relative to the (visual) center of the bar line.

**break-align-symbol** (symbol):

```
'left-edge
```

This key is used for aligning, ordering, and spacing breakable items. See Section “break-alignment-interface” in Internals Reference.
break-visibility (vector):
  #(\#f \#f \#t)
  A vector of 3 booleans, #(end-of-line unbroken begin-of-line). \#t means visible, \#f means killed.

non-musical (boolean):
  \#t
  True if the grob belongs to a NonMusicalPaperColumn.

space-alist (list):
  '((ambitus extra-space . 1.15)
    (breathing-sign minimum-space . 0.0)
    (cue-end-clef extra-space . 0.8)
    (clef extra-space . 0.8)
    (cue-clef extra-space . 0.8)
    (staff-bar extra-space . 0.0)
    (key-cancellation extra-space . 0.0)
    (key-signature extra-space . 0.8)
    (time-signature extra-space . 1.0)
    (custos extra-space . 0.0)
    (first-note fixed-space . 2.0)
    (right-edge extra-space . 0.0))

An alist that specifies distances from this grob to other breakable items, using the format:

    '((break-align-symbol . (spacing-style . space))
      (break-align-symbol . (spacing-style . space))
      ...)

Standard choices for break-align-symbol are listed in Section “break-alignment-interface” in Internals Reference. Additionally, three special break-align symbols available to space-alist are:

  first-note
  used when the grob is just left of the first note on a line

  next-note
  used when the grob is just left of any other note; if not set, the value of first-note gets used

  right-edge
  used when the grob is the last item on the line (only compatible with the extra-space spacing style)

Choices for spacing-style are:

  extra-space
  Put this much space between the two grobs. The space is stretchable when paired with first-note or next-note; otherwise it is fixed.

  minimum-space
  Put at least this much space between the left sides of both grobs, without allowing them to
collide. The space is stretchable when paired with first-note or next-note; otherwise it is fixed. Not compatible with right-edge.

**fixed-space**

Only compatible with first-note and next-note. Put this much fixed space between the grob and the note.

**minimum-fixed-space**

Only compatible with first-note and next-note. Put at least this much fixed space between the left side of the grob and the left side of the note, without allowing them to collide.

**semi-fixed-space**

Only compatible with first-note and next-note. Put this much space between the grob and the note, such that half of the space is fixed and half is stretchable.

Rules for this spacing are much more complicated than this. See [Wanske] page 126–134, [Ross] page 143–147.

**X-extent** (pair of numbers):

`'(0 . 0)

Extent (size) in the X direction, measured in staff-space units, relative to object’s reference point.

**Y-extent** (pair of numbers):

`'(0 . 0)

Extent (size) in the Y direction, measured in staff-space units, relative to object’s reference point.

This object supports the following interface(s): Section 3.2.15 [break-aligned-interface], page 556, Section 3.2.45 [grob-interface], page 570, and Section 3.2.52 [item-interface], page 579.

### 3.1.64 LigatureBracket

LigatureBracket objects are created by: Section 2.2.63 [Ligature_bracket_ engraver], page 337.

Standard settings:

**bracket-visibility** (boolean or symbol):

`#t`

This controls the visibility of the tuplet bracket. Setting it to false prevents printing of the bracket. Setting the property to if-no-beam makes it print only if there is no beam associated with this tuplet bracket.

**connect-to-neighbor** (pair):

`ly:tuplet-bracket::calc-connect-to-neighbors`

Pair of booleans, indicating whether this grob looks as a continued break.

**direction** (direction):

`1`

If side-axis is 0 (or X), then this property determines whether the object is placed LEFT, CENTER or RIGHT with respect to the other object.
Otherwise, it determines whether the object is placed \texttt{UP}, \texttt{CENTER} or \texttt{DOWN}. Numerical values may also be used: \texttt{UP}=1, \texttt{DOWN}=-1, \texttt{LEFT}=-1, \texttt{RIGHT}=1, \texttt{CENTER}=0.

\textbf{edge-height} (pair):
\texttt{'(0.7 . 0.7)}
A pair of numbers specifying the heights of the vertical edges: \texttt{(left-height . right-height)}.

\textbf{padding} (dimension, in staff space):
2.0
Add this much extra space between objects that are next to each other.

\textbf{positions} (pair of numbers):
\texttt{ly:tuplet-bracket::calc-positions}
Pair of staff coordinates \texttt{(left . right)}, where both \texttt{left} and \texttt{right} are in \texttt{staff-space} units of the current staff. For slurs, this value selects which slur candidate to use; if extreme positions are requested, the closest one is taken.

\textbf{shorten-pair} (pair of numbers):
\texttt{'(-0.2 . -0.2)}
The lengths to shorten on both sides a hairpin or text-spanner such as a pedal bracket. Positive values shorten the hairpin or text-spanner, while negative values lengthen it.

\textbf{staff-padding} (dimension, in staff space):
0.25
Maintain this much space between reference points and the staff. Its effect is to align objects of differing sizes (like the dynamics \texttt{p} and \texttt{f}) on their baselines.

\textbf{stencil} (stencil):
\texttt{ly:tuplet-bracket::print}
The symbol to print.

\textbf{thickness} (number):
1.6
For grobs made up of lines, this is the thickness of the line. For slurs and ties, this is the distance between the two arcs of the curve’s outline at its thickest point, not counting the diameter of the virtual “pen” that draws the arcs. This property is expressed as a multiple of the current staff-line thickness (i.e. the visual output is influenced by changes to \texttt{Staff.StaffSymbol.thickness}).

\textbf{tuplet-slur} (boolean)
Draw a slur instead of a bracket for tuplets.

\textbf{X-positions} (pair of numbers):
\texttt{ly:tuplet-bracket::calc-x-positions}
Pair of X staff coordinates of a spanner in the form \texttt{(left . right)}, where both \texttt{left} and \texttt{right} are in \texttt{staff-space} units of the current staff.

This object supports the following interface(s): Section 3.2.45 \texttt{[grob-interface]}, page 570, Section 3.2.61 \texttt{[line-interface]}, page 583, Section 3.2.112 \texttt{[spanner-interface]}, page 612, and Section 3.2.133 \texttt{[tuplet-bracket-interface]}, page 627.
3.1.65 LyricExtender

LyricExtender objects are created by: Section 2.2.36 [Extender_engraver], page 328.

Standard settings:

**minimum-length** (dimension, in staff space):

1.5

Try to make a spanner at least this long, normally in the horizontal direction. This requires an appropriate callback for the **springs-and-rods** property. If added to a **Tie**, this sets the minimum distance between noteheads.

**stencil** (stencil):

`ly:lyric-extender::print`

The symbol to print.

**thickness** (number):

0.8

For grobs made up of lines, this is the thickness of the line. For slurs and ties, this is the distance between the two arcs of the curve’s outline at its thickest point, not counting the diameter of the virtual “pen” that draws the arcs. This property is expressed as a multiple of the current staff-line thickness (i.e. the visual output is influenced by changes to `Staff.StaffSymbol.thickness`).

**Y-extent** (pair of numbers):

`(0.0)`

Extent (size) in the Y direction, measured in staff-space units, relative to object’s reference point.

This object supports the following interface(s): Section 3.2.45 [grob-interface], page 570, Section 3.2.63 [lyric-extender-interface], page 585, Section 3.2.65 [lyric-interface], page 587, and Section 3.2.112 [spanner-interface], page 612.

3.1.66 LyricHyphen

LyricHyphen objects are created by: Section 2.2.54 [Hyphen_engraver], page 334.

Standard settings:

**after-line-breaking** (boolean):

`ly:spanner::kill-zero-spanned-time`

Dummy property, used to trigger callback for **after-line-breaking**.

**dash-period** (number):

10.0

The length of one dash together with whitespace. If negative, no line is drawn at all.

**height** (dimension, in staff space):

0.42

Height of an object in **staff-space** units.

**length** (dimension, in staff space):

0.66

User override for the stem length of unbeamed stems (each unit represents half a **staff-space**).
minimum-distance (dimension, in staff space):
  0.1
  Minimum distance between rest and notes or beam.

minimum-length (dimension, in staff space):
  0.3
  Try to make a spanner at least this long, normally in the horizontal direction. This requires an appropriate callback for the springs-and-rods property. If added to a Tie, this sets the minimum distance between noteheads.

padding (dimension, in staff space):
  0.07
  Add this much extra space between objects that are next to each other.

springs-and-rods (boolean):
  ly:lyric-hyphen::set-spacing-rods
  Dummy variable for triggering spacing routines.

stencil (stencil):
  ly:lyric-hyphen::print
  The symbol to print.

thickness (number):
  1.3
  For grobs made up of lines, this is the thickness of the line. For slurs and ties, this is the distance between the two arcs of the curve's outline at its thickest point, not counting the diameter of the virtual "pen" that draws the arcs. This property is expressed as a multiple of the current staff-line thickness (i.e. the visual output is influenced by changes to Staff.StaffSymbol.thickness).

vertical-skylines (pair of skylines):
  #<unpure-pure-container #<primitive-procedure
  ly:grob::vertical-skylines-from-stencil> #<primitive-
  procedure ly:grob::pure-simple-vertical-skylines-from-
  extents> >
  Two skylines, one above and one below this grob.

Y-extent (pair of numbers):
  '(0 . 0)
  Extent (size) in the Y direction, measured in staff-space units, relative to object's reference point.

This object supports the following interface(s): Section 3.2.36 [font-interface], page 565, Section 3.2.45 [grob-interface], page 570, Section 3.2.64 [lyric-hyphen-interface], page 586, Section 3.2.65 [lyric-interface], page 587, and Section 3.2.112 [spanner-interface], page 612.

3.1.67 LyricSpace

LyricSpace objects are created by: Section 2.2.54 [Hyphen_engraver], page 334.

Standard settings:

minimum-distance (dimension, in staff space):
  0.45
  Minimum distance between rest and notes or beam.
padding (dimension, in staff space):
0.0
Add this much extra space between objects that are next to each other.

springs-and-rods (boolean):
ly:lyric-hyphen::set-spacing-rods
Dummy variable for triggering spacing routines.

X-extent (pair of numbers)
Extent (size) in the X direction, measured in staff-space units, relative
to object’s reference point.

Y-extent (pair of numbers)
Extent (size) in the Y direction, measured in staff-space units, relative
to object’s reference point.

This object supports the following interface(s): Section 3.2.45 [grob-interface], page 570,
Section 3.2.64 [lyric-hyphen-interface], page 586, and Section 3.2.112 [spanner-interface],
page 612.

3.1.68 LyricText
LyricText objects are created by: Section 2.2.64 [Lyric engraver], page 338.

Standard settings:

extra-spacing-height (pair of numbers):
'(0.2 . -0.2)
In the horizontal spacing problem, we increase the height of each item by
this amount (by adding the ‘car’ to the bottom of the item and adding
the ‘cdr’ to the top of the item). In order to make a grob infinitely
high (to prevent the horizontal spacing problem from placing any other
grobs above or below this grob), set this to (-inf.0 . +inf.0).

extra-spacing-width (pair of numbers):
'(0.0 . 0.0)
In the horizontal spacing problem, we pad each item by this amount (by
adding the ‘car’ on the left side of the item and adding the ‘cdr’ on the
right side of the item). In order to make a grob take up no horizontal
space at all, set this to (+inf.0 . -inf.0).

font-series (symbol):
'medium
Select the series of a font. Choices include medium, bold, bold-narrow,
etc.

font-size (number):
1.0
The font size, compared to the ‘normal’ size. 0 is style-sheet’s normal
size, -1 is smaller, +1 is bigger. Each step of 1 is approximately 12%
larger; 6 steps are exactly a factor 2 larger. If the context property
fontSize is set, its value is added to this before the glyph is printed.
Fractional values are allowed.

parent-alignment-X (number):
'()
Specify on which point of the parent the object is aligned. The value
-1 means aligned on parent’s left edge, 0 on center, and 1 right edge,
in X direction. Other numerical values may also be specified - the unit is half the parent’s width. If unset, the value from `self-alignment-X` property will be used.

```
self-alignment-X (number):
  0

Specify alignment of an object. The value -1 means left aligned, 0 centered, and 1 right-aligned in X direction. Other numerical values may also be specified - the unit is half the object width.
```

```
skyline-horizontal-padding (number):
  0.1

For determining the vertical distance between two staves, it is possible to have a configuration which would result in a tight interleaving of grobs from the top staff and the bottom staff. The larger this parameter is, the farther apart the staves are placed in such a configuration.
```

```
stencil (stencil):
  lyric-text::print

The symbol to print.
```

```
text (markup):
  #<procedure #f (grob)>

Text markup. See Section “Formatting text” in Notation Reference.
```

```
vertical-skylines (pair of skylines):
  #<unpure-pure-container #<primitive-procedure
  ly:grob::vertical-skylines-from-stencil> >

Two skylines, one above and one below this grob.
```

```
word-space (dimension, in staff space):
  0.6

Space to insert between words in texts.
```

```
X-align-on-main-noteheads (boolean):
  #t

If true, this grob will ignore suspended noteheads when aligning itself on NoteColumn.
```

```
X-offset (number):
  ly:self-alignment-interface::aligned-on-x-parent

The horizontal amount that this object is moved relative to its X-parent.
```

```
Y-extent (pair of numbers):
  #<unpure-pure-container #<primitive-procedure
  ly:grob::stencil-height> >

Extent (size) in the Y direction, measured in staff-space units, relative to object’s reference point.
```

This object supports the following interface(s): Section 3.2.36 [font-interface], page 565, Section 3.2.45 [grob-interface], page 570, Section 3.2.52 [item-interface], page 579, Section 3.2.66 [lyric-syllable-interface], page 587, Section 3.2.97 [rhythmic-grob-interface], page 601, Section 3.2.101 [self-alignment-interface], page 603, and Section 3.2.126 [text-interface], page 622.
3.1.69 MeasureCounter

MeasureCounter objects are created by: Section 2.2.67 [Measure_counter_engraver], page 339.

Standard settings:

- **count-from** (integer):
  - 1
    
    The first measure in a measure count receives this number. The following measures are numbered in increments from this initial value.

- **direction** (direction):
  - 1
    
    If side-axis is 0 (or X), then this property determines whether the object is placed LEFT, CENTER or RIGHT with respect to the other object. Otherwise, it determines whether the object is placed UP, CENTER or DOWN. Numerical values may also be used: UP=1, DOWN=-1, LEFT=-1, RIGHT=1, CENTER=0.

- **font-encoding** (symbol):
  - 'fetaText
    
    The font encoding is the broadest category for selecting a font. Currently, only Lilypond’s system fonts (Emmentaler) are using this property. Available values are fetaMusic (Emmentaler), fetaBraces, fetaText (Emmentaler).

- **font-size** (number):
  - -2
    
    The font size, compared to the ‘normal’ size. 0 is style-sheet’s normal size, -1 is smaller, +1 is bigger. Each step of 1 is approximately 12% larger; 6 steps are exactly a factor 2 larger. If the context property fontSize is set, its value is added to this before the glyph is printed. Fractional values are allowed.

- **outside-staff-horizontal-padding** (number):
  - 0.5
    
    By default, an outside-staff-object can be placed so that it is very close to another grob horizontally. If this property is set, the outside-staff-object is raised so that it is not so close to its neighbor.

- **outside-staff-priority** (number):
  - 750
    
    If set, the grob is positioned outside the staff in such a way as to avoid all collisions. In case of a potential collision, the grob with the smaller outside-staff-priority is closer to the staff.

- **self-alignment-X** (number):
  - 0
    
    Specify alignment of an object. The value -1 means left aligned, 0 centered, and 1 right-aligned in X direction. Other numerical values may also be specified - the unit is half the object width.

- **side-axis** (number):
  - 1
    
    If the value is X (or equivalently 0), the object is placed horizontally next to the other object. If the value is Y or 1, it is placed vertically.
**Chapter 3: Backend**

3.1.70 MeasureGrouping

MeasureGrouping objects are created by: Section 2.2.68 [Measure_grouping_ engraver], page 339.

Standard settings:

- **direction** (direction):
  
  1
  If side-axis is 0 (or X), then this property determines whether the object is placed LEFT, CENTER or RIGHT with respect to the other object. Otherwise, it determines whether the object is placed UP, CENTER or DOWN. Numerical values may also be used: UP=1, DOWN=-1, LEFT=-1, RIGHT=1, CENTER=0.

- **height** (dimension, in staff space):
  
  2.0
  Height of an object in staff-space units.

- **padding** (dimension, in staff space):
  
  2
  Add this much extra space between objects that are next to each other.

- **side-axis** (number):
  
  1
  If the value is X (or equivalently 0), the object is placed horizontally next to the other object. If the value is Y or 1, it is placed vertically.
staff-padding (dimension, in staff space):
3
Maintain this much space between reference points and the staff. Its
effect is to align objects of differing sizes (like the dynamics p and f) on
their baselines.

Stencil (stencil):
ly:measure-grouping::print
The symbol to print.

thickness (number):
1
For grobs made up of lines, this is the thickness of the line. For slurs
and ties, this is the distance between the two arcs of the curve’s outline
at its thickest point, not counting the diameter of the virtual “pen” that
draws the arcs. This property is expressed as a multiple of the current
staff-line thickness (i.e. the visual output is influenced by changes to
Staff.StaffSymbol.thickness).

Y-offset (number):
#<unpure-pure-container #<primitive-procedure ly:side-
position-interface::y-aligned-side> #<primitive-procedure
ly:side-position-interface::pure-y-aligned-side> >
The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): Section 3.2.45 [grob-interface], page 570,
Section 3.2.69 [measure-grouping-interface], page 587, Section 3.2.85 [outside-staff-interface],
page 596, Section 3.2.105 [side-position-interface], page 606, and Section 3.2.112 [spanner-
interface], page 612.

3.1.71 MeasureSpanner
MeasureSpanner objects are created by: Section 2.2.69 [Measure_spanner_ engraver], page 339.

Standard settings:

connect-to-neighbor (pair):
ly:measure-spanner::calc-connect-to-neighbors
Pair of booleans, indicating whether this grob looks as a continued
break.

direction (direction):
1
If side-axis is 0 (or X), then this property determines whether the
object is placed LEFT, CENTER or RIGHT with respect to the other object.
Otherwise, it determines whether the object is placed UP, CENTER or
DOWN. Numerical values may also be used: UP=1, DOWN=-1, LEFT=-1,
RIGHT=1, CENTER=0.

edge-height (pair):
'(0.7 . 0.7)
A pair of numbers specifying the heights of the vertical edges: (left-
height . right-height).

outside-staff-priority (number):
750
If set, the grob is positioned outside the staff in such a way as to avoid all collisions. In case of a potential collision, the grob with the smaller \texttt{outside-staff-priority} is closer to the staff.

\texttt{self-alignment-X} (number):

\begin{verbatim}
0
\end{verbatim}

Specify alignment of an object. The value \texttt{-1} means left aligned, \texttt{0} centered, and \texttt{1} right-aligned in X direction. Other numerical values may also be specified - the unit is half the object width.

\texttt{side-axis} (number):

\begin{verbatim}
1
\end{verbatim}

If the value is \texttt{X} (or equivalently \texttt{0}), the object is placed horizontally next to the other object. If the value is \texttt{Y} or \texttt{1}, it is placed vertically.

\texttt{spacing-pair} (pair):

\begin{verbatim}
'(staff-bar . staff-bar)
\end{verbatim}

A pair of alignment symbols which set an object’s spacing relative to its left and right \texttt{BreakAlignments}.

For example, a \texttt{MultiMeasureRest} will ignore prefatory items at its bounds (i.e., clefs, key signatures and time signatures) using the following override:

\begin{verbatim}
\override MultiMeasureRest.spacing-pair = #'(staff-bar . staff-bar)
\end{verbatim}

\texttt{staff-padding} (dimension, in staff space):

\begin{verbatim}
0.5
\end{verbatim}

Maintain this much space between reference points and the staff. Its effect is to align objects of differing sizes (like the dynamics \texttt{p} and \texttt{f}) on their baselines.

\texttt{stencil} (stencil):

\begin{verbatim}
ly:measure-spanner::print
\end{verbatim}

The symbol to print.

\texttt{Y-offset} (number):

\begin{verbatim}
#<unpure-pure-container #<primitive-procedure ly:side-position-interface::y-aligned-side> #<primitive-procedure ly:side-position-interface::pure-y-aligned-side> >
\end{verbatim}

The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): Section 3.2.36 [font-interface], page 565, Section 3.2.45 [grob-interface], page 570, Section 3.2.61 [line-interface], page 583, Section 3.2.70 [measure-spanner-interface], page 588, Section 3.2.85 [outside-staff-interface], page 596, Section 3.2.101 [self-alignment-interface], page 603, Section 3.2.105 [side-position-interface], page 606, Section 3.2.112 [spanner-interface], page 612, and Section 3.2.126 [text-interface], page 622.

### 3.1.72 MelodyItem

MelodyItem objects are created by: Section 2.2.70 [Melody engraver], page 340.

Standard settings:

\texttt{neutral-direction} (direction):

\begin{verbatim}
-1
\end{verbatim}

Which direction to take in the center of the staff.
This object supports the following interface(s): Section 3.2.45 [grob-interface], page 570, Section 3.2.52 [item-interface], page 579, and Section 3.2.71 [melody-spanner-interface], page 589.

### 3.1.73 MensuralLigature

MensuralLigature objects are created by: Section 2.2.71 [Mensural_ligature_engraver], page 340.

Standard settings:

- **springs-and-rods** (boolean):
  - **ly:spanner::set-spacing-rods**
    Dummy variable for triggering spacing routines.

- **stencil** (stencil):
  - **ly:mensural-ligature::print**
    The symbol to print.

- **thickness** (number):
  - 1.3
    For grobs made up of lines, this is the thickness of the line. For slurs and ties, this is the distance between the two arcs of the curve’s outline at its thickest point, not counting the diameter of the virtual “pen” that draws the arcs. This property is expressed as a multiple of the current staff-line thickness (i.e. the visual output is influenced by changes to `Staff.StaffSymbol.thickness`).

This object supports the following interface(s): Section 3.2.36 [font-interface], page 565, Section 3.2.45 [grob-interface], page 570, Section 3.2.72 [mensural-ligature-interface], page 589, and Section 3.2.112 [spanner-interface], page 612.

### 3.1.74 MetronomeMark

MetronomeMark objects are created by: Section 2.2.73 [Metronome_mark_engraver], page 340.

Standard settings:

- **after-line-breaking** (boolean):
  - **ly:side-position-interface::move-to-extremal-staff**
    Dummy property, used to trigger callback for after-line-breaking.

- **break-align-symbols** (list):
  - `'(time-signature)`
    A list of break-align symbols that determines which breakable items to align this to. If the grob selected by the first symbol in the list is invisible due to break-visibility, we will align to the next grob (and so on). Choices are listed in Section “break-alignment-interface” in Internals Reference.

- **break-visibility** (vector):
  - `#(#f #t #t)`
    A vector of 3 booleans, `#(end-of-line unbroken begin-of-line). #t` means visible, #f means killed.

- **direction** (direction):
  - 1
    If `side-axis` is 0 (or X), then this property determines whether the object is placed LEFT, CENTER or RIGHT with respect to the other object. Otherwise, it determines whether the object is placed UP, CENTER or
DOWN. Numerical values may also be used: \texttt{UP=1, DOWN=-1, LEFT=-1, RIGHT=1, CENTER=0}.

\texttt{extra-spacing-width} (pair of numbers):
'(+inf.0 . -inf.0)
In the horizontal spacing problem, we pad each item by this amount (by adding the ‘car’ on the left side of the item and adding the ‘cdr’ on the right side of the item). In order to make a grob take up no horizontal space at all, set this to (+inf.0 . -inf.0).

\texttt{flag-style} (symbol):
'default
The style of the flag to be used with \texttt{MetronomeMark}. Available are 'modern-straight-flag, 'old-straight-flag, flat-flag, mensural and 'default

\texttt{non-break-align-symbols} (list):
'(paper-column-interface)
A list of symbols that determine which NON-break-aligned interfaces to align this to.

\texttt{outside-staff-horizontal-padding} (number):
0.2
By default, an outside-staff-object can be placed so that is it very close to another grob horizontally. If this property is set, the outside-staff-object is raised so that it is not so close to its neighbor.

\texttt{outside-staff-priority} (number):
1000
If set, the grob is positioned outside the staff in such a way as to avoid all collisions. In case of a potential collision, the grob with the smaller \texttt{outside-staff-priority} is closer to the staff.

\texttt{padding} (dimension, in staff space):
0.8
Add this much extra space between objects that are next to each other.

\texttt{self-alignment-X} (number):
-1
Specify alignment of an object. The value -1 means left aligned, 0 centered, and 1 right-aligned in X direction. Other numerical values may also be specified - the unit is half the object width.

\texttt{side-axis} (number):
1
If the value is X (or equivalently 0), the object is placed horizontally next to the other object. If the value is Y or 1, it is placed vertically.

\texttt{stencil} (stencil):
ly:text-interface::print
The symbol to print.

\texttt{vertical-skylines} (pair of skylines):
#<unpure-pure-container #<primitive-procedure ly:grob::vertical-skylines-from-stencil> >
Two skylines, one above and one below this grob.
X-offset (number):
  self-alignment-interface::self-aligned-on-breakable
  The horizontal amount that this object is moved relative to its X-parent.

Y-extent (pair of numbers):
  #<unpure-pure-container #<primitive-procedure ly:grob::stencil-height> >
  Extent (size) in the Y direction, measured in staff-space units, relative to object’s reference point.

Y-offset (number):
  #<unpure-pure-container #<primitive-procedure ly:side-position-interface::y-aligned-side> #<primitive-procedure ly:side-position-interface::pure-y-aligned-side> >
  The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): Section 3.2.14 [break-alignable-interface], page 556, Section 3.2.36 [font-interface], page 565, Section 3.2.45 [grob-interface], page 570, Section 3.2.52 [item-interface], page 579, Section 3.2.73 [metronome-mark-interface], page 590, Section 3.2.85 [outside-staff-interface], page 596, Section 3.2.101 [self-alignment-interface], page 603, Section 3.2.105 [side-position-interface], page 606, and Section 3.2.126 [text-interface], page 622.

3.1.75 MultiMeasureRest

MultiMeasureRest objects are created by: Section 2.2.75 [Multi_measure_rest_engraver], page 341.

Standard settings:

  bound-padding (number):
    0.5
    The amount of padding to insert around spanner bounds.

  expand-limit (integer):
    10
    Maximum number of measures expanded in church rests.

  hair-thickness (number):
    2.0
    Thickness of the thin line in a bar line, expressed as a multiple of the default staff-line thickness (i.e. the visual output is not influenced by changes to Staff.StaffSymbol.thickness).

  max-symbol-separation (number):
    8.0
    The maximum distance between symbols making up a church rest.

  round-up-exceptions (list):
    '() One list of pairs where car is the numerator and cdr the denominator of a moment. Each pair in this list means that the multi-measure rests of the corresponding length will be rounded up to the longer rest. See round-up-to-longer-rest.

  spacing-pair (pair):
    '(break-alignment . break-alignment)
A pair of alignment symbols which set an object’s spacing relative to its left and right BreakAlignments.

For example, a MultiMeasureRest will ignore prefatory items at its bounds (i.e., clefs, key signatures and time signatures) using the following override:

\override MultiMeasureRest.spacing-pair = #'(staff-bar . staff-bar)

springs-and-rods (boolean):
ly:multi-measure-rest::set-spacing-rods
Dummy variable for triggering spacing routines.

stencil (stencil):
ly:multi-measure-rest::print
The symbol to print.

thick-thickness (number):
6.6
Thickness of the thick line in a bar line, expressed as a multiple of the default staff-line thickness (i.e. the visual output is not influenced by changes to Staff.StaffSymbol.thickness).

usable-duration-logs (list):
'(-3 -2 -1 0)
List of duration-logs that can be used in typesetting the grob.

voiced-position (number):
4
The staff-position of a voiced Rest, negative if the rest has direction DOWN.

Y-extent (pair of numbers):
#<unpure-pure-container #<primitive-procedure ly:multi-measure-rest::height> >
Extent (size) in the Y direction, measured in staff-space units, relative to object’s reference point.

Y-offset (number):
#<unpure-pure-container #<primitive-procedure ly:staff-symbol-referencer::callback> >
The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): Section 3.2.36 [font-interface], page 565, Section 3.2.45 [grob-interface], page 570, Section 3.2.74 [multi-measure-interface], page 590, Section 3.2.75 [multi-measure-rest-interface], page 590, Section 3.2.85 [outside-staff-interface], page 596, Section 3.2.96 [rest-interface], page 601, Section 3.2.112 [spanner-interface], page 612, and Section 3.2.116 [staff-symbol-referencer-interface], page 616.

3.1.76 MultiMeasureRestNumber
MultiMeasureRestNumber objects are created by: Section 2.2.75 [Multi_measure_rest_engraver], page 341.

Standard settings:

bound-padding (number):
1.0
The amount of padding to insert around spanner bounds.
direction (direction):

1

If side-axis is 0 (or X), then this property determines whether the object is placed LEFT, CENTER or RIGHT with respect to the other object. Otherwise, it determines whether the object is placed UP, CENTER or DOWN. Numerical values may also be used: UP=1, DOWN=-1, LEFT=-1, RIGHT=1, CENTER=0.

font-encoding (symbol):

'fetaText

The font encoding is the broadest category for selecting a font. Currently, only lilypond’s system fonts (Emmentaler) are using this property. Available values are fetaMusic (Emmentaler), fetaBraces, fetaText (Emmentaler).

padding (dimension, in staff space):

0.4

Add this much extra space between objects that are next to each other.

parent-alignment-X (number):

0

Specify on which point of the parent the object is aligned. The value −1 means aligned on parent’s left edge, 0 on center, and 1 right edge, in X direction. Other numerical values may also be specified - the unit is half the parent’s width. If unset, the value from self-alignment-X property will be used.

self-alignment-X (number):

0

Specify alignment of an object. The value −1 means left aligned, 0 centered, and 1 right-aligned in X direction. Other numerical values may also be specified - the unit is half the object width.

side-axis (number):

1

If the value is X (or equivalently 0), the object is placed horizontally next to the other object. If the value is Y or 1, it is placed vertically.

springs-and-rods (boolean):

ly:multi-measure-rest::set-text-rods

Dummy variable for triggering spacing routines.

staff-padding (dimension, in staff space):

0.4

Maintain this much space between reference points and the staff. Its effect is to align objects of differing sizes (like the dynamics p and f) on their baselines.

stencil (stencil):

ly:text-interface::print

The symbol to print.

vertical-skylines (pair of skylines):

#<unpure-pure-container #<primitive-procedure
ly:grob::vertical-skylines-from-stencil> #<primitive-
procedure ly:grob::pure-simple-vertical-skylines-from-extents>

Two skylines, one above and one below this grob.

X-offset (number):
  ly:self-alignment-interface::aligned-on-x-parent
The horizontal amount that this object is moved relative to its X-parent.

Y-extent (pair of numbers):
  #<unpure-pure-container #<primitive-procedure
  ly:grob::stencil-height> >
Extent (size) in the Y direction, measured in staff-space units, relative
to object’s reference point.

Y-offset (number):
  #<unpure-pure-container #<primitive-procedure
  ly:side-position-interface::y-aligned-side> #<primitive-procedure
  ly:side-position-interface::pure-y-aligned-side> >
The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): Section 3.2.36 [font-interface], page 565,
Section 3.2.45 [grob-interface], page 570, Section 3.2.74 [multi-measure-interface], page 590,
Section 3.2.85 [outside-staff-interface], page 596, Section 3.2.101 [self-alignment-interface],
page 603, Section 3.2.105 [side-position-interface], page 606, Section 3.2.112 [spanner-interface],
page 612, and Section 3.2.126 [text-interface], page 622.

3.1.77 MultiMeasureRestScript
MultiMeasureRestScript objects are created by: Section 2.2.75 [Multi_measure_rest_engraver],
page 341.

Standard settings:

direction (direction):
  1
  If side-axis is 0 (or X), then this property determines whether the
  object is placed LEFT, CENTER or RIGHT with respect to the other object.
  Otherwise, it determines whether the object is placed UP, CENTER or
  DOWN. Numerical values may also be used: UP=1, DOWN=-1, LEFT=-1,
  RIGHT=1, CENTER=0.

outside-staff-padding (number):
  0
  The padding to place between grobs when spacing accord-
  ing to outside-staff-priority. Two grobs with different
  outside-staff-padding values have the larger value of padding
  between them.

outside-staff-priority (number):
  40
  If set, the grob is positioned outside the staff in such a way as to avoid
  all collisions. In case of a potential collision, the grob with the smaller
  outside-staff-priority is closer to the staff.

parent-alignment-X (number):
  0
Specify on which point of the parent the object is aligned. The value -1 means aligned on parent’s left edge, 0 on center, and 1 right edge, in X direction. Other numerical values may also be specified - the unit is half the parent’s width. If unset, the value from \texttt{self-alignment-X} property will be used.

\texttt{self-alignment-X} (number):

\begin{verbatim}
0
\end{verbatim}

Specify alignment of an object. The value -1 means left aligned, 0 centered, and 1 right-aligned in X direction. Other numerical values may also be specified - the unit is half the object width.

\texttt{staff-padding} (dimension, in staff space):

\begin{verbatim}
0.25
\end{verbatim}

Maintain this much space between reference points and the staff. Its effect is to align objects of differing sizes (like the dynamics p and f) on their baselines.

\texttt{stencil} (stencil):

\begin{verbatim}
ly:script-interface::print
\end{verbatim}

The symbol to print.

\texttt{vertical-skylines} (pair of skylines):

\begin{verbatim}
#<unpure-pure-container #<primitive-procedure
ly:grob::vertical-skylines-from-stencil> #<primitive-
procedure ly:grob::pure-simple-vertical-skylines-from-
extents> >
\end{verbatim}

Two skylines, one above and one below this grob.

\texttt{X-offset} (number):

\begin{verbatim}
ly:self-alignment-interface::aligned-on-x-parent
\end{verbatim}

The horizontal amount that this object is moved relative to its X-parent.

\texttt{Y-extent} (pair of numbers):

\begin{verbatim}
#<unpure-pure-container #<primitive-procedure
ly:grob::stencil-height> >
\end{verbatim}

Extent (size) in the Y direction, measured in staff-space units, relative to object’s reference point.

\texttt{Y-offset} (number):

\begin{verbatim}
#<unpure-pure-container #<primitive-procedure ly:side-
position-interface::y-aligned-side> #<primitive-procedure
ly:side-position-interface::pure-y-aligned-side> >
\end{verbatim}

The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): Section 3.2.36 [font-interface], page 565, Section 3.2.45 [grob-interface], page 570, Section 3.2.74 [multi-measure-interface], page 590, Section 3.2.85 [outside-staff-interface], page 596, Section 3.2.100 [script-interface], page 602, Section 3.2.101 [self-alignment-interface], page 603, Section 3.2.105 [side-position-interface], page 606, and Section 3.2.112 [spanner-interface], page 612.

3.1.78 MultiMeasureRestText

MultiMeasureRestText objects are created by: Section 2.2.75 [Multi_measure_rest_engraver], page 341.
Standard settings:

**direction** (direction):

1

If *side-axis* is 0 (or X), then this property determines whether the object is placed **LEFT**, **CENTER** or **RIGHT** with respect to the other object. Otherwise, it determines whether the object is placed **UP**, **CENTER** or **DOWN**. Numerical values may also be used: **UP**=1, **DOWN**=-1, **LEFT**=-1, **RIGHT**=1, **CENTER**=0.

**outside-staff-priority** (number):

450

If set, the grob is positioned outside the staff in such a way as to avoid all collisions. In case of a potential collision, the grob with the smaller **outside-staff-priority** is closer to the staff.

**padding** (dimension, in staff space):

0.2

Add this much extra space between objects that are next to each other.

**parent-alignment-X** (number):

0

Specify on which point of the parent the object is aligned. The value -1 means aligned on parent’s left edge, 0 on center, and 1 right edge, in X direction. Other numerical values may also be specified - the unit is half the parent’s width. If unset, the value from **self-alignment-X** property will be used.

**self-alignment-X** (number):

0

Specify alignment of an object. The value -1 means left aligned, 0 centered, and 1 right-aligned in X direction. Other numerical values may also be specified - the unit is half the object width.

**skyline-horizontal-padding** (number):

0.2

For determining the vertical distance between two staves, it is possible to have a configuration which would result in a tight interleaving of grobs from the top staff and the bottom staff. The larger this parameter is, the farther apart the staves are placed in such a configuration.

**staff-padding** (dimension, in staff space):

0.25

Maintain this much space between reference points and the staff. Its effect is to align objects of differing sizes (like the dynamics **p** and **f**) on their baselines.

**stencil** (stencil):

```
ly: text-interface::print
```

The symbol to print.

**vertical-skylines** (pair of skylines):

```
#{<unpure-pure-container #<primitive-procedure
ly: grob::vertical-skylines-from-stencil> #<primitive-
procedure ly: grob::pure-simple-vertical-skylines-from-
extents> >
```
Two skylines, one above and one below this grob.

X-offset (number):
  ly:self-alignment-interface:aligned-on-x-parent
The horizontal amount that this object is moved relative to its X-parent.

Y-extent (pair of numbers):
  #<unpure-pure-container #<primitive-procedure
  ly:grob::stencil-height>
Extent (size) in the Y direction, measured in staff-space units, relative
to object’s reference point.

Y-offset (number):
  #<unpure-pure-container #<primitive-procedure ly:side-
  position-interface::y-aligned-side> #<primitive-procedure
  ly:side-position-interface::pure-y-aligned-side>
The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): Section 3.2.36 [font-interface], page 565,
Section 3.2.45 [grob-interface], page 570, Section 3.2.74 [multi-measure-interface], page 590,
Section 3.2.85 [outside-staff-interface], page 596, Section 3.2.101 [self-alignment-interface],
page 603, Section 3.2.105 [side-position-interface], page 606, Section 3.2.112 [spanner-interface],
page 612, and Section 3.2.126 [text-interface], page 622.

3.1.79 NonMusicalPaperColumn

NonMusicalPaperColumn objects are created by: Section 2.2.85 [Paper
  column engraver], page 345.

Standard settings:

  allow-loose-spacing (boolean):
    #t
    If set, column can be detached from main spacing.

  axes (list):
    '(0)
    List of axis numbers. In the case of alignment grobs, this should contain
    only one number.

  before-line-breaking (boolean):
    ly:paper-column::before-line-breaking
    Dummy property, used to trigger a callback function.

  font-size (number):
    -7.5
    The font size, compared to the ‘normal’ size. 0 is style-sheet’s normal
    size, -1 is smaller, +1 is bigger. Each step of 1 is approximately 12%
    larger; 6 steps are exactly a factor 2 larger. If the context property
    fontSize is set, its value is added to this before the glyph is printed.
    Fractional values are allowed.

  full-measure-extra-space (number):
    1.0
    Extra space that is allocated at the beginning of a measure with only
    one note. This property is read from the NonMusicalPaperColumn that
    begins the measure.
horizontal-skylines (pair of skylines):
   ly:separation-item::calc-skylines
   Two skylines, one to the left and one to the right of this grob.

keep-inside-line (boolean):
   #t
   If set, this column cannot have objects sticking into the margin.

layer (integer):
   1000
   An integer which determines the order of printing objects. Objects with
   the lowest value of layer are drawn first, then objects with progressively
   higher values are drawn, so objects with higher values overwrite objects
   with lower values. By default most objects are assigned a layer value of
   1.

line-break-permission (symbol):
   'allow
   Instructs the line breaker on whether to put a line break at this column.
   Can be force or allow.

non-musical (boolean):
   #t
   True if the grob belongs to a NonMusicalPaperColumn.

page-break-permission (symbol):
   'allow
   Instructs the page breaker on whether to put a page break at this col-
   umn. Can be force or allow.

X-extent (pair of numbers):
   ly:axis-group-interface::width
   Extent (size) in the X direction, measured in staff-space units, relative
   to object’s reference point.

This object supports the following interface(s): Section 3.2.7 [axis-group-interface], page 549,
Section 3.2.36 [font-interface], page 565, Section 3.2.45 [grob-interface], page 570, Section 3.2.52
[item-interface], page 579, Section 3.2.86 [paper-column-interface], page 596, Section 3.2.104
[separation-item-interface], page 605, and Section 3.2.107 [spaceable-grob-interface], page 610.

3.1.80 NoteCollision

NoteCollision objects are created by: Section 2.2.19 [Collision engraver], page 322.

Standard settings:

axes (list):
   '(0 1)
   List of axis numbers. In the case of alignment grobs, this should contain
   only one number.

note-collision-threshold (dimension, in staff space):
   1
   Simultaneous notes that are this close or closer in units of staff-space
   will be identified as vertically colliding. Used by Stem grobs for notes in
   the same voice, and NoteCollision grobs for notes in different voices.
   Default value 1.
prefer-dotted-right (boolean):

    #t

For note collisions, prefer to shift dotted up-note to the right, rather than shifting just the dot.

X-extent (pair of numbers):

    ly:axis-group-interface::width

Extent (size) in the X direction, measured in staff-space units, relative to object’s reference point.

Y-extent (pair of numbers):

    #<unpure-pure-container #<primitive-procedure ly:axis-group-interface::height> #<primitive-procedure ly:axis-group-interface::pure-height> >

Extent (size) in the Y direction, measured in staff-space units, relative to object’s reference point.

This object supports the following interface(s): Section 3.2.7 [axis-group-interface], page 549, Section 3.2.45 [grob-interface], page 570, Section 3.2.52 [item-interface], page 579, and Section 3.2.76 [note-collision-interface], page 591.

3.1.81 NoteColumn

NoteColumn objects are created by: Section 2.2.100 [Rhythmic_column_engraver], page 351.

Standard settings:

    axes (list):
        '(0 1)

List of axis numbers. In the case of alignment grobs, this should contain only one number.

horizontal-skylines (pair of skylines):

    ly:separation-item::calc-skylines

Two skylines, one to the left and one to the right of this grob.

skyline-vertical-padding (number):

    0.15

The amount by which the left and right skylines of a column are padded vertically, beyond the Y-extents and extra-spacing-heights of the constituent grobs in the column. Increase this to prevent interleaving of grobs from adjacent columns.

X-extent (pair of numbers):

    ly:axis-group-interface::width

Extent (size) in the X direction, measured in staff-space units, relative to object’s reference point.

Y-extent (pair of numbers):

    #<unpure-pure-container #<primitive-procedure ly:axis-group-interface::height> #<primitive-procedure ly:axis-group-interface::pure-height> >

Extent (size) in the Y direction, measured in staff-space units, relative to object’s reference point.

This object supports the following interface(s): Section 3.2.7 [axis-group-interface], page 549, Section 3.2.45 [grob-interface], page 570, Section 3.2.52 [item-interface], page 579, Section 3.2.77 [note-column-interface], page 592, and Section 3.2.104 [separation-item-interface], page 605.
3.1.82 NoteHead

NoteHead objects are created by: Section 2.2.20 [Completion_heads_engraver], page 322, Section 2.2.31 [Drum_notes_engraver], page 326, and Section 2.2.78 [Note_heads_engraver], page 343.

Standard settings:

- **duration-log** (integer):
  ```
  note-head::calc-duration-log
  ```
  The 2-log of the note head duration, i.e., 0 = whole note, 1 = half note, etc.

- **extra-spacing-height** (pair of numbers):
  ```
  ly:note-head::include-ledger-line-height
  ```
  In the horizontal spacing problem, we increase the height of each item by this amount (by adding the ‘car’ to the bottom of the item and adding the ‘cdr’ to the top of the item). In order to make a grob infinitely high (to prevent the horizontal spacing problem from placing any other grobs above or below this grob), set this to (-inf.0 . +inf.0).

- **glyph-name** (string):
  ```
  note-head::calc-glyph-name
  ```
  The glyph name within the font.

  In the context of (span) bar lines, *glyph-name* represents a processed form of *glyph*, where decisions about line breaking etc. are already taken.

- **parenthesis-friends** (list):
  ```
  '(accidental-grob dot)
  ```
  A list of Grob types, as symbols. When parentheses enclose a Grob that has ‘parenthesis-friends, the parentheses widen to include any child Grobs with type among ‘parenthesis-friends.

- **stem-attachment** (pair of numbers):
  ```
  ly:note-head::calc-stem-attachment
  ```
  An (x . y) pair where the stem attaches to the notehead.

- **stencil** (stencil):
  ```
  ly:note-head::print
  ```
  The symbol to print.

- **X-offset** (number):
  ```
  ly:note-head::stem-x-shift
  ```
  The horizontal amount that this object is moved relative to its X-parent.

- **Y-extent** (pair of numbers):
  ```
  #<unpure-pure-container #<primitive-procedure
  ly:grob::stencil-height> >
  ```
  Extent (size) in the Y direction, measured in staff-space units, relative to object’s reference point.

- **Y-offset** (number):
  ```
  #<unpure-pure-container #<primitive-procedure ly:staff-
  symbol-referencer::callback> >
  ```
  The vertical amount that this object is moved relative to its Y-parent.
This object supports the following interface(s): Section 3.2.36 [font-interface], page 565, Section 3.2.42 [gregorian-ligature-interface], page 569, Section 3.2.45 [grob-interface], page 570, Section 3.2.52 [item-interface], page 579, Section 3.2.57 [ledgered-interface], page 583, Section 3.2.59 [ligature-head-interface], page 589, Section 3.2.72 [mensural-ligature-interface], page 589, Section 3.2.78 [note-head-interface], page 593, Section 3.2.97 [rhythmic-grob-interface], page 601, Section 3.2.98 [rhythmic-head-interface], page 601, Section 3.2.116 [staff-symbol-referencer-interface], page 616, and Section 3.2.136 [vaticana-ligature-interface], page 629.

3.1.83 NoteName

NoteName objects are created by: Section 2.2.79 [Note_name_engraver], page 343.

Standard settings:

stencil (stencil):
   ly:text-interface::print
   The symbol to print.

Y-extent (pair of numbers):
   #<unpure-pure-container #<primitive-procedure
   ly:grob::stencil-height> >
   Extent (size) in the Y direction, measured in staff-space units, relative
to object’s reference point.

This object supports the following interface(s): Section 3.2.36 [font-interface], page 565, Section 3.2.45 [grob-interface], page 570, Section 3.2.52 [item-interface], page 579, Section 3.2.79 [note-name-interface], page 594, and Section 3.2.126 [text-interface], page 622.

3.1.84 NoteSpacing

NoteSpacing objects are created by: Section 2.2.81 [Note_spacing_engraver], page 344.

Standard settings:

knee-spacing-correction (number):
   1.0
   Factor for the optical correction amount for kneed beams. Set between
   0 for no correction and 1 for full correction.

same-direction-correction (number):
   0.25
   Optical correction amount for stems that are placed in tight configu-
   rations. This amount is used for stems with the same direction to
   compensate for note head to stem distance.

space-to-barline (boolean):
   #t
   If set, the distance between a note and the following non-musical column
   will be measured to the bar line instead of to the beginning of the non-
   musical column. If there is a clef change followed by a bar line, for
   example, this means that we will try to space the non-musical column
   as though the clef is not there.

stem-spacing-correction (number):
   0.5
   Optical correction amount for stems that are placed in tight configu-
   rations. For opposite directions, this amount is the correction for two
   normal sized stems that overlap completely.
This object supports the following interface(s): Section 3.2.45 [grob-interface], page 570, Section 3.2.52 [item-interface], page 579, Section 3.2.80 [note-spacing-interface], page 594, and Section 3.2.108 [spacing-interface], page 610.

3.1.85 OttavaBracket

OttavaBracket objects are created by: Section 2.2.82 [Ottava spanner engraver], page 344.

Standard settings:

\texttt{\texttt{dash-fraction}} (number):
\begin{verbatim}
0.3
\end{verbatim}
Size of the dashes, relative to \texttt{dash-period}. Should be between 0.1 and 1.0 (continuous line). If set to 0.0, a dotted line is produced

\texttt{\texttt{direction}} (direction):
\begin{verbatim}
1
\end{verbatim}
If \texttt{side-axis} is 0 (or X), then this property determines whether the object is placed \texttt{LEFT}, \texttt{CENTER} or \texttt{RIGHT} with respect to the other object. Otherwise, it determines whether the object is placed \texttt{UP}, \texttt{CENTER} or \texttt{DOWN}. Numerical values may also be used: \texttt{UP}=1, \texttt{DOWN}=-1, \texttt{LEFT}=-1, \texttt{RIGHT}=1, \texttt{CENTER}=0.

\texttt{\texttt{edge-height}} (pair):
\begin{verbatim}
'(0 . 0.8)
\end{verbatim}
A pair of numbers specifying the heights of the vertical edges: (\texttt{left-height} . \texttt{right-height}).

\texttt{\texttt{font-series}} (symbol):
\begin{verbatim}
'\texttt{bold}
\end{verbatim}
Select the series of a font. Choices include \texttt{medium}, \texttt{bold}, \texttt{bold-narrow}, etc.

\texttt{\texttt{font-shape}} (symbol):
\begin{verbatim}
'\texttt{italic}
\end{verbatim}
Select the shape of a font. Choices include \texttt{upright}, \texttt{italic}, \texttt{caps}.

\texttt{\texttt{minimum-length}} (dimension, in staff space):
\begin{verbatim}
0.3
\end{verbatim}
Try to make a spanner at least this long, normally in the horizontal direction. This requires an appropriate callback for the \texttt{springs-and-rods} property. If added to a \texttt{Tie}, this sets the minimum distance between noteheads.

\texttt{\texttt{outside-staff-priority}} (number):
\begin{verbatim}
400
\end{verbatim}
If set, the grob is positioned outside the staff in such a way as to avoid all collisions. In case of a potential collision, the grob with the smaller \texttt{outside-staff-priority} is closer to the staff.

\texttt{\texttt{padding}} (dimension, in staff space):
\begin{verbatim}
0.5
\end{verbatim}
Add this much extra space between objects that are next to each other.

\texttt{\texttt{shorten-pair}} (pair of numbers):
\begin{verbatim}
'(-0.8 . -0.6)
\end{verbatim}
The lengths to shorten on both sides a hairpin or text-spanner such as a pedal bracket. Positive values shorten the hairpin or text-spanner, while negative values lengthen it.

**staff-padding** (dimension, in staff space):

```
2.0
```

Maintain this much space between reference points and the staff. Its effect is to align objects of differing sizes (like the dynamics p and f) on their baselines.

**stencil** (stencil):

```
ly:ottava-bracket::print
```

The symbol to print.

**style** (symbol):

```
'dashed-line
```

This setting determines in what style a grob is typeset. Valid choices depend on the **stencil** callback reading this property.

**vertical-skylines** (pair of skylines):

```
#<unpure-pure-container #<primitive-procedure
ly:grob::vertical-skylines-from-stencil> #<primitive-
procedure ly:grob::pure-simple-vertical-skylines-from-
extents> >
```

Two skylines, one above and one below this grob.

**Y-offset** (number):

```
#<unpure-pure-container #<primitive-procedure
ly:side-
position-interface::y-aligned-side> #<primitive-procedure
ly:side-position-interface::pure-y-aligned-side> >
```

The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): Section 3.2.36 [font-interface], page 565, Section 3.2.45 [grob-interface], page 570, Section 3.2.48 [horizontal-bracket-interface], page 576, Section 3.2.61 [line-interface], page 583, Section 3.2.83 [ottava-bracket-interface], page 595, Section 3.2.85 [outside-staff-interface], page 596, Section 3.2.105 [side-position-interface], page 606, Section 3.2.112 [spanner-interface], page 612, and Section 3.2.126 [text-interface], page 622.

### 3.1.86 PaperColumn

PaperColumn objects are created by: Section 2.2.85 [Paper_column_engraver], page 345.

Standard settings:

**allow-loose-spacing** (boolean):

```
#t
```

If set, column can be detached from main spacing.

**axes** (list):

```
'(0)
```

List of axis numbers. In the case of alignment grobs, this should contain only one number.

**before-line-breaking** (boolean):

```
ly:paper-column::before-line-breaking
```

Dummy property, used to trigger a callback function.
font-size (number):
-7.5
   The font size, compared to the ‘normal’ size. 0 is style-sheet’s
   normal size, -1 is smaller, +1 is bigger. Each step of 1 is
   approximately 12% larger; 6 steps are exactly a factor 2 larger. If
   the context property fontSize is set, its value is added to this
   before the glyph is printed. Fractional values are allowed.

horizontal-skylines (pair of skylines):
   ly:separation-item::calc-skylines
   Two skylines, one to the left and one to the right of this grob.

keep-inside-line (boolean):
   #t
   If set, this column cannot have objects sticking into the margin.

layer (integer):
   1000
   An integer which determines the order of printing objects. Objects
   with the lowest value of layer are drawn first, then objects with
   progressively higher values are drawn, so objects with higher values
   overwrite objects with lower values. By default most objects are
   assigned a layer value of 1.

skyline-vertical-padding (number):
   0.08
   The amount by which the left and right skylines of a column are
   padded vertically, beyond the Y-extents and extra-spacing-heights
   of the constituent grobs in the column. Increase this to prevent
   interleaving of grobs from adjacent columns.

X-extent (pair of numbers):
   ly:axis-group-interface::width
   Extent (size) in the X direction, measured in staff-space units,
   relative to object’s reference point.

This object supports the following interface(s): Section 3.2.7 [axis-group-interface], page 549, Section 3.2.36 [font-interface], page 565, Section 3.2.45 [grob-interface], page 570, Section 3.2.52 [item-interface], page 579, Section 3.2.86 [paper-column-interface], page 596, Section 3.2.104 [separation-item-interface], page 605, and Section 3.2.107 [spaceable-grob-interface], page 610.

3.1.87 ParenthesesItem

ParenthesesItem objects are created by: Section 2.2.86 [Parenthesis_engraver], page 346.

Standard settings:

font-size (number):
-6
   The font size, compared to the ‘normal’ size. 0 is style-sheet’s
   normal size, -1 is smaller, +1 is bigger. Each step of 1 is
   approximately 12% larger; 6 steps are exactly a factor 2 larger. If
   the context property fontSize is set, its value is added to this
   before the glyph is printed. Fractional values are allowed.

padding (dimension, in staff space):
0.2
Add this much extra space between objects that are next to each other.

```
 stencil (stencil):
  parentheses-item::print
  The symbol to print.

 stencils (list):
  parentheses-item::calc-parenthesis-stencils
  Multiple stencils, used as intermediate value.

 X-extent (pair of numbers):
  '(0 . 0)
  Extent (size) in the X direction, measured in staff-space units, relative
to object’s reference point.

 Y-extent (pair of numbers):
  parentheses-item::y-extent
  Extent (size) in the Y direction, measured in staff-space units, relative
to object’s reference point.
```

This object supports the following interface(s): Section 3.2.36 [font-interface], page 565,
Section 3.2.45 [grob-interface], page 570, Section 3.2.52 [item-interface], page 579, and
Section 3.2.87 [parentheses-interface], page 598.

### 3.1.88 PercentRepeat

PercentRepeat objects are created by: Section 2.2.88 [Percent repeat engraver], page 346.

Standard settings:

```
 dot-negative-kern (number):
  0.75
  The space to remove between a dot and a slash in percent repeat glyphs.
  Larger values bring the two elements closer together.

 font-encoding (symbol):
  'fetaMusic
  The font encoding is the broadest category for selecting a font. Current-
  ly, only lilypond’s system fonts (Emmentaler) are using this prop-
  erty. Available values are fetaMusic (Emmentaler), fetaBraces,
  fetaText (Emmentaler).

 slope (number):
  1.0
  The slope of this object.

 spacing-pair (pair):
  '(break-alignment . staff-bar)
  A pair of alignment symbols which set an object’s spacing relative to
  its left and right BreakAlignments.
  For example, a MultiMeasureRest will ignore prefatory items at its
  bounds (i.e., clefs, key signatures and time signatures) using the follow-
  ing override:

  \override MultiMeasureRest.spacing-pair = #'(staff-bar . staff-bar)
```

```
 springs-and-rods (boolean):
  ly:multi-measure-rest::set-spacing-rods
  Dummy variable for triggering spacing routines.
```
stencil (stencil):
    ly:multi-measure-rest::percent
    The symbol to print.

thickness (number):
    0.48
    For grobs made up of lines, this is the thickness of the line. For slurs
    and ties, this is the distance between the two arcs of the curve’s outline
    at its thickest point, not counting the diameter of the virtual “pen” that
    draws the arcs. This property is expressed as a multiple of the current
    staff-line thickness (i.e. the visual output is influenced by changes to
    Staff.StaffSymbol.thickness).

This object supports the following interface(s): Section 3.2.36 [font-interface], page 565,
Section 3.2.45 [grob-interface], page 570, Section 3.2.75 [multi-measure-rest-interface], page 590,
Section 3.2.88 [percent-repeat-interface], page 598, and Section 3.2.112 [spanner-interface],
page 612.

3.1.89 PercentRepeatCounter

PercentRepeatCounter objects are created by: Section 2.2.88 [Percent_repeat_engraver],
page 346.

Standard settings:

direction (direction):
    1
    If side-axis is 0 (or X), then this property determines whether the
    object is placed LEFT, CENTER or RIGHT with respect to the other object.
    Otherwise, it determines whether the object is placed UP, CENTER or
    DOWN. Numerical values may also be used: UP=1, DOWN=-1, LEFT=-1,
    RIGHT=1, CENTER=0.

font-encoding (symbol):
    'fetaText
    The font encoding is the broadest category for selecting a font. Cur-
    rently, only lilypond’s system fonts (Emmentaler) are using this prop-
    erty. Available values are fetaMusic (Emmentaler), fetaBraces,
    fetaText (Emmentaler).

font-size (number):
    -2
    The font size, compared to the ‘normal’ size. 0 is style-sheet’s normal
    size, -1 is smaller, +1 is bigger. Each step of 1 is approximately 12%
    larger; 6 steps are exactly a factor 2 larger. If the context property
    fontSize is set, its value is added to this before the glyph is printed.
    Fractional values are allowed.

padding (dimension, in staff space):
    0.2
    Add this much extra space between objects that are next to each other.

parent-alignment-X (number):
    0
    Specify on which point of the parent the object is aligned. The value
    -1 means aligned on parent’s left edge, 0 on center, and 1 right edge,
in X direction. Other numerical values may also be specified - the unit is half the parent’s width. If unset, the value from self-alignment-X property will be used.

self-alignment-X (number):
0
Specify alignment of an object. The value -1 means left aligned, 0 centered, and 1 right-aligned in X direction. Other numerical values may also be specified - the unit is half the object width.

staff-padding (dimension, in staff space):
0.25
Maintain this much space between reference points and the staff. Its effect is to align objects of differing sizes (like the dynamics p and f) on their baselines.

stencil (stencil):
ly:text-interface::print
The symbol to print.

X-offset (number):
ly:self-alignment-interface::aligned-on-x-parent
The horizontal amount that this object is moved relative to its X-parent.

Y-extent (pair of numbers):
#<unpure-pure-container #<primitive-procedure ly:grob::stencil-height> >
Extent (size) in the Y direction, measured in staff-space units, relative to object’s reference point.

Y-offset (number):
#<unpure-pure-container #<primitive-procedure ly:side-position-interface::y-aligned-side> #<primitive-procedure ly:side-position-interface::pure-y-aligned-side> >
The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): Section 3.2.36 [font-interface], page 565, Section 3.2.45 [grob-interface], page 570, Section 3.2.85 [outside-staff-interface], page 596, Section 3.2.88 [percent-repeat-interface], page 598, Section 3.2.101 [self-alignment-interface], page 603, Section 3.2.105 [side-position-interface], page 606, Section 3.2.112 [spanner-interface], page 612, and Section 3.2.126 [text-interface], page 622.

3.1.90 PhrasingSlur

PhrasingSlur objects are created by: Section 2.2.89 [Phrasing_slur_engraver], page 347.

Standard settings:

control-points (list of number pairs):
ly:slur::calc-control-points
List of offsets (number pairs) that form control points for the tie, slur, or bracket shape. For Béziers, this should list the control points of a third-order Bézier curve.

details (list):
'((region-size . 4)
 (head-encompass-penalty . 1000.0)
A list of parameters for detailed grob behavior. More information on the allowed parameters for a grob can be found by looking at the top of the Internals Reference page for each interface having a details property.

direction (direction):
ly:slur::calc-direction

If side-axis is 0 (or X), then this property determines whether the object is placed LEFT, CENTER or RIGHT with respect to the other object. Otherwise, it determines whether the object is placed UP, CENTER or DOWN. Numerical values may also be used: UP=1, DOWN=-1, LEFT=-1, RIGHT=1, CENTER=0.

height-limit (dimension, in staff space):
2.0

Maximum slur height: The longer the slur, the closer it is to this height.

minimum-length (dimension, in staff space):
1.5

Try to make a spanner at least this long, normally in the horizontal direction. This requires an appropriate callback for the springs-and-rods property. If added to a Tie, this sets the minimum distance between noteheads.

ratio (number):
0.333

Parameter for slur shape. The higher this number, the quicker the slur attains its height-limit.

springs-and-rods (boolean):
ly:spanner::set-spacing-rods

Dummy variable for triggering spacing routines.
stencil (stencil):
  ly:slur::print
  The symbol to print.

thickness (number):
  1.1
  For grobs made up of lines, this is the thickness of the line. For slurs
  and ties, this is the distance between the two arcs of the curve’s outline
  at its thickest point, not counting the diameter of the virtual “pen” that
  draws the arcs. This property is expressed as a multiple of the current
  staff-line thickness (i.e. the visual output is influenced by changes to
  Staff.StaffSymbol.thickness).

vertical-skylines (pair of skylines):
  #<unpure-pure-container #<primitive-procedure
  ly:slur::vertical-skylines> #<primitive-procedure
  ly:grob::pure-simple-vertical-skylines-from-extents> >
  Two skylines, one above and one below this grob.

Y-extent (pair of numbers):
  #<unpure-pure-container #<primitive-procedure
  ly:slur::height> #<primitive-procedure ly:slur::pure-
  height> >
  Extent (size) in the Y direction, measured in staff-space units, relative
  to object’s reference point.

This object supports the following interface(s): Section 3.2.45 [grob-interface], page 570,
Section 3.2.85 [outside-staff-interface], page 596, Section 3.2.106 [slur-interface], page 607, and
Section 3.2.112 [spanner-interface], page 612.

3.1.91 PianoPedalBracket

PianoPedalBracket objects are created by: Section 2.2.91 [Piano_pedal_engraver], page 347.

Standard settings:

bound-padding (number):
  1.0
  The amount of padding to insert around spanner bounds.

bracket-flare (pair of numbers):
  '(0.5 . 0.5)
  A pair of numbers specifying how much edges of brackets should slant
  outward. Value 0.0 means straight edges.

direction (direction):
  -1
  If side-axis is 0 (or X), then this property determines whether the
  object is placed LEFT, CENTER or RIGHT with respect to the other object.
  Otherwise, it determines whether the object is placed UP, CENTER or
  DOWN. Numerical values may also be used: UP=1, DOWN=-1, LEFT=-1,
  RIGHT=1, CENTER=0.

edge-height (pair):
  '(1.0 . 1.0)
  A pair of numbers specifying the heights of the vertical edges: (left-
  height . right-height).
The lengths to shorten on both sides a hairpin or text-spanner such as a pedal bracket. Positive values shorten the hairpin or text-spanner, while negative values lengthen it.

The symbol to print.

This setting determines in what style a grob is typeset. Valid choices depend on the `stencil` callback reading this property.

For grobs made up of lines, this is the thickness of the line. For slurs and ties, this is the distance between the two arcs of the curve’s outline at its thickest point, not counting the diameter of the virtual “pen” that draws the arcs. This property is expressed as a multiple of the current staff-line thickness (i.e. the visual output is influenced by changes to `Staff.StaffSymbol.thickness`).

Two skylines, one above and one below this grob.

This object supports the following interface(s): Section 3.2.45 [grob-interface], page 570, Section 3.2.61 [line-interface], page 583, Section 3.2.90 [piano-pedal-bracket-interface], page 599, Section 3.2.91 [piano-pedal-interface], page 600, and Section 3.2.112 [spanner-interface], page 612.

**3.1.92 RehearsalMark**

RehearsalMark objects are created by: Section 2.2.66 [Mark engraver], page 338.

Standard settings:

A list of `break-align symbols` that determines which breakable items to align this to. If the grob selected by the first symbol in the list is invisible due to `break-visibility`, we will align to the next grob (and so on). Choices are listed in Section “break-alignment-interface” in *Internals Reference*. 
break-visibility (vector):
  #(#f #t #t)
  A vector of 3 booleans, #((end-of-line unbroken begin-of-line). #t
  means visible, #f means killed.

direction (direction):
  1
  If side-axis is 0 (or X), then this property determines whether the
  object is placed LEFT, CENTER or RIGHT with respect to the other object.
  Otherwise, it determines whether the object is placed UP, CENTER or
  DOWN. Numerical values may also be used: UP=1, DOWN=-1, LEFT=-1,
  RIGHT=1, CENTER=0.

extra-spacing-width (pair of numbers):
  '(+inf.0 . -inf.0)
  In the horizontal spacing problem, we pad each item by this amount (by
  adding the ‘car’ on the left side of the item and adding the ‘cdr’ on the
  right side of the item). In order to make a grob take up no horizontal
  space at all, set this to (+inf.0 . -inf.0).

font-size (number):
  2
  The font size, compared to the ‘normal’ size. 0 is style-sheet’s normal
  size, -1 is smaller, +1 is bigger. Each step of 1 is approximately 12%
  larger; 6 steps are exactly a factor 2 larger. If the context property
  fontSize is set, its value is added to this before the glyph is printed.
  Fractional values are allowed.

non-musical (boolean):
  #t
  True if the grob belongs to a NonMusicalPaperColumn.

outside-staff-horizontal-padding (number):
  0.2
  By default, an outside-staff-object can be placed so that is it very close
  to another grob horizontally. If this property is set, the outside-staff-
  object is raised so that it is not so close to its neighbor.

outside-staff-priority (number):
  1500
  If set, the grob is positioned outside the staff in such a way as to avoid
  all collisions. In case of a potential collision, the grob with the smaller
  outside-staff-priority is closer to the staff.

padding (dimension, in staff space):
  0.8
  Add this much extra space between objects that are next to each other.

self-alignment-X (number):
  break-alignable-interface::self-alignment-opposite-of-
  anchor
  Specify alignment of an object. The value -1 means left aligned, 0 cen-
  tered, and 1 right-aligned in X direction. Other numerical values may
  also be specified - the unit is half the object width.
stencil (stencil):
    ly:text-interface::print
The symbol to print.

vertical-skylines (pair of skylines):
    #<unpure-pure-container #<primitive-procedure
    ly:grob::vertical-skylines-from-stencil> >
Two skylines, one above and one below this grob.

X-offset (number):
    self-alignment-interface::self-aligned-on-breakable
The horizontal amount that this object is moved relative to its X-parent.

Y-extent (pair of numbers):
    #<unpure-pure-container #<primitive-procedure
    ly:grob::stencil-height> >
Extent (size) in the Y direction, measured in staff-space units, relative
to object's reference point.

Y-offset (number):
    #<unpure-pure-container #<primitive-procedure ly:side-
    position-interface::y-aligned-side> #<primitive-procedure
    ly:side-position-interface::pure-y-aligned-side> >
The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): Section 3.2.14 [break-alignable-interface],
page 556, Section 3.2.36 [font-interface], page 565, Section 3.2.45 [grob-interface], page 570,
Section 3.2.52 [item-interface], page 579, Section 3.2.67 [mark-interface], page 587,
Section 3.2.85 [outside-staff-interface], page 596, Section 3.2.101 [self-alignment-interface],
page 603, Section 3.2.105 [side-position-interface], page 606, and Section 3.2.126 [text-interface],
page 622.

3.1.93 RepeatSlash

RepeatSlash objects are created by: Section 2.2.105 [Slash_repeat_engraver], page 352.

Standard settings:

slash-negative-kern (number):
    0.85
The space to remove between slashes in percent repeat glyphs. Larger
values bring the two elements closer together.

slope (number):
    1.7
The slope of this object.

stencil (stencil):
    ly:percent-repeat-item-interface::beat-slash
The symbol to print.

thickness (number):
    0.48
For grobs made up of lines, this is the thickness of the line. For slurs
and ties, this is the distance between the two arcs of the curve's outline
at its thickest point, not counting the diameter of the virtual "pen" that
draws the arcs. This property is expressed as a multiple of the current
staff-line thickness (i.e. the visual output is influenced by changes to \texttt{Staff.StaffSymbol.thickness}).

Y-extent (pair of numbers):
\begin{verbatim}
  ly:grob::stencil-height
\end{verbatim}
Extent (size) in the Y direction, measured in staff-space units, relative to object’s reference point.

This object supports the following interface(s): Section 3.2.45 [grob-interface], page 570, Section 3.2.52 [item-interface], page 579, Section 3.2.88 [percent-repeat-interface], page 598, Section 3.2.89 [percent-repeat-item-interface], page 599, and Section 3.2.97 [rhythmic-grob-interface], page 601.

3.1.94 RepeatTie

RepeatTie objects are created by: Section 2.2.97 [Repeat_tie_engraver], page 350.

Standard settings:

\begin{verbatim}
  control-points (list of number pairs):
  ly:semi-tie::calc-control-points
  List of offsets (number pairs) that form control points for the tie, slur, or bracket shape. For Béziers, this should list the control points of a third-order Bézier curve.

  details (list):
  '((ratio . 0.333) (height-limit . 1.0))
  A list of parameters for detailed grob behavior. More information on the allowed parameters for a grob can be found by looking at the top of the Internals Reference page for each interface having a \texttt{details} property.

  direction (direction):
  ly:tie::calc-direction
  If \texttt{side-axis} is 0 (or X), then this property determines whether the object is placed LEFT, CENTER or RIGHT with respect to the other object. Otherwise, it determines whether the object is placed UP, CENTER or DOWN. Numerical values may also be used: \texttt{UP=1, DOWN=-1, LEFT=-1, RIGHT=1, CENTER=0}.

  extra-spacing-height (pair of numbers):
  '(-0.5 . 0.5)
  In the horizontal spacing problem, we increase the height of each item by this amount (by adding the ‘car’ to the bottom of the item and adding the ‘cdr’ to the top of the item). In order to make a grob infinitely high (to prevent the horizontal spacing problem from placing any other grobs above or below this grob), set this to \texttt{(-inf.0 . +inf.0)}.

  head-direction (direction):
  1
  Are the note heads left or right in a semitie?

  stencil (stencil):
  ly:tie::print
  The symbol to print.
\end{verbatim}
thickness (number):
   1.0
For grobs made up of lines, this is the thickness of the line. For slurs
and ties, this is the distance between the two arcs of the curve’s outline
at its thickest point, not counting the diameter of the virtual “pen” that
draws the arcs. This property is expressed as a multiple of the current
staff-line thickness (i.e. the visual output is influenced by changes to
Staff.StaffSymbol.thickness).

vertical-skylines (pair of skylines):
   #<unpure-pure-container #<primitive-procedure
ly:grob::vertical-skylines-from-stencil> >
Two skylines, one above and one below this grob.

Y-extent (pair of numbers):
   #<unpure-pure-container #<primitive-procedure
ly:grob::stencil-height> >
Extent (size) in the Y direction, measured in staff-space units, relative
to object’s reference point.

This object supports the following interface(s): Section 3.2.45 [grob-interface], page 570,
Section 3.2.52 [item-interface], page 579, and Section 3.2.103 [semi-tie-interface], page 604.

3.1.95 RepeatTieColumn
RepeatTieColumn objects are created by: Section 2.2.97 [Repeat_tie_engraver], page 350.
Standard settings:

   head-direction (direction):
   ly:semi-tie-column::calc-head-direction
   Are the note heads left or right in a semitie?

   X-extent (pair of numbers)
   Extent (size) in the X direction, measured in staff-space units, relative
to object’s reference point.

   Y-extent (pair of numbers)
   Extent (size) in the Y direction, measured in staff-space units, relative
to object’s reference point.

This object supports the following interface(s): Section 3.2.45 [grob-interface], page 570,
Section 3.2.52 [item-interface], page 579, and Section 3.2.102 [semi-tie-column-interface],
page 604.

3.1.96 Rest
Rest objects are created by: Section 2.2.21 [Completion_rest_engraver], page 323, and
Section 2.2.99 [Rest_engraver], page 350.
Standard settings:

duration-log (integer):
   stem::calc-duration-log
   The 2-log of the note head duration, i.e., 0 = whole note, 1 = half note,
etc.

minimum-distance (dimension, in staff space):
   0.25
   Minimum distance between rest and notes or beam.
parenthesis-friends (list):
  '(dot)
  A list of Grob types, as symbols. When parentheses enclose a Grob that has parenthesis-friends, the parentheses widen to include any child Grobs with type among parenthesis-friends.

stencil (stencil):
  ly:rest::print
  The symbol to print.

vertical-skylines (pair of skylines):
  #<unpure-pure-container #<primitive-procedure
  ly:grob::vertical-skylines-from-stencil> #<primitive-
  procedure ly:grob::pure-simple-vertical-skylines-from-
  extents> >
  Two skylines, one above and one below this grob.

voiced-position (number):
  4
  The staff-position of a voiced Rest, negative if the rest has direction DOWN.

X-extent (pair of numbers):
  ly:rest::width
  Extent (size) in the X direction, measured in staff-space units, relative to object’s reference point.

Y-extent (pair of numbers):
  #<unpure-pure-container #<primitive-procedure
  ly:rest::height> #<primitive-procedure ly:rest::pure-
  height> >
  Extent (size) in the Y direction, measured in staff-space units, relative to object’s reference point.

Y-offset (number):
  #<unpure-pure-container #<primitive-procedure ly:rest::y-
  offset-callback> >
  The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): Section 3.2.36 [font-interface], page 565, Section 3.2.45 [grob-interface], page 570, Section 3.2.52 [item-interface], page 579, Section 3.2.96 [rest-interface], page 601, Section 3.2.97 [rhythmic-grob-interface], page 601, Section 3.2.98 [rhythmic-head-interface], page 601, and Section 3.2.116 [staff-symbol-referencer-interface], page 616.

3.1.97 RestCollision

RestCollision objects are created by: Section 2.2.98 [Rest_collision_ engraver], page 350.

Standard settings:

  minimum-distance (dimension, in staff space):
    0.75
    Minimum distance between rest and notes or beam.

This object supports the following interface(s): Section 3.2.45 [grob-interface], page 570, Section 3.2.52 [item-interface], page 579, and Section 3.2.95 [rest-collision-interface], page 600.
3.1.98 Script

Script objects are created by: Section 2.2.31 [Drum_notes_ engraver], page 326, Section 2.2.76 [New_fingering_ engraver], page 342, and Section 2.2.102 [Script_ engraver], page 351.

Standard settings:

 add-stem-support (boolean):
     #t
     If set, the Stem object is included in this script’s support.

direction (direction):
     ly:script-interface::calc-direction
     If side-axis is 0 (or X), then this property determines whether the object is placed LEFT, CENTER or RIGHT with respect to the other object. Otherwise, it determines whether the object is placed UP, CENTER or DOWN. Numerical values may also be used: UP=1, DOWN=-1, LEFT=-1, RIGHT=1, CENTER=0.

font-encoding (symbol):
     'fetaMusic
     The font encoding is the broadest category for selecting a font. Currently, only lilypond’s system fonts (Emmentaler) are using this property. Available values are fetaMusic (Emmentaler), fetaBraces, fetaText (Emmentaler).

horizon-padding (number):
     0.1
     The amount to pad the axis along which a Skyline is built for the side-position-interface.

self-alignment-X (number):
     0
     Specify alignment of an object. The value -1 means left aligned, 0 centered, and 1 right-aligned in X direction. Other numerical values may also be specified - the unit is half the object width.

side-axis (number):
     1
     If the value is X (or equivalently 0), the object is placed horizontally next to the other object. If the value is Y or 1, it is placed vertically.

slur-padding (number):
     0.2
     Extra distance between slur and script.

staff-padding (dimension, in staff space):
     0.25
     Maintain this much space between reference points and the staff. Its effect is to align objects of differing sizes (like the dynamics p and f) on their baselines.

stencil (stencil):
     ly:script-interface::print
     The symbol to print.
vertical-skylines (pair of skylines):

Two skylines, one above and one below this grob.

X-offset (number):

X-offset (number):

The horizontal amount that this object is moved relative to its X-parent.

Y-extent (pair of numbers):

Extent (size) in the Y direction, measured in staff-space units, relative to object’s reference point.

Y-offset (number):

The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): Section 3.2.36 [font-interface], page 565, Section 3.2.45 [grob-interface], page 570, Section 3.2.52 [item-interface], page 579, Section 3.2.85 [outside-staff-interface], page 596, Section 3.2.100 [script-interface], page 602, Section 3.2.101 [self-alignment-interface], page 603, and Section 3.2.105 [side-position-interface], page 606.

3.1.99 ScriptColumn

ScriptColumn objects are created by: Section 2.2.101 [Script_column_engraver], page 351.

Standard settings:

before-line-breaking (boolean):

Dummy property, used to trigger a callback function.

This object supports the following interface(s): Section 3.2.45 [grob-interface], page 570, Section 3.2.52 [item-interface], page 579, and Section 3.2.99 [script-column-interface], page 602.

3.1.100 ScriptRow

ScriptRow objects are created by: Section 2.2.103 [Script_row_engraver], page 351.

Standard settings:

before-line-breaking (boolean):

Dummy property, used to trigger a callback function.

This object supports the following interface(s): Section 3.2.45 [grob-interface], page 570, Section 3.2.52 [item-interface], page 579, and Section 3.2.99 [script-column-interface], page 602.

3.1.101 Slur

Slur objects are created by: Section 2.2.106 [Slur_engraver], page 352.

Standard settings:

avoid-slur (symbol):

'inside
Method of handling slur collisions. Choices are *inside*, *outside*, *around*, and *ignore*. *inside* adjusts the slur if needed to keep the grob inside the slur. *outside* moves the grob vertically to the outside of the slur. *around* moves the grob vertically to the outside of the slur only if there is a collision. *ignore* does not move either. In grobs whose notational significance depends on vertical position (such as accidentals, clefs, etc.), *outside* and *around* behave like *ignore*.

**control-points** (list of number pairs):

```lisp
ly:slur::calc-control-points
```

List of offsets (number pairs) that form control points for the tie, slur, or bracket shape. For Béziers, this should list the control points of a third-order Bézier curve.

**details** (list):

```lisp
'(\(region-size . 4\)
  (head-encompass-penalty . 1000.0)
  (stem-encompass-penalty . 30.0)
  (edge-attraction-factor . 4)
  (same-slope-penalty . 20)
  (steeper-slope-factor . 50)
  (non-horizontal-penalty . 15)
  (max-slope . 1.1)
  (max-slope-factor . 10)
  (free-head-distance . 0.3)
  (free-slur-distance . 0.8)
  (gap-to-staffline-inside . 0.2)
  (gap-to-staffline-outside . 0.1)
  (extra-object-collision-penalty . 50)
  (accidental-collision . 3)
  (extra-encompass-free-distance . 0.3)
  (extra-encompass-collision-distance . 0.8)
  (head-slur-distance-max-ratio . 3)
  (head-slur-distance-factor . 10)
  (absolute-closeness-measure . 0.3)
  (edge-slope-exponent . 1.7)
  (close-to-edge-length . 2.5)
  (encompass-object-range-overshoot . 0.5)
  (slur-tie-extrema-min-distance . 0.2)
  (slur-tie-extrema-min-distance-penalty . 2))
```

A list of parameters for detailed grob behavior. More information on the allowed parameters for a grob can be found by looking at the top of the Internals Reference page for each interface having a `details` property.

**direction** (direction):

```lisp
ly:slur::calc-direction
```

If `side-axis` is 0 (or X), then this property determines whether the object is placed **LEFT**, **CENTER** or **RIGHT** with respect to the other object. Otherwise, it determines whether the object is placed **UP**, **CENTER** or **DOWN**. Numerical values may also be used: **UP**=1, **DOWN**=-1, **LEFT**=-1, **RIGHT**=1, **CENTER**=0.

**height-limit** (dimension, in staff space):

2.0
Maximum slur height: The longer the slur, the closer it is to this height.

**line-thickness** (number):

0.8

For slurs and ties, this is the diameter of the virtual “pen” that draws the two arcs of the curve’s outline, which intersect at the endpoints. This property is expressed as a multiple of the current staff-line thickness (i.e. the visual output is influenced by changes to `Staff.StaffSymbol.thickness`).

**minimum-length** (dimension, in staff space):

1.5

Try to make a spanner at least this long, normally in the horizontal direction. This requires an appropriate callback for the `springs-and-rods` property. If added to a `Tie`, this sets the minimum distance between noteheads.

**ratio** (number):

0.25

Parameter for slur shape. The higher this number, the quicker the slur attains its `height-limit`.

**springs-and-rods** (boolean):

`ly:spanner::set-spacing-rods`

Dummy variable for triggering spacing routines.

**stencil** (stencil):

`ly:slur::print`

The symbol to print.

**thickness** (number):

1.2

For grobs made up of lines, this is the thickness of the line. For slurs and ties, this is the distance between the two arcs of the curve’s outline at its thickest point, not counting the diameter of the virtual “pen” that draws the arcs. This property is expressed as a multiple of the current staff-line thickness (i.e. the visual output is influenced by changes to `Staff.StaffSymbol.thickness`).

**vertical-skylines** (pair of skylines):

```plaintext
#<unpure-pure-container #<primitive-procedure
ly:slur::vertical-skylines> #<primitive-procedure
ly:grob::pure-simple-vertical-skylines-from-extents> >
```

Two skylines, one above and one below this grob.

**Y-extent** (pair of numbers):

```plaintext
#<unpure-pure-container #<primitive-procedure
ly:slur::height> #<primitive-procedure ly:slur::pure-height> >
```

Extent (size) in the Y direction, measured in staff-space units, relative to object’s reference point.

This object supports the following interface(s): Section 3.2.45 [grob-interface], page 570, Section 3.2.85 [outside-staff-interface], page 596, Section 3.2.106 [slur-interface], page 607, and Section 3.2.112 [spanner-interface], page 612.
3.1.102 SostenutoPedal

SostenutoPedal objects are created by: Section 2.2.91 [Piano_pedal_engraver], page 347.

Standard settings:

- **direction (direction):**
  
  1
  
  If `side-axis` is 0 (or X), then this property determines whether the object is placed LEFT, CENTER or RIGHT with respect to the other object. Otherwise, it determines whether the object is placed UP, CENTER or DOWN. Numerical values may also be used: UP=1, DOWN=-1, LEFT=-1, RIGHT=1, CENTER=0.

- **extra-spacing-width (pair of numbers):**
  
  `'(+inf.0 . -inf.0)`
  
  In the horizontal spacing problem, we pad each item by this amount (by adding the ‘car’ on the left side of the item and adding the ‘cdr’ on the right side of the item). In order to make a grob take up no horizontal space at all, set this to `(+inf.0 . -inf.0)`.  

- **font-shape (symbol):**
  
  `'italic`
  
  Select the shape of a font. Choices include `upright`, `italic`, `caps`.

- **padding (dimension, in staff space):**
  
  0.0
  
  Add this much extra space between objects that are next to each other.

- **parent-alignment-X (number):**
  
  Specify on which point of the parent the object is aligned. The value -1 means aligned on parent’s left edge, 0 on center, and 1 right edge, in X direction. Other numerical values may also be specified - the unit is half the parent’s width. If unset, the value from `self-alignment-X` property will be used.

- **self_alignment-X (number):**
  
  0
  
  Specify alignment of an object. The value -1 means left aligned, 0 centered, and 1 right-aligned in X direction. Other numerical values may also be specified - the unit is half the object width.

- **stencil (stencil):**
  
  `ly:text-interface::print`
  
  The symbol to print.

- **vertical-skylines (pair of skylines):**
  
  `#<unpure-pure-container #<primitive-procedure ly:grob::vertical-skylines-from-stencil> >`
  
  Two skylines, one above and one below this grob.

- **X-offset (number):**
  
  `ly:self-alignment-interface::aligned-on-x-parent`
  
  The horizontal amount that this object is moved relative to its X-parent.

- **Y-extent (pair of numbers):**
  
  `#<unpure-pure-container #<primitive-procedure ly:grob::stencil-height> >`
Extent (size) in the Y direction, measured in staff-space units, relative to object’s reference point.

This object supports the following interface(s): Section 3.2.36 [font-interface], page 565, Section 3.2.45 [grob-interface], page 570, Section 3.2.52 [item-interface], page 579, Section 3.2.92 [piano-pedal-script-interface], page 600, Section 3.2.101 [self-alignment-interface], page 603, and Section 3.2.126 [text-interface], page 622.

3.1.103 SostenutoPedalLineSpanner

SostenutoPedalLineSpanner objects are created by: Section 2.2.90 [Piano_pedal_align_engraver], page 347.

Standard settings:

axes (list):
  ' (1)
  List of axis numbers. In the case of alignment grobs, this should contain only one number.

direction (direction):
  -1
  If side-axis is 0 (or X), then this property determines whether the object is placed LEFT, CENTER or RIGHT with respect to the other object. Otherwise, it determines whether the object is placed UP, CENTER or DOWN. Numerical values may also be used: UP=1, DOWN=-1, LEFT=-1, RIGHT=1, CENTER=0.

minimum-space (dimension, in staff space):
  1.0
  Minimum distance that the victim should move (after padding).

outside-staff-priority (number):
  1000
  If set, the grob is positioned outside the staff in such a way as to avoid all collisions. In case of a potential collision, the grob with the smaller outside-staff-priority is closer to the staff.

padding (dimension, in staff space):
  1.2
  Add this much extra space between objects that are next to each other.

side-axis (number):
  1
  If the value is X (or equivalently 0), the object is placed horizontally next to the other object. If the value is Y or 1, it is placed vertically.

staff-padding (dimension, in staff space):
  1.0
  Maintain this much space between reference points and the staff. Its effect is to align objects of differing sizes (like the dynamics p and f) on their baselines.

vertical-skylines (pair of skylines):
  #<unpure-pure-container #<primitive-procedure ly:grob::vertical-skylines-from-element-stencils>
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Two skylines, one above and one below this grob.

X-extent (pair of numbers):
   ly:axis-group-interface::width
Extent (size) in the X direction, measured in staff-space units, relative to object’s reference point.

Y-extent (pair of numbers):
   ly:axis-group-interface::height
   ly:axis-group-interface::pure-height
Extent (size) in the Y direction, measured in staff-space units, relative to object’s reference point.

Y-offset (number):
   ly:side-position-interface::y-aligned-side
   ly:side-position-interface::pure-y-aligned-side
The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): Section 3.2.7 [axis-group-interface], page 549, Section 3.2.45 [grob-interface], page 570, Section 3.2.85 [outside-staff-interface], page 596, Section 3.2.91 [piano-pedal-interface], page 600, Section 3.2.105 [side-position-interface], page 606, and Section 3.2.112 [spanner-interface], page 612.

3.1.104 SpacingSpanner

SpacingSpanner objects are created by: Section 2.2.108 [Spacing_engraver], page 353.

Standard settings:

average-spacing-wishes (boolean):
   #t
If set, the spacing wishes are averaged over staves.

base-shortest-duration (moment):
   #<Mom 3/16>
Spacing is based on the shortest notes in a piece. Normally, pieces are spaced as if notes at least as short as this are present.

common-shortest-duration (moment):
   ly:spacing-spanner::calc-common-shortest-duration
The most common shortest note length. This is used in spacing. Enlarging this sets the score tighter.

shortest-duration-space (number):
   2.0
Start with this multiple of spacing-increment space for the shortest duration. See also Section “spacing-spanner-interface” in Internals Reference.

spacing-increment (dimension, in staff space):
   1.2
The unit of length for note-spacing. Typically, the width of a note head. See also Section “spacing-spanner-interface” in Internals Reference.
springs-and-rods (boolean):
    ly:spacing-spanner::set-springs
    Dummy variable for triggering spacing routines.

This object supports the following interface(s): Section 3.2.45 [grob-interface], page 570, Section 3.2.109 [spacing-options-interface], page 611, Section 3.2.110 [spacing-spanner-interface], page 611, and Section 3.2.112 [spanner-interface], page 612.

3.1.105 SpanBar
SpanBar objects are created by: Section 2.2.110 [Span_bar_engraver], page 353.
Standard settings:

allow-span-bar (boolean):
    #t
    If false, no inter-staff bar line will be created below this bar line.

bar-extent (pair of numbers):
    #<unpure-pure-container #<primitive-procedure ly:axis-group-interface::height> #<primitive-procedure ly:axis-group-interface::pure-height> >
    The Y-extent of the actual bar line. This may differ from Y-extent because it does not include the dots in a repeat bar line.

before-line-breaking (boolean):
    ly:span-bar::before-line-breaking
    Dummy property, used to trigger a callback function.

break-align-symbol (symbol):
    'staff-bar
    This key is used for aligning, ordering, and spacing breakable items. See Section “break-alignment-interface” in Internals Reference.

glyph-name (string):
    ly:span-bar::calc-glyph-name
    The glyph name within the font.
    In the context of (span) bar lines, glyph-name represents a processed form of glyph, where decisions about line breaking etc. are already taken.

layer (integer):
    0
    An integer which determines the order of printing objects. Objects with the lowest value of layer are drawn first, then objects with progressively higher values are drawn, so objects with higher values overwrite objects with lower values. By default most objects are assigned a layer value of 1.

non-musical (boolean):
    #t
    True if the grob belongs to a NonMusicalPaperColumn.

stencil (stencil):
    ly:span-bar::print
    The symbol to print.
X-extent (pair of numbers):
  ly:span-bar::width
  Extent (size) in the X direction, measured in staff-space units, relative to object’s reference point.

Y-extent (pair of numbers):
  '(+inf.0 . -inf.0)
  Extent (size) in the Y direction, measured in staff-space units, relative to object’s reference point.

This object supports the following interface(s): Section 3.2.9 [bar-line-interface], page 551, Section 3.2.36 [font-interface], page 565, Section 3.2.45 [grob-interface], page 570, Section 3.2.52 [item-interface], page 579, and Section 3.2.111 [span-bar-interface], page 612.

3.1.106 SpanBarStub
SpanBarStub objects are created by: Section 2.2.111 [Span_bar_stub_engraver], page 354.
Standard settings:

  extra-spacing-height (pair of numbers):
    pure-from-neighbor-interface::extra-spacing-height
    In the horizontal spacing problem, we increase the height of each item by this amount (by adding the ‘car’ to the bottom of the item and adding the ‘cdr’ to the top of the item). In order to make a grob infinitely high (to prevent the horizontal spacing problem from placing any other grobs above or below this grob), set this to (-inf.0 . +inf.0).

X-extent (pair of numbers):
  #<procedure #f (grob)> 
  Extent (size) in the X direction, measured in staff-space units, relative to object’s reference point.

Y-extent (pair of numbers):
  #<unpure-pure-container #f #<procedure pure-from-neighbor-interface::pure-height (grob beg end)> >
  Extent (size) in the Y direction, measured in staff-space units, relative to object’s reference point.

This object supports the following interface(s): Section 3.2.45 [grob-interface], page 570, Section 3.2.52 [item-interface], page 579, and Section 3.2.94 [pure-from-neighbor-interface], page 600.

3.1.107 StaffGrouper
StaffGrouper objects are not created by any engraver.
Standard settings:

  staff-staff-spacing (list):
    '(((basic-distance . 9)
      (minimum-distance . 7)
      (padding . 1)
      (stretchability . 5))
  When applied to a staff-group’s StaffGrouper grob, this spacing alist controls the distance between consecutive staves within the staff-group. When applied to a staff’s VerticalAxisGroup grob, it controls the distance between the staff and the nearest staff below it in the same system,
replacing any settings inherited from the StaffGrouper grob of the containing staff-group, if there is one. This property remains in effect even when non-staff lines appear between staves. The alist can contain the following keys:

- **basic-distance** – the vertical distance, measured in staff-spaces, between the reference points of the two items when no collisions would result, and no stretching or compressing is in effect.
- **minimum-distance** – the smallest allowable vertical distance, measured in staff-spaces, between the reference points of the two items, when compressing is in effect.
- **padding** – the minimum required amount of unobstructed vertical whitespace between the bounding boxes (or skylines) of the two items, measured in staff-spaces.
- **stretchability** – a unitless measure of the dimension’s relative propensity to stretch. If zero, the distance will not stretch (unless collisions would result).

**staffgroup-staff-spacing** (list):

```
'((basic-distance . 10.5)
 (minimum-distance . 8)
 (padding . 1)
 (stretchability . 9))
```

The spacing alist controlling the distance between the last staff of the current staff-group and the staff just below it in the same system, even if one or more non-staff lines exist between the two staves. If the staff-staff-spacing property of the staff’s VerticalAxisGroup grob is set, that is used instead. See **staff-staff-spacing** for a description of the alist structure.

This object supports the following interface(s): Section 3.2.45 [grob-interface], page 570, Section 3.2.112 [spanner-interface], page 612, and Section 3.2.113 [staff-grouper-interface], page 614.

### 3.1.108 StaffSpacing

StaffSpacing objects are created by: Section 2.2.104 [Separating_line_group_engraver], page 352.

#### Standard settings:

- **non-musical** (boolean):
  
  `#t`

  True if the grob belongs to a NonMusicalPaperColumn.

- **stem-spacing-correction** (number):
  
  `0.4`

  Optical correction amount for stems that are placed in tight configurations. For opposite directions, this amount is the correction for two normal sized stems that overlap completely.

This object supports the following interface(s): Section 3.2.45 [grob-interface], page 570, Section 3.2.52 [item-interface], page 579, Section 3.2.108 [spacing-interface], page 610, and Section 3.2.114 [staff-spacing-interface], page 614.
3.1.109 StaffSymbol

StaffSymbol objects are created by: Section 2.2.116 [Staff_symbol_engraver], page 354, and Section 2.2.122 [Tab_staff_symbol_engraver], page 357.

Standard settings:

break-align-symbols (list):
'(staff-bar break-alignment)
A list of break-align symbols that determines which breakable items to align this to. If the grob selected by the first symbol in the list is invisible due to break-visibility, we will align to the next grob (and so on). Choices are listed in Section “break-alignment-interface” in Internals Reference.

layer (integer):
0
An integer which determines the order of printing objects. Objects with the lowest value of layer are drawn first, then objects with progressively higher values are drawn, so objects with higher values overwrite objects with lower values. By default most objects are assigned a layer value of 1.

ledger-line-thickness (pair of numbers):
'(1.0 . 0.1)
The thickness of ledger lines. It is the sum of 2 numbers: The first is the factor for line thickness, and the second for staff space. Both contributions are added.

line-count (integer):
5
The number of staff lines.

stencil (stencil):
ly:staff-symbol::print
The symbol to print.

Y-extent (pair of numbers):
#<unpure-pure-container #<primitive-procedure ly:staff-symbol::height> >
Extent (size) in the Y direction, measured in staff-space units, relative to object’s reference point.

This object supports the following interface(s): Section 3.2.45 [grob-interface], page 570, Section 3.2.112 [spanner-interface], page 612, and Section 3.2.115 [staff-symbol-interface], page 615.

3.1.110 StanzaNumber

StanzaNumber objects are created by: Section 2.2.118 [Stanza_number_engraver], page 355.

Standard settings:

direction (direction):
-1
If side-axis is 0 (or X), then this property determines whether the object is placed LEFT, CENTER or RIGHT with respect to the other object. Otherwise, it determines whether the object is placed UP, CENTER or...
DOWN. Numerical values may also be used: UP=1, DOWN=-1, LEFT=-1, RIGHT=1, CENTER=0.

**font-series** (symbol):

*b*bold

Select the series of a font. Choices include medium, bold, bold-narrow, etc.

**padding** (dimension, in staff space):

1.0

Add this much extra space between objects that are next to each other.

**side-axis** (number):

0

If the value is X (or equivalently 0), the object is placed horizontally next to the other object. If the value is Y or 1, it is placed vertically.

**stencil** (stencil):

`ly:text-interface::print`

The symbol to print.

**X-offset** (number):

`ly:side-position-interface::x-aligned-side`

The horizontal amount that this object is moved relative to its X-parent.

**Y-extent** (pair of numbers):

`ly:grob::stencil-height`

Extent (size) in the Y direction, measured in staff-space units, relative to object’s reference point.

This object supports the following interface(s): Section 3.2.36 [font-interface], page 565, Section 3.2.45 [grob-interface], page 570, Section 3.2.52 [item-interface], page 579, Section 3.2.105 [side-position-interface], page 606, Section 3.2.117 [stanza-number-interface], page 616, and Section 3.2.126 [text-interface], page 622.

### 3.1.111 Stem

Stem objects are created by: Section 2.2.112 [Span_stem_engraver], page 354, and Section 2.2.119 [Stem_engraver], page 355.

Standard settings:

**beamlet-default-length** (pair):

`'(1.1 . 1.1)`

A pair of numbers. The first number specifies the default length of a beamlet that sticks out of the left hand side of this stem; the second number specifies the default length of the beamlet to the right. The actual length of a beamlet is determined by taking either the default length or the length specified by **beamlet-max-length-proportion**, whichever is smaller.

**beamlet-max-length-proportion** (pair):

`'(0.75 . 0.75)`

The maximum length of a beamlet, as a proportion of the distance between two adjacent stems.
default-direction (direction):
     ly:stem::calc-default-direction
     Direction determined by note head positions.

details (list):
     '((lengths 3.5 3.5 3.5 4.25 5.0 6.0 7.0 8.0 9.0)
      (beamed-lengths 3.26 3.5 3.6)
      (beamed-minimum-free-lengths 1.83 1.5 1.25)
      (beamed-extreme-minimum-free-lengths 2.0 1.25)
      (stem-shorten 1.0 0.5 0.25))
A list of parameters for detailed grob behavior. More information on the allowed parameters for a grob can be found by looking at the top of the Internals Reference page for each interface having a details property.
direction (direction):
     ly:stem::calc-direction
     If side-axis is 0 (or X), then this property determines whether the object is placed LEFT, CENTER or RIGHT with respect to the other object. Otherwise, it determines whether the object is placed UP, CENTER or DOWN. Numerical values may also be used: UP=1, DOWN=-1, LEFT=-1, RIGHT=1, CENTER=0.
double-stem-separation (number):
     0.5
     The distance between the two stems of a half note in tablature when using \tabFullNotation, not counting the width of the stems themselves, expressed as a multiple of the default height of a staff-space in the traditional five-line staff.
duration-log (integer):
     stem::calc-duration-log
     The 2-log of the note head duration, i.e., 0 = whole note, 1 = half note, etc.
length (dimension, in staff space):
     #<unpure-pure-container #<primitive-procedure
      ly:stem::calc-length> #<primitive-procedure ly:stem::pure-
      calc-length> >
     User override for the stem length of unbeamed stems (each unit represents half a staff-space).
neutral-direction (direction):
     -1
     Which direction to take in the center of the staff.
note-collision-threshold (dimension, in staff space):
     1
     Simultaneous notes that are this close or closer in units of staff-space will be identified as vertically colliding. Used by Stem grobs for notes in the same voice, and NoteCollision grobs for notes in different voices. Default value 1.
stem-begin-position (number):
     #<unpure-pure-container #<primitive-procedure
      ly:stem::calc-stem-begin-position> #<primitive-procedure
      ly:stem::pure-calc-stem-begin-position> >
User override for the begin position of a stem.

**stencil (stencil):**
- `ly:stem::print`
  The symbol to print.

**thickness (number):**
- `1.3`
  For grobs made up of lines, this is the thickness of the line. For slurs and ties, this is the distance between the two arcs of the curve’s outline at its thickest point, not counting the diameter of the virtual “pen” that draws the arcs. This property is expressed as a multiple of the current staff-line thickness (i.e. the visual output is influenced by changes to `Staff.StaffSymbol.thickness`).

**X-extent (pair of numbers):**
- `ly:stem::width`
  Extent (size) in the X direction, measured in staff-space units, relative to object’s reference point.

**X-offset (number):**
- `ly:stem::offset-callback`
  The horizontal amount that this object is moved relative to its X-parent.

**Y-extent (pair of numbers):**
- `<unpure-pure-container #<primitive-procedure ly:stem::height> #<primitive-procedure ly:stem::pure-height> >`
  Extent (size) in the Y direction, measured in staff-space units, relative to object’s reference point.

**Y-offset (number):**
- `<unpure-pure-container #<primitive-procedure ly:staff-symbol-referencer::callback> >`
  The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): Section 3.2.45 [grob-interface], page 570, Section 3.2.52 [item-interface], page 579, and Section 3.2.118 [stem-interface], page 616.

### 3.1.112 StemStub

StemStub objects are created by: Section 2.2.119 [Stem_engraver], page 355.

Standard settings:

**extra-spacing-height (pair of numbers):**
- `stem-stub::extra-spacing-height`
  In the horizontal spacing problem, we increase the height of each item by this amount (by adding the ‘car’ to the bottom of the item and adding the ‘cdr’ to the top of the item). In order to make a grob infinitely high (to prevent the horizontal spacing problem from placing any other grobs above or below this grob), set this to `(-inf.0 . +inf.0)`.

**X-extent (pair of numbers):**
- `stem-stub::width`
  Extent (size) in the X direction, measured in staff-space units, relative to object’s reference point.
Y-extent (pair of numbers):

Extant (size) in the Y direction, measured in staff-space units, relative to object’s reference point.

This object supports the following interface(s): Section 3.2.45 [groo-interface], page 570, and Section 3.2.52 [item-interface], page 579.

3.1.113 StemTremolo

StemTremolo objects are created by: Section 2.2.119 [Stem engraver], page 355.

Standard settings:

beam-thickness (dimension, in staff space):

0.48

Beam thickness, measured in staff-space units.

beam-width (dimension, in staff space):

ly:stem-tremolo::calc-width

Width of the tremolo sign.

direction (direction):

ly:stem-tremolo::calc-direction

If side-axis is 0 (or X), then this property determines whether the object is placed LEFT, CENTER or RIGHT with respect to the other object. Otherwise, it determines whether the object is placed UP, CENTER or DOWN. Numerical values may also be used: UP=1, DOWN=-1, LEFT=-1, RIGHT=1, CENTER=0.

parent-alignment-X (number):

0

Specify on which point of the parent the object is aligned. The value -1 means aligned on parent’s left edge, 0 on center, and 1 right edge, in X direction. Other numerical values may also be specified - the unit is half the parent’s width. If unset, the value from self-alignment-X property will be used.

shape (symbol):

ly:stem-tremolo::calc-shape

This setting determines what shape a grob has. Valid choices depend on the stencil callback reading this property.

slope (number):

ly:stem-tremolo::calc-slope

The slope of this object.

stencil (stencil):

ly:stem-tremolo::print

The symbol to print.

X-extent (pair of numbers):

ly:stem-tremolo::width

Extent (size) in the X direction, measured in staff-space units, relative to object’s reference point.
X-offset (number):
ly:self-alignment-interface::aligned-on-x-parent
The horizontal amount that this object is moved relative to its X-parent.

Y-extent (pair of numbers):
#<unpure-pure-container #<primitive-procedure
ly:grob::stencil-height> #<primitive-procedure ly:stem-
tremolo::pure-height> >
Extent (size) in the Y direction, measured in staff-space units, relative
to object’s reference point.

Y-offset (number):
#<unpure-pure-container #<primitive-procedure ly:stem-
tremolo::calc-y-offset> #<primitive-procedure ly:stem-
tremolo::pure-calc-y-offset> >
The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): Section 3.2.45 [grob-interface], page 570,
Section 3.2.52 [item-interface], page 579, Section 3.2.101 [self-alignment-interface], page 603,
and Section 3.2.119 [stem-tremolo-interface], page 618.

3.1.114 StringNumber
StringNumber objects are created by: Section 2.2.76 [New_fingering_engraver], page 342.
Standard settings:

avoid-slur (symbol):
'around
Method of handling slur collisions. Choices are inside, outside, around, and ignore. inside adjusts the slur if needed to keep the
grob inside the slur. outside moves the grob vertically to the outside
of the slur. around moves the grob vertically to the outside of the slur
only if there is a collision. ignore does not move either. In grobs whose
notational significance depends on vertical position (such as accidentals,
clefs, etc.), outside and around behave like ignore.

font-encoding (symbol):
'fetaText
The font encoding is the broadest category for selecting a font. Cur-
rently, only lilypond’s system fonts (Emmentaler) are using this prop-
erty. Available values are fetaMusic (Emmentaler), fetaBraces,
fetaText (Emmentaler).

font-size (number):
-5
The font size, compared to the ‘normal’ size. 0 is style-sheet’s normal
size, -1 is smaller, +1 is bigger. Each step of 1 is approximately 12% larger; 6 steps are exactly a factor 2 larger. If the context property
fontSize is set, its value is added to this before the glyph is printed.
Fractional values are allowed.

number-type (symbol):
'arabic
Numbering style. Choices include roman-lower, roman-upper and
arabic.
padding (dimension, in staff space):

0.5

Add this much extra space between objects that are next to each other.

parent-alignment-X (number):

0

Specify on which point of the parent the object is aligned. The value
-1 means aligned on parent’s left edge, 0 on center, and 1 right edge,
in X direction. Other numerical values may also be specified - the unit
is half the parent’s width. If unset, the value from self-alignment-X
property will be used.

script-priority (number):

100

A key for determining the order of scripts in a stack, by being added to
the position of the script in the user input, the sum being the overall
priority. Smaller means closer to the head.

self-alignment-X (number):

0

Specify alignment of an object. The value -1 means left aligned, 0 cen-
tered, and 1 right-aligned in X direction. Other numerical values may
also be specified - the unit is half the object width.

self-alignment-Y (number):

0

Like self-alignment-X but for the Y axis.

staff-padding (dimension, in staff space):

0.5

Maintain this much space between reference points and the staff. Its
effect is to align objects of differing sizes (like the dynamics p and f) on
their baselines.

stencil (stencil):

print-circled-text-callback

The symbol to print.

text (markup):

string-number::calc-text

Text markup. See Section “Formatting text” in Notation Reference.

Y-extent (pair of numbers):

#<unpure-pure-container #<primitive-procedure
ly:grobs::stencil-height> >

Extent (size) in the Y direction, measured in staff-space units, relative
to object’s reference point.

This object supports the following interface(s): Section 3.2.36 [font-interface], page 565,
Section 3.2.45 [grob-interface], page 570, Section 3.2.52 [item-interface], page 579, Section 3.2.81
[number-interface], page 594, Section 3.2.85 [outside-staff-interface], page 596, Section 3.2.101
[self-alignment-interface], page 603, Section 3.2.105 [side-position-interface], page 606,
Section 3.2.120 [string-number-interface], page 619, Section 3.2.126 [text-interface], page 622,
and Section 3.2.127 [text-script-interface], page 623.
3.1.115 StrokeFinger

StrokeFinger objects are created by: Section 2.2.76 [New_fingering_engraver], page 342.

Standard settings:

- **digit-names (vector):**
  
  #("p" "i" "m" "a" "x")

  Names for string finger digits.

- **font-shape (symbol):**
  
  'italic

  Select the shape of a font. Choices include *upright*, *italic*, *caps*.

- **font-size (number):**
  
  -4

  The font size, compared to the ‘normal’ size. 0 is style-sheet’s normal size, -1 is smaller, +1 is bigger. Each step of 1 is approximately 12\% larger; 6 steps are exactly a factor 2 larger. If the context property *fontSize* is set, its value is added to this before the glyph is printed. Fractional values are allowed.

- **padding (dimension, in staff space):**
  
  0.5

  Add this much extra space between objects that are next to each other.

- **parent-alignment-X (number):**
  
  0

  Specify on which point of the parent the object is aligned. The value -1 means aligned on parent’s left edge, 0 on center, and 1 right edge, in X direction. Other numerical values may also be specified - the unit is half the parent’s width. If unset, the value from *self-alignment-X* property will be used.

- **script-priority (number):**
  
  100

  A key for determining the order of scripts in a stack, by being added to the position of the script in the user input, the sum being the overall priority. Smaller means closer to the head.

- **self-alignment-X (number):**
  
  0

  Specify alignment of an object. The value -1 means left aligned, 0 centered, and 1 right-aligned in X direction. Other numerical values may also be specified - the unit is half the object width.

- **self-alignment-Y (number):**
  
  0

  Like *self-alignment-X* but for the Y axis.

- **staff-padding (dimension, in staff space):**
  
  0.5

  Maintain this much space between reference points and the staff. Its effect is to align objects of differing sizes (like the dynamics *p* and *f*) on their baselines.
stencil (stencil):
  ly:text-interface::print
The symbol to print.

text (markup):
  stroke-finger::calc-text
Text markup. See Section “Formatting text” in Notation Reference.

Y-extent (pair of numbers):
  #<unpure-pure-container #<primitive-procedure
  ly:grob::stencil-height> >
Extent (size) in the Y direction, measured in staff-space units, relative
to object’s reference point.

This object supports the following interface(s): Section 3.2.36 [font-interface], page 565,
Section 3.2.45 [grob-interface], page 570, Section 3.2.52 [item-interface], page 579, Section 3.2.85
[outside-staff-interface], page 596, Section 3.2.101 [self-alignment-interface], page 603,
Section 3.2.105 [side-position-interface], page 606, Section 3.2.121 [stroke-finger-interface],
page 619, Section 3.2.126 [text-interface], page 622, and Section 3.2.127 [text-script-interface],
page 623.

3.1.116 SustainPedal
SustainPedal objects are created by: Section 2.2.91 [Piano_pedal_engraver], page 347.

Standard settings:

extra-spacing-width (pair of numbers):
  ‘(+inf.0 . -inf.0)
In the horizontal spacing problem, we pad each item by this amount (by
adding the ‘car’ on the left side of the item and adding the ‘cdr’ on the
right side of the item). In order to make a grob take up no horizontal
space at all, set this to (+inf.0 . -inf.0).

padding (dimension, in staff space):
  0.0
Add this much extra space between objects that are next to each other.

parent-alignment-X (number)
  Specify on which point of the parent the object is aligned. The value
  -1 means aligned on parent’s left edge, 0 on center, and 1 right edge,
in X direction. Other numerical values may also be specified - the unit
is half the parent’s width. If unset, the value from self-alignment-X
property will be used.

self-alignment-X (number):
  0
  Specify alignment of an object. The value -1 means left aligned, 0 cen-
tered, and 1 right-aligned in X direction. Other numerical values may
also be specified - the unit is half the object width.

stencil (stencil):
  ly:sustain-pedal::print
The symbol to print.

vertical-skylines (pair of skylines):
  #<unpure-pure-container #<primitive-procedure
  ly:grob::vertical-skylines-from-stencil> >
Two skylines, one above and one below this grob.

**X-offset** (number):

```
1y::self-alignment-interface::aligned-on-x-parent
```

The horizontal amount that this object is moved relative to its X-parent.

**Y-extent** (pair of numbers):

```
#<unpure-pure-container #<primitive-procedure
1y:grob::stencil-height>
```

Extent (size) in the Y direction, measured in staff-space units, relative to object’s reference point.

This object supports the following interface(s): Section 3.2.36 [font-interface], page 565, Section 3.2.45 [grob-interface], page 570, Section 3.2.52 [item-interface], page 579, Section 3.2.91 [piano-pedal-interface], page 600, Section 3.2.92 [piano-pedal-script-interface], page 600, Section 3.2.101 [self-alignment-interface], page 603, and Section 3.2.126 [text-interface], page 622.

### 3.1.117 SustainPedalLineSpanner

SustainPedalLineSpanner objects are created by: Section 2.2.90 [Piano pedal align engraver], page 347.

Standard settings:

- **axes** (list):
  
  `(1)`

  List of axis numbers. In the case of alignment grobs, this should contain only one number.

- **direction** (direction):

  `-1`

  If `side-axis` is 0 (or X), then this property determines whether the object is placed **LEFT**, **CENTER** or **RIGHT** with respect to the other object. Otherwise, it determines whether the object is placed **UP**, **CENTER** or **DOWN**. Numerical values may also be used: **UP**=1, **DOWN**=-1, **LEFT**=-1, **RIGHT**=1, **CENTER**=0.

- **minimum-space** (dimension, in staff space):

  `1.0`

  Minimum distance that the victim should move (after padding).

- **outside-staff-priority** (number):

  `1000`

  If set, the grob is positioned outside the staff in such a way as to avoid all collisions. In case of a potential collision, the grob with the smaller **outside-staff-priority** is closer to the staff.

- **padding** (dimension, in staff space):

  `1.2`

  Add this much extra space between objects that are next to each other.

- **side-axis** (number):

  `1`

  If the value is X (or equivalently 0), the object is placed horizontally next to the other object. If the value is Y or 1, it is placed vertically.
staff-padding (dimension, in staff space):
1.2
Maintain this much space between reference points and the staff. Its
effect is to align objects of differing sizes (like the dynamics p and f) on
their baselines.

vertical-skylines (pair of skylines):
  #<unpure-pure-container #<primitive-procedure
  ly:grob::vertical-skylines-from-element-stencils>
  #<primitive-procedure ly:grob::pure-vertical-skylines-from-
  element-stencils> >
Two skylines, one above and one below this grob.

X-extent (pair of numbers):
  ly:axis-group-interface::width
Extent (size) in the X direction, measured in staff-space units, relative
to object’s reference point.

Y-extent (pair of numbers):
  #<unpure-pure-container #<primitive-procedure ly:axis-
  group-interface::height> #<primitive-procedure ly:axis-
  group-interface::pure-height> >
Extent (size) in the Y direction, measured in staff-space units, relative
to object’s reference point.

Y-offset (number):
  #<unpure-pure-container #<primitive-procedure ly:side-
  position-interface::y-aligned-side> #<primitive-procedure
  ly:side-position-interface::pure-y-aligned-side> >
The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): Section 3.2.7 [axis-group-interface], page 549,Section 3.2.45 [grob-interface], page 570, Section 3.2.85 [outside-staff-interface], page 596,Section 3.2.91 [piano-pedal-interface], page 600, Section 3.2.105 [side-position-interface],page 606, and Section 3.2.112 [spanner-interface], page 612.

3.1.118 System
System objects are not created by any engraver.
Standard settings:

  axes (list):
  ’(0 1)
List of axis numbers. In the case of alignment grobs, this should contain
only one number.

outside-staff-placement-directive (symbol):
’left-to-right-polite
One of four directives telling how outside staff objects should be placed.
  • left-to-right-greedy – Place each successive grob from left to
    right.
  • left-to-right-polite – Place a grob from left to right only if it
does not potentially overlap with another grob that has been placed
on a pass through a grob array. If there is overlap, do another pass
to determine placement.
• **right-to-left-greedy** – Same as **left-to-right-greedy**, but from right to left.

• **right-to-left-polite** – Same as **left-to-right-polite**, but from right to left.

**skyline-horizontal-padding** (number):

1.0

For determining the vertical distance between two staves, it is possible to have a configuration which would result in a tight interleaving of grobs from the top staff and the bottom staff. The larger this parameter is, the farther apart the staves are placed in such a configuration.

**vertical-skylines** (pair of skylines):

ly:axis-group-interface::calc-skylines

Two skylines, one above and one below this grob.

**X-extent** (pair of numbers):

ly:axis-group-interface::width

Extent (size) in the X direction, measured in staff-space units, relative to object’s reference point.

**Y-extent** (pair of numbers):

 ly:system::height> ly:system::calc-pure-height

Extent (size) in the Y direction, measured in staff-space units, relative to object’s reference point.

This object supports the following interface(s): Section 3.2.7 [axis-group-interface], page 549, Section 3.2.45 [grob-interface], page 570, Section 3.2.84 [outside-staff-axis-group-interface], page 595, Section 3.2.112 [spanner-interface], page 612, and Section 3.2.122 [system-interface], page 619.

### 3.1.119 SystemStartBar

SystemStartBar objects are created by: Section 2.2.120 [System_start_delimiter_engraver], page 356.

Standard settings:

**collapse-height** (dimension, in staff space):

5.0

Minimum height of system start delimiter. If equal or smaller, the bracket/brace/line is removed.

**direction** (direction):

-1

If **side-axis** is 0 (or X), then this property determines whether the object is placed **LEFT**, **CENTER** or **RIGHT** with respect to the other object. Otherwise, it determines whether the object is placed **UP**, **CENTER** or **DOWN**. Numerical values may also be used: **UP**=1, **DOWN**=-1, **LEFT**=-1, **RIGHT**=1, **CENTER**=0.

**padding** (dimension, in staff space):

-0.1

Add this much extra space between objects that are next to each other.
stencil (stencil):
   ly:system-start-delimiter::print
   The symbol to print.

style (symbol):
   'bar-line
   This setting determines in what style a grob is typeset. Valid choices depend on the stencil callback reading this property.

thickness (number):
   1.6
   For grobs made up of lines, this is the thickness of the line. For slurs and ties, this is the distance between the two arcs of the curve’s outline at its thickest point, not counting the diameter of the virtual “pen” that draws the arcs. This property is expressed as a multiple of the current staff-line thickness (i.e. the visual output is influenced by changes to Staff.StaffSymbol.thickness).

X-offset (number):
   ly:side-position-interface::x-aligned-side
   The horizontal amount that this object is moved relative to its X-parent.

This object supports the following interface(s): Section 3.2.45 [grob-interface], page 570, Section 3.2.105 [side-position-interface], page 606, Section 3.2.112 [spanner-interface], page 612, and Section 3.2.123 [system-start-delimiter-interface], page 620.

3.1.120 SystemStartBrace

SystemStartBrace objects are created by: Section 2.2.120 [System_start_delimiter_engraver], page 356.

Standard settings:

collapse-height (dimension, in staff space):
   5.0
   Minimum height of system start delimiter. If equal or smaller, the bracket/brace/line is removed.

direction (direction):
   -1
   If side-axis is 0 (or X), then this property determines whether the object is placed LEFT, CENTER or RIGHT with respect to the other object. Otherwise, it determines whether the object is placed UP, CENTER or DOWN. Numerical values may also be used: UP=1, DOWN=-1, LEFT=-1, RIGHT=1, CENTER=0.

font-encoding (symbol):
   'fetaBraces
   The font encoding is the broadest category for selecting a font. Currently, only Lilypond’s system fonts (Emmentaler) are using this property. Available values are fetaMusic (Emmentaler), fetaBraces, fetaText (Emmentaler).

padding (dimension, in staff space):
   0.3
   Add this much extra space between objects that are next to each other.
The symbol to print.

This setting determines in what style a grob is typeset. Valid choices depend on the stencil callback reading this property.

The horizontal amount that this object is moved relative to its X-parent.

This object supports the following interface(s): Section 3.2.36 [font-interface], page 565, Section 3.2.45 [grob-interface], page 570, Section 3.2.105 [side-position-interface], page 606, Section 3.2.112 [spanner-interface], page 612, and Section 3.2.123 [system-start-delimiter-interface], page 620.

### 3.1.121 SystemStartBracket

SystemStartBracket objects are created by: Section 2.2.120 [System_start_delimiter_engraver], page 356.

Standard settings:

- **collapse-height** (dimension, in staff space):
  - 5.0
    - Minimum height of system start delimiter. If equal or smaller, the bracket/brace/line is removed.

- **direction** (direction):
  - -1
    - If side-axis is 0 (or X), then this property determines whether the object is placed LEFT, CENTER or RIGHT with respect to the other object. Otherwise, it determines whether the object is placed UP, CENTER or DOWN. Numerical values may also be used: UP=1, DOWN=-1, LEFT=-1, RIGHT=1, CENTER=0.

- **padding** (dimension, in staff space):
  - 0.8
    - Add this much extra space between objects that are next to each other.

- **stencil** (stencil):
  - ly:system-start-delimiter::print
    - The symbol to print.

- **style** (symbol):
  - 'bracket
    - This setting determines in what style a grob is typeset. Valid choices depend on the stencil callback reading this property.

- **thickness** (number):
  - 0.45
    - For grobs made up of lines, this is the thickness of the line. For slurs and ties, this is the distance between the two arcs of the curve’s outline at its thickest point, not counting the diameter of the virtual “pen” that draws the arcs. This property is expressed as a multiple of the current...
staff-line thickness (i.e. the visual output is influenced by changes to \texttt{Staff.StaffSymbol.thickness}).

\textbf{X-offset} (number):
\begin{verbatim}
  ly:side-position-interface::x-aligned-side
  The horizontal amount that this object is moved relative to its X-parent.
\end{verbatim}

This object supports the following interface(s): Section 3.2.36 [font-interface], page 565, Section 3.2.45 [grob-interface], page 570, Section 3.2.105 [side-position-interface], page 606, Section 3.2.112 [spanner-interface], page 612, and Section 3.2.123 [system-start-delimiter-interface], page 620.

\subsection{SystemStartSquare}

SystemStartSquare objects are created by: Section 2.2.120 [System_start_delimiter_engraver], page 356.

Standard settings:

\textbf{collapse-height} (dimension, in staff space):
\begin{verbatim}
  5.0
  Minimum height of system start delimiter. If equal or smaller, the bracket/brace/line is removed.
\end{verbatim}

\textbf{direction} (direction):
\begin{verbatim}
  -1
  If \texttt{side-axis} is 0 (or X), then this property determines whether the object is placed LEFT, CENTER or RIGHT with respect to the other object. Otherwise, it determines whether the object is placed UP, CENTER or DOWN. Numerical values may also be used: UP=1, DOWN=-1, LEFT=-1, RIGHT=1, CENTER=0.
\end{verbatim}

\textbf{stencil} (stencil):
\begin{verbatim}
  ly:system-start-delimiter::print
  The symbol to print.
\end{verbatim}

\textbf{style} (symbol):
\begin{verbatim}
  'line-bracket
  This setting determines in what style a grob is typeset. Valid choices depend on the \texttt{stencil} callback reading this property.
\end{verbatim}

\textbf{thickness} (number):
\begin{verbatim}
  1.0
  For grobs made up of lines, this is the thickness of the line. For slurs and ties, this is the distance between the two arcs of the curve’s outline at its thickest point, not counting the diameter of the virtual “pen” that draws the arcs. This property is expressed as a multiple of the current staff-line thickness (i.e. the visual output is influenced by changes to \texttt{Staff.StaffSymbol.thickness}).
\end{verbatim}

\textbf{X-offset} (number):
\begin{verbatim}
  ly:side-position-interface::x-aligned-side
  The horizontal amount that this object is moved relative to its X-parent.
\end{verbatim}

This object supports the following interface(s): Section 3.2.36 [font-interface], page 565, Section 3.2.45 [grob-interface], page 570, Section 3.2.105 [side-position-interface], page 606, Section 3.2.112 [spanner-interface], page 612, and Section 3.2.123 [system-start-delimiter-interface], page 620.
3.1.123 TabNoteHead

TabNoteHead objects are created by: Section 2.2.121 [Tab_note_heads_ engraver], page 356.

Standard settings:

details (list):

'((cautionary-properties
   (angularity . 0.4)
   (half-thickness . 0.075)
   (padding . 0)
   (procedure
     ;
     ;<procedure parenthesize-stencil (stencil half-thickness width angularity
     (width . 0.25))
     (head-offset . 3/5)
     (harmonic-properties
      (angularity . 2)
      (half-thickness . 0.075)
      (padding . 0)
      (procedure
        ;
        ;<procedure parenthesize-stencil (stencil half-thickness width angularity
        (width . 0.25))
        (repeat-tied-properties
         (note-head-visible . #t)
         (parenthesize . #t))
      (tied-properties
       (break-visibility . #(#f #f #t))
       (parenthesize . #t))

A list of parameters for detailed grob behavior. More information on the
allowed parameters for a grob can be found by looking at the top of the
Internals Reference page for each interface having a details property.

direction (direction):

0

If side-axis is 0 (or X), then this property determines whether the
object is placed LEFT, CENTER or RIGHT with respect to the other object.
Otherwise, it determines whether the object is placed UP, CENTER or
DOWN. Numerical values may also be used: UP=1, DOWN=-1, LEFT=-1,
RIGHT=1, CENTER=0.

duration-log (integer):

note-head::calc-duration-log

The 2-log of the note head duration, i.e., 0 = whole note, 1 = half note,
etc.

font-series (symbol):

'bold

Select the series of a font. Choices include medium, bold, bold-narrow,
etc.

font-size (number):

-2

The font size, compared to the ‘normal’ size. 0 is style-sheet’s normal
size, -1 is smaller, +1 is bigger. Each step of 1 is approximately 12%
larger; 6 steps are exactly a factor 2 larger. If the context property 
\texttt{fontSize} is set, its value is added to this before the glyph is printed. 
Fractional values are allowed.

\textbf{parenthesis-friends} (list):

\begin{verbatim}
'(dot)
\end{verbatim}

A list of Grob types, as symbols. When parentheses enclose a Grob 
that has \texttt{`parenthesis-friends}, the parentheses widen to include any child 
Grobs with type among \texttt{`parenthesis-friends}.

\textbf{stem-attachment} (pair of numbers):

\begin{verbatim}
'(0.0 . 1.35)
\end{verbatim}

An \((x . y)\) pair where the stem attaches to the notehead.

\textbf{stencil} (stencil):

\begin{verbatim}
\texttt{tab-note-head::print}
\end{verbatim}

The symbol to print.

\textbf{whiteout} (boolean-or-number):

\begin{verbatim}
#t
\end{verbatim}

If a number or true, the grob is printed over a white background to 
white-out underlying material, if the grob is visible. A number indicates 
how far the white background extends beyond the bounding box of the 
grob as a multiple of the staff-line thickness. The \texttt{LyricHyphen} grob uses 
a special implementation of whiteout: A positive number indicates how 
far the white background extends beyond the bounding box in multiples 
of \texttt{line-thickness}. The shape of the background is determined by 
\texttt{whiteout-style}. Usually \texttt{#f} by default.

\textbf{X-offset} (number):

\begin{verbatim}
ly:self-alignment-interface::x-aligned-on-self
\end{verbatim}

The horizontal amount that this object is moved relative to its X-parent.

\textbf{Y-extent} (pair of numbers):

\begin{verbatim}
#<unpure-pure-container #<primitive-procedure 
ly:grob::stencil-height> >
\end{verbatim}

Extent (size) in the Y direction, measured in staff-space units, relative 
to object’s reference point.

\textbf{Y-offset} (number):

\begin{verbatim}
#<unpure-pure-container #<primitive-procedure ly:staff-
symbol-referencer::callback> >
\end{verbatim}

The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): Section 3.2.36 [font-interface], page 565, 
Section 3.2.45 [grob-interface], page 570, Section 3.2.52 [item-interface], page 579, Section 3.2.78 
[note-head-interface], page 593, Section 3.2.97 [rhythmic-grob-interface], page 601, Section 3.2.98 
rhythmic-head-interface], page 601, Section 3.2.116 [staff-symbol-referencer-interface], page 616, 
Section 3.2.125 [tab-note-head-interface], page 621, and Section 3.2.126 [text-interface], page 622.

\subsection{3.1.124 TextScript}

TextScript objects are created by: Section 2.2.125 [Text engraver], page 357.

Standard settings:

\textbf{avoid-slur} (symbol):

\begin{verbatim}
'around
\end{verbatim}
Method of handling slur collisions. Choices are inside, outside, around, and ignore. inside adjusts the slur if needed to keep the grob inside the slur. outside moves the grob vertically to the outside of the slur. around moves the grob vertically to the outside of the slur only if there is a collision. ignore does not move either. In grobs whose notational significance depends on vertical position (such as accidentals, clefs, etc.), outside and around behave like ignore.

direction (direction):
-1
If side-axis is 0 (or X), then this property determines whether the object is placed LEFT, CENTER or RIGHT with respect to the other object. Otherwise, it determines whether the object is placed UP, CENTER or DOWN. Numerical values may also be used: UP=1, DOWN=-1, LEFT=-1, RIGHT=1, CENTER=0.

extra-spacing-width (pair of numbers):
'(+inf.0 . -inf.0)
In the horizontal spacing problem, we pad each item by this amount (by adding the ‘car’ on the left side of the item and adding the ‘cdr’ on the right side of the item). In order to make a grob take up no horizontal space at all, set this to (+inf.0 . -inf.0).

outside-staff-horizontal-padding (number):
0.2
By default, an outside-staff-object can be placed so that it is very close to another grob horizontally. If this property is set, the outside-staff-object is raised so that it is not so close to its neighbor.

outside-staff-priority (number):
450
If set, the grob is positioned outside the staff in such a way as to avoid all collisions. In case of a potential collision, the grob with the smaller outside-staff-priority is closer to the staff.

padding (dimension, in staff space):
0.3
Add this much extra space between objects that are next to each other.

parent-alignment-X (number)
Specify on which point of the parent the object is aligned. The value -1 means aligned on parent’s left edge, 0 on center, and 1 right edge, in X direction. Other numerical values may also be specified - the unit is half the parent’s width. If unset, the value from self-alignment-X property will be used.

script-priority (number):
200
A key for determining the order of scripts in a stack, by being added to the position of the script in the user input, the sum being the overall priority. Smaller means closer to the head.

self-alignment-X (number)
Specify alignment of an object. The value -1 means left aligned, 0 centered, and 1 right-aligned in X direction. Other numerical values may also be specified - the unit is half the object width.
side-axis (number):
  1
  If the value is X (or equivalently 0), the object is placed horizontally
  next to the other object. If the value is Y or 1, it is placed vertically.

slur-padding (number):
  0.5
  Extra distance between slur and script.

staff-padding (dimension, in staff space):
  0.5
  Maintain this much space between reference points and the staff. Its
  effect is to align objects of differing sizes (like the dynamics p and f) on
  their baselines.

stencil (stencil):
  ly:text-interface::print
  The symbol to print.

vertical-skylines (pair of skylines):
  #<unpure-pure-container #<primitive-procedure
  ly:grob::vertical-skylines-from-stencil> >
  Two skylines, one above and one below this grob.

X-align-on-main-noteheads (boolean):
  #t
  If true, this grob will ignore suspended noteheads when aligning itself
  on NoteColumn.

X-offset (number):
  ly:self-alignment-interface::aligned-on-x-parent
  The horizontal amount that this object is moved relative to its X-parent.

Y-extent (pair of numbers):
  #<unpure-pure-container #<primitive-procedure
  ly:grob::stencil-height> >
  Extent (size) in the Y direction, measured in staff-space units, relative
  to object’s reference point.

Y-offset (number):
  #<unpure-pure-container #<primitive-procedure ly:side-
  position-interface::y-aligned-side> #<primitive-procedure
  ly:side-position-interface::pure-y-aligned-side> >
  The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): Section 3.2.36 [font-interface], page 565,
Section 3.2.45 [grob-interface], page 570, Section 3.2.51 [instrument-specific-markup-interface],
page 577, Section 3.2.52 [item-interface], page 579, Section 3.2.85 [outside-staff-interface],
page 596, Section 3.2.101 [self-alignment-interface], page 603, Section 3.2.105 [side-position-
interface], page 606, Section 3.2.126 [text-interface], page 622, and Section 3.2.127 [text-script-
interface], page 623.

3.1.125 TextSpanner

TextSpanner objects are created by: Section 2.2.126 [Text_spanner_ engraver], page 358.
Standard settings:

**bound-details** (list):

```
'((left (Y . 0) (padding . 0.25) (attach-dir . -1))
 (left-broken (attach-dir . 1))
 (right (Y . 0) (padding . 0.25)))
```

An alist of properties for determining attachments of spanners to edges.

**dash-fraction** (number):

0.2

Size of the dashes, relative to **dash-period**. Should be between 0.1 and 1.0 (continuous line). If set to 0.0, a dotted line is produced.

**dash-period** (number):

3.0

The length of one dash together with whitespace. If negative, no line is drawn at all.

**direction** (direction):

1

If **side-axis** is 0 (or X), then this property determines whether the object is placed LEFT, CENTER or RIGHT with respect to the other object. Otherwise, it determines whether the object is placed UP, CENTER or DOWN. Numerical values may also be used: UP=1, DOWN=-1, LEFT=-1, RIGHT=1, CENTER=0.

**font-shape** (symbol):

'italic

Select the shape of a font. Choices include upright, italic, caps.

**left-bound-info** (list):

```
ly:line-spanner::calc-left-bound-info
```

An alist of properties for determining attachments of spanners to edges.

**outside-staff-priority** (number):

350

If set, the grob is positioned outside the staff in such a way as to avoid all collisions. In case of a potential collision, the grob with the smaller **outside-staff-priority** is closer to the staff.

**right-bound-info** (list):

```
ly:line-spanner::calc-right-bound-info
```

An alist of properties for determining attachments of spanners to edges.

**side-axis** (number):

1

If the value is X (or equivalently 0), the object is placed horizontally next to the other object. If the value is Y or 1, it is placed vertically.

**staff-padding** (dimension, in staff space):

0.8

Maintain this much space between reference points and the staff. Its effect is to align objects of differing sizes (like the dynamics p and f) on their baselines.
stencil (stencil):
    ly:line-spanner::print
    The symbol to print.

style (symbol):
    'dashed-line
    This setting determines in what style a grob is typeset. Valid choices
    depend on the stencil callback reading this property.

Y-offset (number):
    #<unpure-pure-container #<primitive-procedure ly:side-
    position-interface::y-aligned-side> #<primitive-procedure
    ly:side-position-interface::pure-y-aligned-side> >
    The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): Section 3.2.36 [font-interface], page 565,
Section 3.2.45 [grob-interface], page 570, Section 3.2.61 [line-interface], page 583, Section 3.2.62
[line-spanner-interface], page 584, Section 3.2.85 [outside-staff-interface], page 596,
Section 3.2.105 [side-position-interface], page 606, and Section 3.2.112 [spanner-interface],
page 612.

3.1.126 Tie
Tie objects are created by: Section 2.2.20 [Completion_heads engraver], page 322, and
Section 2.2.127 [Tie engraver], page 358.

Standard settings:

avoid-slur (symbol):
    'inside
    Method of handling slur collisions. Choices are inside, outside,
    around, and ignore. inside adjusts the slur if needed to keep the
    grob inside the slur. outside moves the grob vertically to the outside
    of the slur. around moves the grob vertically to the outside of the slur
    only if there is a collision. ignore does not move either. In grobs whose
    notational significance depends on vertical position (such as accidentals,
    clefs, etc.), outside and around behave like ignore.

control-points (list of number pairs):
    ly:tie::calc-control-points
    List of offsets (number pairs) that form control points for the tie, slur,
    or bracket shape. For Béziers, this should list the control points of a
    third-order Bézier curve.

details (list):
    '((ratio . 0.333)
    (center-staff-line-clearance . 0.6)
    (tip-staff-line-clearance . 0.45)
    (note-head-gap . 0.2)
    (stem-gap . 0.35)
    (height-limit . 1.0)
    (horizontal-distance-penalty-factor . 10)
    (same-dir-as-stem-penalty . 8)
    (min-length-penalty-factor . 26)
    (tie-tie-collision-distance . 0.45)
    (tie-tie-collision-penalty . 25.0)
A list of parameters for detailed grob behavior. More information on the allowed parameters for a grob can be found by looking at the top of the Internals Reference page for each interface having a details property.

direction (direction):
ly:tie::calc-direction
If side-axis is 0 (or X), then this property determines whether the object is placed LEFT, CENTER or RIGHT with respect to the other object. Otherwise, it determines whether the object is placed UP, CENTER or DOWN. Numerical values may also be used: UP=1, DOWN=-1, LEFT=-1, RIGHT=1, CENTER=0.

font-size (number):
-6
The font size, compared to the ‘normal’ size. 0 is style-sheet’s normal size, -1 is smaller, +1 is bigger. Each step of 1 is approximately 12% larger; 6 steps are exactly a factor 2 larger. If the context property fontSize is set, its value is added to this before the glyph is printed. Fractional values are allowed.

line-thickness (number):
0.8
For slurs and ties, this is the diameter of the virtual “pen” that draws the two arcs of the curve’s outline, which intersect at the endpoints. This property is expressed as a multiple of the current staff-line thickness (i.e. the visual output is influenced by changes to Staff.StaffSymbol.thickness).

neutral-direction (direction):
1
Which direction to take in the center of the staff.

springs-and-rods (boolean):
ly:spanner::set-spacing-rods
Dummy variable for triggering spacing routines.

stencil (stencil):
ly:tie::print
The symbol to print.

thickness (number):
1.2
For grobs made up of lines, this is the thickness of the line. For slurs and ties, this is the distance between the two arcs of the curve’s outline.
at its thickest point, not counting the diameter of the virtual “pen” that
draws the arcs. This property is expressed as a multiple of the current
staff-line thickness (i.e. the visual output is influenced by changes to
Staff.StaffSymbol.thickness).

vertical-skylines (pair of skylines):
  #<unpure-pure-container #<primitive-procedure
  ly:grob::vertical-skylines-from-stencil> #<primitive-
  procedure ly:grob::pure-simple-vertical-skylines-from-
  extents> >
Two skylines, one above and one below this grob.

This object supports the following interface(s): Section 3.2.45 [grob-interface], page 570,
Section 3.2.112 [spanner-interface], page 612, and Section 3.2.129 [tie-interface], page 623.

3.1.127 TieColumn

TieColumn objects are created by: Section 2.2.20 [Completion_heads_engraver], page 322, and
Section 2.2.127 [Tie_engraver], page 358.

Standard settings:

  before-line-breaking (boolean):
    ly:tie-column::before-line-breaking
    Dummy property, used to trigger a callback function.

  X-extent (pair of numbers)
  Extent (size) in the X direction, measured in staff-space units, relative
to object’s reference point.

  Y-extent (pair of numbers)
  Extent (size) in the Y direction, measured in staff-space units, relative
to object’s reference point.

This object supports the following interface(s): Section 3.2.45 [grob-interface], page 570,
Section 3.2.112 [spanner-interface], page 612, and Section 3.2.128 [tie-column-interface],
page 623.

3.1.128 TimeSignature

TimeSignature objects are created by: Section 2.2.129 [Time_signature_engraver], page 359.

Standard settings:

  avoid-slur (symbol):
    'inside
    Method of handling slur collisions. Choices are inside, outside,
around, and ignore. inside adjusts the slur if needed to keep the
grob inside the slur. outside moves the grob vertically to the outside
of the slur. around moves the grob vertically to the outside of the slur
only if there is a collision. ignore does not move either. In grobs whose
notational significance depends on vertical position (such as accidentals,
clefs, etc.), outside and around behave like ignore.

  break-align-anchor (number):
    ly:break-aligned-interface::calc-extent-aligned-anchor
    Grobs aligned to this breakable item will have their X-offsets shifted by
this number. In bar lines, for example, this is used to position grobs
relative to the (visual) center of the bar line.
break-align-anchor-alignment (number):
  -1
  Read by ly:break-aligned-interface::calc-extent-aligned-anchor for aligning an anchor to a grob’s extent.

break-align-symbol (symbol):
  'time-signature
  This key is used for aligning, ordering, and spacing breakable items. See Section “break-alignment-interface” in Internals Reference.

break-visibility (vector):
  #(#t #t #t)
  A vector of 3 booleans. #(end-of-line unbroken begin-of-line). #t means visible, #f means killed.

extra-spacing-height (pair of numbers):
  pure-from-neighbor-interface::extra-spacing-height-including-staff
  In the horizontal spacing problem, we increase the height of each item by this amount (by adding the ‘car’ to the bottom of the item and adding the ‘cdr’ to the top of the item). In order to make a grob infinitely high (to prevent the horizontal spacing problem from placing any other grobs above or below this grob), set this to (-inf.0 . +inf.0).

extra-spacing-width (pair of numbers):
  '(0.0 . 0.8)
  In the horizontal spacing problem, we pad each item by this amount (by adding the ‘car’ on the left side of the item and adding the ‘cdr’ on the right side of the item). In order to make a grob take up no horizontal space at all, set this to (+inf.0 . -inf.0).

non-musical (boolean):
  #t
  True if the grob belongs to a NonMusicalPaperColumn.

space-alist (list):
  '(((ambitus extra-space . 1.0)
    (cue-clef extra-space . 1.5)
    (first-note fixed-space . 2.0)
    (right-edge extra-space . 0.5)
    (staff-bar extra-space . 1.0))
  An alist that specifies distances from this grob to other breakable items, using the format:
    '(((break-align-symbol . (spacing-style . space))
       (break-align-symbol . (spacing-style . space))
       ...
    Standard choices for break-align-symbol are listed in Section “break-alignment-interface” in Internals Reference. Additionally, three special break-align symbols available to space-alist are:

  first-note
    used when the grob is just left of the first note on a line
next-note
used when the grob is just left of any other note; if not set, the value of first-note gets used

right-edge
used when the grob is the last item on the line (only compatible with the extra-space spacing style)

Choices for spacing-style are:

extra-space
Put this much space between the two grobs. The space is stretchable when paired with first-note or next-note; otherwise it is fixed.

minimum-space
Put at least this much space between the left sides of both grobs, without allowing them to collide. The space is stretchable when paired with first-note or next-note; otherwise it is fixed. Not compatible with right-edge.

fixed-space
Only compatible with first-note and next-note. Put this much fixed space between the grob and the note.

minimum-fixed-space
Only compatible with first-note and next-note. Put at least this much fixed space between the left side of the grob and the left side of the note, without allowing them to collide.

semi-fixed-space
Only compatible with first-note and next-note. Put this much space between the grob and the note, such that half of the space is fixed and half is stretchable.

Rules for this spacing are much more complicated than this. See [Wanske] page 126–134, [Ross] page 143–147.

stencil (stencil):
  ly:time-signature::print
The symbol to print.

style (symbol):
  ‘C
This setting determines in what style a grob is typeset. Valid choices depend on the stencil callback reading this property.

Y-extent (pair of numbers):
  #<unpure-pure-container #<primitive-procedure
  ly:grob::stencil-height> >
Extent (size) in the Y direction, measured in staff-space units, relative to object’s reference point.

This object supports the following interface(s): Section 3.2.15 [break-aligned-interface], page 556, Section 3.2.36 [font-interface], page 565, Section 3.2.45 [grob-interface], page 570, Section 3.2.52 [item-interface], page 579, Section 3.2.94 [pure-from-neighbor-interface], page 600, and Section 3.2.130 [time-signature-interface], page 626.

3.1.129 TrillPitchAccidental

TrillPitchAccidental objects are created by: Section 2.2.94 [Pitched_trill_ engraver], page 349.

Standard settings:

- direction (direction):
  -1
  If side-axis is 0 (or X), then this property determines whether the object is placed LEFT, CENTER or RIGHT with respect to the other object. Otherwise, it determines whether the object is placed UP, CENTER or DOWN. Numerical values may also be used: UP=1, DOWN=-1, LEFT=-1, RIGHT=1, CENTER=0.

- font-size (number):
  -4
  The font size, compared to the ‘normal’ size. 0 is style-sheet’s normal size, -1 is smaller, +1 is bigger. Each step of 1 is approximately 12% larger; 6 steps are exactly a factor 2 larger. If the context property fontSize is set, its value is added to this before the glyph is printed. Fractional values are allowed.

- glyph-name-alist (list):
  '((0 . "accidentals.natural")
    (-1/2 . "accidentals.flat")
    (1/2 . "accidentals.sharp")
    (1 . "accidentals.doublesharp")
    (-1 . "accidentals.flatsharp")
    (3/4 .
      "accidentals.sharp.slashslash.stemstemstem")
    (1/4 . "accidentals.sharp.slashslash.stem")
    (-1/4 . "accidentals.mirroredflat")
    (-3/4 . "accidentals.mirroredflat.flat"))
  An alist of key-string pairs.

- padding (dimension, in staff space):
  0.2
  Add this much extra space between objects that are next to each other.

- side-axis (number):
  0
  If the value is X (or equivalently 0), the object is placed horizontally next to the other object. If the value is Y or 1, it is placed vertically.

- stencil (Stencil):
  ly: accidental-interface::print
  The symbol to print.
X-offset (number):
ly:side-position-interface::x-aligned-side
The horizontal amount that this object is moved relative to its X-parent.

Y-extent (pair of numbers):
#<unpure-pure-container #<primitive-procedure
ly:accidental-interface::height> >
Extent (size) in the Y direction, measured in staff-space units, relative
to object’s reference point.

This object supports the following interface(s): Section 3.2.1 [accidental-interface], page 545, Section 3.2.36 [font-interface], page 565, Section 3.2.45 [grob-interface], page 570, Section 3.2.50 [inline-accidental-interface], page 577, Section 3.2.52 [item-interface], page 579, Section 3.2.105 [side-position-interface], page 606, and Section 3.2.131 [trill-pitch-accidental-interface], page 627.

3.1.130 TrillPitchGroup
TrillPitchGroup objects are created by: Section 2.2.94 [Pitched_trill_engraver], page 349.
Standard settings:

axes (list):
'(0)
List of axis numbers. In the case of alignment grobs, this should contain
only one number.

direction (direction):
1
If side-axis is 0 (or X), then this property determines whether the object is placed LEFT, CENTER or RIGHT with respect to the other object.
Otherwise, it determines whether the object is placed UP, CENTER or DOWN. Numerical values may also be used: UP=1, DOWN=-1, LEFT=-1, RIGHT=1, CENTER=0.

font-size (number):
-4
The font size, compared to the ‘normal’ size. 0 is style-sheet’s normal size, -1 is smaller, +1 is bigger. Each step of 1 is approximately 12% larger; 6 steps are exactly a factor 2 larger. If the context property fontSize is set, its value is added to this before the glyph is printed. Fractional values are allowed.

horizon-padding (number):
0.1
The amount to pad the axis along which a Skyline is built for the side-position-interface.

minimum-space (dimension, in staff space):
2.5
Minimum distance that the victim should move (after padding).

padding (dimension, in staff space):
0.3
Add this much extra space between objects that are next to each other.

side-axis (number):
0
If the value is \( X \) (or equivalently 0), the object is placed horizontally next to the other object. If the value is \( Y \) or 1, it is placed vertically.

```
stencil (stencil):
  parenthesize-elements
  The symbol to print.

stencils (list):
  parentheses-item::calc-parenthesis-stencils
  Multiple stencils, used as intermediate value.

X-offset (number):
  ly:side-position-interface::x-aligned-side
  The horizontal amount that this object is moved relative to its X-parent.

Y-extent (pair of numbers):
  #<unpure-pure-container #<primitive-procedure ly:grob::stencil-height> >
  Extent (size) in the Y direction, measured in staff-space units, relative to object’s reference point.
```

This object supports the following interface(s): Section 3.2.7 [axis-group-interface], page 549, Section 3.2.36 [font-interface], page 565, Section 3.2.45 [grob-interface], page 570, Section 3.2.52 [item-interface], page 579, Section 3.2.78 [note-head-interface], page 593, Section 3.2.87 [parentheses-interface], page 598, and Section 3.2.105 [side-position-interface], page 606.

### 3.1.131 TrillPitchHead

TrillPitchHead objects are created by: Section 2.2.94 [Pitched_trill_engraver], page 349.

Standard settings:

```
duration-log (integer):
  2
  The 2-log of the note head duration, i.e., 0 = whole note, 1 = half note, etc.

font-size (number):
  -4
  The font size, compared to the ‘normal’ size. 0 is style-sheet’s normal size, -1 is smaller, +1 is bigger. Each step of 1 is approximately 12% larger; 6 steps are exactly a factor 2 larger. If the context property `fontSize` is set, its value is added to this before the glyph is printed. Fractional values are allowed.

stencil (stencil):
  ly:note-head::print
  The symbol to print.
```

```
Y-extent (pair of numbers):
  #<unpure-pure-container #<primitive-procedure ly:grob::stencil-height> >
  Extent (size) in the Y direction, measured in staff-space units, relative to object’s reference point.

Y-offset (number):
  #<unpure-pure-container #<primitive-procedure ly:staff-symbol-referencer::callback> >
```
The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): Section 3.2.36 [font-interface], page 565, Section 3.2.45 [grob-interface], page 570, Section 3.2.52 [item-interface], page 579, Section 3.2.57 [ledgered-interface], page 583, Section 3.2.93 [pitched-trill-interface], page 600, Section 3.2.98 [rhythmic-head-interface], page 601, and Section 3.2.116 [staff-symbol-referencer-interface], page 616.

### 3.1.132 TrillSpanner

TrillSpanner objects are created by: Section 2.2.132 [Trill_spanner_ engraver], page 360.

Standard settings:

```plaintext
after-line-breaking (boolean):
   ly:spanner::kill-zero-spanned-time
   Dummy property, used to trigger callback for after-line-breaking.

bound-details (list):
   '((left (text #<procedure musicglyph-markup (layout props glyph-name)>
   "scripts.trill")
      (Y . 0)
      (stencil-offset -0.5 . -1)
      (padding . 0.5)
      (attach-dir . 0))
   (left-broken (end-on-note . #t))
   (right (Y . 0)))
   An alist of properties for determining attachments of spanners to edges.

direction (direction):
   1
   If side-axis is 0 (or X), then this property determines whether the
   object is placed LEFT, CENTER or RIGHT with respect to the other object.
   Otherwise, it determines whether the object is placed UP, CENTER or
   DOWN. Numerical values may also be used: UP=1, DOWN=-1, LEFT=-1,
   RIGHT=1, CENTER=0.

left-bound-info (list):
   ly:line-spanner::calc-left-bound-info
   An alist of properties for determining attachments of spanners to edges.

outside-staff-priority (number):
   50
   If set, the grob is positioned outside the staff in such a way as to avoid
   all collisions. In case of a potential collision, the grob with the smaller
   outside-staff-priority is closer to the staff.

padding (dimension, in staff space):
   0.5
   Add this much extra space between objects that are next to each other.

right-bound-info (list):
   ly:line-spanner::calc-right-bound-info
   An alist of properties for determining attachments of spanners to edges.

side-axis (number):
   1
```
If the value is $X$ (or equivalently $0$), the object is placed horizontally next to the other object. If the value is $Y$ or $1$, it is placed vertically.

**staff-padding** (dimension, in staff space):

1.0

Maintain this much space between reference points and the staff. Its effect is to align objects of differing sizes (like the dynamics $p$ and $f$) on their baselines.

**stencil** (stencil):

ly:line-spanner::print

The symbol to print.

**style** (symbol):

'trill

This setting determines in what style a grob is typeset. Valid choices depend on the **stencil** callback reading this property.

**Y-offset** (number):

#<unpure-pure-container #<primitive-procedure ly:side-position-interface::y-aligned-side> #<primitive-procedure ly:side-position-interface::pure-y-aligned-side> >

The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): Section 3.2.36 [font-interface], page 565, Section 3.2.45 [grob-interface], page 570, Section 3.2.61 [line-interface], page 583, Section 3.2.62 [line-spanner-interface], page 584, Section 3.2.85 [outside-staff-interface], page 596, Section 3.2.105 [side-position-interface], page 606, Section 3.2.112 [spanner-interface], page 612, and Section 3.2.132 [trill-spanner-interface], page 627.

### 3.1.133 TupletBracket

TupletBracket objects are created by: Section 2.2.133 [Tuplet_engraver], page 361.

**Standard settings:**

**avoid-scripts** (boolean):

#t

If set, a tuplet bracket avoids the scripts associated with the note heads it encompasses.

**connect-to-neighbor** (pair):

ly:tuplet-bracket::calc-connect-to-neighbors

Pair of booleans, indicating whether this grob looks as a continued break.

**direction** (direction):

ly:tuplet-bracket::calc-direction

If **side-axis** is 0 (or X), then this property determines whether the object is placed LEFT, CENTER or RIGHT with respect to the other object. Otherwise, it determines whether the object is placed UP, CENTER or DOWN. Numerical values may also be used: UP=1, DOWN=-1, LEFT=-1, RIGHT=1, CENTER=0.

**edge-height** (pair):

'(0.7 . 0.7)

A pair of numbers specifying the heights of the vertical edges: (left-height . right-height).
full-length-to-extent (boolean):
  #t
  Run to the extent of the column for a full-length tuplet bracket.

padding (dimension, in staff space):
  1.1
  Add this much extra space between objects that are next to each other.

positions (pair of numbers):
  ly:tuplet-bracket::calc-positions
  Pair of staff coordinates (left . right), where both left and right are
  in staff-space units of the current staff. For slurs, this value selects
  which slur candidate to use; if extreme positions are requested, the
  closest one is taken.

shorten-pair (pair of numbers):
  '(-0.2 . -0.2)
  The lengths to shorten on both sides a hairpin or text-spanner such as
  a pedal bracket. Positive values shorten the hairpin or text-spanner,
  while negative values lengthen it.

staff-padding (dimension, in staff space):
  0.25
  Maintain this much space between reference points and the staff. Its
  effect is to align objects of differing sizes (like the dynamics p and f)
  on their baselines.

stencil (stencil):
  ly:tuplet-bracket::print
  The symbol to print.

thickness (number):
  1.6
  For grobs made up of lines, this is the thickness of the line. For slurs
  and ties, this is the distance between the two arcs of the curve’s outline
  at its thickest point, not counting the diameter of the virtual “pen” that
  draws the arcs. This property is expressed as a multiple of the current
  staff-line thickness (i.e. the visual output is influenced by changes to
  Staff.StaffSymbol.thickness).

tuplet-slur (boolean)
  Draw a slur instead of a bracket for tuplets.

vertical-skylines (pair of skylines):
  #<unpure-pure-container #<primitive-procedure
  ly:grob::vertical-skylines-from-stencil #<primitive-
  procedure ly:grob::pure-simple-vertical-skylines-from-
  extents> >
  Two skylines, one above and one below this grob.

X-positions (pair of numbers):
  ly:tuplet-bracket::calc-x-positions
  Pair of X staff coordinates of a spanner in the form (left . right),
  where both left and right are in staff-space units of the current staff.
This object supports the following interface(s): Section 3.2.45 [grob-interface], page 570, Section 3.2.61 [line-interface], page 583, Section 3.2.85 [outside-staff-interface], page 596, Section 3.2.112 [spanner-interface], page 612, and Section 3.2.133 [tuplet-bracket-interface], page 627.

### 3.1.134 TupletNumber

TupletNumber objects are created by: Section 2.2.133 [Tuplet-engraver], page 361.

**Standard settings:**

- **avoid-slur** (symbol):
  - `'inside`
  Method of handling slur collisions. Choices are inside, outside, around, and ignore. inside adjusts the slur if needed to keep the grob inside the slur. outside moves the grob vertically to the outside of the slur. around moves the grob vertically to the outside of the slur only if there is a collision. ignore does not move either. In grobs whose notational significance depends on vertical position (such as accidentals, clefs, etc.), outside and around behave like ignore.

- **direction** (direction):
  - `tuplet-number::calc-direction`
  If side-axis is 0 (or X), then this property determines whether the object is placed LEFT, CENTER or RIGHT with respect to the other object. Otherwise, it determines whether the object is placed UP, CENTER or DOWN. Numerical values may also be used: UP=1, DOWN=-1, LEFT=-1, RIGHT=1, CENTER=0.

- **font-shape** (symbol):
  - `'italic`
  Select the shape of a font. Choices include upright, italic, caps.

- **font-size** (number):
  - `-2`
  The font size, compared to the ‘normal’ size. 0 is style-sheet’s normal size, -1 is smaller, +1 is bigger. Each step of 1 is approximately 12% larger; 6 steps are exactly a factor 2 larger. If the context property `fontSize` is set, its value is added to this before the glyph is printed. Fractional values are allowed.

- **knee-to-beam** (boolean):
  - `#t`
  Determines whether a tuplet number will be positioned next to a kneed beam.

- **stencil** (stencil):
  - `ly:tuplet-number::print`
  The symbol to print.

- **text** (markup):
  - `tuplet-number::calc-denominator-text`
  Text markup. See Section “Formatting text” in Notation Reference.

- **X-offset** (number):
  - `ly:tuplet-number::calc-x-offset`
  The horizontal amount that this object is moved relative to its X-parent.
Y-offset (number):
   \texttt{ly:tuplet-number::calc-y-offset}
   
The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): Section 3.2.36 [font-interface], page 565, Section 3.2.45 [grob-interface], page 570, Section 3.2.85 [outside-staff-interface], page 596, Section 3.2.112 [spanner-interface], page 612, Section 3.2.126 [text-interface], page 622, and Section 3.2.134 [tuplet-number-interface], page 629.

3.1.135 UnaCordaPedal

UnaCordaPedal objects are created by: Section 2.2.91 [Piano pedal engraver], page 347.

Standard settings:

direction (direction):
   1
   
   If \texttt{side-axis} is 0 (or X), then this property determines whether the object is placed \texttt{LEFT}, \texttt{CENTER} or \texttt{RIGHT} with respect to the other object. Otherwise, it determines whether the object is placed \texttt{UP}, \texttt{CENTER} or \texttt{DOWN}. Numerical values may also be used: \texttt{UP}=1, \texttt{DOWN}=-1, \texttt{LEFT}=-1, \texttt{RIGHT}=1, \texttt{CENTER}=0.

extra-spacing-width (pair of numbers):
   '(+inf.0 . -inf.0)
   
   In the horizontal spacing problem, we pad each item by this amount (by adding the ‘car’ on the left side of the item and adding the ‘cdr’ on the right side of the item). In order to make a grob take up no horizontal space at all, set this to (+inf.0 . -inf.0).

font-shape (symbol):
   'italic
   
   Select the shape of a font. Choices include \texttt{upright}, \texttt{italic}, \texttt{caps}.

padding (dimension, in staff space):
   0.0
   
   Add this much extra space between objects that are next to each other.

parent-alignment\textsubscript{-X} (number)
   
   Specify on which point of the parent the object is aligned. The value \texttt{-1} means aligned on parent’s left edge, \texttt{0} on center, and \texttt{1} right edge, in X direction. Other numerical values may also be specified - the unit is half the parent’s width. If unset, the value from \texttt{self-alignment\textsubscript{-X}} property will be used.

self-alignment\textsubscript{-X} (number):
   0
   
   Specify alignment of an object. The value \texttt{-1} means left aligned, \texttt{0} centered, and \texttt{1} right-aligned in X direction. Other numerical values may also be specified - the unit is half the object width.

stencil (stencil):
   \texttt{ly:text-interface::print}
   
   The symbol to print.

vertical-skylines (pair of skylines):
   \texttt{#<unpure-pure-container #<primitive-procedure
   \texttt{ly:grob::vertical-skylines-from-stencil> >}
Two skylines, one above and one below this grob.

**X-offset (number):**

\[
\text{ly: self-alignment-interface: aligned-on-x-parent}
\]

The horizontal amount that this object is moved relative to its X-parent.

**Y-extent (pair of numbers):**

\[
\text{#<unpure-pure-container #<primitive-procedure}
\text{ly: grob::stencil-height> >}
\]

Extent (size) in the Y direction, measured in staff-space units, relative to object’s reference point.

This object supports the following interface(s): Section 3.2.36 [font-interface], page 565, Section 3.2.45 [grob-interface], page 570, Section 3.2.52 [item-interface], page 579, Section 3.2.92 [piano-pedal-script-interface], page 600, Section 3.2.101 [self-alignment-interface], page 603, and Section 3.2.126 [text-interface], page 622.

### 3.1.136 UnaCordaPedalLineSpanner

UnaCordaPedalLineSpanner objects are created by: Section 2.2.90 [Piano_pedal_align_engraver], page 347.

Standard settings:

**axes (list):**

'(1)

List of axis numbers. In the case of alignment grobs, this should contain only one number.

**direction (direction):**

-1

If `side-axis` is 0 (or X), then this property determines whether the object is placed LEFT, CENTER or RIGHT with respect to the other object. Otherwise, it determines whether the object is placed UP, CENTER or DOWN. Numerical values may also be used: UP=1, DOWN=-1, LEFT=-1, RIGHT=1, CENTER=0.

**minimum-space (dimension, in staff space):**

1.0

Minimum distance that the victim should move (after padding).

**outside-staff-priority (number):**

1000

If set, the grob is positioned outside the staff in such a way as to avoid all collisions. In case of a potential collision, the grob with the smaller `outside-staff-priority` is closer to the staff.

**padding (dimension, in staff space):**

1.2

Add this much extra space between objects that are next to each other.

**side-axis (number):**

1

If the value is X (or equivalently 0), the object is placed horizontally next to the other object. If the value is Y or 1, it is placed vertically.
staff-padding (dimension, in staff space):

1.2

Maintain this much space between reference points and the staff. Its
effect is to align objects of differing sizes (like the dynamics p and f) on
their baselines.

vertical-skylines (pair of skylines):

Two skylines, one above and one below this grob.

X-extent (pair of numbers):

ly:axis-group-interface::width

Extent (size) in the X direction, measured in staff-space units, relative
to object’s reference point.

Y-extent (pair of numbers):

ly:axis-group-interface::height

 Extent (size) in the Y direction, measured in staff-space units, relative
to object’s reference point.

Y-offset (number):

The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): Section 3.2.7 [axis-group-interface], page 549,
Section 3.2.45 [grob-interface], page 570, Section 3.2.85 [outside-staff-interface], page 596,
Section 3.2.91 [piano-pedal-interface], page 600, Section 3.2.105 [side-position-interface],
page 606, and Section 3.2.112 [spanner-interface], page 612.

3.1.137 VaticanaLigature

VaticanaLigature objects are created by: Section 2.2.135 [Vaticana_ligature_engraver], page 361.

Standard settings:

stencil (stencil):

ly:vaticana-ligature::print

The symbol to print.

thickness (number):

0.6

For grobs made up of lines, this is the thickness of the line. For slurs
and ties, this is the distance between the two arcs of the curve’s outline
at its thickest point, not counting the diameter of the virtual “pen” that
draws the arcs. This property is expressed as a multiple of the current
staff-line thickness (i.e. the visual output is influenced by changes to
Staff.StaffSymbol.thickness).

This object supports the following interface(s): Section 3.2.36 [font-interface], page 565,
Section 3.2.45 [grob-interface], page 570, Section 3.2.112 [spanner-interface], page 612, and
Section 3.2.136 [vaticana-ligature-interface], page 629.
3.1.138 VerticalAlignment

VerticalAlignment objects are created by: Section 2.2.136 [Vertical_align_engraver], page 361.

Standard settings:

axes (list):
  ' (1)
  List of axis numbers. In the case of alignment grobs, this should contain only one number.

stacking-dir (direction):
  -1
  Stack objects in which direction?

vertical-skylines (pair of skylines):
  ly:axis-group-interface::combine-skylines
  Two skylines, one above and one below this grob.

X-extent (pair of numbers):
  ly:axis-group-interface::width
  Extent (size) in the X direction, measured in staff-space units, relative to object’s reference point.

Y-extent (pair of numbers):
  ly:axis-group-interface::height
  ly:axis-group-interface::pure-height
  Extent (size) in the Y direction, measured in staff-space units, relative to object’s reference point.

This object supports the following interface(s): Section 3.2.4 [align-interface], page 547, Section 3.2.7 [axis-group-interface], page 549, Section 3.2.45 [grob-interface], page 570, and Section 3.2.112 [spanner-interface], page 612.

3.1.139 VerticalAxisGroup

VerticalAxisGroup objects are created by: Section 2.2.5 [Axis_group_engraver], page 316.

Standard settings:

axes (list):
  ' (1)
  List of axis numbers. In the case of alignment grobs, this should contain only one number.

default-staff-staff-spacing (list):
  '((basic-distance . 9)
   (minimum-distance . 8)
   (padding . 1))
  The settings to use for staff-staff-spacing when it is unset, for ungrouped staves and for grouped staves that do not have the relevant StaffGrouper property set (staff-staff-spacing or staffgroup-staff-spacing).

nonstaff-unrelatedstaff-spacing (list):
  ' (padding . 0.5)
  The spacing alist controlling the distance between the current non-staff line and the nearest staff in the opposite direction from
staff-affinity, if there are no other non-staff lines between the two, and staff-affinity is either UP or DOWN. See staff-staff-spacing for a description of the alist structure.

outside-staff-placement-directive (symbol):

'left-to-right-polite
One of four directives telling how outside staff objects should be placed.

• left-to-right-greedy – Place each successive grob from left to right.
• left-to-right-polite – Place a grob from left to right only if it does not potentially overlap with another grob that has been placed on a pass through a grob array. If there is overlap, do another pass to determine placement.
• right-to-left-greedy – Same as left-to-right-greedy, but from right to left.
• right-to-left-polite – Same as left-to-right-polite, but from right to left.

skyline-horizontal-padding (number):

0.1
For determining the vertical distance between two staves, it is possible to have a configuration which would result in a tight interleaving of grobs from the top staff and the bottom staff. The larger this parameter is, the farther apart the staves are placed in such a configuration.

staff-staff-spacing (list):

#<unpure-pure-container #<primitive-procedure ly:axis-group-interface::calc-staff-staff-spacing> #<primitive-procedure ly:axis-group-interface::calc-pure-staff-staff-spacing> >

When applied to a staff-group’s StaffGrouper grob, this spacing alist controls the distance between consecutive staves within the staff-group. When applied to a staff’s VerticalAxisGroup grob, it controls the distance between the staff and the nearest staff below it in the same system, replacing any settings inherited from the StaffGrouper grob of the containing staff-group, if there is one. This property remains in effect even when non-staff lines appear between staves. The alist can contain the following keys:

• basic-distance – the vertical distance, measured in staff-spaces, between the reference points of the two items when no collisions would result, and no stretching or compressing is in effect.
• minimum-distance – the smallest allowable vertical distance, measured in staff-spaces, between the reference points of the two items, when compressing is in effect.
• padding – the minimum required amount of unobstructed vertical whitespace between the bounding boxes (or skylines) of the two items, measured in staff-spaces.
• stretchability – a unitless measure of the dimension’s relative propensity to stretch. If zero, the distance will not stretch (unless collisions would result).
stencil (stencil):
  ly:axis-group-interface::print
  The symbol to print.

vertical-skylines (pair of skylines):
  ly:hara-kiri-group-spanner::calc-skylines
  Two skylines, one above and one below this grob.

X-extent (pair of numbers):
  ly:axis-group-interface::width
  Extent (size) in the X direction, measured in staff-space units, relative
to object’s reference point.

Y-extent (pair of numbers):
  #<unpure-pure-container #<primitive-procedure ly:hara-
kiri-group-spanner::y-extent> #<primitive-procedure
ly:hara-kiri-group-spanner::pure-height> >
  Extent (size) in the Y direction, measured in staff-space units, relative
to object’s reference point.

Y-offset (number):
  ly:hara-kiri-group-spanner::force-hara-kiri-callback
  The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): Section 3.2.7 [axis-group-interface], page 549,
Section 3.2.45 [grob-interface], page 570, Section 3.2.47 [hara-kiri-group-spanner-interface],
page 575, Section 3.2.84 [outside-staff-axis-group-interface], page 595, and Section 3.2.112
[spanner-interface], page 612.

3.1.140 VoiceFollower

VoiceFollower objects are created by: Section 2.2.77 [Note_head_line_engraver], page 343.

Standard settings:

after-line-breaking (boolean):
  ly:spanner::kill-zero-spanned-time
  Dummy property, used to trigger callback for after-line-breaking.

bound-details (list):
  '((right (attach-dir . 0) (padding . 1.5))
   (left (attach-dir . 0) (padding . 1.5)))
  An alist of properties for determining attachments of spanners to edges.

gap (dimension, in staff space):
  0.5
  Size of a gap in a variable symbol.

left-bound-info (list):
  ly:line-spanner::calc-left-bound-info
  An alist of properties for determining attachments of spanners to edges.

non-musical (boolean):
  #t
  True if the grob belongs to a NonMusicalPaperColumn.
right-bound-info (list):
  ly:line-spanner::calc-right-bound-info
  An alist of properties for determining attachments of spanners to edges.

stencil (stencil):
  ly:line-spanner::print
  The symbol to print.

style (symbol):
  'line
  This setting determines in what style a grob is typeset. Valid choices depend on the stencil callback reading this property.

X-extent (pair of numbers)
  Extent (size) in the X direction, measured in staff-space units, relative to object’s reference point.

Y-extent (pair of numbers)
  Extent (size) in the Y direction, measured in staff-space units, relative to object’s reference point.

This object supports the following interface(s): Section 3.2.45 [grob-interface], page 570, Section 3.2.61 [line-interface], page 583, Section 3.2.62 [line-spanner-interface], page 584, and Section 3.2.112 [spanner-interface], page 612.

3.1.141 VoltaBracket
VoltaBracket objects are created by: Section 2.2.137 [Volta_engraver], page 362.

Standard settings:

  baseline-skip (dimension, in staff space):
    1.7
    Distance between base lines of multiple lines of text.

  direction (direction):
    1
    If side-axis is 0 (or X), then this property determines whether the object is placed LEFT, CENTER or RIGHT with respect to the other object. Otherwise, it determines whether the object is placed UP, CENTER or DOWN. Numerical values may also be used: UP=1, DOWN=-1, LEFT=-1, RIGHT=1, CENTER=0.

  edge-height (pair):
    '(2.0 . 2.0)
    A pair of numbers specifying the heights of the vertical edges: (left-height . right-height).

  font-encoding (symbol):
    'fetaText
    The font encoding is the broadest category for selecting a font. Currently, only Lilypond’s system fonts (Emmentaler) are using this property. Available values are fetaMusic (Emmentaler), fetaBraces, fetaText (Emmentaler).

  font-size (number):
    -4
The font size, compared to the ‘normal’ size. 0 is style-sheet’s normal size, -1 is smaller, +1 is bigger. Each step of 1 is approximately 12% larger; 6 steps are exactly a factor 2 larger. If the context property `fontSize` is set, its value is added to this before the glyph is printed. Fractional values are allowed.

`shorten-pair` (pair of numbers):
```
ly:volta-bracket::calc-shorten-pair
```
The lengths to shorten on both sides a hairpin or text-spanner such as a pedal bracket. Positive values shorten the hairpin or text-spanner, while negative values lengthen it.

`stencil` (stencil):
```
ly:volta-bracket-interface::print
```
The symbol to print.

`thickness` (number):
```
1.6
```
For grobs made up of lines, this is the thickness of the line. For slurs and ties, this is the distance between the two arcs of the curve’s outline at its thickest point, not counting the diameter of the virtual “pen” that draws the arcs. This property is expressed as a multiple of the current staff-line thickness (i.e. the visual output is influenced by changes to `Staff.StaffSymbol.thickness`).

`vertical-skylines` (pair of skylines):
```
#<unpure-pure-container #<primitive-procedure
ly:grob::vertical-skylines-from-stencil> #<primitive-
procedure ly:grob::pure-simple-vertical-skylines-from-
extents> >
```
Two skylines, one above and one below this grob.

`word-space` (dimension, in staff space):
```
0.6
```
Space to insert between words in texts.

`Y-extent` (pair of numbers):
```
#<unpure-pure-container #<primitive-procedure
ly:grob::stencil-height> #<procedure volta-bracket-
interface::pure-height (grob start end)>>
```
Extent (size) in the Y direction, measured in staff-space units, relative to object’s reference point.

This object supports the following interface(s): Section 3.2.36 [font-interface], page 565, Section 3.2.45 [grob-interface], page 570, Section 3.2.48 [horizontal-bracket-interface], page 576, Section 3.2.61 [line-interface], page 583, Section 3.2.105 [side-position-interface], page 606, Section 3.2.112 [spanner-interface], page 612, Section 3.2.126 [text-interface], page 622, Section 3.2.137 [volta-bracket-interface], page 630, and Section 3.2.138 [volta-interface], page 631.

### 3.1.142 VoltaBracketSpanner

VoltaBracketSpanner objects are created by: Section 2.2.137 [Volta engraver], page 362.

Standard settings:

`after-line-breaking` (boolean):
```
ly:side-position-interface::move-to-extremal-staff
```
Dummy property, used to trigger callback for `after-line-breaking`.

`axes (list)`:

'(1)

List of axis numbers. In the case of alignment grobs, this should contain only one number.

`direction (direction)`:

1

If `side-axis` is 0 (or X), then this property determines whether the object is placed LEFT, CENTER or RIGHT with respect to the other object. Otherwise, it determines whether the object is placed UP, CENTER or DOWN. Numerical values may also be used: UP=1, DOWN=-1, LEFT=-1, RIGHT=1, CENTER=0.

`no-alignment (boolean)`:

#t

If set, don’t place this grob in a `VerticalAlignment`; rather, place it using its own Y-offset callback.

`outside-staff-priority (number)`:

600

If set, the grob is positioned outside the staff in such a way as to avoid all collisions. In case of a potential collision, the grob with the smaller `outside-staff-priority` is closer to the staff.

`padding (dimension, in staff space)`:

1

Add this much extra space between objects that are next to each other.

`side-axis (number)`:

1

If the value is X (or equivalently 0), the object is placed horizontally next to the other object. If the value is Y or 1, it is placed vertically.

`vertical-skylines (pair of skylines)`:

Two skylines, one above and one below this grob.

`X-extent (pair of numbers)`:

Extent (size) in the X direction, measured in staff-space units, relative to object’s reference point.

`Y-extent (pair of numbers)`:

Extent (size) in the Y direction, measured in staff-space units, relative to object’s reference point.
Y-offset (number):

This object supports the following interface(s): Section 3.2.7 [axis-group-interface], page 549, Section 3.2.45 [grob-interface], page 570, Section 3.2.85 [outside-staff-interface], page 596, Section 3.2.105 [side-position-interface], page 606, Section 3.2.112 [spanner-interface], page 612, and Section 3.2.138 [volta-interface], page 631.

3.1.143 VowelTransition

VowelTransition objects are created by: Section 2.2.54 [Hyphen engraver], page 334.

Standard settings:

after-line-breaking (boolean):
  ly:spanner::kill-zero-spanned-time
  Dummy property, used to trigger callback for after-line-breaking.

arrow-length (number):
  0.5
  Arrow length.

arrow-width (number):
  0.5
  Arrow width.

bound-details (list):
  '((left (Y . 0) (padding . 0.14) (attach-dir . 1))
    (right-broken (padding . 0))
    (left-broken (padding . 0))
    (right (Y . 0)
      (padding . 0.14)
      (attach-dir . -1)
      (arrow . #t)))
  An alist of properties for determining attachments of spanners to edges.

left-bound-info (list):
  ly:line-spanner::calc-left-bound-info
  An alist of properties for determining attachments of spanners to edges.

minimum-length (dimension, in staff space):
  1.0
  Try to make a spanner at least this long, normally in the horizontal direction. This requires an appropriate callback for the springs-and-rods property. If added to a Tie, this sets the minimum distance between noteheads.

right-bound-info (list):
  ly:line-spanner::calc-right-bound-info
  An alist of properties for determining attachments of spanners to edges.

springs-and-rods (boolean):
  ly:vowel-transition::set-spacing-rods
  Dummy variable for triggering spacing routines.
stencil (stencil):
   ly:line-spanner::print
   The symbol to print.

style (symbol):
   'line
   This setting determines in what style a grob is typeset. Valid choices
   depend on the stencil callback reading this property.

vertical-skylines (pair of skylines):
   #<unpure-pure-container #<primitive-procedure
   ly:grob::vertical-skylines-from-stencil> #<primitive-
   procedure ly:grob::pure-simple-vertical-skylines-from-
   extents> >
   Two skylines, one above and one below this grob.

Y-offset (number):
   0.5
   The vertical amount that this object is moved relative to its Y-parent.

This object supports the following interface(s): Section 3.2.45 [grob-interface], page 570,
Section 3.2.61 [line-interface], page 583, Section 3.2.62 [line-spanner-interface], page 584,
Section 3.2.65 [lyric-interface], page 587, and Section 3.2.112 [spanner-interface], page 612.

3.2 Graphical Object Interfaces

3.2.1 accidental-interface
A single accidental.

User settable properties:

   alteration (number)
   Alteration numbers for accidental.

   avoid-slur (symbol)
   Method of handling slur collisions. Choices are inside, outside,
   around, and ignore. inside adjusts the slur if needed to keep the
   grob inside the slur. outside moves the grob vertically to the outside
   of the slur. around moves the grob vertically to the outside of the slur
   only if there is a collision. ignore does not move either. In grobs whose
   notational significance depends on vertical position (such as accidentals,
   clefs, etc.), outside and around behave like ignore.

   glyph-name (string)
   The glyph name within the font.
   In the context of (span) bar lines, glyph-name represents a processed
   form of glyph, where decisions about line breaking etc. are already
   taken.

   glyph-name-alist (list)
   An alist of key-string pairs.

   hide-tied-accidental-after-break (boolean)
   If set, an accidental that appears on a tied note after a line break will
   not be displayed.
Parenthesis this grob.

Print a natural before the accidental.

Internal properties:

forced (boolean)
Manually forced accidental.

tie (graphical (layout) object)
A pointer to a Tie object.

This grob interface is used in the following graphical object(s): Section 3.1.1 [Accidental], page 377, Section 3.1.2 [AccidentalCautionary], page 378, Section 3.1.4 [AccidentalSuggestion], page 380, Section 3.1.6 [AmbitusAccidental], page 383, and Section 3.1.129 [TrillPitchAccidental], page 528.

3.2.2 accidental-placement-interface
Resolve accidental collisions.

User settable properties:

direction (direction)
If side-axis is 0 (or X), then this property determines whether the object is placed LEFT, CENTER or RIGHT with respect to the other object. Otherwise, it determines whether the object is placed UP, CENTER or DOWN. Numerical values may also be used: UP=1, DOWN=-1, LEFT=-1, RIGHT=1, CENTER=0.

padding (dimension, in staff space)
Add this much extra space between objects that are next to each other.

right-padding (dimension, in staff space)
Space to insert on the right side of an object (e.g., between note and its accidentals).

script-priority (number)
A key for determining the order of scripts in a stack, by being added to the position of the script in the user input, the sum being the overall priority. Smaller means closer to the head.

Internal properties:

accidental-grobs (list)
An alist with (notename . groblist) entries.

positioning-done (boolean)
Used to signal that a positioning element did its job. This ensures that a positioning is only done once.

This grob interface is used in the following graphical object(s): Section 3.1.3 [AccidentalPlacement], page 379.

3.2.3 accidental-suggestion-interface
An accidental, printed as a suggestion (typically: vertically over a note).

This grob interface is used in the following graphical object(s): Section 3.1.4 [AccidentalSuggestion], page 380.
3.2.4 align-interface
Order grobs from top to bottom, left to right, right to left or bottom to top. For vertical alignments of staves, the line-break-system-details of the left Section “NonMusicalPaper-Column” in Internals Reference may be set to tune vertical spacing.

User settable properties:
- **align-dir** (direction)
  Which side to align? -1: left side, 0: around center of width, 1: right side.
- **axes** (list)
  List of axis numbers. In the case of alignment grobs, this should contain only one number.
- **padding** (dimension, in staff space)
  Add this much extra space between objects that are next to each other.
- **stacking-dir** (direction)
  Stack objects in which direction?

Internal properties:
- **elements** (array of grobs)
  An array of grobs; the type is depending on the grob where this is set in.
- **minimum-translations-alist** (list)
  An list of translations for a given start and end point.
- **positioning-done** (boolean)
  Used to signal that a positioning element did its job. This ensures that a positioning is only done once.

This grob interface is used in the following graphical object(s): Section 3.1.14 [BassFigure-Alignment], page 394, and Section 3.1.138 [VerticalAlignment], page 538.

3.2.5 ambitus-interface
The line between note heads for a pitch range.

User settable properties:
- **gap** (dimension, in staff space)
  Size of a gap in a variable symbol.
- **length-fraction** (number)
  Multiplier for lengths. Used for determining ledger lines and stem lengths.
- **maximum-gap** (number)
  Maximum value allowed for gap property.
- **thickness** (number)
  For grobs made up of lines, this is the thickness of the line. For slurs and ties, this is the distance between the two arcs of the curve’s outline at its thickest point, not counting the diameter of the virtual “pen” that draws the arcs. This property is expressed as a multiple of the current staff-line thickness (i.e. the visual output is influenced by changes to Staff.StaffSymbol.thickness).
Internal properties:

- **note-heads** (array of grobs)
  
  An array of note head grobs.

  This grob interface is used in the following graphical object(s): Section 3.1.5 [Ambitus], page 382, Section 3.1.7 [AmbitusLine], page 384, and Section 3.1.8 [AmbitusNoteHead], page 385.

### 3.2.6 arpeggio-interface

Functions and settings for drawing an arpeggio symbol.

User settable properties:

- **arpeggio-direction** (direction)
  
  If set, put an arrow on the arpeggio squiggly line.

- **dash-definition** (pair)
  
  List of **dash-elements** defining the dash structure. Each **dash-element** has a starting t value, an ending t-value, a **dash-fraction**, and a **dash-period**.

- **line-thickness** (number)
  
  For slurs and ties, this is the diameter of the virtual “pen” that draws the two arcs of the curve’s outline, which intersect at the endpoints. This property is expressed as a multiple of the current staff-line thickness (i.e. the visual output is influenced by changes to `Staff.StaffSymbol.thickness`).

- **positions** (pair of numbers)
  
  Pair of staff coordinates (**left** . **right**), where both **left** and **right** are in staff-space units of the current staff. For slurs, this value selects which slur candidate to use; if extreme positions are requested, the closest one is taken.

- **protrusion** (number)
  
  In an arpeggio bracket, the length of the horizontal edges.

- **script-priority** (number)
  
  A key for determining the order of scripts in a stack, by being added to the position of the script in the user input, the sum being the overall priority. Smaller means closer to the head.

- **thickness** (number)
  
  For grobs made up of lines, this is the thickness of the line. For slurs and ties, this is the distance between the two arcs of the curve’s outline at its thickest point, not counting the diameter of the virtual “pen” that draws the arcs. This property is expressed as a multiple of the current staff-line thickness (i.e. the visual output is influenced by changes to `Staff.StaffSymbol.thickness`).

Internal properties:

- **stems** (array of grobs)
  
  An array of stem objects.

  This grob interface is used in the following graphical object(s): Section 3.1.9 [Arpeggio], page 386.
3.2.7 axis-group-interface

An object that groups other layout objects.

User settable properties:

- **axes** (list) List of axis numbers. In the case of alignment grobs, this should contain only one number.

- **default-staff-staff-spacing** (list) The settings to use for **staff-staff-spacing** when it is unset, for ungrouped staves and for grouped staves that do not have the relevant StaffGrouper property set (**staff-staff-spacing** or **staffgroup-staff-spacing**).

- **no-alignment** (boolean) If set, don’t place this grob in a VerticalAlignment; rather, place it using its own Y-offset callback.

- **nonstaff-nonstaff-spacing** (list) The spacing alist controlling the distance between the current non-staff line and the next non-staff line in the direction of **staff-affinity**, if both are on the same side of the related staff, and **staff-affinity** is either UP or DOWN. See **staff-staff-spacing** for a description of the alist structure.

- **nonstaff-relatedstaff-spacing** (list) The spacing alist controlling the distance between the current non-staff line and the nearest staff in the direction of **staff-affinity**, if there are no non-staff lines between the two, and **staff-affinity** is either UP or DOWN. If **staff-affinity** is CENTER, then **nonstaff-relatedstaff-spacing** is used for the nearest staves on both sides, even if other non-staff lines appear between the current one and either of the staves. See **staff-staff-spacing** for a description of the alist structure.

- **nonstaff-unrelatedstaff-spacing** (list) The spacing alist controlling the distance between the current non-staff line and the nearest staff in the opposite direction from **staff-affinity**, if there are no other non-staff lines between the two, and **staff-affinity** is either UP or DOWN. See **staff-staff-spacing** for a description of the alist structure.

- **staff-affinity** (direction) The direction of the staff to use for spacing the current non-staff line. Choices are UP, DOWN, and CENTER. If CENTER, the non-staff line will be placed equidistant between the two nearest staves on either side, unless collisions or other spacing constraints prevent this. Setting **staff-affinity** for a staff causes it to be treated as a non-staff line. Setting **staff-affinity** to #f causes a non-staff line to be treated as a staff.

- **staff-staff-spacing** (list) When applied to a staff-group’s StaffGrouper grob, this spacing alist controls the distance between consecutive staves within the staff-group. When applied to a staff’s VerticalAxisGroup grob, it controls the distance between the staff and the nearest staff below it in the same system, replacing any settings inherited from the StaffGrouper grob of the containing staff-group, if there is one. This property remains in effect even
when non-staff lines appear between staves. The alist can contain the following keys:

- **basic-distance** – the vertical distance, measured in staff-spaces, between the reference points of the two items when no collisions would result, and no stretching or compressing is in effect.
- **minimum-distance** – the smallest allowable vertical distance, measured in staff-spaces, between the reference points of the two items, when compressing is in effect.
- **padding** – the minimum required amount of unobstructed vertical whitespace between the bounding boxes (or skylines) of the two items, measured in staff-spaces.
- **stretchability** – a unitless measure of the dimension’s relative propensity to stretch. If zero, the distance will not stretch (unless collisions would result).

**Internal properties:**

- **adjacent-pure-heights** (pair)
  A pair of vectors. Used by a VerticalAxisGroup to cache the Y-extents of different column ranges.

- **bound-alignment-interfaces** (list)
  Interfaces to be used for positioning elements that align with a column.

- **elements** (array of grobs)
  An array of grobs; the type is depending on the grob where this is set in.

- **pure-relevant-grobs** (array of grobs)
  All the grobs (items and spanners) that are relevant for finding the pure-Y-extent.

- **pure-relevant-items** (array of grobs)
  A subset of elements that are relevant for finding the pure-Y-extent.

- **pure-relevant-spanners** (array of grobs)
  A subset of elements that are relevant for finding the pure-Y-extent.

- **pure-Y-common** (graphical (layout) object)
  A cache of the common_refpoint_of_array of the elements grob set.

- **staff-grouper** (graphical (layout) object)
  The staff grouper we belong to.

- **system-Y-offset** (number)
  The Y-offset (relative to the bottom of the top-margin of the page) of the system to which this staff belongs.

- **X-common** (graphical (layout) object)
  Common reference point for axis group.

- **Y-common** (graphical (layout) object)
  See X-common.

This grob interface is used in the following graphical object(s): Section 3.1.5 [Ambitus], page 382, Section 3.1.14 [BassFigureAlignment], page 394, Section 3.1.15 [BassFigureAlignment-Positioning], page 395, Section 3.1.18 [BassFigureLine], page 396, Section 3.1.21 [BreakAlign-Group], page 400, Section 3.1.22 [BreakAlignment], page 400, Section 3.1.33 [DotColumn],
3.2.8 balloon-interface

A collection of routines to put text balloons around an object.

User settable properties:

- **annotation-balloon** (boolean)
  
  Print the balloon around an annotation.

- **annotation-line** (boolean)
  
  Print the line from an annotation to the grob that it annotates.

- **padding** (dimension, in staff space)
  
  Add this much extra space between objects that are next to each other.

- **text** (markup)
  
  Text markup. See Section “Formatting text” in Notation Reference.

Internal properties:

- **spanner-placement** (direction)
  
  The place of an annotation on a spanner. **LEFT** is for the first spanner, and **RIGHT** is for the last. **CENTER** will place it on the broken spanner that falls closest to the center of the length of the entire spanner, although this behavior is unpredictable in situations with lots of rhythmic diversity. For predictable results, use **LEFT** and **RIGHT**.

This grob interface is used in the following graphical object(s): Section 3.1.10 [BalloonTextItem], page 388, Section 3.1.45 [FootnoteItem], page 433, and Section 3.1.46 [FootnoteSpanner], page 434.

3.2.9 bar-line-interface

Print a special bar symbol. It replaces the regular bar symbol with a special symbol. The argument **bartype** is a string which specifies the kind of bar line to print.

The list of allowed glyphs and predefined bar lines can be found in **scm/bar-line.scm**.

- **gap** is used for the gaps in dashed bar lines.

User settable properties:

- **allow-span-bar** (boolean)
  
  If false, no inter-staff bar line will be created below this bar line.

- **bar-extent** (pair of numbers)
  
  The Y-extent of the actual bar line. This may differ from **Y-extent** because it does not include the dots in a repeat bar line.

- **gap** (dimension, in staff space)
  
  Size of a gap in a variable symbol.
glyph (string)
A string determining what ‘style’ of glyph is typeset. Valid choices depend on the function that is reading this property.
In combination with (span) bar lines, it is a string resembling the bar line appearance in ASCII form.

glyph-name (string)
The glyph name within the font.
In the context of (span) bar lines, glyph-name represents a processed form of glyph, where decisions about line breaking etc. are already taken.

hair-thickness (number)
Thickness of the thin line in a bar line, expressed as a multiple of the default staff-line thickness (i.e. the visual output is not influenced by changes to Staff.StaffSymbol.thickness).

kern (dimension, in staff space)
The space between individual elements in any compound bar line, expressed as a multiple of the default staff-line thickness (i.e. the visual output is not influenced by changes to Staff.StaffSymbol.thickness).

rounded (boolean)
Decide whether lines should be drawn rounded or not.

segno-kern (number)
The space between the two thin lines of the segno bar line symbol, expressed as a multiple of the default staff-line thickness (i.e. the visual output is not influenced by changes to Staff.StaffSymbol.thickness).

thick-thickness (number)
Thickness of the thick line in a bar line, expressed as a multiple of the default staff-line thickness (i.e. the visual output is not influenced by changes to Staff.StaffSymbol.thickness).

Internal properties:

has-span-bar (pair)
A pair of grobs containing the span bars to be drawn below and above the staff. If no span bar is in a position, the respective element is set to #f.

This grob interface is used in the following graphical object(s): Section 3.1.11 [BarLine], page 388, and Section 3.1.105 [SpanBar], page 500.

3.2.10 bass-figure-alignment-interface
Align a bass figure.

This grob interface is used in the following graphical object(s): Section 3.1.14 [BassFigure-Alignment], page 394.

3.2.11 bass-figure-interface
A bass figure text.
User settable properties:

**implicit** (boolean)
Is this an implicit bass figure?

This grob interface is used in the following graphical object(s): Section 3.1.13 [BassFigure], page 394.

### 3.2.12 beam-interface

A beam.

The **beam-thickness** property is the weight of beams, measured in staffspace. The **direction** property is not user-serviceable. Use the **direction** property of Stem instead. The following properties may be set in the **details** list.

**stem-length-demerit-factor**
Demerit factor used for inappropriate stem lengths.

**secondary-beam-demerit**
Demerit used in quanting calculations for multiple beams.

**region-size**
Size of region for checking quant scores.

**beam-eps**
Epsilon for beam quant code to check for presence in gap.

**stem-length-limit-penalty**
Penalty for differences in stem lengths on a beam.

**damping-direction-penalty**
Demerit penalty applied when beam direction is different from damping direction.

**hint-direction-penalty**
Demerit penalty applied when beam direction is different from damping direction, but damping slope is \( \leq \text{round-to-zero-slope} \).

**musical-direction-factor**
Demerit scaling factor for difference between beam slope and music slope.

**ideal-slope-factor**
Demerit scaling factor for difference between beam slope and damping slope.

**round-to-zero-slope**
Damping slope which is considered zero for purposes of calculating direction penalties.

User settable properties:

**annotation** (string)
Annotate a grob for debug purposes.

**auto-knee-gap** (dimension, in staff space)
If a gap is found between note heads where a horizontal beam fits and it is larger than this number, make a kneed beam.

**beam-thickness** (dimension, in staff space)
Beam thickness, measured in **staff-space** units.

**beamed-stem-shorten** (list)
How much to shorten beamed stems, when their direction is forced. It is a list, since the value is different depending on the number of flags and beams.
beaming (pair)
   Pair of number lists. Each number list specifies which beams to make.
   0 is the central beam, 1 is the next beam toward the note, etc. This
   information is used to determine how to connect the beaming patterns
   from stem to stem inside a beam.

break-overshoot (pair of numbers)
   How much does a broken spanner stick out of its bounds?

clip-edges (boolean)
   Allow outward pointing beamlets at the edges of beams?

collision-interfaces (list)
   A list of interfaces for which automatic beam-collision resolution is run.

collision-voice-only (boolean)
   Does automatic beam collision apply only to the voice in which the beam
   was created?

concaveness (number)
   A beam is concave if its inner stems are closer to the beam than the two
   outside stems. This number is a measure of the closeness of the inner
   stems. It is used for damping the slope of the beam.

damping (number)
   Amount of beam slope damping.

details (list)
   A list of parameters for detailed grob behavior. More information on the
   allowed parameters for a grob can be found by looking at the top of the
   Internals Reference page for each interface having a details property.

direction (direction)
   If side-axis is 0 (or X), then this property determines whether the
   object is placed LEFT, CENTER or RIGHT with respect to the other object.
   Otherwise, it determines whether the object is placed UP, CENTER or
   DOWN. Numerical values may also be used: UP=1, DOWN=-1, LEFT=-1,
   RIGHT=1, CENTER=0.

gap (dimension, in staff space)
   Size of a gap in a variable symbol.

gap-count (integer)
   Number of gapped beams for tremolo.

grow-direction (direction)
   Crescendo or decrescendo?

inspect-quants (pair of numbers)
   If debugging is set, set beam and slur position to a (quantized) position
   that is as close as possible to this value, and print the demerits for the
   inspected position in the output.

knee (boolean)
   Is this beam kneed?

length-fraction (number)
   Multiplier for lengths. Used for determining ledger lines and stem
   lengths.
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neutral-direction (direction)
Which direction to take in the center of the staff.

positions (pair of numbers)
Pair of staff coordinates (left . right), where both left and right are in staff-space units of the current staff. For slurs, this value selects which slur candidate to use; if extreme positions are requested, the closest one is taken.

skip-quanting (boolean)
Should beam quanting be skipped?

X-positions (pair of numbers)
Pair of X staff coordinates of a spanner in the form (left . right), where both left and right are in staff-space units of the current staff.

Internal properties:

beam-segments (list)
Internal representation of beam segments.

covered-grobs (array of grobs)
Grobs that could potentially collide with a beam.

least-squares-dy (number)
The ideal beam slope, without damping.

normal-stems (array of grobs)
An array of visible stems.

quantized-positions (pair of numbers)
The beam positions after quanting.

shorten (dimension, in staff space)
The amount of space that a stem is shortened. Internally used to distribute beam shortening over stems.

stems (array of grobs)
An array of stem objects.

User settable properties:

thickness (number)
For grobs made up of lines, this is the thickness of the line. For slurs and ties, this is the distance between the two arcs of the curve’s outline at its thickest point, not counting the diameter of the virtual “pen” that draws the arcs. This property is expressed as a multiple of the current staff-line thickness (i.e. the visual output is influenced by changes to Staff.StaffSymbol.thickness).
Internal properties:

\textbf{delta-position} (number)
This is the vertical position difference.

This grob interface is used in the following graphical object(s): Section 3.1.20 [BendAfter], page 399.

3.2.14 break-alignable-interface
Object that is aligned on a break alignment.

User settable properties:

\textbf{break-align-symbols} (list)
A list of \textit{break-align symbols} that determines which breakable items to align this to. If the grob selected by the first symbol in the list is invisible due to \textit{break-visibility}, we will align to the next grob (and so on). Choices are listed in Section “break-alignment-interface” in Internals Reference.

\textbf{non-break-align-symbols} (list)
A list of symbols that determine which NON-break-aligned interfaces to align this to.

This grob interface is used in the following graphical object(s): Section 3.1.12 [BarNumber], page 392, Section 3.1.74 [MetronomeMark], page 466, and Section 3.1.92 [RehearsalMark], page 487.

3.2.15 break-aligned-interface
Breakable items.

User settable properties:

\textbf{break-align-anchor} (number)
Grobs aligned to this breakable item will have their X-offsets shifted by this number. In bar lines, for example, this is used to position grobs relative to the (visual) center of the bar line.

\textbf{break-align-anchor-alignment} (number)
Read by \texttt{ly:break-aligned-interface::calc-extent-aligned-anchor} for aligning an anchor to a grob’s extent.

\textbf{break-align-symbol} (symbol)
This key is used for aligning, ordering, and spacing breakable items. See Section “break-alignment-interface” in Internals Reference.

\textbf{space-alist} (list)
An alist that specifies distances from this grob to other breakable items, using the format:

```
'((break-align-symbol . (spacing-style . space))
 (break-align-symbol . (spacing-style . space))
 ...)
```

Standard choices for \textit{break-align-symbol} are listed in Section “break-alignment-interface” in Internals Reference. Additionally, three special break-align symbols available to \textit{space-alist} are:
**first-note**
used when the grob is just left of the first note on a line

**next-note**
used when the grob is just left of any other note; if not set, the value of **first-note** gets used

**right-edge**
used when the grob is the last item on the line (only compatible with the **extra-space** spacing style)

Choices for **spacing-style** are:

**extra-space**
Put this much space between the two grobs. The space is stretchable when paired with **first-note** or **next-note**; otherwise it is fixed.

**minimum-space**
Put at least this much space between the left sides of both grobs, without allowing them to collide. The space is stretchable when paired with **first-note** or **next-note**; otherwise it is fixed. Not compatible with **right-edge**.

**fixed-space**
Only compatible with **first-note** and **next-note**. Put this much fixed space between the grob and the note.

**minimum-fixed-space**
Only compatible with **first-note** and **next-note**. Put at least this much fixed space between the left side of the grob and the left side of the note, without allowing them to collide.

**semi-fixed-space**
Only compatible with **first-note** and **next-note**. Put this much space between the grob and the note, such that half of the space is fixed and half is stretchable.

Rules for this spacing are much more complicated than this. See [Wanske] page 126–134, [Ross] page 143–147.

This grob interface is used in the following graphical object(s): Section 3.1.5 [Ambitus], page 382, Section 3.1.6 [AmbitusAccidental], page 383, Section 3.1.11 [BarLine], page 388, Section 3.1.21 [BreakAlignGroup], page 400, Section 3.1.23 [BreathingSign], page 402, Section 3.1.25 [Clef], page 405, Section 3.1.30 [CueClef], page 411, Section 3.1.31 [CueEndClef], page 414, Section 3.1.32 [Custos], page 417, Section 3.1.35 [DoublePercentRepeat], page 420, Section 3.1.57 [KeyCancellation], page 446, Section 3.1.58 [KeySignature], page 448, Section 3.1.63 [LeftEdge], page 454, and Section 3.1.128 [TimeSignature], page 525.
3.2.16 break-alignment-interface

The object that performs break alignment.

Three interfaces deal specifically with break alignment:
1. break-alignment-interface (this one),
2. Section 3.2.14 [break-alignable-interface], page 556, and
3. Section 3.2.15 [break-aligned-interface], page 556.

Each of these interfaces supports grob properties that use break-align symbols, which are Scheme symbols that are used to specify the alignment, ordering, and spacing of certain notational elements ('breakable' items).

Available break-align symbols:
- ambitus
- breathing-sign
- clef
- cue-clef
- cue-end-clef
- custos
- key-cancellation
- key-signature
- left-edge
- staff-bar
- time-signature

User settable properties:

break-align-orders (vector)
   This is a vector of 3 lists: #(end-of-line unbroken start-of-line).
   Each list contains break-align symbols that specify an order of breakable items (see Section “break-alignment-interface” in Internals Reference).
   For example, this places time signatures before clefs:

\override Score.BreakAlignment.break-align-orders =
#(make-vector 3 '
(left-edge
   cue-end-clef
   ambitus
   breathing-sign
   time-signature
   clef
   cue-clef
   staff-bar
   key-cancellation
   key-signature
   custos))

Internal properties:

positioning-done (boolean)
   Used to signal that a positioning element did its job. This ensures that a positioning is only done once.

This grob interface is used in the following graphical object(s): Section 3.1.22 [BreakAlignment], page 400.
3.2.17 breathing-sign-interface
A breathing sign.

User settable properties:

- **direction** (direction)
  - If `side-axis` is 0 (or X), then this property determines whether the object is placed LEFT, CENTER or RIGHT with respect to the other object.
  - Otherwise, it determines whether the object is placed UP, CENTER or DOWN. Numerical values may also be used: UP=1, DOWN=-1, LEFT=-1, RIGHT=1, CENTER=0.

This grob interface is used in the following graphical object(s): Section 3.1.23 [BreathingSign], page 402.

3.2.18 chord-name-interface
A chord label (name or fretboard).

Internal properties:

- **begin-of-line-visible** (boolean)
  - Set to make ChordName or FretBoard be visible only at beginning of line or at chord changes.

This grob interface is used in the following graphical object(s): Section 3.1.24 [ChordName], page 404, and Section 3.1.47 [FretBoard], page 435.

3.2.19 clef-interface
A clef sign.

User settable properties:

- **full-size-change** (boolean)
  - Don’t make a change clef smaller.

- **glyph** (string)
  - A string determining what ‘style’ of glyph is typeset. Valid choices depend on the function that is reading this property.
  - In combination with (span) bar lines, it is a string resembling the bar line appearance in ASCII form.

- **glyph-name** (string)
  - The glyph name within the font.
  - In the context of (span) bar lines, `glyph-name` represents a processed form of `glyph`, where decisions about line breaking etc. are already taken.

- **non-default** (boolean)
  - Set for manually specified clefs and keys.

This grob interface is used in the following graphical object(s): Section 3.1.25 [Clef], page 405, Section 3.1.30 [CueClef], page 411, and Section 3.1.31 [CueEndClef], page 414.

3.2.20 clef-modifier-interface
The number describing transposition of the clef, placed below or above clef sign. Usually this is 8 (octave transposition) or 15 (two octaves), but LilyPond allows any integer here.
User settable properties:

**clef-alignments** (list)
   An alist of parent-alignments that should be used for clef modifiers with various clefs

This grob interface is used in the following graphical object(s): Section 3.1.26 [ClefModifier], page 407.

### 3.2.21 cluster-beacon-interface

A place holder for the cluster spanner to determine the vertical extents of a cluster spanner at this X position.

User settable properties:

**positions** (pair of numbers)
   Pair of staff coordinates (left, right), where both left and right are in staff-space units of the current staff. For slurs, this value selects which slur candidate to use; if extreme positions are requested, the closest one is taken.

This grob interface is used in the following graphical object(s): Section 3.1.28 [ClusterSpannerBeacon], page 409.

### 3.2.22 cluster-interface

A graphically drawn musical cluster.

- **padding** adds to the vertical extent of the shape (top and bottom).
- The property **style** controls the shape of cluster segments. Valid values include leftsided-stairs, rightsided-stairs, centered-stairs, and ramp.

User settable properties:

- **padding** (dimension, in staff space)
  Add this much extra space between objects that are next to each other.

- **style** (symbol)
  This setting determines in what style a grob is typeset. Valid choices depend on the stencil callback reading this property.

**Internal properties:**

- **columns** (array of grobs)
  An array of grobs, typically containing PaperColumn or NoteColumn objects.

This grob interface is used in the following graphical object(s): Section 3.1.27 [ClusterSpanner], page 409.

### 3.2.23 custos-interface

A custos object. **style** can have four valid values: mensural, vaticana, medicaea, and hufnagel. mensural is the default style.

User settable properties:

- **neutral-direction** (direction)
  Which direction to take in the center of the staff.
**neutral-position** (number)
  Position (in half staff spaces) where to flip the direction of custos stem.

**style** (symbol)
  This setting determines in what style a grob is typeset. Valid choices depend on the `stencil` callback reading this property.

This grob interface is used in the following graphical object(s): Section 3.1.32 [Custos], page 417.

### 3.2.24 dot-column-interface

Group dot objects so they form a column, and position dots so they do not clash with staff lines.

**User settable properties:**

- **chord-dots-limit** (integer)
  Limits the column of dots on each chord to the height of the chord plus `chord-dots-limit` staff-positions.

- **direction** (direction)
  If `side-axis` is 0 (or X), then this property determines whether the object is placed LEFT, CENTER or RIGHT with respect to the other object. Otherwise, it determines whether the object is placed UP, CENTER or DOWN. Numerical values may also be used: UP=1, DOWN=-1, LEFT=-1, RIGHT=1, CENTER=0.

**Internal properties:**

- **dots** (array of grobs)
  Multiple Dots objects.

- **note-collision** (graphical (layout) object)
  The NoteCollision object of a dot column.

- **positioning-done** (boolean)
  Used to signal that a positioning element did its job. This ensures that a positioning is only done once.

This grob interface is used in the following graphical object(s): Section 3.1.33 [DotColumn], page 419.

### 3.2.25 dots-interface

The dots to go with a notehead or rest. **direction** sets the preferred direction to move in case of staff line collisions. **style** defaults to undefined, which is normal 19th/20th century traditional style. Set **style** to `vaticana` for ancient type dots.

**User settable properties:**

- **direction** (direction)
  If `side-axis` is 0 (or X), then this property determines whether the object is placed LEFT, CENTER or RIGHT with respect to the other object. Otherwise, it determines whether the object is placed UP, CENTER or DOWN. Numerical values may also be used: UP=1, DOWN=-1, LEFT=-1, RIGHT=1, CENTER=0.

- **dot-count** (integer)
  The number of dots.
style (symbol)
This setting determines in what style a grob is typeset. Valid choices depend on the stencil callback reading this property.

This grob interface is used in the following graphical object(s): Section 3.1.34 [Dots], page 419.

3.2.26 dynamic-interface
Any kind of loudness sign.

This grob interface is used in the following graphical object(s): Section 3.1.38 [DynamicLineSpanner], page 424, Section 3.1.39 [DynamicText], page 425, Section 3.1.40 [DynamicTextSpanner], page 427, and Section 3.1.52 [Hairpin], page 440.

3.2.27 dynamic-line-spanner-interface
Dynamic line spanner.

User settable properties:

avoid-slur (symbol)
Method of handling slur collisions. Choices are inside, outside, around, and ignore. inside adjusts the slur if needed to keep the grob inside the slur. outside moves the grob vertically to the outside of the slur. around moves the grob vertically to the outside of the slur only if there is a collision. ignore does not move either. In grobs whose notational significance depends on vertical position (such as accidentals, clefs, etc.), outside and around behave like ignore.

This grob interface is used in the following graphical object(s): Section 3.1.38 [DynamicLineSpanner], page 424.

3.2.28 dynamic-text-interface
An absolute text dynamic.

User settable properties:

right-padding (dimension, in staff space)
Space to insert on the right side of an object (e.g., between note and its accidentals).

This grob interface is used in the following graphical object(s): Section 3.1.39 [DynamicText], page 425.

3.2.29 dynamic-text-spanner-interface
Dynamic text spanner.

User settable properties:

text (markup)
Text markup. See Section “Formatting text” in Notation Reference.

This grob interface is used in the following graphical object(s): Section 3.1.40 [DynamicTextSpanner], page 427.

3.2.30 enclosing-bracket-interface
Brackets alongside bass figures.
User settable properties:

- **bracket-flare** (pair of numbers)
  A pair of numbers specifying how much edges of brackets should slant outward. Value 0.0 means straight edges.

- **dashed-edge** (boolean)
  If set, the bracket edges are dashed like the rest of the bracket.

- **edge-height** (pair)
  A pair of numbers specifying the heights of the vertical edges: \((left-height, right-height)\).

- **padding** (dimension, in staff space)
  Add this much extra space between objects that are next to each other.

- **shorten-pair** (pair of numbers)
  The lengths to shorten on both sides a hairpin or text-spanner such as a pedal bracket. Positive values shorten the hairpin or text-spanner, while negative values lengthen it.

- **thickness** (number)
  For grobs made up of lines, this is the thickness of the line. For slurs and ties, this is the distance between the two arcs of the curve’s outline at its thickest point, not counting the diameter of the virtual “pen” that draws the arcs. This property is expressed as a multiple of the current staff-line thickness (i.e. the visual output is influenced by changes to \(Staff.StaffSymbol.thickness\)).

Internal properties:

- **elements** (array of grobs)
  An array of grobs; the type is depending on the grob where this is set in.

This grob interface is used in the following graphical object(s): Section 3.1.16 [BassFigure-Bracket], page 396.

**3.2.31 episema-interface**

An episema line.

This grob interface is used in the following graphical object(s): Section 3.1.41 [Episema], page 429.

**3.2.32 figured-bass-continuation-interface**

Simple extender line between bounds.

User settable properties:

- **padding** (dimension, in staff space)
  Add this much extra space between objects that are next to each other.

- **thickness** (number)
  For grobs made up of lines, this is the thickness of the line. For slurs and ties, this is the distance between the two arcs of the curve’s outline at its thickest point, not counting the diameter of the virtual “pen” that draws the arcs. This property is expressed as a multiple of the current staff-line thickness (i.e. the visual output is influenced by changes to \(Staff.StaffSymbol.thickness\)).
Internal properties:

figures (array of grobs)
   Figured bass objects for continuation line.

This grob interface is used in the following graphical object(s): Section 3.1.17 [BassFigure-Continuation], page 396.

3.2.33 finger-interface
A fingering instruction.

This grob interface is used in the following graphical object(s): Section 3.1.42 [Fingering], page 429.

3.2.34 fingering-column-interface
Makes sure that fingerings placed laterally do not collide and that they are flush if necessary.

User settable properties:

padding (dimension, in staff space)
   Add this much extra space between objects that are next to each other.

snap-radius (number)
   The maximum distance between two objects that will cause them to snap to alignment along an axis.

Internal properties:

positioning-done (boolean)
   Used to signal that a positioning element did its job. This ensures that a positioning is only done once.

This grob interface is used in the following graphical object(s): Section 3.1.43 [FingeringColumn], page 431.

3.2.35 flag-interface
A flag that gets attached to a stem. The style property is symbol determining what style of flag glyph is typeset on a Stem. Valid options include '()' for standard flags, 'mensural' and 'no-flag', which switches off the flag.

User settable properties:

glyph-name (string)
   The glyph name within the font.
   In the context of (span) bar lines, glyph-name represents a processed form of glyph, where decisions about line breaking etc. are already taken.

stroke-style (string)
   Set to "grace" to turn stroke through flag on.

style (symbol)
   This setting determines in what style a grob is typeset. Valid choices depend on the stencil callback reading this property.

This grob interface is used in the following graphical object(s): Section 3.1.44 [Flag], page 432.
3.2.36 font-interface

Any symbol that is typeset through fixed sets of glyphs, (i.e., fonts).

**User settable properties:**

- **font-encoding** (symbol)
  The font encoding is the broadest category for selecting a font. Currently, only LilyPond’s system fonts (Emmentaler) are using this property. Available values are `fetaMusic` (Emmentaler), `fetaBraces`, `fetaText` (Emmentaler).

- **font-family** (symbol)
  The font family is the broadest category for selecting text fonts. Options include: `sans`, `roman`.

- **font-features** (list)
  Opentype features.

- **font-name** (string)
  Specifies a file name (without extension) of the font to load. This setting overrides selection using `font-family`, `font-series` and `font-shape`.

- **font-series** (symbol)
  Select the series of a font. Choices include `medium`, `bold`, `bold-narrow`, etc.

- **font-shape** (symbol)
  Select the shape of a font. Choices include `upright`, `italic`, `caps`.

- **font-size** (number)
  The font size, compared to the ‘normal’ size. 0 is style-sheet’s normal size, -1 is smaller, +1 is bigger. Each step of 1 is approximately 12% larger; 6 steps are exactly a factor 2 larger. If the context property `fontSize` is set, its value is added to this before the glyph is printed. Fractional values are allowed.

**Internal properties:**

- **font** (font metric)
  A cached font metric object.

This grob interface is used in the following graphical object(s): Section 3.1.1 [Accidental], page 377, Section 3.1.2 [AccidentalCautionary], page 378, Section 3.1.4 [AccidentalSuggestion], page 380, Section 3.1.6 [AmbitusAccidental], page 383, Section 3.1.7 [AmbitusLine], page 384, Section 3.1.8 [AmbitusNoteHead], page 385, Section 3.1.9 [Arpeggio], page 386, Section 3.1.10 [BalloonTextItem], page 388, Section 3.1.11 [BarLine], page 388, Section 3.1.12 [BarNumber], page 392, Section 3.1.13 [BassFigure], page 394, Section 3.1.19 [Beam], page 397, Section 3.1.23 [BreathingSign], page 402, Section 3.1.24 [ChordName], page 404, Section 3.1.25 [Clef], page 405, Section 3.1.26 [ClefModifier], page 407, Section 3.1.29 [CombineTextScript], page 410, Section 3.1.30 [CueClef], page 411, Section 3.1.31 [CueEndClef], page 414, Section 3.1.32 [Custos], page 417, Section 3.1.34 [Dots], page 419, Section 3.1.35 [DoublePercentRepeat], page 420, Section 3.1.36 [DoublePercentRepeatCounter], page 421, Section 3.1.37 [DoubleRepeatSlash], page 423, Section 3.1.39 [DynamicText], page 425, Section 3.1.40 [DynamicTextSpanner], page 427, Section 3.1.41 [Episema], page 429, Section 3.1.42 [Fingering], page 429, Section 3.1.44 [Flag], page 432, Section 3.1.45 [FootnoteItem], page 433, Section 3.1.46 [FootnoteSpanner], page 434, Section 3.1.47 [FretBoard], page 435, Section 3.1.54 [HorizontalBracketText], page 442, Section 3.1.55 [InstrumentName], page 443, Section 3.1.56 [Intru-
3.2.37 footnote-interface
Make a footnote.

User settable properties:

- automatically-numbered (boolean)
  If set, footnotes are automatically numbered.

- footnote (boolean)
  Should this be a footnote or in-note?

- footnote-text (markup)
  A footnote for the grob.

Internal properties:

- numbering-assertion-function (any type)
  The function used to assert that footnotes are receiving correct automatic numbers.

This grob interface is used in the following graphical object(s): Section 3.1.45 [FootnoteItem], page 433, and Section 3.1.46 [FootnoteSpanner], page 434.

3.2.38 footnote-spanner-interface
Make a footnote spanner.

User settable properties:

- footnote-text (markup)
  A footnote for the grob.
Internal properties:

`spanner-placement` (direction)
The place of an annotation on a spanner. **LEFT** is for the first spanner, and **RIGHT** is for the last. **CENTER** will place it on the broken spanner that falls closest to the center of the length of the entire spanner, although this behavior is unpredictable in situations with lots of rhythmic diversity. For predictable results, use **LEFT** and **RIGHT**.

This grob interface is used in the following graphical object(s): Section 3.1.46 [FootnoteS-panner], page 434.

### 3.2.39 fret-diagram-interface

A fret diagram

User settable properties:

`align-dir` (direction)
Which side to align? -1: left side, 0: around center of width, 1: right side.

`dot-placement-list` (list)
List consisting of `{description string-number fret-number finger-number}` entries used to define fret diagrams.

`fret-diagram-details` (list)
An alist of detailed grob properties for fret diagrams. Each alist entry consists of a `(property . value)` pair. The properties which can be included in `fret-diagram-details` include the following:

- **barre-type** – Type of barre indication used. Choices include curved, straight, and none. Default curved.
- **capo-thickness** – Thickness of capo indicator, in multiples of fret-space. Default value 0.5.
- **dot-color** – Color of dots. Options include black and white. Default black.
- **dot-label-font-mag** – Magnification for font used to label fret dots. Default value 1.
- **dot-position** – Location of dot in fret space. Default 0.6 for dots without labels, 0.95 for labeled dots.
- **dot-radius** – Radius of dots, in terms of fret spaces. Default value 0.425 for labeled dots, 0.25 for unlabeled dots.
- **finger-code** – Code for the type of fingering indication used. Options include none, in-dot, and below-string. Default none for markup fret diagrams, below-string for FretBoards fret diagrams.
- **fret-count** – The number of frets. Default 4.
- **fret-distance** – Multiplier to adjust the distance between frets. Default 1.0.
- **fret-label-custom-format** – The format string to be used label the lowest fret number, when `number-type` equals to custom. Default "~a".
- **fret-label-font-mag** – The magnification of the font used to label the lowest fret number. Default 0.5.
• `fret-label-vertical-offset` – The offset of the fret label from the center of the fret in direction parallel to strings. Default 0.

• `fret-label-horizontal-offset` – The offset of the fret label from the center of the fret in direction orthogonal to strings. Default 0.

• `handedness` – Print the fret-diagram left- or right-handed. -1, `LEFT` for left; 1, `RIGHT` for right. Default `RIGHT`.

• `paren-padding` – The padding for the parenthesis. Default 0.05.

• `label-dir` – Side to which the fret label is attached. -1, `LEFT`, or `DOWN` for left or down; 1, `RIGHT`, or `UP` for right or up. Default `RIGHT`.

• `mute-string` – Character string to be used to indicate muted string. Default "x".

• `number-type` – Type of numbers to use in fret label. Choices include `roman-lower`, `roman-upper`, `arabic` and `custom`. In the later case, the format string is supplied by the `fret-label-custom-format` property. Default `roman-lower`.

• `open-string` – Character string to be used to indicate open string. Default "o".

• `orientation` – Orientation of fret-diagram. Options include `normal`, `landscape`, and `opposing-landscape`. Default `normal`.

• `string-count` – The number of strings. Default 6.

• `string-distance` – Multiplier to adjust the distance between strings. Default 1.0.

• `string-label-font-mag` – The magnification of the font used to label fingerings at the string, rather than in the dot. Default value 0.6 for `normal` orientation, 0.5 for `landscape` and `opposing-landscape`.

• `string-thickness-factor` – Factor for changing thickness of each string in the fret diagram. Thickness of string k is given by `thickness * (1+string-thickness-factor) ^ (k-1)`. Default 0.

• `top-fret-thickness` – The thickness of the top fret line, as a multiple of the standard thickness. Default value 3.

• `xo-font-magnification` – Magnification used for mute and open string indicators. Default value 0.5.

• `xo-padding` – Padding for open and mute indicators from top fret. Default value 0.25.

`size (number)`

The ratio of the size of the object to its default size.

`thickness (number)`

For grobs made up of lines, this is the thickness of the line. For slurs and ties, this is the distance between the two arcs of the curve's outline at its thickest point, not counting the diameter of the virtual "pen" that draws the arcs. This property is expressed as a multiple of the current staff-line thickness (i.e. the visual output is influenced by changes to `Staff.StaffSymbol.thickness`).

This grob interface is used in the following graphical object(s): Section 3.1.47 [FretBoard], page 435.
3.2.40 glissando-interface
A glissando.

Internal properties:

- **glissando-index** (integer)
  The index of a glissando in its note column.

This grob interface is used in the following graphical object(s): Section 3.1.48 [Glissando], page 437.

3.2.41 grace-spacing-interface
Keep track of durations in a run of grace notes.

User settable properties:

- **common-shortest-duration** (moment)
  The most common shortest note length. This is used in spacing. Enlarging this sets the score tighter.

Internal properties:

- **columns** (array of grobs)
  An array of grobs, typically containing PaperColumn or NoteColumn objects.

This grob interface is used in the following graphical object(s): Section 3.1.49 [GraceSpacing], page 438.

3.2.42 gregorian-ligature-interface
A gregorian ligature.

Internal properties:

- **ascendens** (boolean)
  Is this neume of ascending type?

- **auctum** (boolean)
  Is this neume liquescentically augmented?

- **cavum** (boolean)
  Is this neume outlined?

- **context-info** (integer)
  Within a ligature, the final glyph or shape of a head may be affected by the left and/or right neighbour head. context-info holds for each head such information about the left and right neighbour, encoded as a bit mask.

- **deminutum** (boolean)
  Is this neume diminished?

- **descendens** (boolean)
  Is this neume of descendent type?

- **inclinatum** (boolean)
  Is this neume an inclinatum?
linea (boolean)  
Attach vertical lines to this neume?

oriscus (boolean)  
Is this neume an oriscus?

pes-or-flexa (boolean)  
Shall this neume be joined with the previous head?

prefix-set (number)  
A bit mask that holds all Gregorian head prefixes, such as \virga or \quilisma.

quilisma (boolean)  
Is this neume a quilisma?

stropha (boolean)  
Is this neume a stropha?

virga (boolean)  
Is this neume a virga?

This grob interface is used in the following graphical object(s): Section 3.1.82 [NoteHead], page 477.

3.2.43 grid-line-interface
A line that is spanned between grid-points.

User settable properties:

  thickness (number)  
  For grobs made up of lines, this is the thickness of the line. For slurs and ties, this is the distance between the two arcs of the curve’s outline at its thickest point, not counting the diameter of the virtual “pen” that draws the arcs. This property is expressed as a multiple of the current staff-line thickness (i.e. the visual output is influenced by changes to Staff.StaffSymbol.thickness).

Internal properties:

  elements (array of grobs)  
  An array of grobs; the type is depending on the grob where this is set in.

This grob interface is used in the following graphical object(s): Section 3.1.50 [GridLine], page 438.

3.2.44 grid-point-interface
A spanning point for grid lines.

This grob interface is used in the following graphical object(s): Section 3.1.51 [GridPoint], page 439.

3.2.45 grob-interface
A grob represents a piece of music notation.

All grobs have an X and Y position on the page. These X and Y positions are stored in a relative format, thus they can easily be combined by stacking them, hanging one grob to the side of another, or coupling them into grouping objects.
Each grob has a reference point (a.k.a. parent): The position of a grob is stored relative to that reference point. For example, the X reference point of a staccato dot usually is the note head that it applies to. When the note head is moved, the staccato dot moves along automatically.

A grob is often associated with a symbol, but some grobs do not print any symbols. They take care of grouping objects. For example, there is a separate grob that stacks staves vertically. The Section 3.1.80 [NoteCollision], page 475, object is also an abstract grob: It only moves around chords, but doesn’t print anything.

Grobs have properties (Scheme variables) that can be read and set. Two types of them exist: immutable and mutable. Immutable variables define the default style and behavior. They are shared between many objects. They can be changed using \override and \revert. Mutable properties are variables that are specific to one grob. Typically, lists of other objects, or results from computations are stored in mutable properties. In particular, every call to ly:grob-set-property! (or its C++ equivalent) sets a mutable property.

The properties after-line-breaking and before-line-breaking are dummies that are not user-serviceable.

User settable properties:

- **after-line-breaking** (boolean)
  Dummy property, used to trigger callback for after-line-breaking.

- **avoid-slur** (symbol)
  Method of handling slur collisions. Choices are inside, outside, around, and ignore. inside adjusts the slur if needed to keep the grob inside the slur. outside moves the grob vertically to the outside of the slur. around moves the grob vertically to the outside of the slur only if there is a collision. ignore does not move either. In grobs whose notational significance depends on vertical position (such as accidentals, clefs, etc.), outside and around behave like ignore.

- **before-line-breaking** (boolean)
  Dummy property, used to trigger a callback function.

- **color** (color)
  The color of this grob.

- **extra-offset** (pair of numbers)
  A pair representing an offset. This offset is added just before outputting the symbol, so the typesetting engine is completely oblivious to it. The values are measured in staff-space units of the staff’s StaffSymbol.

- **footnote-music** (music)
  Music creating a footnote.

- **forced-spacing** (number)
  Spacing forced between grobs, used in various ligature engravers.

- **horizontal-skylines** (pair of skylines)
  Two skylines, one to the left and one to the right of this grob.

- **id** (string)
  An id string for the grob.

- **layer** (integer)
  An integer which determines the order of printing objects. Objects with the lowest value of layer are drawn first, then objects with progressively higher values are drawn, so objects with higher values overwrite objects
with lower values. By default most objects are assigned a layer value of 1.

**minimum-X-extent** (pair of numbers)
Minimum size of an object in X dimension, measured in \textit{staff-space} units.

**minimum-Y-extent** (pair of numbers)
Minimum size of an object in Y dimension, measured in \textit{staff-space} units.

**output-attributes** (list)
An alist of attributes for the grob, to be included in output files. When the SVG typesetting backend is used, the attributes are assigned to a group (\texttt{<g>}) containing all of the stencils that comprise a given grob. For example, '((id . 123) (class . foo) (data-whatever . "\bar") ) will produce \texttt{<g id=\"123\" class=\"foo\" data-whatever=\"\bar\"> ... </g>}. In the Postscript backend, where there is no way to group items, the setting of the output-attributes property will have no effect.

**parenthesis-friends** (list)
A list of Grob types, as symbols. When parentheses enclose a Grob that has 'parenthesis-friends, the parentheses widen to include any child Grobs with type among 'parenthesis-friends.

**rotation** (list)
Number of degrees to rotate this object, and what point to rotate around. For example, '(45 0 0) rotates by 45 degrees around the center of this object.

**skyline-horizontal-padding** (number)
For determining the vertical distance between two staves, it is possible to have a configuration which would result in a tight interleaving of grobs from the top staff and the bottom staff. The larger this parameter is, the farther apart the staves are placed in such a configuration.

**springs-and-rods** (boolean)
Dummy variable for triggering spacing routines.

**stencil** (stencil)
The symbol to print.

**transparent** (boolean)
This makes the grob invisible.

**vertical-skylines** (pair of skylines)
Two skylines, one above and one below this grob.

**whiteout** (boolean-or-number)
If a number or true, the grob is printed over a white background to white-out underlying material, if the grob is visible. A number indicates how far the white background extends beyond the bounding box of the grob as a multiple of the staff-line thickness. The \texttt{LyricHyphen} grob uses a special implementation of whiteout: A positive number indicates how far the white background extends beyond the bounding box in multiples of \texttt{line-thickness}. The shape of the background is determined by \texttt{whiteout-style}. Usually \texttt{#f} by default.
whiteout-style (symbol)
Determines the shape of the whiteout background. Available are
‘outline’, ‘rounded-box’, and the default ‘box’. There is one excep-
tion: Use ‘special’ for LyricHyphen.

X-extent (pair of numbers)
Extent (size) in the X direction, measured in staff-space units, relative
to object’s reference point.

X-offset (number)
The horizontal amount that this object is moved relative to its X-parent.

Y-extent (pair of numbers)
Extent (size) in the Y direction, measured in staff-space units, relative
to object’s reference point.

Y-offset (number)
The vertical amount that this object is moved relative to its Y-parent.

Internal properties:

axis-group-parent-X (graphical (layout) object)
Containing X axis group.

axis-group-parent-Y (graphical (layout) object)
Containing Y axis group.

cause (any type)
Any kind of causation objects (i.e., music, or perhaps translator) that
was the cause for this grob.

cross-staff (boolean)
True for grobs whose Y-extent depends on inter-staff spacing. The
extent is measured relative to the grobs’s parent staff (more gener-
ally, its VerticalAxisGroup) so this boolean flags grobs that are not
rigidly fixed to their parent staff. Beams that join notes from two
staves are cross-staff. Grobs that are positioned around such beams
are also cross-staff. Grobs that are grouping objects, however, like
VerticalAxisGroups will not in general be marked cross-staff when
some of the members of the group are cross-staff.

interfaces (list)
A list of symbols indicating the interfaces supported by this object. It
is initialized from the meta field.

meta (list) Provide meta information. It is an list with the entries name and
interfaces.

pure-Y-offset-in-progress (boolean)
A debugging aid for catching cyclic dependencies.

staff-symbol (graphical (layout) object)
The staff symbol grob that we are in.

This grob interface is used in the following graphical object(s): Section 3.1.1 [Accidental],
page 377, Section 3.1.2 [AccidentalCautionary], page 378, Section 3.1.3 [AccidentalPlacement],
page 379, Section 3.1.4 [AccidentalSuggestion], page 380, Section 3.1.5 [Ambitus], page 382,
Section 3.1.6 [AmbitusAccidental], page 383, Section 3.1.7 [AmbitusLine], page 384,
Section 3.1.8 [AmbitusNoteHead], page 385, Section 3.1.9 [Arpeggio], page 386, Section 3.1.10
[BalloonTextItem], page 388, Section 3.1.11 [BarLine], page 388, Section 3.1.12 [BarNumber],
page 392, Section 3.1.13 [BassFigure], page 394, Section 3.1.14 [BassFigureAlignment], page 394,
Section 3.1.15 [BassFigureAlignmentPositioning], page 395, Section 3.1.16 [BassFigureBracket],
page 396, Section 3.1.17 [BassFigureContinuation], page 396, Section 3.1.18 [BassFigureLine],
page 396, Section 3.1.19 [Beam], page 397, Section 3.1.20 [BendAfter], page 399, Section 3.1.21
[BreakAlignGroup], page 400, Section 3.1.22 [BreakAlignment], page 400, Section 3.1.23
[BreathingSign], page 402, Section 3.1.24 [ChordName], page 404, Section 3.1.25 [Clef],
page 405, Section 3.1.26 [ClefModifier], page 407, Section 3.1.27 [ClusterSpanner], page 409,
Section 3.1.28 [ClusterSpannerBeacon], page 409, Section 3.1.29 [CombineTextScript], page 410,
Section 3.1.30 [CueClef], page 411, Section 3.1.31 [CueEndClef], page 414, Section 3.1.32
[Custos], page 417, Section 3.1.33 [DotColumn], page 419, Section 3.1.34 [Dots], page 419,
Section 3.1.35 [DoublePercentRepeat], page 420, Section 3.1.36 [DoublePercentRepeatCounter],
page 421, Section 3.1.37 [DoubleRepeatSlash], page 423, Section 3.1.38 [DynamicLineSpanner],
page 424, Section 3.1.39 [DynamicText], page 425, Section 3.1.40 [DynamicTextSpanner],
page 427, Section 3.1.41 [Episema], page 429, Section 3.1.42 [Fingering], page 429, Section 3.1.43
[FingeringColumn], page 431, Section 3.1.44 [Flag], page 432, Section 3.1.45 [FootnoteItem],
page 433, Section 3.1.46 [FootnoteSpanner], page 434, Section 3.1.47 [Fretboard], page 435,
Section 3.1.48 [Glissando], page 437, Section 3.1.49 [GraceSpacing], page 438, Section 3.1.50
[GridLine], page 438, Section 3.1.51 [GridPoint], page 439, Section 3.1.52 [Hairpin], page 440,
Section 3.1.53 [HorizontalBracket], page 441, Section 3.1.54 [HorizontalBracketText],
page 442, Section 3.1.55 [InstrumentName], page 443, Section 3.1.56 [InstrumentSwitch],
page 444, Section 3.1.57 [KeyCancellation], page 446, Section 3.1.58 [KeySignature], page 448,
Section 3.1.59 [KievanLigature], page 451, Section 3.1.60 [LaissezVibrerTie], page 452,
Section 3.1.61 [LaissezVibrerTieColumn], page 453, Section 3.1.62 [LedgerLineSpanner],
page 453, Section 3.1.63 [LeftEdge], page 454, Section 3.1.64 [LigatureBracket], page 456,
Section 3.1.65 [LyricExtender], page 458, Section 3.1.66 [LyricHyphen], page 458, Section 3.1.67
[LyricSpace], page 459, Section 3.1.68 [LyricText], page 460, Section 3.1.69 [MeasureCounter],
page 462, Section 3.1.70 [MeasureGrouping], page 463, Section 3.1.71 [MeasureSpanner],
page 464, Section 3.1.72 [MelodyItem], page 465, Section 3.1.73 [MensuralLigature], page 466,
Section 3.1.74 [MetronomeMark], page 466, Section 3.1.75 [MultiMeasureRest], page 468,
Section 3.1.76 [MultiMeasureRestNumber], page 469, Section 3.1.77 [MultiMeasureRestScript],
page 471, Section 3.1.78 [MultiMeasureRestText], page 472, Section 3.1.79 [NonMusicalPa-
perColumn], page 474, Section 3.1.80 [NoteCollision], page 475, Section 3.1.81 [NoteColumn],
page 476, Section 3.1.82 [NoteHead], page 477, Section 3.1.83 [NoteName], page 478,
Section 3.1.84 [NoteSpacing], page 478, Section 3.1.85 [OttavaBracket], page 479, Section 3.1.86
[PaperColumn], page 480, Section 3.1.87 [ParenthesesItem], page 481, Section 3.1.88
[PercentRepeat], page 482, Section 3.1.89 [PercentRepeatCounter], page 483, Section 3.1.90
[PhrasingSlur], page 484, Section 3.1.91 [PianoPedalBracket], page 486, Section 3.1.92
[RehearsalMark], page 487, Section 3.1.93 [RepeatSlash], page 489, Section 3.1.94 [RepeatTie],
page 490, Section 3.1.95 [RepeatTieColumn], page 491, Section 3.1.96 [Rest], page 491,
Section 3.1.97 [RestCollision], page 492, Section 3.1.98 [Script], page 493, Section 3.1.99
[ScriptColumn], page 494, Section 3.1.100 [ScriptRow], page 494, Section 3.1.101 [Shur],
page 494, Section 3.1.102 [SostenutoPedal], page 497, Section 3.1.103 [SostenutoPedalLineSpanner],
page 498, Section 3.1.104 [SpacingSpanner], page 499, Section 3.1.105 [SpanBar], page 500, Section 3.1.106 [SpanBarStub], page 501, Section 3.1.107 [StaffGrouper],
page 501, Section 3.1.108 [StaffSpacing], page 502, Section 3.1.109 [StaffSymbol], page 503,
Section 3.1.110 [StanzaNumber], page 503, Section 3.1.111 [Stem], page 504, Section 3.1.112
[StemStub], page 506, Section 3.1.113 [StemTremolo], page 507, Section 3.1.114 [StringNumber],
page 508, Section 3.1.115 [StrokeFinger], page 510, Section 3.1.116 [SustainPedal], page 511,
Section 3.1.117 [SustainPedalLineSpanner], page 512, Section 3.1.118 [System], page 513,
Section 3.1.119 [SystemStartBar], page 514, Section 3.1.120 [SystemStartBracket], page 515,
Section 3.1.121 [SystemStartSquare], page 516, Section 3.1.122 [SystemStartSquare], page 517,
3.2.46 hairpin-interface

A hairpin crescendo or decrescendo.

User settable properties:

- **bound-padding** (number)
  The amount of padding to insert around spanner bounds.

- **broken-bound-padding** (number)
  The amount of padding to insert when a spanner is broken at a line break.

- **circled-tip** (boolean)
  Put a circle at start/end of hairpins (al/del niente).

- **grow-direction** (direction)
  Crescendo or decrescendo?

- **height** (dimension, in staff space)
  Height of an object in staff-space units.

- **shorten-pair** (pair of numbers)
  The lengths to shorten on both sides a hairpin or text-spanner such as a pedal bracket. Positive values shorten the hairpin or text-spanner, while negative values lengthen it.

Internal properties:

- **adjacent-spanners** (array of grobs)
  An array of directly neighboring dynamic spanners.

- **concurrent-hairpins** (array of grobs)
  All concurrent hairpins.

This grob interface is used in the following graphical object(s): Section 3.1.52 [Hairpin], page 440.

3.2.47 hara-kiri-group-spanner-interface

A group spanner that keeps track of interesting items. If it doesn’t contain any after line breaking, it removes itself and all its children. Greater control can be exercised via `remove-layer` which can prioritize layers so only the lowest-numbered non-empty layer is retained; make the layer independent of the group; or make it dependent on any other member of the group
User settable properties:

- **remove-empty** (boolean)
  If set, remove group if it contains no interesting items.

- **remove-first** (boolean)
  Remove the first staff of an orchestral score?

- **remove-layer** (index or symbol)
  When set as a positive integer, the `Keep_alive_together_engraver` removes all `VerticalAxisGroup` grobs with a `remove-layer` larger than the smallest retained `remove-layer`. Set to #f to make a layer independent of the `Keep_alive_together_engraver`. Set to () , the layer does not participate in the layering decisions. The property can also be set as a symbol for common behaviors: #'any to keep the layer alive with any other layer in the group; #'above or #'below to keep the layer alive with the context immediately before or after it, respectively.

Internal properties:

- **important-column-ranks** (vector)
  A cache of columns that contain `items-worth-living` data.

- **items-worth-living** (array of grobs)
  An array of interesting items. If empty in a particular staff, then that staff is erased.

- **keep-alive-with** (array of grobs)
  An array of other `VerticalAxisGroup` s. If any of them are alive, then we will stay alive.

- **make-dead-when** (array of grobs)
  An array of other `VerticalAxisGroup` s. If any of them are alive, then we will turn dead.

This grob interface is used in the following graphical object(s): Section 3.1.139 [VerticalAxisGroup], page 538.

### 3.2.48 horizontal-bracket-interface

A horizontal bracket encompassing notes.

User settable properties:

- **bracket-flare** (pair of numbers)
  A pair of numbers specifying how much edges of brackets should slant outward. Value 0.0 means straight edges.

- **connect-to-neighbor** (pair)
  Pair of booleans, indicating whether this grob looks as a continued break.

- **dashed-edge** (boolean)
  If set, the bracket edges are dashed like the rest of the bracket.

- **edge-height** (pair)
  A pair of numbers specifying the heights of the vertical edges: (left-height . right-height).
shorten-pair (pair of numbers)
   The lengths to shorten on both sides a hairpin or text-spanner such as a pedal bracket. Positive values shorten the hairpin or text-spanner, while negative values lengthen it.

Internal properties:

   bracket-text (graphical (layout) object)
      The text for an analysis bracket.

   columns (array of grobs)
      An array of grobs, typically containing PaperColumn or NoteColumn objects.

This grob interface is used in the following graphical object(s): Section 3.1.53 [HorizontalBracket], page 441, Section 3.1.85 [OttavaBracket], page 479, and Section 3.1.141 [VoltaBracket], page 541.

3.2.49 horizontal-bracket-text-interface
Label for an analysis bracket.

Internal properties:

   bracket (graphical (layout) object)
      The bracket for a number.

   columns (array of grobs)
      An array of grobs, typically containing PaperColumn or NoteColumn objects.

This grob interface is used in the following graphical object(s): Section 3.1.54 [HorizontalBracketText], page 442.

3.2.50 inline-accidental-interface
An inlined accidental (i.e. normal accidentals, cautionary accidentals).

This grob interface is used in the following graphical object(s): Section 3.1.1 [Accidental], page 377, Section 3.1.2 [AccidentalCautionary], page 378, and Section 3.1.129 [TrillPitchAccidental], page 528.

3.2.51 instrument-specific-markup-interface
Instrument-specific markup (like fret boards or harp pedal diagrams).

User settable properties:

   fret-diagram-details (list)
      An alist of detailed grob properties for fret diagrams. Each alist entry consists of a (property . value) pair. The properties which can be included in fret-diagram-details include the following:
      • barre-type – Type of barre indication used. Choices include curved, straight, and none. Default curved.
      • capo-thickness – Thickness of capo indicator, in multiples of fret-space. Default value 0.5.
      • dot-color – Color of dots. Options include black and white. Default black.
- **dot-label-font-mag** – Magnification for font used to label fret dots. Default value 1.
- **dot-position** – Location of dot in fret space. Default 0.6 for dots without labels, 0.95 * dot-radius for dots with labels.
- **dot-radius** – Radius of dots, in terms of fret spaces. Default value 0.425 for labeled dots, 0.25 for unlabeled dots.
- **finger-code** – Code for the type of fingering indication used. Options include none, in-dot, and below-string. Default none for markup fret diagrams, below-string for FretBoards fret diagrams.
- **fret-count** – The number of frets. Default 4.
- **fret-distance** – Multiplier to adjust the distance between frets. Default 1.0.
- **fret-label-custom-format** – The format string to be used label the lowest fret number, when number-type equals to custom. Default "~a".
- **fret-label-font-mag** – The magnification of the font used to label the lowest fret number. Default 0.5.
- **fret-label-vertical-offset** – The offset of the fret label from the center of the fret in direction parallel to strings. Default 0.
- **fret-label-horizontal-offset** – The offset of the fret label from the center of the fret in direction orthogonal to strings. Default 0.
- **handedness** – Print the fret-diagram left- or right-handed. -1, LEFT for left ; 1, RIGHT for right. Default RIGHT.
- **paren-padding** – The padding for the parenthesis. Default 0.05.
- **label-dir** – Side to which the fret label is attached. -1, LEFT, or DOWN for left or down; 1, RIGHT, or UP for right or up. Default RIGHT.
- **mute-string** – Character string to be used to indicate muted string. Default "x".
- **number-type** – Type of numbers to use in fret label. Choices include roman-lower, roman-upper, arabic and custom. In the later case, the format string is supplied by the fret-label-custom-format property. Default roman-lower.
- **open-string** – Character string to be used to indicate open string. Default "o".
- **orientation** – Orientation of fret-diagram. Options include normal, landscape, and opposing-landscape. Default normal.
- **string-count** – The number of strings. Default 6.
- **string-distance** – Multiplier to adjust the distance between strings. Default 1.0.
- **string-label-font-mag** – The magnification of the font used to label fingerings at the string, rather than in the dot. Default value 0.6 for normal orientation, 0.5 for landscape and opposing-landscape.
- **string-thickness-factor** – Factor for changing thickness of each string in the fret diagram. Thickness of string \( k \) is given by \( \text{thickness} \ast (1 \ast \text{string-thickness-factor}) ^ { (k-1)} \). Default 0.
• **top-fret-thickness** – The thickness of the top fret line, as a multiple of the standard thickness. Default value 3.

• **xo-font-magnification** – Magnification used for mute and open string indicators. Default value 0.5.

• **xo-padding** – Padding for open and mute indicators from top fret. Default value 0.25.

**graphical** (boolean)
Display in graphical (vs. text) form.

**harp-pedal-details** (list)
An alist of detailed grob properties for harp pedal diagrams. Each alist entry consists of a (**property**, **value**) pair. The properties which can be included in harp-pedal-details include the following:

• **box-offset** – Vertical shift of the center of flat/sharp pedal boxes above/below the horizontal line. Default value 0.8.

• **box-width** – Width of each pedal box. Default value 0.4.

• **box-height** – Height of each pedal box. Default value 1.0.

• **space-before-divider** – Space between boxes before the first divider (so that the diagram can be made symmetric). Default value 0.8.

• **space-after-divider** – Space between boxes after the first divider. Default value 0.8.

• **circle-thickness** – Thickness (in unit of the line-thickness) of the ellipse around circled pedals. Default value 0.5.

• **circle-x-padding** – Padding in X direction of the ellipse around circled pedals. Default value 0.15.

• **circle-y-padding** – Padding in Y direction of the ellipse around circled pedals. Default value 0.2.

**size** (number)
The ratio of the size of the object to its default size.

**thickness** (number)
For grobs made up of lines, this is the thickness of the line. For slurs and ties, this is the distance between the two arcs of the curve’s outline at its thickest point, not counting the diameter of the virtual “pen” that draws the arcs. This property is expressed as a multiple of the current staff-line thickness (i.e., the visual output is influenced by changes to `Staff.StaffSymbol.thickness`).

This grob interface is used in the following graphical object(s): Section 3.1.124 [TextScript], page 519.

### 3.2.52 item-interface

Grobs can be distinguished in their role in the horizontal spacing. Many grobs define constraints on the spacing by their sizes, for example, note heads, clefs, stems, and all other symbols with a fixed shape. These grobs form a subtype called **Item**.

Some items need special treatment for line breaking. For example, a clef is normally only printed at the start of a line (i.e., after a line break). To model this, ‘breakable’ items (clef, key signature, bar lines, etc.) are copied twice. Then we have three versions of each breakable item: one version if there is no line break, one version that is printed before the line break (at the end of a system), and one version that is printed after the line break.
Whether these versions are visible and take up space is determined by the outcome of the `break-visibility` grob property, which is a function taking a direction (-1, 0 or 1) as an argument. It returns a cons of booleans, signifying whether this grob should be transparent and have no extent.

The following variables for `break-visibility` are predefined:

<table>
<thead>
<tr>
<th>grob will show:</th>
<th>before</th>
<th>break</th>
<th>after</th>
</tr>
</thead>
<tbody>
<tr>
<td>all-invisible</td>
<td>no</td>
<td>no</td>
<td>no</td>
</tr>
<tr>
<td>begin-of-line-visible</td>
<td>no</td>
<td>no</td>
<td>yes</td>
</tr>
<tr>
<td>end-of-line-visible</td>
<td>yes</td>
<td>no</td>
<td>no</td>
</tr>
<tr>
<td>all-visible</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>begin-of-line-invisible</td>
<td>yes</td>
<td>yes</td>
<td>no</td>
</tr>
<tr>
<td>end-of-line-invisible</td>
<td>no</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>center-invisible</td>
<td>yes</td>
<td>no</td>
<td>yes</td>
</tr>
</tbody>
</table>

User settable properties:

- **break-visibility** (vector)
  - A vector of 3 booleans, `#(end-of-line unbroken begin-of-line)`. #t means visible, #f means killed.

- **extra-spacing-height** (pair of numbers)
  - In the horizontal spacing problem, we increase the height of each item by this amount (by adding the ‘car’ to the bottom of the item and adding the ‘cdr’ to the top of the item). In order to make a grob infinitely high (to prevent the horizontal spacing problem from placing any other grobs above or below this grob), set this to `(-inf.0 . +inf.0)`.

- **extra-spacing-width** (pair of numbers)
  - In the horizontal spacing problem, we pad each item by this amount (by adding the ‘car’ on the left side of the item and adding the ‘cdr’ on the right side of the item). In order to make a grob take up no horizontal space at all, set this to `(+inf.0 . -inf.0)`.

- **non-musical** (boolean)
  - True if the grob belongs to a `NonMusicalPaperColumn`.

This grob interface is used in the following graphical object(s): Section 3.1.1 [Accidental], page 377, Section 3.1.2 [AccidentalCautionary], page 378, Section 3.1.3 [AccidentalPlacement], page 379, Section 3.1.4 [AccidentalSuggestion], page 380, Section 3.1.5 [Ambitus], page 382, Section 3.1.6 [AmbitusAccidental], page 383, Section 3.1.7 [AmbitusLine], page 384, Section 3.1.8 [AmbitusNoteHead], page 385, Section 3.1.9 [Arpeggio], page 386, Section 3.1.10 [BalloonTextItem], page 388, Section 3.1.11 [BarLine], page 388, Section 3.1.12 [BarNumber], page 392, Section 3.1.13 [BassFigure], page 394, Section 3.1.16 [BassFigureBracket], page 396, Section 3.1.21 [BreakAlignGroup], page 400, Section 3.1.22 [BreakAlignment], page 400, Section 3.1.23 [BreathingSign], page 402, Section 3.1.24 [ChordName], page 404, Section 3.1.25 [Clef], page 405, Section 3.1.26 [ClefModifier], page 407, Section 3.1.28 [ClusterSpannerBeacon], page 409, Section 3.1.29 [CombineTextScript], page 410, Section 3.1.30 [CueClef], page 411, Section 3.1.31 [CueEndClef], page 414, Section 3.1.32 [Custos], page 417, Section 3.1.33 [DotColumn], page 419, Section 3.1.34 [Dots], page 419, Section 3.1.35 [DoublePercentRepeat], page 420, Section 3.1.36 [DoublePercentRepeatCounter], page 421, Section 3.1.37 [DoubleRepeatSlash], page 423, Section 3.1.39 [DynamicText], page 425, Section 3.1.42 [Fingering], page 429, Section 3.1.43 [FingeringColumn], page 431, Section 3.1.44 [Flag], page 432, Section 3.1.45 [FootnoteItem], page 433, Section 3.1.47 [FretBoard], page 435, Section 3.1.50
3.2.53 key-cancellation-interface

A key cancellation.

This grob interface is used in the following graphical object(s): Section 3.1.57 [KeyCancellation], page 446.

3.2.54 key-signature-interface

A group of accidentals, to be printed as signature sign.

User settable properties:

alteration-alist (list)

List of (pitch . accidental) pairs for key signature.

flat-positions (list)

Flats in key signatures are placed within the specified ranges of staff-positions. The general form is a list of pairs, with one pair for each type of clef, in order of the staff-position at which each clef places C: (alto treble tenor soprano baritone mezzosoprano bass). If the list contains a single element it applies for all clefs. A single number in place of a pair sets accidentals within the octave ending at that staff-position.

glyph-name-alist (list)

An alist of key-string pairs.

non-default (boolean)

Set for manually specified clefs and keys.

padding (dimension, in staff space)

Add this much extra space between objects that are next to each other.

padding-pairs (list)

An alist mapping (name . name) to distances.
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**3.2.55 kievan-ligature-interface**
A kievan ligature.

**User settable properties:**
- **padding** (dimension, in staff space)
  Add this much extra space between objects that are next to each other.

**Internal properties:**
- **primitive** (integer)
  A pointer to a ligature primitive, i.e., an item similar to a note head that is part of a ligature.

This grob interface is used in the following graphical object(s): Section 3.1.59 [KievanLigature], page 451.

**3.2.56 ledger-line-spanner-interface**
This spanner draws the ledger lines of a staff. This is a separate grob because it has to process all potential collisions between all note heads. The thickness of ledger lines is controlled by the **ledger-line-thickness** property of the Section 3.1.109 [StaffSymbol], page 503, grob.

**User settable properties:**
- **gap** (dimension, in staff space)
  Size of a gap in a variable symbol.
- **length-fraction** (number)
  Multiplier for lengths. Used for determining ledger lines and stem lengths.
- **minimum-length-fraction** (number)
  Minimum length of ledger line as fraction of note head size.

**Internal properties:**
- **note-heads** (array of grobs)
  An array of note head grobs.

This grob interface is used in the following graphical object(s): Section 3.1.62 [LedgerLineSpanner], page 453.
3.2.57 ledgered-interface

Objects that need ledger lines, typically note heads. See also Section 3.2.56 [ledger-line-spanner-interface], page 582.

**User settable properties:**

```plaintext
no-ledgers (boolean)
  If set, don't draw ledger lines on this object.
```

This grob interface is used in the following graphical object(s): Section 3.1.8 [AmbitusNoteHead], page 385, Section 3.1.82 [NoteHead], page 477, and Section 3.1.131 [TrillPitchHead], page 530.

3.2.58 ligature-bracket-interface

A bracket indicating a ligature in the original edition.

**User settable properties:**

```plaintext
height (dimension, in staff space)
  Height of an object in staff-space units.

thickness (number)
  For grobs made up of lines, this is the thickness of the line. For slurs and ties, this is the distance between the two arcs of the curve's outline at its thickest point, not counting the diameter of the virtual “pen” that draws the arcs. This property is expressed as a multiple of the current staff-line thickness (i.e. the visual output is influenced by changes to `Staff.StaffSymbol.thickness`).

width (dimension, in staff space)
  The width of a grob measured in staff space.
```

This grob interface is not used in any graphical object.

3.2.59 ligature-head-interface

A note head that can become part of a ligature.

This grob interface is used in the following graphical object(s): Section 3.1.82 [NoteHead], page 477.

3.2.60 ligature-interface

A ligature.

This grob interface is not used in any graphical object.

3.2.61 line-interface

Generic line objects. Any object using lines supports this. The property `style` can be line, dashed-line, trill, dotted-line, zigzag or none (a transparent line).

For dashed-line, the length of the dashes is tuned with `dash-fraction`. If the latter is set to 0, a dotted line is produced.

**User settable properties:**

```plaintext
arrow-length (number)
  Arrow length.

arrow-width (number)
  Arrow width.
```
**dash-fraction** (number)
Size of the dashes, relative to **dash-period**. Should be between 0.1 and 1.0 (continuous line). If set to 0.0, a dotted line is produced.

**dash-period** (number)
The length of one dash together with whitespace. If negative, no line is drawn at all.

**style** (symbol)
This setting determines in what style a grob is typeset. Valid choices depend on the **stencil** callback reading this property.

**thickness** (number)
For grobs made up of lines, this is the thickness of the line. For slurs and ties, this is the distance between the two arcs of the curve’s outline at its thickest point, not counting the diameter of the virtual “pen” that draws the arcs. This property is expressed as a multiple of the current staff-line thickness (i.e. the visual output is influenced by changes to `Staff.StaffSymbol.thickness`).

**zigzag-length** (dimension, in staff space)
The length of the lines of a zigzag, relative to **zigzag-width**. A value of 1 gives 60-degree zigzags.

**zigzag-width** (dimension, in staff space)
The width of one zigzag squiggle. This number is adjusted slightly so that the glissando line can be constructed from a whole number of squiggles.

This grob interface is used in the following graphical object(s): Section 3.1.40 [DynamicTextSpanner], page 427, Section 3.1.41 [Episema], page 429, Section 3.1.48 [Glissando], page 437, Section 3.1.52 [Hairpin], page 440, Section 3.1.53 [HorizontalBracket], page 441, Section 3.1.64 [LigatureBracket], page 456, Section 3.1.71 [MeasureSpanner], page 464, Section 3.1.85 [OttavaBracket], page 479, Section 3.1.91 [PianoPedalBracket], page 486, Section 3.1.125 [TextSpanner], page 521, Section 3.1.132 [TrillSpanner], page 531, Section 3.1.133 [TupletBracket], page 532, Section 3.1.140 [VoiceFollower], page 540, Section 3.1.141 [VoltaBracket], page 541, and Section 3.1.143 [VowelTransition], page 544.

3.2.62 line-spanner-interface
Generic line drawn between two objects, e.g., for use with glissandi.

**bound-details** is a nested alist. It’s possible to specify settings for the sub-properties: **left**, **left-broken**, **right** and **right-broken**.

Values for the following keys may be set:

**Y**
Sets the Y coordinate of the end point, in staff-spaces offset from the staff center line. By default, it is the center of the bound object, so a glissando points to the vertical center of the note head. For horizontal spanners, such as text spanners and trill spanners, it is hardcoded to 0.

**attach-dir**
Determines where the line starts and ends in the X direction, relative to the bound object. So, a value of -1 (or **LEFT**) makes the line start/end at the left side of the note head it is attached to.

**X**
This is the absolute X coordinate of the end point. Usually computed on the fly.

**stencil**
Line spanners may have symbols at the beginning or end, which is contained in this sub-property. For internal use.
A markup that is evaluated to yield the stencil.

`stencil-align-dir-y` 
Without setting one of these, the stencil is simply put at the end-point, centered on the line, as defined by the X and Y sub-properties. Setting `stencil-align-dir-y` moves the symbol at the edge vertically relative to the end point of the line. With `stencil-offset`, expecting a number pair, the stencil is moved along the X axis according to the first value, the second value moves the stencil along the Y axis.

`arrow` 
Produces an arrowhead at the end-points of the line.

`padding` 
Controls the space between the specified end point of the line and the actual end. Without padding, a glissando would start and end in the center of each note head.

**User settable properties:**

- `bound-details` (list) 
  An alist of properties for determining attachments of spanners to edges.

- `extra-dy` (number) 
  Slope glissandi this much extra.

- `gap` (dimension, in staff space) 
  Size of a gap in a variable symbol.

- `left-bound-info` (list) 
  An alist of properties for determining attachments of spanners to edges.

- `right-bound-info` (list) 
  An alist of properties for determining attachments of spanners to edges.

- `simple-Y` (boolean) 
  Should the Y placement of a spanner disregard changes in system heights?

- `thickness` (number) 
  For grobs made up of lines, this is the thickness of the line. For slurs and ties, this is the distance between the two arcs of the curve’s outline at its thickest point, not counting the diameter of the virtual “pen” that draws the arcs. This property is expressed as a multiple of the current staff-line thickness (i.e. the visual output is influenced by changes to `Staff.StaffSymbol.thickness`).

- `to-barline` (boolean) 
  If true, the spanner will stop at the bar line just before it would otherwise stop.

**Internal properties:**

- `note-columns` (array of grobs) 
  An array of `NoteColumn` grobs.

This grob interface is used in the following graphical object(s): Section 3.1.40 [DynamicTextSpanner], page 427, Section 3.1.41 [Episema], page 429, Section 3.1.48 [Glissando], page 437, Section 3.1.125 [TextSpanner], page 521, Section 3.1.132 [TrillSpanner], page 531, Section 3.1.140 [VoiceFollower], page 540, and Section 3.1.143 [VowelTransition], page 544.

### 3.2.63 lyric-extender-interface

The extender is a simple line at the baseline of the lyric that helps show the length of a melisma (a tied or slurred note).
User settable properties:

- **left-padding** (dimension, in staff space)
  The amount of space that is put left to an object (e.g., a lyric extender).

- **next** (graphical (layout) object)
  Object that is next relation (e.g., the lyric syllable following an extender).

- **right-padding** (dimension, in staff space)
  Space to insert on the right side of an object (e.g., between note and its accidentals).

- **thickness** (number)
  For grobs made up of lines, this is the thickness of the line. For slurs and ties, this is the distance between the two arcs of the curve’s outline at its thickest point, not counting the diameter of the virtual “pen” that draws the arcs. This property is expressed as a multiple of the current staff-line thickness (i.e. the visual output is influenced by changes to `Staff.StaffSymbol.thickness`).

Internal properties:

- **heads** (array of grobs)
  An array of note heads.

  This grob interface is used in the following graphical object(s): Section 3.1.65 [LyricExtender], page 458.

### 3.2.64 lyric-hyphen-interface

A centered hyphen is simply a line between lyrics used to divide syllables.

User settable properties:

- **dash-period** (number)
  The length of one dash together with whitespace. If negative, no line is drawn at all.

- **height** (dimension, in staff space)
  Height of an object in staff-space units.

- **length** (dimension, in staff space)
  User override for the stem length of unbeamed stems (each unit represents half a staff-space).

- **minimum-distance** (dimension, in staff space)
  Minimum distance between rest and notes or beam.

- **minimum-length** (dimension, in staff space)
  Try to make a spanner at least this long, normally in the horizontal direction. This requires an appropriate callback for the `springs-and-rods` property. If added to a `Tie`, this sets the minimum distance between noteheads.

- **padding** (dimension, in staff space)
  Add this much extra space between objects that are next to each other.

- **thickness** (number)
  For grobs made up of lines, this is the thickness of the line. For slurs and ties, this is the distance between the two arcs of the curve’s outline.
at its thickest point, not counting the diameter of the virtual “pen” that
draws the arcs. This property is expressed as a multiple of the current
staff-line thickness (i.e. the visual output is influenced by changes to
Staff.StaffSymbol.thickness).

This grob interface is used in the following graphical object(s): Section 3.1.66 [LyricHyphen],
page 458, and Section 3.1.67 [LyricSpace], page 459.

3.2.65 lyric-interface
Any object that is related to lyrics.

This grob interface is used in the following graphical object(s): Section 3.1.65 [LyricExtender],
page 458, Section 3.1.66 [LyricHyphen], page 458, and Section 3.1.143 [VowelTransition],
page 544.

3.2.66 lyric-syllable-interface
A single piece of lyrics.

This grob interface is used in the following graphical object(s): Section 3.1.68 [LyricText],
page 460.

3.2.67 mark-interface
A rehearsal mark.

This grob interface is used in the following graphical object(s): Section 3.1.92 [RehearsalMark],
page 487.

3.2.68 measure-counter-interface
A counter for numbering measures.

User settable properties:

- count-from (integer)
  The first measure in a measure count receives this number. The follow-
  ing measures are numbered in increments from this initial value.

- spacing-pair (pair)
  A pair of alignment symbols which set an object’s spacing relative to
  its left and right BreakAlignments.

  For example, a MultiMeasureRest will ignore prefatory items at its
  bounds (i.e., clefs, key signatures and time signatures) using the follow-
  ing override:

  \override MultiMeasureRest.spacing-pair = #'(staff-bar . staff-bar)

Internal properties:

- columns (array of grobs)
  An array of grobs, typically containing PaperColumn or NoteColumn
  objects.

This grob interface is used in the following graphical object(s): Section 3.1.69 [Measure-
Counter], page 462.

3.2.69 measure-grouping-interface
This object indicates groups of beats. Valid choices for style are bracket and triangle.
User settable properties:

height (dimension, in staff space)
  Height of an object in staff-space units.

style (symbol)
  This setting determines in what style a grob is typeset. Valid choices
  depend on the stencil callback reading this property.

thickness (number)
  For grobs made up of lines, this is the thickness of the line. For slurs
  and ties, this is the distance between the two arcs of the curve’s outline
  at its thickest point, not counting the diameter of the virtual “pen” that
  draws the arcs. This property is expressed as a multiple of the current
  staff-line thickness (i.e. the visual output is influenced by changes to
  Staff.StaffSymbol.thickness).

This grob interface is used in the following graphical object(s): Section 3.1.70 [Measure-
Grouping], page 463.

3.2.70 measure-spanner-interface
A bracket aligned to a measure or measures.

User settable properties:

bracket-flare (pair of numbers)
  A pair of numbers specifying how much edges of brackets should slant
  outward. Value 0.0 means straight edges.

bracket-visibility (boolean or symbol)
  This controls the visibility of the tuplet bracket. Setting it to false pre-
  vents printing of the bracket. Setting the property to if-no-beam makes
  it print only if there is no beam associated with this tuplet bracket.

connect-to-neighbor (pair)
  Pair of booleans, indicating whether this grob looks as a continued
  break.

direction (direction)
  If side-axis is 0 (or X), then this property determines whether the
  object is placed LEFT, CENTER or RIGHT with respect to the other object.
  Otherwise, it determines whether the object is placed UP, CENTER or
  DOWN. Numerical values may also be used: UP=1, DOWN=-1, LEFT=-1,
  RIGHT=1, CENTER=0.

edge-height (pair)
  A pair of numbers specifying the heights of the vertical edges: (left-
  height . right-height).

padding (dimension, in staff space)
  Add this much extra space between objects that are next to each other.

shorten-pair (pair of numbers)
  The lengths to shorten on both sides a hairpin or text-spanner such as
  a pedal bracket. Positive values shorten the hairpin or text-spanner,
  while negative values lengthen it.
A pair of alignment symbols which set an object’s spacing relative to its left and right BreakAlignments.

For example, a MultiMeasureRest will ignore prefatory items at its bounds (i.e., clefs, key signatures and time signatures) using the following override:

\override MultiMeasureRest.spacing-pair = #'(staff-bar . staff-bar)

Maintain this much space between reference points and the staff. Its effect is to align objects of differing sizes (like the dynamics p and f) on their baselines.

For grobs made up of lines, this is the thickness of the line. For slurs and ties, this is the distance between the two arcs of the curve’s outline at its thickest point, not counting the diameter of the virtual “pen” that draws the arcs. This property is expressed as a multiple of the current staff-line thickness (i.e. the visual output is influenced by changes to Staff.StaffSymbol.thickness).

This grob interface is used in the following graphical object(s): Section 3.1.71 [MeasureSpanner], page 464.

**3.2.71 melody-spanner-interface**
Context dependent typesetting decisions.

**User settable properties:**

neutral-direction (direction)
Which direction to take in the center of the staff.

**Internal properties:**

stems (array of grobs)
An array of stem objects.

This grob interface is used in the following graphical object(s): Section 3.1.72 [MelodyItem], page 465.

**3.2.72 mensural-ligature-interface**
A mensural ligature.

**User settable properties:**

thickness (number)
For grobs made up of lines, this is the thickness of the line. For slurs and ties, this is the distance between the two arcs of the curve’s outline at its thickest point, not counting the diameter of the virtual “pen” that draws the arcs. This property is expressed as a multiple of the current staff-line thickness (i.e. the visual output is influenced by changes to Staff.StaffSymbol.thickness).
Internal properties:

- **add-join** (boolean)
  Is this ligature head-joined with the next one by a vertical line?

- **delta-position** (number)
  The vertical position difference.

- **flexa-interval** (integer)
  The interval spanned by the two notes of a flexa shape (1 is a second, 7 is an octave).

- **head-width** (dimension, in staff space)
  The width of this ligature head.

- **ligature-flexa** (boolean)
  Request joining note to the previous one in a flexa.

- **primitive** (integer)
  A pointer to a ligature primitive, i.e., an item similar to a note head that is part of a ligature.

This grob interface is used in the following graphical object(s): Section 3.1.73 [MensuralLigature], page 466, and Section 3.1.82 [NoteHead], page 477.

### 3.2.73 metronome-mark-interface

A metronome mark.

This grob interface is used in the following graphical object(s): Section 3.1.74 [MetronomeMark], page 466.

### 3.2.74 multi-measure-interface

Multi measure rest, and the text or number that is printed over it.

User settable properties:

- **bound-padding** (number)
  The amount of padding to insert around spanner bounds.

This grob interface is used in the following graphical object(s): Section 3.1.75 [MultiMeasureRest], page 468, Section 3.1.76 [MultiMeasureRestNumber], page 469, Section 3.1.77 [MultiMeasureRestScript], page 471, and Section 3.1.78 [MultiMeasureRestText], page 472.

### 3.2.75 multi-measure-rest-interface

A rest that spans a whole number of measures.

User settable properties:

- **bound-padding** (number)
  The amount of padding to insert around spanner bounds.

- **expand-limit** (integer)
  Maximum number of measures expanded in church rests.

- **hair-thickness** (number)
  Thickness of the thin line in a bar line, expressed as a multiple of the default staff-line thickness (i.e. the visual output is not influenced by changes to `Staff.StaffSymbol.thickness`).
max-symbol-separation  (number)
    The maximum distance between symbols making up a church rest.

measure-count  (integer)
    The number of measures for a multi-measure rest.

minimum-length  (dimension, in staff space)
    Try to make a spanner at least this long, normally in the horizontal
direction. This requires an appropriate callback for the springs-and-
rods property. If added to a Tie, this sets the minimum distance be-
tween noteheads.

round-up-exceptions  (list)
    A list of pairs where car is the numerator and cdr the denominator of
a moment. Each pair in this list means that the multi-measure rests
of the corresponding length will be rounded up to the longer rest. See
round-up-to-longer-rest.

round-up-to-longer-rest  (boolean)
    Displays the longer multi-measure rest when the length of a measure is
between two values of usable-duration-logs. For example, displays
a breve instead of a whole in a 3/2 measure.

spacing-pair  (pair)
    A pair of alignment symbols which set an object’s spacing relative to
its left and right BreakAlignments.

For example, a MultiMeasureRest will ignore prefatory items at its
bounds (i.e., clefs, key signatures and time signatures) using the follow-
ing override:

\override MultiMeasureRest.spacing-pair = #'(staff-bar . staff-bar)

thick-thickness  (number)
    Thickness of the thick line in a bar line, expressed as a multiple of the
default staff-line thickness (i.e. the visual output is not influenced by
changes to Staff.StaffSymbol.thickness).

usable-duration-logs  (list)
    List of duration-logs that can be used in typesetting the grob.

Internal properties:

    space-increment  (dimension, in staff space)
    The amount by which the total duration of a multimeasure rest
affects horizontal spacing. Each doubling of the duration adds
space-increment to the length of the bar.

This grob interface is used in the following graphical object(s): Section 3.1.75 [MultiMeasur-
eRest], page 468, and Section 3.1.88 [PercentRepeat], page 482.

3.2.76  note-collision-interface
An object that handles collisions between notes with different stem directions and horizontal
shifts. Most of the interesting properties are to be set in Section 3.2.77 [note-column-interface],
page 592: these are force-hshift and horizontal-shift.
User settable properties:

**merge-differently-dotted** (boolean)
Merge note heads in collisions, even if they have a different number of dots. This is normal notation for some types of polyphonic music.

*merge-differently-dotted* only applies to opposing stem directions (i.e., voice 1 & 2).

**merge-differently-headed** (boolean)
Merge note heads in collisions, even if they have different note heads. The smaller of the two heads is rendered invisible. This is used in polyphonic guitar notation. The value of this setting is used by Section “note-collision-interface” in *Internals Reference*.

*merge-differently-headed* only applies to opposing stem directions (i.e., voice 1 & 2).

**note-collision-threshold** (dimension, in staff space)
Simultaneous notes that are this close or closer in units of *staff-space* will be identified as vertically colliding. Used by *Stem* grobs for notes in the same voice, and *NoteCollision* grobs for notes in different voices. Default value 1.

**prefer-dotted-right** (boolean)
For note collisions, prefer to shift dotted up-note to the right, rather than shifting just the dot.

Internal properties:

**positioning-done** (boolean)
Used to signal that a positioning element did its job. This ensures that a positioning is only done once.

This grob interface is used in the following graphical object(s): Section 3.1.80 [NoteCollision], page 475.

3.2.77 note-column-interface
Stem and noteheads combined.

User settable properties:

**force-hshift** (number)
This specifies a manual shift for notes in collisions. The unit is the note head width of the first voice note. This is used by Section “note-collision-interface” in *Internals Reference*.

**glissando-skip** (boolean)
Should this *NoteHead* be skipped by glissandi?

**horizontal-shift** (integer)
An integer that identifies ranking of *NoteColumns* for horizontal shifting. This is used by Section “note-collision-interface” in *Internals Reference*.

**ignore-collision** (boolean)
If set, don’t do note collision resolution on this *NoteColumn*. 
Internal properties:

- **note-heads** (array of grobs)
  An array of note head grobs.
- **rest** (graphical (layout) object)
  A pointer to a Rest object.
- **rest-collision** (graphical (layout) object)
  A rest collision that a rest is in.
- **stem** (graphical (layout) object)
  A pointer to a Stem object.

This grob interface is used in the following graphical object(s): Section 3.1.81 [NoteColumn], page 476.

### 3.2.78 note-head-interface

A note head. There are many possible values for style. For a complete list, see Section “Note head styles” in Notation Reference.

User settable properties:

- **duration-log** (integer)
  The 2-log of the note head duration, i.e., 0 = whole note, 1 = half note, etc.
- **glyph-name** (string)
  The glyph name within the font.
  In the context of (span) bar lines, glyph-name represents a processed form of glyph, where decisions about line breaking etc. are already taken.
- **ignore-ambitus** (boolean)
  If set, don’t consider this notehead for ambitus calculation.
- **ledger-positions** (list)
  Vertical positions of ledger lines. When set on a StaffSymbol grob it defines a repeating pattern of ledger lines and any parenthesized groups will always be shown together.
- **note-names** (vector)
  Vector of strings containing names for easy-notation note heads.
- **stem-attachment** (pair of numbers)
  An (x, y) pair where the stem attaches to the notehead.
- **style** (symbol)
  This setting determines in what style a grob is typeset. Valid choices depend on the stencil callback reading this property.

Internal properties:

- **accidental-grob** (graphical (layout) object)
  The accidental for this note.

This grob interface is used in the following graphical object(s): Section 3.1.8 [AmbitusNote-Head], page 385, Section 3.1.82 [NoteHead], page 477, Section 3.1.123 [TabNoteHead], page 518, and Section 3.1.130 [TrillPitchGroup], page 529.
3.2.79 note-name-interface

Note names.

This grob interface is used in the following graphical object(s): Section 3.1.83 [NoteName], page 478.

3.2.80 note-spacing-interface

This object calculates spacing wishes for individual voices.

User settable properties:

- **knee-spacing-correction** (number)
  Factor for the optical correction amount for kneed beams. Set between 0 for no correction and 1 for full correction.

- **same-direction-correction** (number)
  Optical correction amount for stems that are placed in tight configurations. This amount is used for stems with the same direction to compensate for note head to stem distance.

- **space-to-barline** (boolean)
  If set, the distance between a note and the following non-musical column will be measured to the bar line instead of to the beginning of the non-musical column. If there is a clef change followed by a bar line, for example, this means that we will try to space the non-musical column as though the clef is not there.

- **stem-spacing-correction** (number)
  Optical correction amount for stems that are placed in tight configurations. For opposite directions, this amount is the correction for two normal sized stems that overlap completely.

Internal properties:

- **left-items** (array of grobs)
  Grobs organized on the left by a spacing object.

- **right-items** (array of grobs)
  Grobs organized on the right by a spacing object.

This grob interface is used in the following graphical object(s): Section 3.1.84 [NoteSpacing], page 478.

3.2.81 number-interface

Numbers.

User settable properties:

- **number-type** (symbol)
  Numbering style. Choices include **roman-lower**, **roman-upper** and **arabic**.

This grob interface is used in the following graphical object(s): Section 3.1.114 [StringNumber], page 508.

3.2.82 only-prebreak-interface

Kill this grob after the line breaking process.

This grob interface is not used in any graphical object.
3.2.83 ottava-bracket-interface

An ottava bracket.

User settable properties:

- **bracket-flare** (pair of numbers)
  A pair of numbers specifying how much edges of brackets should slant outward. Value 0.0 means straight edges.

- **dashed-edge** (boolean)
  If set, the bracket edges are dashed like the rest of the bracket.

- **edge-height** (pair)
  A pair of numbers specifying the heights of the vertical edges: (left-height . right-height).

- **minimum-length** (dimension, in staff space)
  Try to make a spanner at least this long, normally in the horizontal direction. This requires an appropriate callback for the springs-and-rods property. If added to a Tie, this sets the minimum distance between noteheads.

- **shorten-pair** (pair of numbers)
  The lengths to shorten on both sides a hairpin or text-spanner such as a pedal bracket. Positive values shorten the hairpin or text-spanner, while negative values lengthen it.

This grob interface is used in the following graphical object(s): Section 3.1.85 [OttavaBracket], page 479.

3.2.84 outside-staff-axis-group-interface

A vertical axis group on which outside-staff skyline calculations are done.

User settable properties:

- **outside-staff-placement-directive** (symbol)
  One of four directives telling how outside staff objects should be placed.
  - **left-to-right-greedy** – Place each successive grob from left to right.
  - **left-to-right-polite** – Place a grob from left to right only if it does not potentially overlap with another grob that has been placed on a pass through a grob array. If there is overlap, do another pass to determine placement.
  - **right-to-left-greedy** – Same as left-to-right-greedy, but from right to left.
  - **right-to-left-polite** – Same as left-to-right-polite, but from right to left.

Internal properties:

- **vertical-skyline-elements** (array of grobs)
  An array of grobs used to create vertical skylines.

This grob interface is used in the following graphical object(s): Section 3.1.18 [BassFigure-Line], page 396, Section 3.1.118 [System], page 513, and Section 3.1.139 [VerticalAxisGroup], page 538.
3.2.85 outside-staff-interface

A grob that could be placed outside staff.

User settable properties:

outside-staff-horizontal-padding (number)
By default, an outside-staff-object can be placed so that it is very close
to another grob horizontally. If this property is set, the outside-staff-
object is raised so that it is not so close to its neighbor.

outside-staff-padding (number)
The padding to place between grobs when spacing accord-
ing to outside-staff-priority. Two grobs with different
outside-staff-padding values have the larger value of padding
between them.

outside-staff-priority (number)
If set, the grob is positioned outside the staff in such a way as to avoid
all collisions. In case of a potential collision, the grob with the smaller
outside-staff-priority is closer to the staff.

This grob interface is used in the following graphical object(s): Section 3.1.4 [Accidental-
Suggestion], page 380, Section 3.1.12 [BarNumber], page 392, Section 3.1.15 [BassFigureAlign-
mentPositioning], page 395, Section 3.1.23 [BreathingSign], page 402, Section 3.1.24 [Chord-
Name], page 404, Section 3.1.26 [ClefModifier], page 407, Section 3.1.29 [CombineTextScript],
page 410, Section 3.1.36 [DoublePercentRepeatCounter], page 421, Section 3.1.37 [DoubleRe-
peatSlash], page 423, Section 3.1.38 [DynamicLineSpanner], page 424, Section 3.1.39 [Dynam-
icText], page 425, Section 3.1.42 [Fingering], page 429, Section 3.1.47 [FretBoard], page 435,
Section 3.1.52 [Hairpin], page 440, Section 3.1.53 [HorizontalBracket], page 441, Section 3.1.54
[HorizontalBracketText], page 442, Section 3.1.56 [InstrumentSwitch], page 444, Section 3.1.69
[MeasureCounter], page 462, Section 3.1.70 [MeasureGrouping], page 463, Section 3.1.71 [Mea-
sureSpanner], page 464, Section 3.1.74 [MetronomeMark], page 466, Section 3.1.75 [MultiMea-
SureRest], page 468, Section 3.1.76 [MultiMeasureRestNumber], page 469, Section 3.1.77 [Multi-
MeasureRestScript], page 471, Section 3.1.78 [MultiMeasureRestText], page 472, Section 3.1.85
[OttavaBracket], page 479, Section 3.1.89 [PercentRepeatCounter], page 483, Section 3.1.90
[PhrasingSlur], page 484, Section 3.1.92 [RehearsalMark], page 487, Section 3.1.98 [Script],
page 493, Section 3.1.101 [Slur], page 494, Section 3.1.103 [SustainPedalLineSpanner],
page 498, Section 3.1.114 [StringNumber], page 508, Section 3.1.115 [StrokeFinger], page 510,
Section 3.1.117 [SustainPedalLineSpanner], page 512, Section 3.1.124 [TextScript], page 519,
Section 3.1.125 [TextSpanner], page 521, Section 3.1.132 [TrillSpanner], page 531, Section 3.1.133
[TupletBracket], page 532, Section 3.1.134 [TupletNumber], page 534, Section 3.1.136 [UnaCor-
daPedalLineSpanner], page 536, and Section 3.1.142 [VoltaBracketSpanner], page 542.

3.2.86 paper-column-interface

Paper_column objects form the top-most X parents for items. There are two types of columns:
musical and non-musical, to which musical and non-musical objects are attached respectively.
The spacing engine determines the X positions of these objects.

They are numbered, the first (leftmost) is column 0. Numbering happens before line breaking,
and columns are not renumbered after line breaking. Since many columns go unused, you should
only use the rank field to get ordering information. Two adjacent columns may have non-adjacent
numbers.
User settable properties:

`between-cols` (pair)
Where to attach a loose column to.

`full-measure-extra-space` (number)
Extra space that is allocated at the beginning of a measure with only one note. This property is read from the NonMusicalPaperColumn that begins the measure.

`labels` (list)
List of labels (symbols) placed on a column.

`line-break-penalty` (number)
Penalty for a line break at this column. This affects the choices of the line breaker; it avoids a line break at a column with a positive penalty and prefers a line break at a column with a negative penalty.

`line-break-permission` (symbol)
Instructs the line breaker on whether to put a line break at this column. Can be `force` or `allow`.

`line-break-system-details` (list)
An alist of properties to use if this column is the start of a system.

`page-break-penalty` (number)
Penalty for page break at this column. This affects the choices of the page breaker; it avoids a page break at a column with a positive penalty and prefers a page break at a column with a negative penalty.

`page-break-permission` (symbol)
Instructs the page breaker on whether to put a page break at this column. Can be `force` or `allow`.

`page-turn-penalty` (number)
Penalty for a page turn at this column. This affects the choices of the page breaker; it avoids a page turn at a column with a positive penalty and prefers a page turn at a column with a negative penalty.

`page-turn-permission` (symbol)
Instructs the page breaker on whether to put a page turn at this column. Can be `force` or `allow`.

`rhythmic-location` (rhythmic location)
Where (bar number, measure position) in the score.

`shortest-playing-duration` (moment)
The duration of the shortest note playing here.

`shortest-starter-duration` (moment)
The duration of the shortest note that starts here.

`used` (boolean)
If set, this spacing column is kept in the spacing problem.

`when` (moment)
Global time step associated with this column.
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Internal properties:

* **bounded-by-me** (array of grobs)
  An array of spanners that have this column as start/begin point. Only columns that have grobs or act as bounds are spaced.

* **grace-spacing** (graphical (layout) object)
  A run of grace notes.

* **maybe-loose** (boolean)
  Used to mark a breakable column that is loose if and only if it is in the middle of a line.

* **spacing** (graphical (layout) object)
  The spacing spanner governing this section.

This grob interface is used in the following graphical object(s): Section 3.1.79 [NonMusicalPaperColumn], page 474, and Section 3.1.86 [PaperColumn], page 480.

3.2.87 parentheses-interface
Parentheses for other objects.

User settable properties:

* **padding** (dimension, in staff space)
  Add this much extra space between objects that are next to each other.

* **stencils** (list)
  Multiple stencils, used as intermediate value.

This grob interface is used in the following graphical object(s): Section 3.1.87 [ParenthesesItem], page 481, and Section 3.1.130 [TrillPitchGroup], page 529.

3.2.88 percent-repeat-interface
Beat, Double and single measure repeats.

User settable properties:

* **dot-negative-kern** (number)
  The space to remove between a dot and a slash in percent repeat glyphs. Larger values bring the two elements closer together.

* **slash-negative-kern** (number)
  The space to remove between slashes in percent repeat glyphs. Larger values bring the two elements closer together.

* **slope** (number)
  The slope of this object.

* **thickness** (number)
  For grobs made up of lines, this is the thickness of the line. For slurs and ties, this is the distance between the two arcs of the curve’s outline at its thickest point, not counting the diameter of the virtual “pen” that draws the arcs. This property is expressed as a multiple of the current staff-line thickness (i.e. the visual output is influenced by changes to \texttt{Staff.StaffSymbol.thickness}).

This grob interface is used in the following graphical object(s): Section 3.1.35 [DoublePercentRepeat], page 420, Section 3.1.36 [DoublePercentRepeatCounter], page 421, Section 3.1.37 [DoubleRepeatSlash], page 423, Section 3.1.88 [PercentRepeat], page 482, Section 3.1.89 [PercentRepeatCounter], page 483, and Section 3.1.93 [RepeatSlash], page 489.
### 3.2.89 percent-repeat-item-interface
Repeats that look like percent signs.

**User settable properties:**

- **dot-negative-kern** (number)
  The space to remove between a dot and a slash in percent repeat glyphs.
  Larger values bring the two elements closer together.

- **slash-negative-kern** (number)
  The space to remove between slashes in percent repeat glyphs.
  Larger values bring the two elements closer together.

- **slope** (number)
  The slope of this object.

- **thickness** (number)
  For grobs made up of lines, this is the thickness of the line.
  For slurs and ties, this is the distance between the two arcs of the curve’s outline
  at its thickest point, not counting the diameter of the virtual “pen” that
  draws the arcs. This property is expressed as a multiple of the current
  staff-line thickness (i.e. the visual output is influenced by changes to
  `Staff.StaffSymbol.thickness`).

This grob interface is used in the following graphical object(s): Section 3.1.35 [DoublePercentRepeat], page 420, Section 3.1.36 [DoublePercentRepeatCounter], page 421, Section 3.1.37 [DoubleRepeatSlash], page 423, and Section 3.1.93 [RepeatSlash], page 489.

### 3.2.90 piano-pedal-bracket-interface
The bracket of the piano pedal. It can be tuned through the regular bracket properties.

**User settable properties:**

- **bound-padding** (number)
  The amount of padding to insert around spanner bounds.

- **bracket-flare** (pair of numbers)
  A pair of numbers specifying how much edges of brackets should slant outward.
  Value 0.0 means straight edges.

- **dashed-edge** (boolean)
  If set, the bracket edges are dashed like the rest of the bracket.

- **edge-height** (pair)
  A pair of numbers specifying the heights of the vertical edges: `(left-height . right-height)`.

- **shorten-pair** (pair of numbers)
  The lengths to shorten on both sides a hairpin or text-spanner such as
  a pedal bracket. Positive values shorten the hairpin or text-spanner,
  while negative values lengthen it.

**Internal properties:**

- **pedal-text** (graphical (layout) object)
  A pointer to the text of a mixed-style piano pedal.

This grob interface is used in the following graphical object(s): Section 3.1.91 [PianoPedalBracket], page 486.
3.2.91 piano-pedal-interface
A piano pedal sign.

This grob interface is used in the following graphical object(s): Section 3.1.91 [PianoPedalBracket], page 486, Section 3.1.103 [SostenutoPedalLineSpanner], page 498, Section 3.1.116 [SustainPedal], page 511, Section 3.1.117 [SustainPedalLineSpanner], page 512, and Section 3.1.136 [UnaCordaPedalLineSpanner], page 536.

3.2.92 piano-pedal-script-interface
A piano pedal sign, fixed size.

This grob interface is used in the following graphical object(s): Section 3.1.102 [SostenutoPedal], page 497, Section 3.1.116 [SustainPedal], page 511, and Section 3.1.135 [UnaCordaPedal], page 535.

3.2.93 pitched-trill-interface
A note head to indicate trill pitches.

Internal properties:

accidental-grob (graphical (layout) object)
The accidental for this note.

This grob interface is used in the following graphical object(s): Section 3.1.131 [TrillPitchHead], page 530.

3.2.94 pure-from-neighbor-interface
A collection of routines to allow for objects’ pure heights and heights to be calculated based on the heights of the objects’ neighbors.

Internal properties:

neighbors (array of grobs)
The X-axis neighbors of a grob. Used by the pure-from-neighbor-interface to determine various grob heights.

pure-relevant-grobs (array of grobs)
All the grobs (items and spanners) that are relevant for finding the pure-Y-extent

pure-Y-common (graphical (layout) object)
A cache of the common_refpoint_of_array of the elements grob set.

This grob interface is used in the following graphical object(s): Section 3.1.11 [BarLine], page 388, Section 3.1.25 [Clef], page 405, Section 3.1.30 [CueClef], page 411, Section 3.1.31 [CueEndClef], page 414, Section 3.1.57 [KeyCancellation], page 446, Section 3.1.58 [KeySignature], page 448, Section 3.1.106 [SpanBarStub], page 501, and Section 3.1.128 [TimeSignature], page 525.

3.2.95 rest-collision-interface
Move ordinary rests (not multi-measure nor pitched rests) to avoid conflicts.

User settable properties:

minimum-distance (dimension, in staff space)
Minimum distance between rest and notes or beam.
Internal properties:

- **elements** (array of grobs)
  An array of grobs; the type is depending on the grob where this is set in.

- **positioning-done** (boolean)
  Used to signal that a positioning element did its job. This ensures that a positioning is only done once.

This grob interface is used in the following graphical object(s): Section 3.1.97 [RestCollision], page 492.

### 3.2.96 rest-interface

A rest symbol. The property **style** can be `default`, `mensural`, `neomensural` or `classical`.

**User settable properties:**

- **direction** (direction)
  If `side-axis` is 0 (or X), then this property determines whether the object is placed `LEFT`, `CENTER` or `RIGHT` with respect to the other object. Otherwise, it determines whether the object is placed `UP`, `CENTER` or `DOWN`. Numerical values may also be used: `UP=1`, `DOWN=-1`, `LEFT=-1`, `RIGHT=1`, `CENTER=0`.

- **minimum-distance** (dimension, in staff space)
  Minimum distance between rest and notes or beam.

- **style** (symbol)
  This setting determines in what style a grob is typeset. Valid choices depend on the `stencil` callback reading this property.

- **voiced-position** (number)
  The staff-position of a voiced Rest, negative if the rest has `direction` `DOWN`.

This grob interface is used in the following graphical object(s): Section 3.1.75 [MultiMeasureRest], page 468, and Section 3.1.96 [Rest], page 491.

### 3.2.97 rhythmic-grob-interface

Any object with a duration. Used to determine which grobs are interesting enough to maintain a hara-kiri staff.

This grob interface is used in the following graphical object(s): Section 3.1.13 [BassFigure], page 394, Section 3.1.24 [ChordName], page 404, Section 3.1.28 [ClusterSpannerBeacon], page 409, Section 3.1.37 [DoubleRepeatSlash], page 423, Section 3.1.47 [FretBoard], page 435, Section 3.1.68 [LyricText], page 460, Section 3.1.82 [NoteHead], page 477, Section 3.1.93 [RepeatSlash], page 489, Section 3.1.96 [Rest], page 491, and Section 3.1.123 [TabNoteHead], page 518.

### 3.2.98 rhythmic-head-interface

Note head or rest.

**User settable properties:**

- **duration-log** (integer)
  The 2-log of the note head duration, i.e., 0 = whole note, 1 = half note, etc.
glissando-skip (boolean)
Should this NoteHead be skipped by glissandi?

Internal properties:

dot (graphical (layout) object)
A reference to a Dots object.

stem (graphical (layout) object)
A pointer to a Stem object.

This grob interface is used in the following graphical object(s): Section 3.1.8 [Ambitus-NoteHead], page 385, Section 3.1.82 [NoteHead], page 477, Section 3.1.96 [Rest], page 491, Section 3.1.123 [TabNoteHead], page 518, and Section 3.1.131 [TrillPitchHead], page 530.

3.2.99 script-column-interface
An interface that sorts scripts according to their script-priority and outside-staff-priority.

Internal properties:

scripts (array of grobs)
An array of Script objects.

This grob interface is used in the following graphical object(s): Section 3.1.99 [ScriptColumn], page 494, and Section 3.1.100 [ScriptRow], page 494.

3.2.100 script-interface
An object that is put above or below a note.

User settable properties:

avoid-slur (symbol)
Method of handling slur collisions. Choices are inside, outside, around, and ignore. inside adjusts the slur if needed to keep the grob inside the slur. outside moves the grob vertically to the outside of the slur. around moves the grob vertically to the outside of the slur only if there is a collision. ignore does not move either. In grobs whose notational significance depends on vertical position (such as accidentals, clefs, etc.), outside and around behave like ignore.

script-priority (number)
A key for determining the order of scripts in a stack, by being added to the position of the script in the user input, the sum being the overall priority. Smaller means closer to the head.

side-relative-direction (direction)
Multiply direction of direction-source with this to get the direction of this object.

slur-padding (number)
Extra distance between slur and script.

toward-stem-shift (number)
Amount by which scripts are shifted toward the stem if their direction coincides with the stem direction. 0.0 means centered on the note head (the default position of most scripts); 1.0 means centered on the stem. Interpolated values are possible.
toward-stem-shift-in-column (number)
   Amount by which a script is shifted toward the stem if its direction coincides with the stem direction and it is associated with a ScriptColumn object. 0.0 means centered on the note head (the default position of most scripts); 1.0 means centered on the stem. Interpolated values are possible.

Internal properties:

direction-source (graphical (layout) object)
   In case side-relative-direction is set, which grob to get the direction from.

positioning-done (boolean)
   Used to signal that a positioning element did its job. This ensures that a positioning is only done once.

script-column (graphical (layout) object)
   A ScriptColumn associated with a Script object.

script-stencil (pair)
   A pair (type, arg) which acts as an index for looking up a Stencil object.

slur (graphical (layout) object)
   A pointer to a Slur object.

This grob interface is used in the following graphical object(s): Section 3.1.4 [Accidental-Suggestion], page 380, Section 3.1.39 [DynamicText], page 425, Section 3.1.77 [MultiMeasureRestScript], page 471, and Section 3.1.98 [Script], page 493.

3.2.101 self-alignment-interface
Position this object on itself and/or on its parent. To this end, the following functions are provided:

Self_alignment_interface::[xy]_aligned_on_self
   Align self on reference point, using self-alignment-X and self-alignment-Y.

Self_alignment_interface::aligned_on_[xy]_parent
Self_alignment_interface::centered_on_[xy]_parent
   Shift the object so its own reference point is centered on the extent of the parent

User settable properties:

parent-alignment-X (number)
   Specify on which point of the parent the object is aligned. The value -1 means aligned on parent’s left edge, 0 on center, and 1 right edge, in X direction. Other numerical values may also be specified - the unit is half the parent’s width. If unset, the value from self-alignment-X property will be used.

parent-alignment-Y (number)
   Like parent-alignment-X but for the Y axis.

self-alignment-X (number)
   Specify alignment of an object. The value -1 means left aligned, 0 centered, and 1 right-aligned in X direction. Other numerical values may also be specified - the unit is half the object width.
**3.2.102 semi-tie-column-interface**

The interface for a column of l.v. (laissez vibrer) ties.

**User settable properties:**

- **head-direction** (direction)
  
  Are the note heads left or right in a semitie?

- **tie-configuration** (list)
  
  List of \((\text{position}, \text{dir})\) pairs, indicating the desired tie configuration, where \(\text{position}\) is the offset from the center of the staff in staff space and \(\text{dir}\) indicates the direction of the tie (\(1=>\text{up}, -1=>\text{down}, 0=>\text{center}\)). A non-pair entry in the list causes the corresponding tie to be formatted automatically.

**Internal properties:**

- **positioning-done** (boolean)
  
  Used to signal that a positioning element did its job. This ensures that a positioning is only done once.

- **ties** (array of grobs)
  
  A grob array of Tie objects.

This grob interface is used in the following graphical object(s): Section 3.1.61 [LaissezVibrerTieColumn], page 453, and Section 3.1.95 [RepeatTieColumn], page 491.

**3.2.103 semi-tie-interface**

A tie which is only connected to a note head on one side. The following properties may be set in the details list:

- **height-limit**
  
  Maximum tie height: The longer the tie, the closer it is to this height.
**ratio**  
Parameter for tie shape. The higher this number, the quicker the tie attains its height-limit.

**User settable properties:**

- **control-points** (list of number pairs)  
  List of offsets (number pairs) that form control points for the tie, slur, or bracket shape. For Béziers, this should list the control points of a third-order Bézier curve.

- **details** (list)  
  A list of parameters for detailed grob behavior. More information on the allowed parameters for a grob can be found by looking at the top of the Internals Reference page for each interface having a details property.

- **direction** (direction)  
  If side-axis is 0 (or X), then this property determines whether the object is placed LEFT, CENTER or RIGHT with respect to the other object. Otherwise, it determines whether the object is placed UP, CENTER or DOWN. Numerical values may also be used: UP=1, DOWN=-1, LEFT=-1, RIGHT=1, CENTER=0.

- **head-direction** (direction)  
  Are the note heads left or right in a semitie?

- **line-thickness** (number)  
  For slurs and ties, this is the diameter of the virtual “pen” that draws the two arcs of the curve’s outline, which intersect at the endpoints. This property is expressed as a multiple of the current staff-line thickness (i.e. the visual output is influenced by changes to Staff.StaffSymbol.thickness).

- **thickness** (number)  
  For grobs made up of lines, this is the thickness of the line. For slurs and ties, this is the distance between the two arcs of the curve’s outline at its thickest point, not counting the diameter of the virtual “pen” that draws the arcs. This property is expressed as a multiple of the current staff-line thickness (i.e. the visual output is influenced by changes to Staff.StaffSymbol.thickness).

**Internal properties:**

- **note-head** (graphical (layout) object)  
  A single note head.

This grob interface is used in the following graphical object(s): Section 3.1.60 [LaissezVibrerTie], page 452, and Section 3.1.94 [RepeatTie], page 490.

### 3.2.104 separation-item-interface

Item that computes widths to generate spacing rods.

**User settable properties:**

- **horizontal-skylines** (pair of skylines)  
  Two skylines, one to the left and one to the right of this grob.

- **padding** (dimension, in staff space)  
  Add this much extra space between objects that are next to each other.
skyline-vertical-padding (number)
The amount by which the left and right skylines of a column are padded vertically, beyond the Y-extents and extra-spacing-heights of the constituent grobs in the column. Increase this to prevent interleaving of grobs from adjacent columns.

X-extent (pair of numbers)
Extent (size) in the X direction, measured in staff-space units, relative to object’s reference point.

Internal properties:

conditional-elements (array of grobs)
Internal use only.

elements (array of grobs)
An array of grobs; the type is depending on the grob where this is set in.

This grob interface is used in the following graphical object(s): Section 3.1.79 [NonMusical-PaperColumn], page 474, Section 3.1.81 [NoteColumn], page 476, and Section 3.1.86 [PaperColumn], page 480.

3.2.105 side-position-interface
Position a victim object (this one) next to other objects (the support). The property direction signifies where to put the victim object relative to the support (left or right, up or down?)

The routine also takes the size of the staff into account if staff-padding is set. If undefined, the staff symbol is ignored.

User settable properties:

add-stem-support (boolean)
If set, the Stem object is included in this script’s support.

direction (direction)
If side-axis is 0 (or X), then this property determines whether the object is placed LEFT, CENTER or RIGHT with respect to the other object. Otherwise, it determines whether the object is placed UP, CENTER or DOWN. Numerical values may also be used: UP=1, DOWN=-1, LEFT=-1, RIGHT=1, CENTER=0.

horizon-padding (number)
The amount to pad the axis along which a Skyline is built for the side-position-interface.

minimum-space (dimension, in staff space)
Minimum distance that the victim should move (after padding).

padding (dimension, in staff space)
Add this much extra space between objects that are next to each other.

side-axis (number)
If the value is X (or equivalently 0), the object is placed horizontally next to the other object. If the value is Y or 1, it is placed vertically.

slur-padding (number)
Extra distance between slur and script.
staff-padding \text{(dimension, in staff space)}

Maintain this much space between reference points and the staff. Its effect is to align objects of differing sizes (like the dynamics $p$ and $f$) on their baselines.

use-skylines \text{(boolean)}

Should skylines be used for side positioning?

\textbf{Internal properties:}

quantize-position \text{(boolean)}

If set, a vertical alignment is aligned to be within staff spaces.

side-support-elements \text{(array of grobs)}

The side support, an array of grobs.

This grob interface is used in the following graphical object(s): Section 3.1.4 [AccidentalSuggestion], page 380, Section 3.1.6 [AmbitusAccidental], page 383, Section 3.1.9 [Arpeggio], page 386, Section 3.1.12 [BarNumber], page 392, Section 3.1.15 [BassFigureAlignmentPositioning], page 395, Section 3.1.26 [ClefModifier], page 407, Section 3.1.29 [CombineTextScript], page 410, Section 3.1.36 [DoublePercentRepeatCounter], page 421, Section 3.1.38 [DynamicLineSpanner], page 424, Section 3.1.41 [Episema], page 429, Section 3.1.42 [Fingering], page 429, Section 3.1.53 [HorizontalBracket], page 441, Section 3.1.54 [HorizontalBracketText], page 442, Section 3.1.55 [InstrumentName], page 443, Section 3.1.56 [InstrumentSwitch], page 444, Section 3.1.69 [MeasureCounter], page 462, Section 3.1.70 [MeasureGrouping], page 463, Section 3.1.71 [MeasureSpanner], page 464, Section 3.1.74 [MetronomeMark], page 466, Section 3.1.76 [MultiMeasureRestNumber], page 469, Section 3.1.77 [MultiMeasureRestScript], page 471, Section 3.1.78 [MultiMeasureRestText], page 472, Section 3.1.85 [OttavaBracket], page 479, Section 3.1.89 [PercentRepeatCounter], page 483, Section 3.1.92 [RehearsalMark], page 487, Section 3.1.98 [Script], page 493, Section 3.1.103 [SostenutoPedalLineSpanner], page 498, Section 3.1.110 [StanzaNumber], page 503, Section 3.1.114 [StringNumber], page 508, Section 3.1.115 [StrokeFinger], page 510, Section 3.1.117 [SustainPedalLineSpanner], page 512, Section 3.1.119 [SystemStartBar], page 514, Section 3.1.120 [SystemStartBrace], page 515, Section 3.1.121 [SystemStartBracket], page 516, Section 3.1.122 [SystemStartSquare], page 517, Section 3.1.124 [TextScript], page 519, Section 3.1.125 [TextSpanner], page 521, Section 3.1.129 [TrillPitchAccidental], page 528, Section 3.1.130 [TrillPitchGroup], page 529, Section 3.1.132 [TrillSpanner], page 531, Section 3.1.136 [UnaCordaPedalLineSpanner], page 536, Section 3.1.141 [VoltaBracket], page 541, and Section 3.1.142 [VoltaBracketSpanner], page 542.

3.2.106 slur-interface

A slur. Slurs are formatted by trying a number of combinations of left/right end point, and then picking the slur with the lowest demerit score. The combinations are generated by going from the base attachments (i.e., note heads) in the direction in half space increments until we have covered \textbf{region-size} staff spaces. The following properties may be set in the \textbf{details} list.

region-size

Size of region (in staff spaces) for determining potential endpoints in the Y direction.

head-encompass-penalty

Demerit to apply when note heads collide with a slur.

stem-encompass-penalty

Demerit to apply when stems collide with a slur.

edge-attraction-factor

Factor used to calculate the demerit for distances between slur endpoints and their corresponding base attachments.
same-slope-penalty
   Demerit for slurs with attachment points that are horizontally aligned.

steeper-slope-factor
   Factor used to calculate demerit only if this slur is not broken.

non-horizontal-penalty
   Demerit for slurs with attachment points that are not horizontally aligned.

max-slope
   The maximum slope allowed for this slur.

max-slope-factor
   Factor that calculates demerit based on the max slope.

free-head-distance
   The amount of vertical free space that must exist between a slur and note heads.

absolute-closeness-measure
   Factor to calculate demerit for variance between a note head and slur.

extra-object-collision-penalty
   Factor to calculate demerit for extra objects that the slur encompasses, including accidentals, fingerings, and tuplet numbers.

accidental-collision
   Factor to calculate demerit for Accidental objects that the slur encompasses. This property value replaces the value of extra-object-collision-penalty.

extra-encompass-free-distance
   The amount of vertical free space that must exist between a slur and various objects it encompasses, including accidentals, fingerings, and tuplet numbers.

extra-encompass-collision-distance
   This detail is currently unused.

head-slur-distance-factor
   Factor to calculate demerit for variance between a note head and slur.

head-slur-distance-max-ratio
   The maximum value for the ratio of distance between a note head and slur.

gap-to-staffline-inside
   Minimum gap inside the curve of the slur where the slur is parallel to a staffline.

gap-to-staffline-outside
   Minimum gap outside the curve of the slur where the slur is parallel to a staffline.

free-slur-distance
   The amount of vertical free space that must exist between adjacent slurs. This subproperty only works for PhrasingSlur.

edge-slope-exponent
   Factor used to calculate the demerit for the slope of a slur near its endpoints; a larger value yields a larger demerit.

User settable properties:

   annotation (string)
      Annotate a grob for debug purposes.
avoid-slur (symbol)
Method of handling slur collisions. Choices are inside, outside, around, and ignore. inside adjusts the slur if needed to keep the grob inside the slur. outside moves the grob vertically to the outside of the slur. around moves the grob vertically to the outside of the slur only if there is a collision. ignore does not move either. In grobs whose notational significance depends on vertical position (such as accidentals, clefs, etc.), outside and around behave like ignore.

ccontrol-points (list of number pairs)
List of offsets (number pairs) that form control points for the tie, slur, or bracket shape. For Béziers, this should list the control points of a third-order Bézier curve.

dash-definition (pair)
List of dash-elements defining the dash structure. Each dash-element has a starting t value, an ending t-value, a dash-fraction, and a dash-period.

details (list)
A list of parameters for detailed grob behavior. More information on the allowed parameters for a grob can be found by looking at the top of the Internals Reference page for each interface having a details property.

direction (direction)
If side-axis is 0 (or X), then this property determines whether the object is placed LEFT, CENTER or RIGHT with respect to the other object. Otherwise, it determines whether the object is placed UP, CENTER or DOWN. Numerical values may also be used: UP=1, DOWN=-1, LEFT=-1, RIGHT=1, CENTER=0.

eccentricity (number)
How asymmetrical to make a slur. Positive means move the center to the right.

height-limit (dimension, in staff space)
Maximum slur height: The longer the slur, the closer it is to this height.

inspect-quants (pair of numbers)
If debugging is set, set beam and slur position to a (quantized) position that is as close as possible to this value, and print the demerits for the inspected position in the output.

line-thickness (number)
For slurs and ties, this is the diameter of the virtual “pen” that draws the two arcs of the curve’s outline, which intersect at the endpoints. This property is expressed as a multiple of the current staff-line thickness (i.e. the visual output is influenced by changes to Staff.StaffSymbol.thickness).

positions (pair of numbers)
Pair of staff coordinates (left, right), where both left and right are in staff-space units of the current staff. For slurs, this value selects which slur candidate to use; if extreme positions are requested, the closest one is taken.
ratio (number)
Parameter for slur shape. The higher this number, the quicker the slur attains its height-limit.

thickness (number)
For grobs made up of lines, this is the thickness of the line. For slurs and ties, this is the distance between the two arcs of the curve’s outline at its thickest point, not counting the diameter of the virtual “pen” that draws the arcs. This property is expressed as a multiple of the current staff-line thickness (i.e. the visual output is influenced by changes to \texttt{Staff.StaffSymbol.thickness}).

**Internal properties:**

- encompass-objects (array of grobs)
  Objects that a slur should avoid in addition to notes and stems.
- note-columns (array of grobs)
  An array of \texttt{NoteColumn} grobs.

This grob interface is used in the following graphical object(s): Section 3.1.90 [PhrasingSlur], page 484, and Section 3.1.101 [Slur], page 494.

**3.2.107 spaceable-grob-interface**
A layout object that takes part in the spacing problem.

**User settable properties:**

- allow-loose-spacing (boolean)
  If set, column can be detached from main spacing.
- keep-inside-line (boolean)
  If set, this column cannot have objects sticking into the margin.
- measure-length (moment)
  Length of a measure. Used in some spacing situations.

**Internal properties:**

- ideal-distances (list)
  \((\texttt{obj . (dist . strength)})\) pairs.
- left-neighbor (graphical (layout) object)
  The right-most column that has a spacing-wish for this column.
- minimum-distances (list)
  A list of rods that have the format \((\texttt{obj . dist})\).
- right-neighbor (graphical (layout) object)
  See \texttt{left-neighbor}.
- spacing-wishes (array of grobs)
  An array of note spacing or staff spacing objects.

This grob interface is used in the following graphical object(s): Section 3.1.79 [NonMusical-PaperColumn], page 474, and Section 3.1.86 [PaperColumn], page 480.

**3.2.108 spacing-interface**
This object calculates the desired and minimum distances between two columns.
Internal properties:

- **left-items** (array of grobs)
  Grobs organized on the left by a spacing object.

- **right-items** (array of grobs)
  Grobs organized on the right by a spacing object.

This grob interface is used in the following graphical object(s): Section 3.1.84 [NoteSpacing], page 478, and Section 3.1.108 [StaffSpacing], page 502.

### 3.2.109 spacing-options-interface

Supports setting of spacing variables.

**User settable properties:**

- **shortest-duration-space** (number)
  Start with this multiple of spacing-increment space for the shortest duration. See also Section “spacing-spanner-interface” in Internals Reference.

- **spacing-increment** (dimension, in staff space)
  The unit of length for note-spacing. Typically, the width of a note head.
  See also Section “spacing-spanner-interface” in Internals Reference.

This grob interface is used in the following graphical object(s): Section 3.1.49 [GraceSpacing], page 438, and Section 3.1.104 [SpacingSpanner], page 499.

### 3.2.110 spacing-spanner-interface

The space taken by a note is dependent on its duration. Doubling a duration adds spacing-increment to the space. The most common shortest note gets shortest-duration-space. Notes that are even shorter are spaced proportional to their duration.

Typically, the increment is the width of a black note head. In a piece with lots of 8th notes, and some 16th notes, the eighth note gets a 2 note heads width (i.e., the space following a note is a 1 note head width). A 16th note is followed by 0.5 note head width. The quarter note is followed by 3 NHW, the half by 4 NHW, etc.

**User settable properties:**

- **average-spacing-wishes** (boolean)
  If set, the spacing wishes are averaged over staves.

- **base-shortest-duration** (moment)
  Spacing is based on the shortest notes in a piece. Normally, pieces are spaced as if notes at least as short as this are present.

- **common-shortest-duration** (moment)
  The most common shortest note length. This is used in spacing. Enlarging this sets the score tighter.

- **packed-spacing** (boolean)
  If set, the notes are spaced as tightly as possible.

- **shortest-duration-space** (number)
  Start with this multiple of spacing-increment space for the shortest duration. See also Section “spacing-spanner-interface” in Internals Reference.
**spacing-increment** (dimension, in staff space)

The unit of length for note-spacing. Typically, the width of a note head. See also Section “spacing-spanner-interface” in Internals Reference.

**strict-grace-spacing** (boolean)

If set, main notes are spaced normally, then grace notes are put left of the musical columns for the main notes.

**strict-note-spacing** (boolean)

If set, unbroken columns with non-musical material (clefs, bar lines, etc.) are not spaced separately, but put before musical columns.

**uniform-stretching** (boolean)

If set, items stretch proportionally to their natural separation based on durations. This looks better in complex polyphonic patterns.

This grob interface is used in the following graphical object(s): Section 3.1.104 [SpacingSpanner], page 499.

### 3.2.111 span-bar-interface

A bar line that is spanned between other barlines. This interface is used for bar lines that connect different staves.

**User settable properties:**

**glyph-name** (string)

The glyph name within the font.

In the context of (span) bar lines, glyph-name represents a processed form of glyph, where decisions about line breaking etc. are already taken.

**Internal properties:**

**elements** (array of grobs)

An array of grobs; the type is depending on the grob where this is set in.

**pure-relevant-grobs** (array of grobs)

All the grobs (items and spanners) that are relevant for finding the pure-Y-extent.

**pure-relevant-items** (array of grobs)

A subset of elements that are relevant for finding the pure-Y-extent.

**pure-relevant-spanners** (array of grobs)

A subset of elements that are relevant for finding the pure-Y-extent.

**pure-Y-common** (graphical (layout) object)

A cache of the common_refpoint_of_array of the elements grob set.

This grob interface is used in the following graphical object(s): Section 3.1.105 [SpanBar], page 500.

### 3.2.112 spanner-interface

Some objects are horizontally spanned between objects. For example, slurs, beams, ties, etc. These grobs form a subtype called Spanner. All spanners have two span points (these must be Item objects), one on the left and one on the right. The left bound is also the X reference point of the spanner.
User settable properties:

- **minimum-length** (dimension, in staff space)
  
  Try to make a spanner at least this long, normally in the horizontal direction. This requires an appropriate callback for the `springs-and-rods` property. If added to a `Tie`, this sets the minimum distance between noteheads.

- **minimum-length-after-break** (dimension, in staff space)
  
  If set, try to make a broken spanner starting a line this long. This requires an appropriate callback for the `springs-and-rods` property. If added to a `Tie`, this sets the minimum distance to the notehead.

- **normalized-endpoints** (pair)
  
  Represents left and right placement over the total spanner, where the width of the spanner is normalized between 0 and 1.

- **spanner-id** (index or symbol)
  
  An identifier to distinguish concurrent spanners.

- **to-barline** (boolean)
  
  If true, the spanner will stop at the bar line just before it would otherwise stop.

Internal properties:

- **spanner-broken** (boolean)

  Indicates whether spanner alignment should be broken after the current spanner.

This grob interface is used in the following graphical object(s): Section 3.1.14 [BassFigureAlignment], page 394, Section 3.1.15 [BassFigureAlignmentPositioning], page 395, Section 3.1.17 [BassFigureContinuation], page 396, Section 3.1.18 [BassFigureLine], page 396, Section 3.1.19 [Beam], page 397, Section 3.1.20 [BendAfter], page 399, Section 3.1.27 [ClusterSpanner], page 409, Section 3.1.38 [DynamicLineSpanner], page 424, Section 3.1.40 [DynamicTextSpanner], page 427, Section 3.1.41 [Episema], page 429, Section 3.1.46 [FootnoteSpanner], page 434, Section 3.1.48 [Glissando], page 437, Section 3.1.49 [GraceSpacing], page 438, Section 3.1.52 [Hairpin], page 440, Section 3.1.53 [HorizontalBracket], page 441, Section 3.1.54 [HorizontalBracketText], page 442, Section 3.1.55 [InstrumentName], page 443, Section 3.1.59 [KievanLigature], page 451, Section 3.1.62 [LedgerLineSpanner], page 453, Section 3.1.64 [LigatureBracket], page 456, Section 3.1.65 [LyricExtender], page 458, Section 3.1.66 [LyricHyphen], page 458, Section 3.1.67 [LyricSpace], page 459, Section 3.1.69 [MeasureCounter], page 462, Section 3.1.70 [MeasureGrouping], page 463, Section 3.1.71 [MeasureSpanner], page 464, Section 3.1.73 [MeasuresLigature], page 466, Section 3.1.75 [MultiMeasureRest], page 468, Section 3.1.76 [MultiMeasureRestNumber], page 469, Section 3.1.77 [MultiMeasureRestScript], page 471, Section 3.1.78 [MultiMeasureRestText], page 472, Section 3.1.85 [OttavaBracket], page 479, Section 3.1.88 [PercentRepeat], page 482, Section 3.1.89 [PercentRepeatCounter], page 483, Section 3.1.90 [PhrasingSlur], page 484, Section 3.1.91 [PianoPedalBracket], page 486, Section 3.1.101 [Slur], page 494, Section 3.1.103 [SostenutoPedalLineSpanner], page 498, Section 3.1.104 [SpacingSpanner], page 499, Section 3.1.107 [StaffGrouper], page 501, Section 3.1.109 [StaffSymbol], page 503, Section 3.1.117 [SustainPedalLineSpanner], page 512, Section 3.1.118 [System], page 513, Section 3.1.119 [SystemStartBar], page 514, Section 3.1.120 [SystemStartBracket], page 515, Section 3.1.121 [SystemStartSquare], page 517, Section 3.1.125 [TextSpanner], page 521, Section 3.1.126 [Tie], page 523, Section 3.1.127 [TieColumn], page 525, Section 3.1.132 [TrillSpanner], page 531, Section 3.1.133 [TupletBracket],
3.2.113 staff-grouper-interface
A grob that collects staves together.

User settable properties:

staff-staff-spacing (list)
When applied to a staff-group’s StaffGrouper grob, this spacing alist controls the distance between consecutive staves within the staff-group. When applied to a staff’s VerticalAxisGroup grob, it controls the distance between the staff and the nearest staff below it in the same system, replacing any settings inherited from the StaffGrouper grob of the containing staff-group, if there is one. This property remains in effect even when non-staff lines appear between staves. The alist can contain the following keys:

- basic-distance – the vertical distance, measured in staff-spaces, between the reference points of the two items when no collisions would result, and no stretching or compressing is in effect.
- minimum-distance – the smallest allowable vertical distance, measured in staff-spaces, between the reference points of the two items, when compressing is in effect.
- padding – the minimum required amount of unobstructed vertical whitespace between the bounding boxes (or skylines) of the two items, measured in staff-spaces.
- stretchability – a unitless measure of the dimension’s relative propensity to stretch. If zero, the distance will not stretch (unless collisions would result).

staffgroup-staff-spacing (list)
The spacing alist controlling the distance between the last staff of the current staff-group and the staff just below it in the same system, even if one or more non-staff lines exist between the two staves. If the staff-staff-spacing property of the staff’s VerticalAxisGroup grob is set, that is used instead. See staff-staff-spacing for a description of the alist structure.

This grob interface is used in the following graphical object(s): Section 3.1.107 [StaffGrouper], page 501.

3.2.114 staff-spacing-interface
This object calculates spacing details from a breakable symbol (left) to another object. For example, it takes care of optical spacing from a bar line to a note.

User settable properties:

stem-spacing-correction (number)
Optical correction amount for stems that are placed in tight configurations. For opposite directions, this amount is the correction for two normal sized stems that overlap completely.
This grob interface is used in the following graphical object(s): Section 3.1.108 [StaffSpacing], page 502.

3.2.115 staff-symbol-interface

This spanner draws the lines of a staff. A staff symbol defines a vertical unit, the \textit{staff space}. Quantities that go by a half staff space are called \textit{positions}. The center (i.e., middle line or space) is position 0. The length of the symbol may be set by hand through the \texttt{width} property.

User settable properties:

\begin{description}
\item[break-align-symbols (list)] A list of \textit{break-align symbols} that determines which breakable items to align this to. If the grob selected by the first symbol in the list is invisible due to \texttt{break-visibility}, we will align to the next grob (and so on). Choices are listed in Section \textquotedblleft break-alignment-interface\textquotedblright\ in \textit{Internals Reference}.
\item[ ledger-extra (dimension, in staff space)] Extra distance from staff line to draw ledger lines for.
\item[ledger-line-thickness (pair of numbers)] The thickness of ledger lines. It is the sum of 2 numbers: The first is the factor for line thickness, and the second for staff space. Both contributions are added.
\item[ledger-positions (list)] Vertical positions of ledger lines. When set on a \texttt{StaffSymbol} grob it defines a repeating pattern of ledger lines and any parenthesized groups will always be shown together.
\item[ledger-positions-function (any type)] A quoted Scheme procedure that takes a \texttt{StaffSymbol} grob and the vertical position of a note head as arguments and returns a list of ledger line positions.
\item[line-count (integer)] The number of staff lines.
\item[line-positions (list)] Vertical positions of staff lines.
\item[staff-space (dimension, in staff space)] Amount of space between staff lines, expressed in global \texttt{staff-space}.
\item[thickness (number)] For grobs made up of lines, this is the thickness of the line. For slurs and ties, this is the distance between the two arcs of the curve's outline at its thickest point, not counting the diameter of the virtual \textquotedblleft pen\textquotedblright\ that draws the arcs. This property is expressed as a multiple of the current staff-line thickness (i.e. the visual output is influenced by changes to \texttt{Staff.StaffSymbol.thickness}).
\item[width (dimension, in staff space)] The width of a grob measured in staff space.
\end{description}

This grob interface is used in the following graphical object(s): Section 3.1.109 [StaffSymbol], page 503.
3.2.116 staff-symbol-referencer-interface
An object whose Y position is meant relative to a staff symbol. These usually have Staff_symbol_referencer::callback in their Y-offset-callbacks.

User settable properties:

staff-position (number)
  Vertical position, measured in half staff spaces, counted from the middle line.

This grob interface is used in the following graphical object(s): Section 3.1.8 [AmbitusNoteHead], page 385, Section 3.1.9 [Arpeggio], page 386, Section 3.1.19 [Beam], page 397, Section 3.1.25 [Clef], page 405, Section 3.1.30 [CueClef], page 411, Section 3.1.31 [CueEndClef], page 414, Section 3.1.32 [Custos], page 417, Section 3.1.34 [Dots], page 419, Section 3.1.57 [KeyCancellation], page 446, Section 3.1.58 [KeySignature], page 448, Section 3.1.75 [Multi MeasureRest], page 468, Section 3.1.82 [NoteHead], page 477, Section 3.1.96 [Rest], page 491, Section 3.1.123 [TabNoteHead], page 518, and Section 3.1.131 [TrillPitchHead], page 530.

3.2.117 stanza-number-interface
A stanza number, to be put in from of a lyrics line.

This grob interface is used in the following graphical object(s): Section 3.1.110 [StanzaNumber], page 503.

3.2.118 stem-interface
The stem represents the graphical stem. In addition, it internally connects note heads, beams, and tremolos. Rests and whole notes have invisible stems.

The following properties may be set in the details list.

beamed-lengths
  List of stem lengths given beam multiplicity.

beamed-minimum-free-lengths
  List of normal minimum free stem lengths (chord to beams) given beam multiplicity.

beamed-extreme-minimum-free-lengths
  List of extreme minimum free stem lengths (chord to beams) given beam multiplicity.

lengths
  Default stem lengths. The list gives a length for each flag count.

stem-shorten
  How much a stem in a forced direction should be shortened. The list gives an amount depending on the number of flags and beams.

User settable properties:

avoid-note-head (boolean)
  If set, the stem of a chord does not pass through all note heads, but starts at the last note head.

beaming (pair)
  Pair of number lists. Each number list specifies which beams to make. 0 is the central beam, 1 is the next beam toward the note, etc. This information is used to determine how to connect the beaming patterns from stem to stem inside a beam.
beamlet-default-length (pair)
A pair of numbers. The first number specifies the default length of a beamlet that sticks out of the left hand side of this stem; the second number specifies the default length of the beamlet to the right. The actual length of a beamlet is determined by taking either the default length or the length specified by beamlet-max-length-proportion, whichever is smaller.

beamlet-max-length-proportion (pair)
The maximum length of a beamlet, as a proportion of the distance between two adjacent stems.

default-direction (direction)
Direction determined by note head positions.

details (list)
A list of parameters for detailed grob behavior. More information on the allowed parameters for a grob can be found by looking at the top of the Internals Reference page for each interface having a details property.

direction (direction)
If side-axis is 0 (or X), then this property determines whether the object is placed LEFT, CENTER or RIGHT with respect to the other object. Otherwise, it determines whether the object is placed UP, CENTER or DOWN. Numerical values may also be used: UP=1, DOWN=-1, LEFT=-1, RIGHT=1, CENTER=0.

double-stem-separation (number)
The distance between the two stems of a half note in tablature when using\tabFullNotation, not counting the width of the stems themselves, expressed as a multiple of the default height of a staff-space in the traditional five-line staff.

duration-log (integer)
The 2-log of the note head duration, i.e., 0 = whole note, 1 = half note, etc.

french-beaming (boolean)
Use French beaming style for this stem. The stem stops at the innermost beams.

length (dimension, in staff space)
User override for the stem length of unbeamed stems (each unit represents half a staff-space).

length-fraction (number)
Multiplier for lengths. Used for determining ledger lines and stem lengths.

max-beam-connect (integer)
Maximum number of beams to connect to beams from this stem. Further beams are typeset as beamlets.

neutral-direction (direction)
Which direction to take in the center of the staff.

no-stem-extend (boolean)
If set, notes with ledger lines do not get stems extending to the middle staff line.
note-collision-threshold (dimension, in staff space)
Simultaneous notes that are this close or closer in units of staff-space will be identified as vertically colliding. Used by Stem grobs for notes in the same voice, and NoteCollision grobs for notes in different voices. Default value 1.

stem-begin-position (number)
User override for the begin position of a stem.

stemlet-length (number)
How long should be a stem over a rest?

thickness (number)
For grobs made up of lines, this is the thickness of the line. For slurs and ties, this is the distance between the two arcs of the curve’s outline at its thickest point, not counting the diameter of the virtual “pen” that draws the arcs. This property is expressed as a multiple of the current staff-line thickness (i.e. the visual output is influenced by changes to Staff.StaffSymbol.thickness).

Internal properties:

beam (graphical (layout) object)
A pointer to the beam, if applicable.

flag (graphical (layout) object)
A pointer to a Flag object.

french-beaming-stem-adjustment (dimension, in staff space)
Stem will be shortened by this amount of space in case of French beaming style.

melody-spanner (graphical (layout) object)
The MelodyItem object for a stem.

note-heads (array of grobs)
An array of note head grobs.

positioning-done (boolean)
Used to signal that a positioning element did its job. This ensures that a positioning is only done once.

rests (array of grobs)
An array of rest objects.

stem-info (pair)
A cache of stem parameters.

tremolo-flag (graphical (layout) object)
The tremolo object on a stem.

tuplet-start (boolean)
Is stem at the start of a tuplet?

This grob interface is used in the following graphical object(s): Section 3.1.111 [Stem], page 504.

3.2.119 stem-tremolo-interface
A beam slashing a stem to indicate a tremolo. The property shape can be beam-like or rectangle.
User settable properties:

beam-thickness (dimension, in staff space)
Beam thickness, measured in staff-space units.

beam-width (dimension, in staff space)
Width of the tremolo sign.

direction (direction)
If side-axis is 0 (or X), then this property determines whether the object is placed LEFT, CENTER or RIGHT with respect to the other object. Otherwise, it determines whether the object is placed UP, CENTER or DOWN. Numerical values may also be used: UP=1, DOWN=-1, LEFT=-1, RIGHT=1, CENTER=0.

flag-count (number)
The number of tremolo beams.

length-fraction (number)
Multiplier for lengths. Used for determining ledger lines and stem lengths.

shape (symbol)
This setting determines what shape a grob has. Valid choices depend on the stencil callback reading this property.

slope (number)
The slope of this object.

Internal properties:

stem (graphical (layout) object)
A pointer to a Stem object.

This grob interface is used in the following graphical object(s): Section 3.1.113 [StemTremolo], page 507.

3.2.120 string-number-interface
A string number instruction.

This grob interface is used in the following graphical object(s): Section 3.1.114 [StringNumber], page 508.

3.2.121 stroke-finger-interface
A right hand finger instruction.

User settable properties:

digit-names (vector)
Names for string finger digits.

This grob interface is used in the following graphical object(s): Section 3.1.115 [StrokeFinger], page 510.

3.2.122 system-interface
This is the top-level object: Each object in a score ultimately has a System object as its X and Y parent.
User settable properties:

- **labels** (list)
  List of labels (symbols) placed on a column.
- **page-number** (number)
  Page number on which this system ends up.
- **rank-on-page** (number)
  0-based index of the system on a page.

Internal properties:

- **all-elements** (array of grobs)
  An array of all grobs in this line. Its function is to protect objects from being garbage collected.
- **columns** (array of grobs)
  An array of grobs, typically containing PaperColumn or NoteColumn objects.
- **footnote-stencil** (stencil)
  The stencil of a system’s footnotes.
- **footnotes-after-line-breaking** (array of grobs)
  Footnote grobs of a broken system.
- **footnotes-before-line-breaking** (array of grobs)
  Footnote grobs of a whole system.
- **in-note-direction** (direction)
  Direction to place in-notes above a system.
- **in-note-padding** (number)
  Padding between in-notes.
- **in-note-stencil** (stencil)
  The stencil of a system’s in-notes.
- **pure-Y-extent** (pair of numbers)
  The estimated height of a system.
- **vertical-alignment** (graphical (layout) object)
  The VerticalAlignment in a System.

This grob interface is used in the following graphical object(s): Section 3.1.118 [System], page 513.

### 3.2.123 system-start-delimiter-interface

The brace, bracket or bar in front of the system. The following values for **style** are recognized:

- **bracket**
  A thick bracket, normally used to group similar instruments in a score. Default for StaffGroup. SystemStartBracket uses this style.
- **brace**
  A ‘piano style’ brace normally used for an instrument that uses two staves. The default style for GrandStaff. SystemStartBrace uses this style.
- **bar-line**
  A simple line between the staves in a score. Default for staves enclosed in << and >>. SystemStartBar uses this style.
- **line-bracket**
  A simple square, normally used for subgrouping instruments in a score. SystemStartSquare uses this style.

See also input/regression/system-start-nesting.ly.
User settable properties:

- **collapse-height** (dimension, in staff space)
  Minimum height of system start delimiter. If equal or smaller, the bracket/brace/line is removed.

- **style** (symbol)
  This setting determines in what style a grob is typeset. Valid choices depend on the *stencil* callback reading this property.

- **thickness** (number)
  For grobs made up of lines, this is the thickness of the line. For slurs and ties, this is the distance between the two arcs of the curve’s outline at its thickest point, not counting the diameter of the virtual “pen” that draws the arcs. This property is expressed as a multiple of the current staff-line thickness (i.e. the visual output is influenced by changes to `Staff.StaffSymbol.thickness`).

This grob interface is used in the following graphical object(s): Section 3.1.119 [SystemStart-Bar], page 514, Section 3.1.120 [SystemStartBrace], page 515, Section 3.1.121 [SystemStart-Bracket], page 516, and Section 3.1.122 [SystemStartSquare], page 517.

### 3.2.124 system-start-text-interface

Text in front of the system.

User settable properties:

- **long-text** (markup)
  Text markup. See Section “Formatting text” in *Notation Reference*.

- **self-alignment-X** (number)
  Specify alignment of an object. The value -1 means left aligned, 0 centered, and 1 right-aligned in X direction. Other numerical values may also be specified - the unit is half the object width.

- **self-alignment-Y** (number)
  Like `self-alignment-X` but for the Y axis.

- **text** (markup)
  Text markup. See Section “Formatting text” in *Notation Reference*.

This grob interface is used in the following graphical object(s): Section 3.1.55 [Instrument-Name], page 443.

### 3.2.125 tab-note-head-interface

A note head in tablature.

User settable properties:

- **details** (list)
  A list of parameters for detailed grob behavior. More information on the allowed parameters for a grob can be found by looking at the top of the Internals Reference page for each interface having a `details` property.

Internal properties:

- **display-cautionary** (boolean)
  Should the grob be displayed as a cautionary grob?
span-start (boolean)
Is the note head at the start of a spanner?

This grob interface is used in the following graphical object(s): Section 3.1.123 [TabNoteHead], page 518.

3.2.126 text-interface

A Scheme markup text, see Section “Formatting text” in Notation Reference and Section “New markup command definition” in Extending.

There are two important commands: ly:text-interface::print, which is a grob callback, and ly:text-interface::interpret-markup.

User settable properties:

baseline-skip (dimension, in staff space)
Distance between base lines of multiple lines of text.

flag-style (symbol)
The style of the flag to be used with MetronomeMark. Available are 'modern-straight-flag, 'old-straight-flag, flat-flag, mensural and 'default

replacement-alist (list)
Alist of strings. The key is a string of the pattern to be replaced. The value is a string of what should be displayed. Useful for ligatures.

text (markup)
Text markup. See Section “Formatting text” in Notation Reference.

text-direction (direction)
This controls the ordering of the words. The default RIGHT is for roman text. Arabic or Hebrew should use LEFT.

word-space (dimension, in staff space)
Space to insert between words in texts.

This grob interface is used in the following graphical object(s): Section 3.1.10 [BalloonTextItem], page 388, Section 3.1.12 [BarNumber], page 392, Section 3.1.13 [BassFigure], page 394, Section 3.1.23 [BreathingSign], page 402, Section 3.1.24 [ChordName], page 404, Section 3.1.26 [ClefModifier], page 407, Section 3.1.29 [CombineTextScript], page 410, Section 3.1.36 [DoublePercentRepeatCounter], page 421, Section 3.1.39 [DynamicText], page 425, Section 3.1.40 [DynamicTextSpanner], page 427, Section 3.1.42 [Fingering], page 429, Section 3.1.45 [FootnoteItem], page 433, Section 3.1.46 [FootnoteSpanner], page 434, Section 3.1.54 [HorizontalBracketText], page 442, Section 3.1.55 [InstrumentName], page 443, Section 3.1.56 [InstrumentSwitch], page 444, Section 3.1.68 [LyricText], page 460, Section 3.1.69 [MeasureCounter], page 462, Section 3.1.71 [MeasureSpanner], page 464, Section 3.1.74 [MetronomeMark], page 466, Section 3.1.76 [MultiMeasureRestNumber], page 469, Section 3.1.78 [MultiMeasureRestText], page 472, Section 3.1.83 [NoteName], page 478, Section 3.1.85 [OttavaBracket], page 479, Section 3.1.89 [PercentRepeatCounter], page 483, Section 3.1.92 [RehearsalMark], page 487, Section 3.1.102 [SostenutoPedal], page 497, Section 3.1.110 [StanzaNumber], page 503, Section 3.1.114 [StringNumber], page 508, Section 3.1.115 [StrokeFinger], page 510, Section 3.1.116 [SustainPedal], page 511, Section 3.1.123 [TabNoteHead], page 518, Section 3.1.124 [TextScript], page 519, Section 3.1.134 [TupletNumber], page 534, Section 3.1.135 [UnaCordaPedal], page 535, and Section 3.1.141 [VoltaBracket], page 541.
3.2.127 text-script-interface

An object that is put above or below a note.

User settable properties:

- **avoid-slur** (symbol)
  Method of handling slur collisions. Choices are **inside**, **outside**, **around**, and **ignore**. **inside** adjusts the slur if needed to keep the grob inside the slur. **outside** moves the grob vertically to the outside of the slur. **around** moves the grob vertically to the outside of the slur only if there is a collision. **ignore** does not move either. In grobs whose notational significance depends on vertical position (such as accidentals, clefs, etc.), **outside** and **around** behave like **ignore**.

- **script-priority** (number)
  A key for determining the order of scripts in a stack, by being added to the position of the script in the user input, the sum being the overall priority. Smaller means closer to the head.

Internal properties:

- **slur** (graphical (layout) object)
  A pointer to a **Slur** object.

This grob interface is used in the following graphical object(s): Section 3.1.29 [CombineTextScript], page 410, Section 3.1.42 [Fingering], page 429, Section 3.1.114 [StringNumber], page 508, Section 3.1.115 [StrokeFinger], page 510, and Section 3.1.124 [TextScript], page 519.

3.2.128 tie-column-interface

Object that sets directions of multiple ties in a tied chord.

User settable properties:

- **tie-configuration** (list)
  List of **(position . dir)** pairs, indicating the desired tie configuration, where **position** is the offset from the center of the staff in staff space and **dir** indicates the direction of the tie (1=>up, -1=>down, 0=>center). A non-pair entry in the list causes the corresponding tie to be formatted automatically.

Internal properties:

- **positioning-done** (boolean)
  Used to signal that a positioning element did its job. This ensures that a positioning is only done once.

- **ties** (array of grobs)
  A grob array of **Tie** objects.

This grob interface is used in the following graphical object(s): Section 3.1.127 [TieColumn], page 525.

3.2.129 tie-interface

A tie - a horizontal curve connecting two noteheads.

The following properties may be set in the **details** list.

- **height-limit**
  The maximum height allowed for this tie.
ratio: Parameter for tie shape. The higher this number, the quicker the slur attains its height-limit.

between-length-limit: This detail is currently unused.

wrong-direction-offset-penalty: Demerit for ties that are offset in the wrong direction.

min-length: If the tie is shorter than this amount (in staff-spaces) an increasingly large length penalty is incurred.

min-length-penalty-factor: Demerit factor for tie lengths shorter than min-length.

center-staff-line-clearance: If the center of the tie is closer to a staff line than this amount, an increasingly large staff line collision penalty is incurred.

tip-staff-line-clearance: If the tips of the tie are closer to a staff line than this amount, an increasingly large staff line collision penalty is incurred.

staff-line-collision-penalty: Demerit factor for ties whose tips or center come close to staff lines.

dot-collision-clearance: If the tie comes closer to a dot than this amount, an increasingly large dot collision penalty is incurred.

dot-collision-penalty: Demerit factor for ties which come close to dots.

note-head-gap: The distance (in staff-spaces) by which the ends of the tie are offset horizontally from the center line through the note head.

stem-gap: The distance (in staff-spaces) by which the ends of the tie are offset horizontally from a stem which is on the same side of the note head as the tie.

tie-column-monotonicity-penalty: Demerit if the y-position of this tie in the set of ties being considered is less than the y-position of the previous tie.

tie-tie-collision-distance: If this tie is closer than this amount to the previous tie in the set being considered, an increasingly large tie-tie collision penalty is incurred.

tie-tie-collision-penalty: Demerit factor for a tie in the set being considered which is close to the previous one.

horizontal-distance-penalty-factor: Demerit factor for ties in the set being considered which are horizontally distant from the note heads.

vertical-distance-penalty-factor: Demerit factor for ties in the set being considered which are vertically distant from the note heads.
same-dir-as-stem-penalty
Demerit if tie is on the same side as a stem or on the opposite side to the one specified.

intra-space-threshold
If the tie’s height (in half staff-spaces) is less than this it is positioned between two adjacent staff lines; otherwise it is positioned to straddle a staff line further from the note heads.

outer-tie-length-symmetry-penalty-factor
Demerit factor for ties horizontally positioned unsymmetrically with respect to the two note heads.

outer-tie-vertical-distance-symmetry-penalty-factor
Demerit factor for ties vertically positioned unsymmetrically with respect to the two note heads.

outer-tie-vertical-gap
Amount (in half staff-spaces) by which a tie is moved away from the note heads if it is closer to either of them than 0.25 half staff-spaces.

skyline-padding
Padding of the skylines around note heads in chords.

single-tie-region-size
The number of candidate ties to generate when only a single tie is required. Successive candidates differ in their initial vertical position by half a staff-space.

multi-tie-region-size
The number of variations that are tried for the extremal ties in a chord. Variations differ in their initial vertical position by half a staff-space.

User settable properties:

annotation (string)
Annotate a grob for debug purposes.

avoid-slur (symbol)
Method of handling slur collisions. Choices are inside, outside, around, and ignore. inside adjusts the slur if needed to keep the grob inside the slur. outside moves the grob vertically to the outside of the slur. around moves the grob vertically to the outside of the slur only if there is a collision. ignore does not move either. In grobs whose notational significance depends on vertical position (such as accidentals, clefs, etc.), outside and around behave like ignore.

control-points (list of number pairs)
List of offsets (number pairs) that form control points for the tie, slur, or bracket shape. For Béziers, this should list the control points of a third-order Bézier curve.

dash-definition (pair)
List of dash-elements defining the dash structure. Each dash-element has a starting t value, an ending t-value, a dash-fraction, and a dash-period.

details (list)
A list of parameters for detailed grob behavior. More information on the allowed parameters for a grob can be found by looking at the top of the Internals Reference page for each interface having a details property.
**direction** (direction)
If *side-axis* is 0 (or X), then this property determines whether the object is placed *LEFT*, *CENTER* or *RIGHT* with respect to the other object. Otherwise, it determines whether the object is placed *UP*, *CENTER* or *DOWN*. Numerical values may also be used: *UP*=1, *DOWN*=-1, *LEFT*=-1, *RIGHT*=1, *CENTER*=0.

**head-direction** (direction)
Are the note heads left or right in a semitie?

**line-thickness** (number)
For slurs and ties, this is the diameter of the virtual “pen” that draws the two arcs of the curve’s outline, which intersect at the endpoints. This property is expressed as a multiple of the current staff-line thickness (i.e. the visual output is influenced by changes to *Staff.StaffSymbol.thickness*).

**neutral-direction** (direction)
Which direction to take in the center of the staff.

**staff-position** (number)
Vertical position, measured in half staff spaces, counted from the middle line.

**thickness** (number)
For grobs made up of lines, this is the thickness of the line. For slurs and ties, this is the distance between the two arcs of the curve’s outline at its thickest point, not counting the diameter of the virtual “pen” that draws the arcs. This property is expressed as a multiple of the current staff-line thickness (i.e. the visual output is influenced by changes to *Staff.StaffSymbol.thickness*).

This grob interface is used in the following graphical object(s): Section 3.1.126 [Tie], page 523.

### 3.2.130 time-signature-interface
A time signature, in different styles. The following values for *style* are recognized:

- **C**
  - 4/4 and 2/2 are typeset as C and struck C, respectively. All other time signatures are written with two digits. The value *default* is equivalent to C.
- **neomensural**
  - 2/2, 3/2, 2/4, 3/4, 4/4, 6/4, 9/4, 4/8, 6/8, and 9/8 are typeset with neo-mensural style mensuration marks. All other time signatures are written with two digits.
- **mensural**
  - 2/2, 3/2, 2/4, 3/4, 4/4, 6/4, 9/4, 4/8, 6/8, and 9/8 are typeset with mensural style mensuration marks. All other time signatures are written with two digits.
- **single-digit**
  - All time signatures are typeset with a single digit, e.g., 3/2 is written as 3.
- **numbered**
  - All time signatures are typeset with two digits.

**User settable properties:**

- **fraction** (fraction, as pair)
  - Numerator and denominator of a time signature object.
- **style** (symbol)
  - This setting determines in what style a grob is typeset. Valid choices depend on the *stencil* callback reading this property.
This grob interface is used in the following graphical object(s): Section 3.1.128 [TimeSignature], page 525.

3.2.131 trill-pitch-accidental-interface
An accidental for trill pitch.

This grob interface is used in the following graphical object(s): Section 3.1.129 [TrillPitchAccidental], page 528.

3.2.132 trill-spanner-interface
A trill spanner.

This grob interface is used in the following graphical object(s): Section 3.1.132 [TrillSpanner], page 531.

3.2.133 tuplet-bracket-interface
A bracket with a number in the middle, used for tuplets. When the bracket spans a line break, the value of break-overshoot determines how far it extends beyond the staff. At a line break, the markups in the edge-text are printed at the edges.

User settable properties:

avoid-scripts (boolean)
If set, a tuplet bracket avoids the scripts associated with the note heads it encompasses.

bracket-flare (pair of numbers)
A pair of numbers specifying how much edges of brackets should slant outward. Value 0.0 means straight edges.

bracket-visibility (boolean or symbol)
This controls the visibility of the tuplet bracket. Setting it to false prevents printing of the bracket. Setting the property to if-no-beam makes it print only if there is no beam associated with this tuplet bracket.

break-overshoot (pair of numbers)
How much does a broken spanner stick out of its bounds?

connect-to-neighbor (pair)
Pair of booleans, indicating whether this grob looks as a continued break.

dashed-edge (boolean)
If set, the bracket edges are dashed like the rest of the bracket.

direction (direction)
If side-axis is 0 (or X), then this property determines whether the object is placed LEFT, CENTER or RIGHT with respect to the other object. Otherwise, it determines whether the object is placed UP, CENTER or DOWN. Numerical values may also be used: UP=1, DOWN=-1, LEFT=-1, RIGHT=1, CENTER=0.

edge-height (pair)
A pair of numbers specifying the heights of the vertical edges: (left-height . right-height).

edge-text (pair)
A pair specifying the texts to be set at the edges: (left-text . right-text).
full-length-padding (number)
  How much padding to use at the right side of a full-length tuplet bracket.

full-length-to-extent (boolean)
  Run to the extent of the column for a full-length tuplet bracket.

gap (dimension, in staff space)
  Size of a gap in a variable symbol.

padding (dimension, in staff space)
  Add this much extra space between objects that are next to each other.

positions (pair of numbers)
  Pair of staff coordinates (left, right), where both left and right are
  in staff-space units of the current staff. For slurs, this value selects
  which slur candidate to use; if extreme positions are requested, the
  closest one is taken.

shorten-pair (pair of numbers)
  The lengths to shorten on both sides a hairpin or text-spanner such as
  a pedal bracket. Positive values shorten the hairpin or text-spanner,
  while negative values lengthen it.

staff-padding (dimension, in staff space)
  Maintain this much space between reference points and the staff. Its
  effect is to align objects of differing sizes (like the dynamics p and f) on
  their baselines.

thickness (number)
  For grobs made up of lines, this is the thickness of the line. For slurs
  and ties, this is the distance between the two arcs of the curve's outline
  at its thickest point, not counting the diameter of the virtual “pen” that
  draws the arcs. This property is expressed as a multiple of the current
  staff-line thickness (i.e. the visual output is influenced by changes to
  Staff.StaffSymbol.thickness).

tuplet-slur (boolean)
  Draw a slur instead of a bracket for tuplets.

X-positions (pair of numbers)
  Pair of X staff coordinates of a spanner in the form (left, right),
  where both left and right are in staff-space units of the current staff.

Internal properties:

note-columns (array of grobs)
  An array of NoteColumn grobs.

scripts (array of grobs)
  An array of Script objects.

tuplet-number (graphical (layout) object)
  The number for a bracket.

tuplets (array of grobs)
  An array of smaller tuplet brackets.

This grob interface is used in the following graphical object(s): Section 3.1.64 [Ligature-Bracket], page 456, and Section 3.1.133 [TupletBracket], page 532.
3.2.134  **tuplet-number-interface**

The number for a bracket.

**User settable properties:**

- **avoid-slur** *(symbol)*
  Method of handling slur collisions. Choices are `inside`, `outside`, `around`, and `ignore`. `inside` adjusts the slur if needed to keep the grob inside the slur. `outside` moves the grob vertically to the outside of the slur. `around` moves the grob vertically to the outside of the slur only if there is a collision. `ignore` does not move either. In grobs whose notational significance depends on vertical position (such as accidentals, clefs, etc.), `outside` and `around` behave like `ignore`.

- **direction** *(direction)*
  If `side-axis` is 0 (or X), then this property determines whether the object is placed `LEFT`, `CENTER` or `RIGHT` with respect to the other object. Otherwise, it determines whether the object is placed `UP`, `CENTER` or `DOWN`. Numerical values may also be used: `UP`=1, `DOWN`=-1, `LEFT`=-1, `RIGHT`=1, `CENTER`=0.

- **knee-to-beam** *(boolean)*
  Determines whether a tuplet number will be positioned next to a kneed beam.

**Internal properties:**

- **bracket** *(graphical (layout) object)*
  The bracket for a number.

This grob interface is used in the following graphical object(s): Section 3.1.134 [TupletNumber], page 534.

3.2.135  **unbreakable-spanner-interface**

A spanner that should not be broken across line breaks. Override with `breakable=##t`.

**User settable properties:**

- **breakable** *(boolean)*
  Allow breaks here.

This grob interface is used in the following graphical object(s): Section 3.1.19 [Beam], page 397, and Section 3.1.48 [Glissando], page 437.

3.2.136  **vaticana-ligature-interface**

A vaticana style Gregorian ligature.

**User settable properties:**

- **glyph-name** *(string)*
  The glyph name within the font.

  In the context of (span) bar lines, `glyph-name` represents a processed form of `glyph`, where decisions about line breaking etc. are already taken.
**thickness** (number)

For grobs made up of lines, this is the thickness of the line. For slurs and ties, this is the distance between the two arcs of the curve’s outline at its thickest point, not counting the diameter of the virtual “pen” that draws the arcs. This property is expressed as a multiple of the current staff-line thickness (i.e. the visual output is influenced by changes to `Staff.StaffSymbol.thickness`).

**Internal properties:**

- **add-cauda** (boolean)
  Does this flexa require an additional cauda on the left side?

- **add-join** (boolean)
  Is this ligature head-joined with the next one by a vertical line?

- **add-stem** (boolean)
  Is this ligature head a virga and therefore needs an additional stem on the right side?

- **delta-position** (number)
  The vertical position difference.

- **flexa-height** (dimension, in staff space)
  The height of a flexa shape in a ligature grob (in `staff-space` units).

- **flexa-width** (dimension, in staff space)
  The width of a flexa shape in a ligature grob (in `staff-space` units).

- **x-offset** (dimension, in staff space)
  Extra horizontal offset for ligature heads.

This grob interface is used in the following graphical object(s): Section 3.1.82 [NoteHead], page 477, and Section 3.1.137 [VaticanaLigature], page 537.

**3.2.137 volta-bracket-interface**

Volta bracket with number.

**User settable properties:**

- **dashed-edge** (boolean)
  If set, the bracket edges are dashed like the rest of the bracket.

- **height** (dimension, in staff space)
  Height of an object in `staff-space` units.

- **shorten-pair** (pair of numbers)
  The lengths to shorten on both sides a hairpin or text-spanner such as a pedal bracket. Positive values shorten the hairpin or text-spanner, while negative values lengthen it.

- **thickness** (number)
  For grobs made up of lines, this is the thickness of the line. For slurs and ties, this is the distance between the two arcs of the curve’s outline at its thickest point, not counting the diameter of the virtual “pen” that draws the arcs. This property is expressed as a multiple of the current staff-line thickness (i.e. the visual output is influenced by changes to `Staff.StaffSymbol.thickness`).
Internal properties:

bars (array of grobs)
  An array of bar line pointers.

This grob interface is used in the following graphical object(s): Section 3.1.141 [VoltaBracket], page 541.

3.2.138 volta-interface
A volta repeat.

This grob interface is used in the following graphical object(s): Section 3.1.141 [VoltaBracket], page 541, and Section 3.1.142 [VoltaBracketSpanner], page 542.

3.3 User backend properties

add-stem-support (boolean)
  If set, the Stem object is included in this script’s support.

after-line-breaking (boolean)
  Dummy property, used to trigger callback for after-line-breaking.

align-dir (direction)
  Which side to align? -1: left side, 0: around center of width, 1: right side.

allow-loose-spacing (boolean)
  If set, column can be detached from main spacing.

allow-span-bar (boolean)
  If false, no inter-staff bar line will be created below this bar line.

alteration (number)
  Alteration numbers for accidental.

alteration-alist (list)
  List of (pitch . accidental) pairs for key signature.

annotation (string)
  Annotate a grob for debug purposes.

annotation-balloon (boolean)
  Print the balloon around an annotation.

annotation-line (boolean)
  Print the line from an annotation to the grob that it annotates.

arpeggio-direction (direction)
  If set, put an arrow on the arpeggio squiggly line.

arrow-length (number)
  Arrow length.

arrow-width (number)
  Arrow width.

auto-knee-gap (dimension, in staff space)
  If a gap is found between note heads where a horizontal beam fits and it is larger than this number, make a kneed beam.

automatically-numbered (boolean)
  If set, footnotes are automatically numbered.
average-spacing-wishes (boolean)
If set, the spacing wishes are averaged over staves.

avoid-note-head (boolean)
If set, the stem of a chord does not pass through all note heads, but starts at the last note head.

avoid-scripts (boolean)
If set, a tuplet bracket avoids the scripts associated with the note heads it encompasses.

avoid-slur (symbol)
Method of handling slur collisions. Choices are inside, outside, around, and ignore. inside adjusts the slur if needed to keep the grob inside the slur. outside moves the grob vertically to the outside of the slur. around moves the grob vertically to the outside of the slur only if there is a collision. ignore does not move either. In grobs whose notational significance depends on vertical position (such as accidentals, clefs, etc.), outside and around behave like ignore.

axes (list) List of axis numbers. In the case of alignment grobs, this should contain only one number.

bar-extent (pair of numbers)
The Y-extent of the actual bar line. This may differ from Y-extent because it does not include the dots in a repeat bar line.

base-shortest-duration (moment)
Spacing is based on the shortest notes in a piece. Normally, pieces are spaced as if notes at least as short as this are present.

baseline-skip (dimension, in staff space)
Distance between base lines of multiple lines of text.

beam-thickness (dimension, in staff space)
Beam thickness, measured in staff-space units.

beam-width (dimension, in staff space)
Width of the tremolo sign.

beamed-stem-shorten (list)
How much to shorten beamed stems, when their direction is forced. It is a list, since the value is different depending on the number of flags and beams.

beaming (pair)
Pair of number lists. Each number list specifies which beams to make. 0 is the central beam, 1 is the next beam toward the note, etc. This information is used to determine how to connect the beaming patterns from stem to stem inside a beam.

beamlet-default-length (pair)
A pair of numbers. The first number specifies the default length of a beamlet that sticks out of the left hand side of this stem; the second number specifies the default length of the beamlet to the right. The actual length of a beamlet is determined by taking either the default length or the length specified by beamlet-max-length-proportion, whichever is smaller.

beamlet-max-length-proportion (pair)
The maximum length of a beamlet, as a proportion of the distance between two adjacent stems.
before-line-breaking (boolean)
Dummy property, used to trigger a callback function.

between-cols (pair)
Where to attach a loose column to.

bound-details (list)
An alist of properties for determining attachments of spanners to edges.

bound-padding (number)
The amount of padding to insert around spanner bounds.

bracket-flare (pair of numbers)
A pair of numbers specifying how much edges of brackets should slant outward.
Value 0.0 means straight edges.

bracket-visibility (boolean or symbol)
This controls the visibility of the tuplet bracket. Setting it to false prevents printing of the bracket. Setting the property to if-no-beam makes it print only if there is no beam associated with this tuplet bracket.

break-align-anchor (number)
Grobs aligned to this breakable item will have their X-offsets shifted by this number. In bar lines, for example, this is used to position grobs relative to the (visual) center of the bar line.

break-align-anchor-alignment (number)
Read by ly:break-aligned-interface::calc-extent-aligned-anchor for aligning an anchor to a grob’s extent.

break-align-orders (vector)
This is a vector of 3 lists: #(end-of-line unbroken start-of-line). Each list contains break-align symbols that specify an order of breakable items (see Section “break-alignment-interface” in Internals Reference).
For example, this places time signatures before clefs:
\override Score.BreakAlignment.break-align-orders =
 #(make-vector 3 ' (left-edge
cue-end-clef
ambitus
breathing-sign
time-signature
clef
cue-clef
staff-bar
key-cancellation
key-signature
custos))

break-align-symbol (symbol)
This key is used for aligning, ordering, and spacing breakable items. See Section “break-alignment-interface” in Internals Reference.

break-align-symbols (list)
A list of break-align symbols that determines which breakable items to align this to. If the grob selected by the first symbol in the list is invisible due to break-visibility, we will align to the next grob (and so on). Choices are listed in Section “break-alignment-interface” in Internals Reference.
**break-overshoot** (pair of numbers)

How much does a broken spanner stick out of its bounds?

**break-visibility** (vector)

A vector of 3 booleans, \( \texttt{(end-of-line\ unbroken begin-of-line)} \). \#t means visible, \#f means killed.

**breakable** (boolean)

Allow breaks here.

**broken-bound-padding** (number)

The amount of padding to insert when a spanner is broken at a line break.

**chord-dots-limit** (integer)

Limits the column of dots on each chord to the height of the chord plus \( \texttt{chord-dots-limit\ staff-positions} \).

**circled-tip** (boolean)

Put a circle at start/end of hairpins (al/del niente).

**clef-alignments** (list)

An alist of parent-alignments that should be used for clef modifiers with various clefs.

**clip-edges** (boolean)

Allow outward pointing beamlets at the edges of beams?

**collapse-height** (dimension, in staff space)

Minimum height of system start delimiter. If equal or smaller, the bracket/brace/ line is removed.

**collision-interfaces** (list)

A list of interfaces for which automatic beam-collision resolution is run.

**collision-voice-only** (boolean)

Does automatic beam collision apply only to the voice in which the beam was created?

**color** (color)

The color of this grob.

**common-shortest-duration** (moment)

The most common shortest note length. This is used in spacing. Enlarging this sets the score tighter.

**concaveness** (number)

A beam is concave if its inner stems are closer to the beam than the two outside stems. This number is a measure of the closeness of the inner stems. It is used for damping the slope of the beam.

**connect-to-neighbor** (pair)

Pair of booleans, indicating whether this grob looks as a continued break.

**control-points** (list of number pairs)

List of offsets (number pairs) that form control points for the tie, slur, or bracket shape. For Béziers, this should list the control points of a third-order Bézier curve.

**count-from** (integer)

The first measure in a measure count receives this number. The following measures are numbered in increments from this initial value.

**damping** (number)

Amount of beam slope damping.
dash-definition (pair)
List of dash-elements defining the dash structure. Each dash-element has a start-
ing t-value, an ending t-value, a dash-fraction, and a dash-period.

dash-fraction (number)
Size of the dashes, relative to dash-period. Should be between 0.1 and 1.0 (con-
tinuous line). If set to 0.0, a dotted line is produced

dash-period (number)
The length of one dash together with whitespace. If negative, no line is drawn at
all.

dashed-edge (boolean)
If set, the bracket edges are dashed like the rest of the bracket.

default-direction (direction)
Direction determined by note head positions.

default-staff-staff-spacing (list)
The settings to use for staff-staff-spacing when it is unset, for ungrouped staves
and for grouped staves that do not have the relevant StaffGrouper property set
(staff-staff-spacing or staffgroup-staff-spacing).

details (list)
A list of parameters for detailed grob behavior. More information on the allowed
parameters for a grob can be found by looking at the top of the Internals Reference
page for each interface having a details property.

digit-names (vector)
Names for string finger digits.

direction (direction)
If side-axis is 0 (or X), then this property determines whether the object is placed
LEFT, CENTER or RIGHT with respect to the other object. Otherwise, it determines
whether the object is placed UP, CENTER or DOWN. Numerical values may also be
used: UP=1, DOWN=-1, LEFT=-1, RIGHT=1, CENTER=0.

dot-count (integer)
The number of dots.

dot-negative-kern (number)
The space to remove between a dot and a slash in percent repeat glyphs. Larger
values bring the two elements closer together.

dot-placement-list (list)
List consisting of (description string-number fret-number finger-number) en-
tries used to define fret diagrams.

double-stem-separation (number)
The distance between the two stems of a half note in tablature when using
\tabFullNotation, not counting the width of the stems themselves, expressed as a
multiple of the default height of a staff-space in the traditional five-line staff.

duration-log (integer)
The 2-log of the note head duration, i.e., 0 = whole note, 1 = half note, etc.

directional (number)
How asymmetrical to make a slur. Positive means move the center to the right.
edge-height (pair)
   A pair of numbers specifying the heights of the vertical edges: (left-height .
   right-height).

edge-text (pair)
   A pair specifying the texts to be set at the edges: (left-text . right-text).

expand-limit (integer)
   Maximum number of measures expanded in church rests.

extra-dy (number)
   Slope glissandi this much extra.

extra-offset (pair of numbers)
   A pair representing an offset. This offset is added just before outputting the symbol,
   so the typesetting engine is completely oblivious to it. The values are measured in
   staff-space units of the staff’s StaffSymbol.

extra-spacing-height (pair of numbers)
   In the horizontal spacing problem, we increase the height of each item by this amount
   (by adding the ‘car’ to the bottom of the item and adding the ‘cdr’ to the top of
   the item). In order to make a grob infinitely high (to prevent the horizontal spacing
   problem from placing any other grobs above or below this grob), set this to (-inf.0
   . +inf.0).

extra-spacing-width (pair of numbers)
   In the horizontal spacing problem, we pad each item by this amount (by adding the
   ‘car’ on the left side of the item and adding the ‘cdr’ on the right side of the item).
   In order to make a grob take up no horizontal space at all, set this to (+inf.0 .
   -inf.0).

flag-count (number)
   The number of tremolo beams.

flag-style (symbol)
   The style of the flag to be used with MetronomeMark. Available are
   'modern-straight-flag, 'old-straight-flag, flat-flag, mensural and
   'default

flat-positions (list)
   Flats in key signatures are placed within the specified ranges of staff-positions. The
   general form is a list of pairs, with one pair for each type of clef, in order of
   the staff-position at which each clef places C: (alto treble tenor soprano baritone
   mezzosoprano bass). If the list contains a single element it applies for all clefs. A
   single number in place of a pair sets accidentals within the octave ending at that
   staff-position.

font-encoding (symbol)
   The font encoding is the broadest category for selecting a font. Currently, only
   lilypond’s system fonts (Emmentaler) are using this property. Available values are
   fetaMusic (Emmentaler), fetaBraces, fetaText (Emmentaler).

font-family (symbol)
   The font family is the broadest category for selecting text fonts. Options include:
   sans, roman.

font-features (list)
   Opentype features.
font-name (string)
    Specifies a file name (without extension) of the font to load. This setting overrides
    selection using font-family, font-series and font-shape.

font-series (symbol)
    Select the series of a font. Choices include medium, bold, bold-narrow, etc.

font-shape (symbol)
    Select the shape of a font. Choices include upright, italic, caps.

font-size (number)
    The font size, compared to the ‘normal’ size. 0 is style-sheet’s normal size, -1 is
    smaller, +1 is bigger. Each step of 1 is approximately 12% larger; 6 steps are exactly
    a factor 2 larger. If the context property fontSize is set, its value is added to this
    before the glyph is printed. Fractional values are allowed.

footnote (boolean)
    Should this be a footnote or in-note?

footnote-music (music)
    Music creating a footnote.

footnote-text (markup)
    A footnote for the grob.

force-hshift (number)
    This specifies a manual shift for notes in collisions. The unit is the note head width
    of the first voice note. This is used by Section “note-collision-interface” in Internals
    Reference.

forced-spacing (number)
    Spacing forced between grobs, used in various ligature engravers.

fraction (fraction, as pair)
    Numerator and denominator of a time signature object.

french-beaming (boolean)
    Use French beaming style for this stem. The stem stops at the innermost beams.

fret-diagram-details (list)
    An alist of detailed grob properties for fret diagrams. Each alist entry consists of a
    (property . value) pair. The properties which can be included in fret-diagram-
    details include the following:
    • barre-type – Type of barre indication used. Choices include curved, straight, and none. Default curved.
    • capo-thickness – Thickness of capo indicator, in multiples of fret-space. Default value 0.5.
    • dot-color – Color of dots. Options include black and white. Default black.
    • dot-label-font-mag – Magnification for font used to label fret dots. Default value 1.
    • dot-position – Location of dot in fret space. Default 0.6 for dots without
      labels, 0.95-dot-radius for dots with labels.
    • dot-radius – Radius of dots, in terms of fret spaces. Default value 0.425 for
      labeled dots, 0.25 for unlabeled dots.
    • finger-code – Code for the type of fingering indication used. Options include
      none, in-dot, and below-string. Default none for markup fret diagrams,
      below-string for FretBoards fret diagrams.
• **fret-count** – The number of frets. Default 4.
• **fret-distance** – Multiplier to adjust the distance between frets. Default 1.0.
• **fret-label-custom-format** – The format string to be used label the lowest fret number, when **number-type** equals to **custom**. Default "~a".
• **fret-label-font-mag** – The magnification of the font used to label the lowest fret number. Default 0.5.
• **fret-label-vertical-offset** – The offset of the fret label from the center of the fret in direction parallel to strings. Default 0.
• **fret-label-horizontal-offset** – The offset of the fret label from the center of the fret in direction orthogonal to strings. Default 0.
• **handedness** – Print the fret-diagram left- or right-handed. -1, **LEFT** for left; 1, **RIGHT** for right. Default **RIGHT**.
• **paren-padding** – The padding for the parenthesis. Default 0.05.
• **label-dir** – Side to which the fret label is attached. -1, **LEFT**, or **DOWN** for left or down; 1, **RIGHT**, or **UP** for right or up. Default **RIGHT**.
• **mute-string** – Character string to be used to indicate muted string. Default "x".
• **number-type** – Type of numbers to use in fret label. Choices include **roman-lower**, **roman-upper**, **arabic** and **custom**. In the later case, the format string is supplied by the **fret-label-custom-format** property. Default **roman-lower**.
• **open-string** – Character string to be used to indicate open string. Default "o".
• **orientation** – Orientation of fret-diagram. Options include **normal**, **landscape**, and **opposing-landscape**. Default **normal**.
• **string-count** – The number of strings. Default 6.
• **string-distance** – Multiplier to adjust the distance between strings. Default 1.0.
• **string-label-font-mag** – The magnification of the font used to label fingerings at the string, rather than in the dot. Default value 0.6 for **normal** orientation, 0.5 for **landscape** and **opposing-landscape**.
• **string-thickness-factor** – Factor for changing thickness of each string in the fret diagram. Thickness of string k is given by thickness * (1+string-thickness-factor) * (k-1). Default 0.
• **top-fret-thickness** – The thickness of the top fret line, as a multiple of the standard thickness. Default value 3.
• **xo-font-magnification** – Magnification used for mute and open string indicators. Default value 0.5.
• **xo-padding** – Padding for open and mute indicators from top fret. Default value 0.25.

**full-length-padding** (number)
How much padding to use at the right side of a full-length tuplet bracket.

**full-length-to-extent** (boolean)
Run to the extent of the column for a full-length tuplet bracket.

**full-measure-extra-space** (number)
Extra space that is allocated at the beginning of a measure with only one note. This property is read from the NonMusicalPaperColumn that begins the measure.
**full-size-change** (boolean)
Don’t make a change clef smaller.

**gap** (dimension, in staff space)
Size of a gap in a variable symbol.

**gap-count** (integer)
Number of gapped beams for tremolo.

**glissando-skip** (boolean)
Should this NoteHead be skipped by glissandi?

**glyph** (string)
A string determining what ‘style’ of glyph is typeset. Valid choices depend on the function that is reading this property.
In combination with (span) bar lines, it is a string resembling the bar line appearance in ASCII form.

**glyph-name** (string)
The glyph name within the font.
In the context of (span) bar lines, **glyph-name** represents a processed form of **glyph**, where decisions about line breaking etc. are already taken.

**glyph-name-alist** (list)
An alist of key-string pairs.

**graphical** (boolean)
Display in graphical (vs. text) form.

**grow-direction** (direction)
Crescendo or decrescendo?

**hair-thickness** (number)
Thickness of the thin line in a bar line, expressed as a multiple of the default staff-line thickness (i.e. the visual output is not influenced by changes to `Staff.StaffSymbol.thickness`).

**harp-pedal-details** (list)
An alist of detailed grob properties for harp pedal diagrams. Each alist entry consists of a (property . value) pair. The properties which can be included in harp-pedal-details include the following:

- **box-offset** – Vertical shift of the center of flat/sharp pedal boxes above/below the horizontal line. Default value 0.8.
- **box-width** – Width of each pedal box. Default value 0.4.
- **box-height** – Height of each pedal box. Default value 1.0.
- **space-before-divider** – Space between boxes before the first divider (so that the diagram can be made symmetric). Default value 0.8.
- **space-after-divider** – Space between boxes after the first divider. Default value 0.8.
- **circle-thickness** – Thickness (in unit of the line-thickness) of the ellipse around circled pedals. Default value 0.5.
- **circle-x-padding** – Padding in X direction of the ellipse around circled pedals. Default value 0.15.
- **circle-y-padding** – Padding in Y direction of the ellipse around circled pedals. Default value 0.2.
head-direction (direction)
    Are the note heads left or right in a semitie?

height (dimension, in staff space)
    Height of an object in staff-space units.

height-limit (dimension, in staff space)
    Maximum slur height: The longer the slur, the closer it is to this height.

hide-tied-accidental-after-break (boolean)
    If set, an accidental that appears on a tied note after a line break will not be displayed.

horizon-padding (number)
    The amount to pad the axis along which a Skyline is built for the side-position-interface.

horizontal-shift (integer)
    An integer that identifies ranking of NoteColumns for horizontal shifting. This is used by Section “note-collision-interface” in Internals Reference.

horizontal-skylines (pair of skylines)
    Two skylines, one to the left and one to the right of this grob.

id (string)
    An id string for the grob.

ignore-ambitus (boolean)
    If set, don’t consider this notehead for ambitus calculation.

ignore-collision (boolean)
    If set, don’t do note collision resolution on this NoteColumn.

implicit (boolean)
    Is this an implicit bass figure?

inspect-quants (pair of numbers)
    If debugging is set, set beam and slur position to a (quantized) position that is as close as possible to this value, and print the demerits for the inspected position in the output.

keep-inside-line (boolean)
    If set, this column cannot have objects sticking into the margin.

kern (dimension, in staff space)
    The space between individual elements in any compound bar line, expressed as a multiple of the default staff-line thickness (i.e. the visual output is not influenced by changes to Staff.StaffSymbol.thickness).

knee (boolean)
    Is this beam kneed?

knee-spacing-correction (number)
    Factor for the optical correction amount for kneed beams. Set between 0 for no correction and 1 for full correction.

knee-to-beam (boolean)
    Determines whether a tuplet number will be positioned next to a kneed beam.

labels (list)
    List of labels (symbols) placed on a column.
**layer** (integer)
An integer which determines the order of printing objects. Objects with the lowest value of layer are drawn first, then objects with progressively higher values are drawn, so objects with higher values overwrite objects with lower values. By default most objects are assigned a layer value of 1.

**ledger-extra** (dimension, in staff space)
Extra distance from staff line to draw ledger lines for.

**ledger-line-thickness** (pair of numbers)
The thickness of ledger lines. It is the sum of 2 numbers: The first is the factor for line thickness, and the second for staff space. Both contributions are added.

**ledger-positions** (list)
Vertical positions of ledger lines. When set on a `StaffSymbol` grob it defines a repeating pattern of ledger lines and any parenthesized groups will always be shown together.

**ledger-positions-function** (any type)
A quoted Scheme procedure that takes a `StaffSymbol` grob and the vertical position of a note head as arguments and returns a list of ledger line positions.

**left-bound-info** (list)
An alist of properties for determining attachments of spanners to edges.

**left-padding** (dimension, in staff space)
The amount of space that is put left to an object (e.g., a lyric extender).

**length** (dimension, in staff space)
User override for the stem length of unbeamed stems (each unit represents half a `staff-space`).

**length-fraction** (number)
Multiplier for lengths. Used for determining ledger lines and stem lengths.

**line-break-penalty** (number)
Penalty for a line break at this column. This affects the choices of the line breaker; it avoids a line break at a column with a positive penalty and prefers a line break at a column with a negative penalty.

**line-break-permission** (symbol)
Instructs the line breaker on whether to put a line break at this column. Can be `force` or `allow`.

**line-break-system-details** (list)
An alist of properties to use if this column is the start of a system.

**line-count** (integer)
The number of staff lines.

**line-positions** (list)
Vertical positions of staff lines.

**line-thickness** (number)
For slurs and ties, this is the diameter of the virtual “pen” that draws the two arcs of the curve’s outline, which intersect at the endpoints. This property is expressed as a multiple of the current staff-line thickness (i.e. the visual output is influenced by changes to `Staff.StaffSymbol.thickness`).

**long-text** (markup)
Text markup. See Section “Formatting text” in *Notation Reference*. 
max-beam-connect (integer)
Maximum number of beams to connect to beams from this stem. Further beams are typeset as beamlets.

max-symbol-separation (number)
The maximum distance between symbols making up a church rest.

maximum-gap (number)
Maximum value allowed for gap property.

measure-count (integer)
The number of measures for a multi-measure rest.

measure-length (moment)
Length of a measure. Used in some spacing situations.

merge-differently-dotted (boolean)
Merge note heads in collisions, even if they have a different number of dots. This is normal notation for some types of polyphonic music.

merge-differently-dotted only applies to opposing stem directions (i.e., voice 1 & 2).

merge-differently-headed (boolean)
Merge note heads in collisions, even if they have different note heads. The smaller of the two heads is rendered invisible. This is used in polyphonic guitar notation. The value of this setting is used by Section “note-collision-interface” in Internals Reference.

merge-differently-headed only applies to opposing stem directions (i.e., voice 1 & 2).

minimum-distance (dimension, in staff space)
Minimum distance between rest and notes or beam.

minimum-length (dimension, in staff space)
Try to make a spanner at least this long, normally in the horizontal direction. This requires an appropriate callback for the springs-and-rods property. If added to a Tie, this sets the minimum distance between noteheads.

minimum-length-after-break (dimension, in staff space)
If set, try to make a broken spanner starting a line this long. This requires an appropriate callback for the springs-and-rods property. If added to a Tie, this sets the minimum distance to the notehead.

minimum-length-fraction (number)
Minimum length of ledger line as fraction of note head size.

minimum-space (dimension, in staff space)
Minimum distance that the victim should move (after padding).

minimum-X-extent (pair of numbers)
Minimum size of an object in X dimension, measured in staff-space units.

minimum-Y-extent (pair of numbers)
Minimum size of an object in Y dimension, measured in staff-space units.

neutral-direction (direction)
Which direction to take in the center of the staff.

neutral-position (number)
Position (in half staff spaces) where to flip the direction of custos stem.
next (graphical (layout) object)
Object that is next relation (e.g., the lyric syllable following an extender).

no-alignment (boolean)
If set, don’t place this grob in a VerticalAlignment; rather, place it using its own Y-offset callback.

no-ledgers (boolean)
If set, don’t draw ledger lines on this object.

no-stem-extend (boolean)
If set, notes with ledger lines do not get stems extending to the middle staff line.

non-break-align-symbols (list)
A list of symbols that determine which NON-break-aligned interfaces to align this to.

non-default (boolean)
Set for manually specified clefs and keys.

non-musical (boolean)
True if the grob belongs to a NonMusicalPaperColumn.

nonstaff-nonstaff-spacing (list)
The spacing alist controlling the distance between the current non-staff line and the next non-staff line in the direction of staff-affinity, if both are on the same side of the related staff, and staff-affinity is either UP or DOWN. See staff-staff-spacing for a description of the alist structure.

nonstaff-relatedstaff-spacing (list)
The spacing alist controlling the distance between the current non-staff line and the nearest staff in the direction of staff-affinity, if there are no non-staff lines between the two, and staff-affinity is either UP or DOWN. If staff-affinity is CENTER, then nonstaff-relatedstaff-spacing is used for the nearest staves on both sides, even if other non-staff lines appear between the current one and either of the staves. See staff-staff-spacing for a description of the alist structure.

nonstaff-unrelatedstaff-spacing (list)
The spacing alist controlling the distance between the current non-staff line and the nearest staff in the opposite direction from staff-affinity, if there are no other non-staff lines between the two, and staff-affinity is either UP or DOWN. See staff-staff-spacing for a description of the alist structure.

normalized-endpoints (pair)
Represents left and right placement over the total spanner, where the width of the spanner is normalized between 0 and 1.

note-collision-threshold (dimension, in staff space)
Simultaneous notes that are this close or closer in units of staff-space will be identified as vertically colliding. Used by Stem grobs for notes in the same voice, and NoteCollision grobs for notes in different voices. Default value 1.

note-names (vector)
Vector of strings containing names for easy-notation note heads.

number-type (symbol)
Numbering style. Choices include roman-lower, roman-upper and arabic.

output-attributes (list)
An alist of attributes for the grob, to be included in output files. When the SVG typesetting backend is used, the attributes are assigned to a group (<g>)
containing all of the stencils that comprise a given grob. For example, '{}({id . 123} (class . foo) (data-whatever . \bar"))' will produce '<g id=\"123" class=\"foo\" data-whatever=\"\bar\"> ... </g>'. In the Postscript backend, where there is no way to group items, the setting of the output-attributes property will have no effect.

outside-staff-horizontal-padding (number)
By default, an outside-staff-object can be placed so that is it very close to another grob horizontally. If this property is set, the outside-staff-object is raised so that it is not so close to its neighbor.

outside-staff-padding (number)
The padding to place between grobs when spacing according to outside-staff-priority. Two grobs with different outside-staff-padding values have the larger value of padding between them.

outside-staff-placement-directive (symbol)
One of four directives telling how outside staff objects should be placed.

- **left-to-right-greedy** – Place each successive grob from left to right.
- **left-to-right-polite** – Place a grob from left to right only if it does not potentially overlap with another grob that has been placed on a pass through a grob array. If there is overlap, do another pass to determine placement.
- **right-to-left-greedy** – Same as left-to-right-greedy, but from right to left.
- **right-to-left-polite** – Same as left-to-right-polite, but from right to left.

outside-staff-priority (number)
If set, the grob is positioned outside the staff in such a way as to avoid all collisions. In case of a potential collision, the grob with the smaller outside-staff-priority is closer to the staff.

packed-spacing (boolean)
If set, the notes are spaced as tightly as possible.

padding (dimension, in staff space)
Add this much extra space between objects that are next to each other.

padding-pairs (list)
An alist mapping (name . name) to distances.

page-break-penalty (number)
Penalty for page break at this column. This affects the choices of the page breaker; it avoids a page break at a column with a positive penalty and prefers a page break at a column with a negative penalty.

page-break-permission (symbol)
Instructs the page breaker on whether to put a page break at this column. Can be force or allow.

page-number (number)
Page number on which this system ends up.

page-turn-penalty (number)
Penalty for a page turn at this column. This affects the choices of the page breaker; it avoids a page turn at a column with a positive penalty and prefers a page turn at a column with a negative penalty.
page-turn-permission (symbol)
  Instructs the page breaker on whether to put a page turn at this column. Can be
  force or allow.

parent-alignment-X (number)
  Specify on which point of the parent the object is aligned. The value -1 means
  aligned on parent’s left edge, 0 on center, and 1 right edge, in X direction. Other
  numerical values may also be specified - the unit is half the parent’s width. If unset,
  the value from self-alignment-X property will be used.

parent-alignment-Y (number)
  Like parent-alignment-X but for the Y axis.

parenthesis-friends (list)
  A list of Grob types, as symbols. When parentheses enclose a Grob that has
  ’parenthesis-friends, the parentheses widen to include any child Grobs with type
  among ’parenthesis-friends.

parenthesized (boolean)
  Parenthesize this grob.

positions (pair of numbers)
  Pair of staff coordinates (left , right), where both left and right are in
  staff-space units of the current staff. For slurs, this value selects which slur
  candidate to use; if extreme positions are requested, the closest one is taken.

prefer-dotted-right (boolean)
  For note collisions, prefer to shift dotted up-note to the right, rather than shifting
  just the dot.

protrusion (number)
  In an arpeggio bracket, the length of the horizontal edges.

rank-on-page (number)
  0-based index of the system on a page.

ratio (number)
  Parameter for slur shape. The higher this number, the quicker the slur attains its
  height-limit.

remove-empty (boolean)
  If set, remove group if it contains no interesting items.

remove-first (boolean)
  Remove the first staff of an orchestral score?

remove-layer (index or symbol)
  When set as a positive integer, the Keep_alive_together_engraver removes all
  VerticalAxisGroup grobs with a remove-layer larger than the smallest retained
  remove-layer. Set to #f to make a layer independent of the Keep_alive_together_engraver. Set to ’(), the layer does not participate in the layering
  decisions. The property can also be set as a symbol for common behaviors: #’any
  to keep the layer alive with any other layer in the group; #’above or #’below to
  keep the layer alive with the context immediately before or after it, respectively.

replacement-alist (list)
  Alist of strings. The key is a string of the pattern to be replaced. The value is a
  string of what should be displayed. Useful for ligatures.
**restore-first** (boolean)
Print a natural before the accidental.

**rhythmic-location** (rhythmic location)
Where (bar number, measure position) in the score.

**right-bound-info** (list)
An alist of properties for determining attachments of spanners to edges.

**right-padding** (dimension, in staff space)
Space to insert on the right side of an object (e.g., between note and its accidentals).

**rotation** (list)
Number of degrees to rotate this object, and what point to rotate around. For example, '(45 0 0) rotates by 45 degrees around the center of this object.

**round-up-exceptions** (list)
A list of pairs where car is the numerator and cdr the denominator of a moment. Each pair in this list means that the multi-measure rests of the corresponding length will be rounded up to the longer rest. See `round-up-to-longer-rest`.

**round-up-to-longer-rest** (boolean)
Displays the longer multi-measure rest when the length of a measure is between two values of `usable-duration-logs`. For example, displays a breve instead of a whole in a 3/2 measure.

**rounded** (boolean)
Decide whether lines should be drawn rounded or not.

**same-direction-correction** (number)
Optical correction amount for stems that are placed in tight configurations. This amount is used for stems with the same direction to compensate for note head to stem distance.

**script-priority** (number)
A key for determining the order of scripts in a stack, by being added to the position of the script in the user input, the sum being the overall priority. Smaller means closer to the head.

**segno-kern** (number)
The space between the two thin lines of the segno bar line symbol, expressed as a multiple of the default staff-line thickness (i.e. the visual output is not influenced by changes to `Staff.StaffSymbol.thickness`).

**self-alignment-X** (number)
Specify alignment of an object. The value ~1 means left aligned, 0 centered, and 1 right-aligned in X direction. Other numerical values may also be specified - the unit is half the object width.

**self-alignment-Y** (number)
Like `self-alignment-X` but for the Y axis.

**shape** (symbol)
This setting determines what shape a grob has. Valid choices depend on the `stencil` callback reading this property.

**sharp-positions** (list)
Sharps in key signatures are placed within the specified ranges of staff-positions. The general form is a list of pairs, with one pair for each type of clef, in order of the staff-position at which each clef places C: (alto treble tenor soprano baritone
mezzosoprano bass). If the list contains a single element it applies for all clefs. A single number in place of a pair sets accidentals within the octave ending at that staff-position.

**shorten-pair** (pair of numbers)

The lengths to shorten on both sides a hairpin or text-spanner such as a pedal bracket. Positive values shorten the hairpin or text-spanner, while negative values lengthen it.

**shortest-duration-space** (number)

Start with this multiple of **spacing-increment** space for the shortest duration. See also Section “spacing-spanner-interface” in Internals Reference.

**shortest-playing-duration** (moment)

The duration of the shortest note playing here.

**shortest-starter-duration** (moment)

The duration of the shortest note that starts here.

**side-axis** (number)

If the value is X (or equivalently 0), the object is placed horizontally next to the other object. If the value is Y or 1, it is placed vertically.

**side-relative-direction** (direction)

Multiply direction of **direction-source** with this to get the direction of this object.

**simple-Y** (boolean)

Should the Y placement of a spanner disregard changes in system heights?

**size** (number)

The ratio of the size of the object to its default size.

**skip-quanting** (boolean)

Should beam quanting be skipped?

**skyline-horizontal-padding** (number)

For determining the vertical distance between two staves, it is possible to have a configuration which would result in a tight interleaving of grobs from the top staff and the bottom staff. The larger this parameter is, the farther apart the staves are placed in such a configuration.

**skyline-vertical-padding** (number)

The amount by which the left and right skylines of a column are padded vertically, beyond the Y-extents and extra-spacing-heights of the constituent grobs in the column. Increase this to prevent interleaving of grobs from adjacent columns.

**slash-negative-kern** (number)

The space to remove between slashes in percent repeat glyphs. Larger values bring the two elements closer together.

**slope** (number)

The slope of this object.

**slur-padding** (number)

Extra distance between slur and script.

**snap-radius** (number)

The maximum distance between two objects that will cause them to snap to alignment along an axis.
space-alist (list)
An alist that specifies distances from this grob to other breakable items, using the format:
```
'((break-align-symbol . (spacing-style . space))
 (break-align-symbol . (spacing-style . space))
 ...)
```
Standard choices for break-align-symbol are listed in Section “break-alignment-interface” in Internals Reference. Additionally, three special break-align symbols available to space-alist are:

first-note
used when the grob is just left of the first note on a line

next-note
used when the grob is just left of any other note; if not set, the value of first-note gets used

right-edge
used when the grob is the last item on the line (only compatible with the extra-space spacing style)

Choices for spacing-style are:

extra-space
Put this much space between the two grobs. The space is stretchable when paired with first-note or next-note; otherwise it is fixed.

minimum-space
Put at least this much space between the left sides of both grobs, without allowing them to collide. The space is stretchable when paired with first-note or next-note; otherwise it is fixed. Not compatible with right-edge.

fixed-space
Only compatible with first-note and next-note. Put this much fixed space between the grob and the note.

minimum-fixed-space
Only compatible with first-note and next-note. Put at least this much fixed space between the left side of the grob and the left side of the note, without allowing them to collide.

semi-fixed-space
Only compatible with first-note and next-note. Put this much space between the grob and the note, such that half of the space is fixed and half is stretchable.

Rules for this spacing are much more complicated than this. See [Wanske] page 126–134, [Ross] page 143–147.

space-to-barline (boolean)
If set, the distance between a note and the following non-musical column will be measured to the bar line instead of to the beginning of the non-musical column. If there is a clef change followed by a bar line, for example, this means that we will try to space the non-musical column as though the clef is not there.
**spacing-increment** (dimension, in staff space)

The unit of length for note-spacing. Typically, the width of a note head. See also Section “spacing-spanner-interface” in *Internals Reference*.

**spacing-pair** (pair)

A pair of alignment symbols which set an object’s spacing relative to its left and right BreakAlignments.

For example, a MultiMeasureRest will ignore prefatory items at its bounds (i.e., clefs, key signatures and time signatures) using the following override:

```
\override MultiMeasureRest.spacing-pair = #'(staff-bar . staff-bar)
```

**spanner-id** (index or symbol)

An identifier to distinguish concurrent spanners.

**springs-and-rods** (boolean)

Dummy variable for triggering spacing routines.

**stacking-dir** (direction)

Stack objects in which direction?

**staff-affinity** (direction)

The direction of the staff to use for spacing the current non-staff line. Choices are UP, DOWN, and CENTER. If CENTER, the non-staff line will be placed equidistant between the two nearest staves on either side, unless collisions or other spacing constraints prevent this. Setting staff-affinity for a staff causes it to be treated as a non-staff line. Setting staff-affinity to #f causes a non-staff line to be treated as a staff.

**staff-padding** (dimension, in staff space)

Maintain this much space between reference points and the staff. Its effect is to align objects of differing sizes (like the dynamics p and f) on their baselines.

**staff-position** (number)

Vertical position, measured in half staff spaces, counted from the middle line.

**staff-space** (dimension, in staff space)

Amount of space between staff lines, expressed in global staff-space.

**staff-staff-spacing** (list)

When applied to a staff-group’s StaffGrouper grob, this spacing alist controls the distance between consecutive staves within the staff-group. When applied to a staff’s VerticalAxisGroup grob, it controls the distance between the staff and the nearest staff below it in the same system, replacing any settings inherited from the StaffGrouper grob of the containing staff-group, if there is one. This property remains in effect even when non-staff lines appear between staves. The alist can contain the following keys:

- **basic-distance** – the vertical distance, measured in staff-spaces, between the reference points of the two items when no collisions would result, and no stretching or compressing is in effect.

- **minimum-distance** – the smallest allowable vertical distance, measured in staff-spaces, between the reference points of the two items, when compressing is in effect.

- **padding** – the minimum required amount of unobstructed vertical whitespace between the bounding boxes (or skylines) of the two items, measured in staff-spaces.
• **stretchability** – a unitless measure of the dimension’s relative propensity to stretch. If zero, the distance will not stretch (unless collisions would result).

**staffgroup-staff-spacing** (list)
The spacing list controlling the distance between the last staff of the current staff-group and the staff just below it in the same system, even if one or more non-staff lines exist between the two staves. If the **staff-staff-spacing** property of the staff’s **VerticalAxisGroup** grob is set, that is used instead. See **staff-staff-spacing** for a description of the list structure.

**stem-attachment** (pair of numbers)
An (x, y) pair where the stem attaches to the notehead.

**stem-begin-position** (number)
User override for the begin position of a stem.

**stem-spacing-correction** (number)
Optical correction amount for stems that are placed in tight configurations. For opposite directions, this amount is the correction for two normal sized stems that overlap completely.

**stemlet-length** (number)
How long should be a stem over a rest?

**stencil** (stencil)
The symbol to print.

**stencils** (list)
Multiple stencils, used as intermediate value.

**strict-grace-spacing** (boolean)
If set, main notes are spaced normally, then grace notes are put left of the musical columns for the main notes.

**strict-note-spacing** (boolean)
If set, unbroken columns with non-musical material (clefs, bar lines, etc.) are not spaced separately, but put before musical columns.

**stroke-style** (string)
Set to "grace" to turn stroke through flag on.

**style** (symbol)
This setting determines in what style a grob is typeset. Valid choices depend on the **stencil** callback reading this property.

**text** (markup)
Text markup. See Section “Formatting text” in *Notation Reference*.

**text-direction** (direction)
This controls the ordering of the words. The default **RIGHT** is for roman text. Arabic or Hebrew should use **LEFT**.

**thick-thickness** (number)
Thickness of the thick line in a bar line, expressed as a multiple of the default staff-line thickness (i.e. the visual output is *not* influenced by changes to **Staff.StaffSymbol.thickness**).

**thickness** (number)
For grobs made up of lines, this is the thickness of the line. For slurs and ties, this is the distance between the two arcs of the curve’s outline at its thickest point, not
counting the diameter of the virtual “pen” that draws the arcs. This property is expressed as a multiple of the current staff-line thickness (i.e. the visual output is influenced by changes to \texttt{Staff.StaffSymbol.thickness}).

\textbf{tie-configuration} (list)

List of \texttt{(position . dir)} pairs, indicating the desired tie configuration, where \texttt{position} is the offset from the center of the staff in staff space and \texttt{dir} indicates the direction of the tie (1=>up, -1=>down, 0=>center). A non-pair entry in the list causes the corresponding tie to be formatted automatically.

\textbf{to-barline} (boolean)

If true, the spanner will stop at the bar line just before it would otherwise stop.

\textbf{toward-stem-shift} (number)

Amount by which scripts are shifted toward the stem if their direction coincides with the stem direction. 0.0 means centered on the note head (the default position of most scripts); 1.0 means centered on the stem. Interpolated values are possible.

\textbf{toward-stem-shift-in-column} (number)

Amount by which a script is shifted toward the stem if its direction coincides with the stem direction and it is associated with a \texttt{ScriptColumn} object. 0.0 means centered on the note head (the default position of most scripts); 1.0 means centered on the stem. Interpolated values are possible.

\textbf{transparent} (boolean)

This makes the grob invisible.

\textbf{tuplet-slur} (boolean)

Draw a slur instead of a bracket for tuplets.

\textbf{uniform-stretching} (boolean)

If set, items stretch proportionally to their natural separation based on durations. This looks better in complex polyphonic patterns.

\textbf{usable-duration-logs} (list)

List of \texttt{duration-logs} that can be used in typesetting the grob.

\textbf{use-skylines} (boolean)

Should skylines be used for side positioning?

\textbf{used} (boolean)

If set, this spacing column is kept in the spacing problem.

\textbf{vertical-skylines} (pair of skylines)

Two skylines, one above and one below this grob.

\textbf{voiced-position} (number)

The staff-position of a voiced \texttt{Rest}, negative if the rest has \texttt{direction DOWN}.

\textbf{when} (moment)

Global time step associated with this column.

\textbf{whiteout} (boolean-or-number)

If a number or true, the grob is printed over a white background to white-out underlying material, if the grob is visible. A number indicates how far the white background extends beyond the bounding box of the grob as a multiple of the staff-line thickness. The \texttt{LyricHyphen} grob uses a special implementation of whiteout: A positive number indicates how far the white background extends beyond the bounding box in multiples of \texttt{line-thickness}. The shape of the background is determined by \texttt{whiteout-style}. Usually \#f by default.
whiteout-style (symbol)
Determines the shape of the whiteout background. Available are 'outline, 'rounded-box, and the default 'box. There is one exception: Use 'special for LyricHyphen.

width (dimension, in staff space)
The width of a grob measured in staff space.

word-space (dimension, in staff space)
Space to insert between words in texts.

X-align-on-main-noteheads (boolean)
If true, this grob will ignore suspended noteheads when aligning itself on NoteColumn.

X-extent (pair of numbers)
Extent (size) in the X direction, measured in staff-space units, relative to object’s reference point.

X-offset (number)
The horizontal amount that this object is moved relative to its X-parent.

X-positions (pair of numbers)
Pair of X staff coordinates of a spanner in the form (left . right), where both left and right are in staff-space units of the current staff.

Y-extent (pair of numbers)
Extent (size) in the Y direction, measured in staff-space units, relative to object’s reference point.

Y-offset (number)
The vertical amount that this object is moved relative to its Y-parent.

zigzag-length (dimension, in staff space)
The length of the lines of a zigzag, relative to zigzag-width. A value of 1 gives 60-degree zigzags.

zigzag-width (dimension, in staff space)
The width of one zigzag squiggle. This number is adjusted slightly so that the glissando line can be constructed from a whole number of squiggles.

3.4 Internal backend properties

accidental-grob (graphical (layout) object)
The accidental for this note.

accidental-grobs (list)
An alist with (notename . groblist) entries.

add-cauda (boolean)
Does this flexa require an additional cauda on the left side?

add-join (boolean)
Is this ligature head-joined with the next one by a vertical line?

add-stem (boolean)
Is this ligature head a virga and therefore needs an additional stem on the right side?

adjacent-pure-heights (pair)
A pair of vectors. Used by a VerticalAxisGroup to cache the Y-extents of different column ranges.
adjacent-spanners (array of grobs)
   An array of directly neighboring dynamic spanners.

all-elements (array of grobs)
   An array of all grobs in this line. Its function is to protect objects from being garbage collected.

ascendens (boolean)
   Is this neume of ascending type?

auctum (boolean)
   Is this neume liquescentically augmented?

axis-group-parent-X (graphical (layout) object)
   Containing X axis group.

axis-group-parent-Y (graphical (layout) object)
   Containing Y axis group.

bars (array of grobs)
   An array of bar line pointers.

beam (graphical (layout) object)
   A pointer to the beam, if applicable.

beam-segments (list)
   Internal representation of beam segments.

begin-of-line-visible (boolean)
   Set to make ChordName or FretBoard be visible only at beginning of line or at chord changes.

bound-alignment-interfaces (list)
   Interfaces to be used for positioning elements that align with a column.

bounded-by-me (array of grobs)
   An array of spanners that have this column as start/begin point. Only columns that have grobs or act as bounds are spaced.

bracket (graphical (layout) object)
   The bracket for a number.

bracket-text (graphical (layout) object)
   The text for an analysis bracket.

c0-position (integer)
   An integer indicating the position of middle C.

cause (any type)
   Any kind of causation objects (i.e., music, or perhaps translator) that was the cause for this grob.

cavum (boolean)
   Is this neume outlined?

columns (array of grobs)
   An array of grobs, typically containing PaperColumn or NoteColumn objects.

concurrent-hairpins (array of grobs)
   All concurrent hairpins.

conditional-elements (array of grobs)
   Internal use only.
context-info (integer)
  Within a ligature, the final glyph or shape of a head may be affected by the left
  and/or right neighbour head. context-info holds for each head such information
  about the left and right neighbour, encoded as a bit mask.

covered-grobs (array of grobs)
  Grobs that could potentially collide with a beam.

cross-staff (boolean)
  True for grobs whose Y-extent depends on inter-staff spacing. The extent is mea-
  sured relative to the grobs’s parent staff (more generally, its VerticalAxisGroup)
  so this boolean flags grobs that are not rigidly fixed to their parent staff. Beams
  that join notes from two staves are cross-staff. Grobs that are positioned around
  such beams are also cross-staff. Grobs that are grouping objects, however, like
  VerticalAxisGroups will not in general be marked cross-staff when some of the
  members of the group are cross-staff.

delta-position (number)
  The vertical position difference.

diminutum (boolean)
  Is this neume diminished?

descendens (boolean)
  Is this neume of descendent type?

direction-source (graphical (layout) object)
  In case side-relative-direction is set, which grob to get the direction from.

display-cautionary (boolean)
  Should the grob be displayed as a cautionary grob?

dot (graphical (layout) object)
  A reference to a Dots object.

dots (array of grobs)
  Multiple Dots objects.

elements (array of grobs)
  An array of grobs; the type is depending on the grob where this is set in.

encompass-objects (array of grobs)
  Objects that a slur should avoid in addition to notes and stems.

figures (array of grobs)
  Figured bass objects for continuation line.

flag (graphical (layout) object)
  A pointer to a Flag object.

flexa-height (dimension, in staff space)
  The height of a flexa shape in a ligature grob (in staff-space units).

flexa-interval (integer)
  The interval spanned by the two notes of a flexa shape (1 is a second, 7 is an octave).

flexa-width (dimension, in staff space)
  The width of a flexa shape in a ligature grob (in staff-space units).

font (font metric)
  A cached font metric object.
footnote-stencil (stencil)
   The stencil of a system’s footnotes.

footnotes-after-line-breaking (array of grobs)
   Footnote grobs of a broken system.

footnotes-before-line-breaking (array of grobs)
   Footnote grobs of a whole system.

forced (boolean)
   Manually forced accidental.

defrench-beaming-stem-adjustment (dimension, in staff space)
   Stem will be shortened by this amount of space in case of French beaming style.

glissando-index (integer)
   The index of a glissando in its note column.

grace-spacing (graphical (layout) object)
   A run of grace notes.

has-span-bar (pair)
   A pair of grobs containing the span bars to be drawn below and above the staff. If no span bar is in a position, the respective element is set to #f.

head-width (dimension, in staff space)
   The width of this ligature head.

heads (array of grobs)
   An array of note heads.

ideal-distances (list)
   (obj . (dist . strength)) pairs.

important-column-ranks (vector)
   A cache of columns that contain items-worth-living data.

in-note-direction (direction)
   Direction to place in-notes above a system.

in-note-padding (number)
   Padding between in-notes.

in-note-stencil (stencil)
   The stencil of a system’s in-notes.

inclinatum (boolean)
   Is this neume an inclinatum?

interfaces (list)
   A list of symbols indicating the interfaces supported by this object. It is initialized from the meta field.

items-worth-living (array of grobs)
   An array of interesting items. If empty in a particular staff, then that staff is erased.

keep-alive-with (array of grobs)
   An array of other VerticalAxisGroups. If any of them are alive, then we will stay alive.

least-squares-dy (number)
   The ideal beam slope, without damping.
left-items (array of grobs)
   Grobs organized on the left by a spacing object.

left-neighbor (graphical (layout) object)
   The right-most column that has a spacing-wish for this column.

ligature-flexa (boolean)
   request joining note to the previous one in a flexa.

linea (boolean)
   Attach vertical lines to this neume?

make-dead-when (array of grobs)
   An array of other VerticalAxisGroups. If any of them are alive, then we will turn
dead.

maybe-loose (boolean)
   Used to mark a breakable column that is loose if and only if it is in the middle of a
line.

melody-spanner (graphical (layout) object)
   The MelodyItem object for a stem.

meta (list) Provide meta information. It is an alist with the entries name and interfaces.

minimum-distances (list)
   A list of rods that have the format (obj . dist).

minimum-translations-alist (list)
   An list of translations for a given start and end point.

neighbors (array of grobs)
   The X-axis neighbors of a grob. Used by the pure-from-neighbor-interface to deter-
mine various grob heights.

normal-stems (array of grobs)
   An array of visible stems.

note-collision (graphical (layout) object)
   The NoteCollision object of a dot column.

note-columns (array of grobs)
   An array of NoteColumn grobs.

note-head (graphical (layout) object)
   A single note head.

note-heads (array of grobs)
   An array of note head grobs.

numbering-assertion-function (any type)
   The function used to assert that footnotes are receiving correct automatic numbers.

oriscus (boolean)
   Is this neume an oriscus?

pedal-text (graphical (layout) object)
   A pointer to the text of a mixed-style piano pedal.

pes-or-flexa (boolean)
   Shall this neume be joined with the previous head?
positioning-done (boolean)
Used to signal that a positioning element did its job. This ensures that a positioning is only done once.

prefix-set (number)
A bit mask that holds all Gregorian head prefixes, such as \virga or \quilisma.

primitive (integer)
A pointer to a ligature primitive, i.e., an item similar to a note head that is part of a ligature.

pure-relevant-grobs (array of grobs)
All the grobs (items and spanners) that are relevant for finding the pure-Y-extent.

pure-relevant-items (array of grobs)
A subset of elements that are relevant for finding the pure-Y-extent.

pure-relevant-spanners (array of grobs)
A subset of elements that are relevant for finding the pure-Y-extent.

pure-Y-common (graphical (layout) object)
A cache of the common_refpoint_of_array of the elements grob set.

pure-Y-extent (pair of numbers)
The estimated height of a system.

pure-Y-offset-in-progress (boolean)
A debugging aid for catching cyclic dependencies.

quantize-position (boolean)
If set, a vertical alignment is aligned to be within staff spaces.

quantized-positions (pair of numbers)
The beam positions after quanting.

quilisma (boolean)
Is this neume a quilisma?

rest (graphical (layout) object)
A pointer to a Rest object.

rest-collision (graphical (layout) object)
A rest collision that a rest is in.

rests (array of grobs)
An array of rest objects.

right-items (array of grobs)
Grobs organized on the right by a spacing object.

right-neighbor (graphical (layout) object)
See left-neighbor.

script-column (graphical (layout) object)
A ScriptColumn associated with a Script object.

script-stencil (pair)
A pair (type, arg) which acts as an index for looking up a Stencil object.

scripts (array of grobs)
An array of Script objects.
shorten (dimension, in staff space)
The amount of space that a stem is shortened. Internally used to distribute beam shortening over stems.

side-support-elements (array of grobs)
The side support, an array of grobs.

slur (graphical (layout) object)
A pointer to a Slur object.

space-increment (dimension, in staff space)
The amount by which the total duration of a multimeasure rest affects horizontal spacing. Each doubling of the duration adds space-increment to the length of the bar.

spacing (graphical (layout) object)
The spacing spanner governing this section.

spacing-wishes (array of grobs)
An array of note spacing or staff spacing objects.

span-start (boolean)
Is the note head at the start of a spanner?

spanner-broken (boolean)
Indicates whether spanner alignment should be broken after the current spanner.

spanner-placement (direction)
The place of an annotation on a spanner. LEFT is for the first spanner, and RIGHT is for the last. CENTER will place it on the broken spanner that falls closest to the center of the length of the entire spanner, although this behavior is unpredictable in situations with lots of rhythmic diversity. For predictable results, use LEFT and RIGHT.

staff-grouper (graphical (layout) object)
The staff grouper we belong to.

staff-symbol (graphical (layout) object)
The staff symbol grob that we are in.

stem (graphical (layout) object)
A pointer to a Stem object.

stem-info (pair)
A cache of stem parameters.

stems (array of grobs)
An array of stem objects.

stropha (boolean)
Is this neume a stropha?

system-Y-offset (number)
The Y-offset (relative to the bottom of the top-margin of the page) of the system to which this staff belongs.

tie (graphical (layout) object)
A pointer to a Tie object.

ties (array of grobs)
A grob array of Tie objects.
tremolo-flag (graphical (layout) object)
   The tremolo object on a stem.

tuplet-number (graphical (layout) object)
   The number for a bracket.

tuplet-start (boolean)
   Is stem at the start of a tuplet?

tuplets (array of grobs)
   An array of smaller tuplet brackets.

vertical-alignment (graphical (layout) object)
   The VerticalAlignment in a System.

vertical-skyline-elements (array of grobs)
   An array of grobs used to create vertical skylines.

virga (boolean)
   Is this neume a virga?

X-common (graphical (layout) object)
   Common reference point for axis group.

x-offset (dimension, in staff space)
   Extra horizontal offset for ligature heads.

Y-common (graphical (layout) object)
   See X-common.
4 Scheme functions

ly:add-context-mod contextmods modification
  [Function]
  Adds the given context modification to the list contextmods of context modifications.

ly:add-file-name-alist alist
  [Function]
  Add mappings for error messages from alist.

ly:add-interface iface desc props
  [Function]
  Add a new grob interface. iface is the interface name, desc is the interface description, and props is the list of user-settable properties for the interface.

ly:add-listener callback disp cl
  [Function]
  Add the single-argument procedure callback as listener to the dispatcher disp. Whenever disp hears an event of class cl, it calls callback with it.

ly:add-option sym val description
  [Function]
  Add a program option sym. val is the default value and description is a string description.

ly:all-grob-interfaces
  [Function]
  Return the hash table with all grob interface descriptions.

ly:all-options
  [Function]
  Get all option settings in an alist.

ly:all-stencil-expressions
  [Function]
  Return all symbols recognized as stencil expressions.

ly:angle x y
  [Function]
  Calculates angle in degrees of given vector. With one argument, x is a number pair indicating the vector. With two arguments, x and y specify the respective coordinates.

ly:assoc-get key alist default-value strict-checking
  [Function]
  Return value if key in alist, else default-value (or #f if not specified). If strict-checking is set to #t and key is not in alist, a programming_error is output.

ly:axis-group-interface::add-element grob grob-element
  [Function]
  Set grob the parent of grob-element on all axes of grob.

ly:basic-progress str rest
  [Function]
  A Scheme callable function to issue a basic progress message str. The message is formatted with format and rest.

ly:beam-score-count
  [Function]
  count number of beam scores.

ly:book? x
  [Function]
  Is x a Book object?

  [Function]

ly:book-add-score! book-smob score
  [Function]
  Add score to book-smob score list.

  [Function]
   Return header in  book.

   Return paper in  book.

   Print book.  output  is passed to the backend unchanged. For example, it may be a string (for file based outputs) or a socket (for network based output).

   Print book.  output  is passed to the backend unchanged. For example, it may be a string (for file based outputs) or a socket (for network based output).

ly:book-scores  book
   Return scores in  book.

   Set the book header.

ly:box?  x
   Is  x  a  Box  object?

ly:bp  num
   num  bigpoints (1/72th inch).

ly:bracket  a iv t p
   Make a bracket in direction  a. The extent of the bracket is given by  iv. The wings protrude by an amount of  p, which may be negative. The thickness is given by  t.

ly:broadcast  disp ev
   Send the stream event  ev  to the dispatcher  disp.

ly:camel-case->lisp-identifier  name-sym
   Convert  FooBar_Bla  to  foo-bar-bla  style symbol.

ly:chain-assoc-get  key achain default-value strict-checking
   Return value for  key  from a list of alists  achain. If no entry is found, return  default-value  or  #f  if  default-value  is not specified. With  strict-checking  set to  #t, a programming_error  is output in such cases.

ly:check-expected-warnings
   Check whether all expected warnings have really been triggered.

ly:cm  num
   num  cm.

ly:command-line-code
   The Scheme code specified on command-line with  -e.

ly:command-line-options
   The Scheme options specified on command-line with  -d.

ly:connect-dispatchers to from
   Make the dispatcher  to  listen to events from  from.
ly:context? x
Is x a Context object?

ly:context-current-moment context
Return the current moment of context.

ly:context-def? x
Is x a Context_def object?

ly:context-def-lookup def sym val
Return the value of sym in context definition def (e.g., \Voice). If no value is found, return val or '() if val is undefined. sym can be any of 'default-child', 'consists', 'description', 'aliases', 'accepts', 'property-ops', 'context-name', 'group-type'.

ly:context-def-modify def mod
Return the result of applying the context-mod mod to the context definition def. Does not change def.

ly:context-event-source context
Return event-source of context context.

ly:context-events-below context
Return a stream-distributor that distributes all events from context and all its subcontexts.

ly:context-find context name
Find a parent of context that has name or alias name. Return #f if not found.

ly:context-grob-definition context name
Return the definition of name (a symbol) within context as an alist.

ly:context-id context
Return the ID string of context, i.e., for \context Voice = "one" ... return the string one.

ly:context-matched-pop-property context grob cell
This undoes a particular \override, \once \override or \once \revert when given the specific alist pair to undo.

ly:context-mod? x
Is x a Context_mod object?

ly:context-mod-apply! context mod
Apply the context modification mod to context.

ly:context-name context
Return the name of context, i.e., for \context Voice = "one" ... return the symbol Voice.

ly:context-now context
Return now-moment of context context.

ly:context-parent context
Return the parent of context, #f if none.

ly:context-property context sym def
Return the value for property sym in context. If def is given, and property value is '() return def.
ly:context-property-where-defined context name
Return the context above context where name is defined.

ly:context-pushpop-property context grob eltprop val
Do \temporary \override or \revert operation in context. The grob definition grob is
extended with eltprop (if val is specified) or reverted (if unspecified).

ly:context-set-property! context name val
Set value of property name in context context to val.

ly:context-unset-property context name
Unset value of property name in context context.

ly:debug str rest
A Scheme callable function to issue a debug message str. The message is formatted with
format and rest.

ly:default-scale
Get the global default scale.

ly:dimension? d
Is d a dimension? Used to distinguish length variables from normal numbers.

ly:dir? s
Is s a direction? Valid directions are -1, 0, or 1, where -1 represents left or down, 1 represents
right or up, and 0 represents a neutral direction.

ly:directed direction magnitude
Calculates an (x . y) pair with optional magnitude (defaulting to 1.0) and direction specified
either as an angle in degrees or a coordinate pair giving the direction. If magnitude is a pair,
the respective coordinates are scaled independently, useful for ellipse drawings.

ly:disconnect-dispatchers to from
Stop the dispatcher to listening to events from from.

ly:dispatcher? x
Is x a Dispatcher object?

ly:duration? x
Is x a Duration object?

ly:duration<? p1 p2
Is p1 shorter than p2?

ly:duration->string dur
Convert dur to a string.

ly:duration-dot-count dur
Extract the dot count from dur.

ly:duration-factor dur
Extract the compression factor from dur. Return it as a pair.

ly:duration-length dur
The length of the duration as a moment.

ly:duration-log dur
Extract the duration log from dur.
ly:duration-scale dur
Extract the compression factor from dur. Return it as a rational.

ly:effective-prefix
Return effective prefix.

ly:encode-string-for-pdf str
Encode the given string to either Latin1 (which is a subset of the PDFDocEncoding) or if that's not possible to full UTF-16BE with Byte-Order-Mark (BOM).

ly:engraver-announce-end-grob engraver grob cause
Announce the end of a grob (i.e., the end of a spanner) originating from given engraver instance, with grob being a grob. cause should either be another grob or a music event.

ly:engraver-make-grob engraver grob-name cause
Create a grob originating from given engraver instance, with given grob-name, a symbol. cause should either be another grob or a music event.

ly:error str rest
A Scheme callable function to issue the error str. The error is formatted with format and rest.

ly:event? obj
Is obj a proper (non-rhythmic) event object?

ly:event-deep-copy m
Copy m and all sub expressions of m.

ly:event-property sev sym val
Get the property sym of stream event sev. If sym is undefined, return val or '()' if val is not specified.

ly:event-set-property! ev sym val
Set property sym in event ev to val.

ly:expand-environment str
Expand $VAR and ${VAR} in str.

ly:expect-warning str rest
A Scheme callable function to register a warning to be expected and subsequently suppressed. If the warning is not encountered, a warning about the missing warning will be shown. The message should be translated with (_ ...) and changing parameters given after the format string.

ly:find-file name
Return the absolute file name of name, or #f if not found.

ly:font-config-add-directory dir
Add directory dir to FontConfig.

ly:font-config-add-font font
Add font font to FontConfig.

ly:font-config-display-fonts
Dump a list of all fonts visible to FontConfig.

ly:font-config-get-font-file name
Get the file for font name.
**ly:font-design-size font**  
Given the font metric `font`, return the design size, relative to the current output-scale.

**ly:font-file-name font**  
Given the font metric `font`, return the corresponding file name.

**ly:font-get-glyph font name**  
Return a stencil from `font` for the glyph named `name`. If the glyph is not available, return an empty stencil.

Note that this command can only be used to access glyphs from fonts loaded with `ly:system-font-load`; currently, this means either the Emmentaler or Emmentaler-Brace fonts, corresponding to the font encodings `fetaMusic` and `fetaBraces`, respectively.

**ly:font-glyph-name-to-charcode font name**  
Return the character code for glyph `name` in `font`.

Note that this command can only be used to access glyphs from fonts loaded with `ly:system-font-load`; currently, this means either the Emmentaler or Emmentaler-Brace fonts, corresponding to the font encodings `fetaMusic` and `fetaBraces`, respectively.

**ly:font-glyph-name-to-index font name**  
Return the index for `name` in `font`.

Note that this command can only be used to access glyphs from fonts loaded with `ly:system-font-load`; currently, this means either the Emmentaler or Emmentaler-Brace fonts, corresponding to the font encodings `fetaMusic` and `fetaBraces`, respectively.

**ly:font-magnification font**  
Given the font metric `font`, return the magnification, relative to the current output-scale.

**ly:font-metric? x**  
Is `x` a `Font_metic` object?

**ly:font-name font**  
Given the font metric `font`, return the corresponding name.

**ly:font-sub-fons font**  
Given the font metric `font` of an OpenType font, return the names of the subfonts within `font`.

**ly:format str rest**  
LilyPond specific format, supporting " and "[0-9]f. Basic support for "s is also provided.

**ly:format-output context**  
Given a global context in its final state, process it and return the `Music_output` object in its final state.

**ly:generic-bound-extent grob common**  
Determine the extent of `grob` relative to `common` along the X axis, finding its extent as a bound when it a has `bound-alignment-interfaces` property list set and otherwise the full extent.
ly:get-all-function-documentation [Function]
Get a hash table with all LilyPond Scheme extension functions.

ly:get-all-translators [Function]
Return a list of all translator objects that may be instantiated.

ly:get-cff-offset font-file-name idx [Function]
Get the offset of 'CFF' table for font-file-name, returning it as an integer. The optional idx
argument is useful for OpenType/CFF collections (OTC) only; it specifies the font index
within the OTC. The default value of idx is 0.

ly:get-context-mods contextmod [Function]
Returns the list of context modifications stored in contextmod.

ly:get-font-format font-file-name idx [Function]
Get the font format for font-file-name, returning it as a symbol. The optional idx argument
is useful for TrueType Collections (TTC) and OpenType/CFF collections (OTC) only; it
specifies the font index within the TTC/OTC. The default value of idx is 0.

ly:get-option var [Function]
Get a global option setting.

ly:get-spacing-spec from-scm to-scm [Function]
Return the spacing spec going between the two given grobs, from_scm and to_scm.

ly:get-undead undead [Function]
Get back object from undead.

ly:gettext original [Function]
A Scheme wrapper function for gettext.

ly:grob? x [Function]
Is x a Grob object?

ly:grob-alist-chain grob global [Function]
Get an alist chain for grob grob, with global as the global default. If unspecified,
font-defaults from the layout block is taken.

ly:grob-array? x [Function]
Is x a Grob_array object?

ly:grob-array->list grob-arr [Function]
Return the elements of grob-arr as a Scheme list.

ly:grob-array-length grob-arr [Function]
Return the length of grob-arr.

ly:grob-array-ref grob-arr index [Function]
Retrieve the indexth element of grob-arr.

ly:grob-basic-properties grob [Function]
Get the immutable properties of grob.

ly:grob-chain-callback grob proc sym [Function]
Find the callback that is stored as property sym of grob grob and chain proc to the head of
this, meaning that it is called using grob and the previous callback’s result.
ly:grob-common-refpoint grob other axis
Find the common refpoint of grob and other for axis.

ly:grob-common-refpoint-of-array grob others axis
Find the common refpoint of grob and others (a grob-array) for axis.

ly:grob-default-font grob
Return the default font for grob grob.

ly:grob-extent grob refp axis
Get the extent in axis direction of grob relative to the grob refp.

ly:grob-get-vertical-axis-group-index grob
Get the index of the vertical axis group the grob grob belongs to; return -1 if none is found.

ly:grob-interfaces grob
Return the interfaces list of grob grob.

ly:grob-layout grob
Get \layout definition from grob grob.

ly:grob-object grob sym
Return the value of a pointer in grob grob of property sym. It returns '()' (end-of-list) if sym is undefined in grob.

ly:grob-original grob
Return the unbroken original grob of grob.

ly:grob-parent grob axis
Get the parent of grob. axis is 0 for the X-axis, 1 for the Y-axis.

ly:grob-pq<? a b
Compare two grob priority queue entries. This is an internal function.

ly:grob-properties? x
Is x a Grob_properties object?

ly:grob-property grob sym val
Return the value for property sym of grob. If no value is found, return val or '()' if val is not specified.

ly:grob-property-data grob sym
Return the value for property sym of grob, but do not process callbacks.

ly:grob-pure-height grob refp beg end val
Return the pure height of grob given refpoint refp. If no value is found, return val or '()' if val is not specified.

ly:grob-pure-property grob sym beg end val
Return the pure value for property sym of grob. If no value is found, return val or '()' if val is not specified.

ly:grob-relative-coordinate grob refp axis
Get the coordinate in axis direction of grob relative to the grob refp.

ly:grob-robust-relative-extent grob refp axis
Get the extent in axis direction of grob relative to the grob refp, or (0,0) if empty.
ly:grob-script-priority-less  a  b
   Compare two grobs by script priority. For internal use.

ly:grob-set-nested-property!  grob  symlist  val
   Set nested property symlist in grob grob to value val.

ly:grob-set-object!  grob  sym  val
   Set sym in grob grob to value val.

ly:grob-set-parent!  grob  axis  parent-grob
   Set parent-grob the parent of grob grob in axis axis.

ly:grob-set-property!  grob  sym  val
   Set sym in grob grob to value val.

ly:grob-spanned-rank-interval  grob
   Returns a pair with the rank of the furthest left column and the rank of the furthest right column spanned by grob.

ly:grob-staff-position  sg
   Return the Y-position of sg relative to the staff.

ly:grob-suicide!  grob
   Kill grob.

ly:grob-system  grob
   Return the system grob of grob.

ly:grob-translate-axis!  grob  d  a
   Translate grob on axis a over distance d.

ly:grob-vertical <?  a  b
   Does a lie above b on the page?

ly:gulp-file  name  size
   Read size characters from the file name, and return its contents in a string. If size is undefined, the entire file is read. The file is looked up using the search path.

ly:has-glyph-names?  font-file-name  idx
   Does the font for font_file_name have glyph names? The optional idx argument is useful for TrueType Collections (TTC) and OpenType/CFF collections (OTC) only; it specifies the font index within the TTC/OTC. The default value of idx is 0.

ly:hash-table-keys  tab
   Return a list of keys in tab.

ly:inch  num
   num inches.

ly:input-both-locations  sip
   Return input location in sip as (file-name first-line first-column last-line last-column).

ly:input-file-line-char-column  sip
   Return input location in sip as (file-name line char column).

ly:input-location?  x
   Is x a Input object?
**ly:input-message** `sip msg rest`  
Print `msg` as a GNU compliant error message, pointing to the location in `sip`. `msg` is interpreted similar to `format`'s argument, using `rest`.

**ly:input-warning** `sip msg rest`  
Print `msg` as a GNU compliant warning message, pointing to the location in `sip`. `msg` is interpreted similar to `format`'s argument, using `rest`.

**ly:interpret-music-expression** `mus ctx`  
Interpret the music expression `mus` in the global context `ctx`. The context is returned in its final state.

**ly:interpret-stencil-expression** `expr func arg1 offset`  
Parse `expr`, feed bits to `func` with first arg `arg1` having offset `offset`.

**ly:interlog2** `d`  
The 2-logarithm of `1/d`.

**ly:item?** `g`  
Is `g` an `Item` object?

**ly:item-break-dir** `it`  
The break status direction of item `it`. -1 means end of line, 0 unbroken, and 1 beginning of line.

**ly:item-get-column** `it`  
Return the `PaperColumn` or `NonMusicalPaperColumn` associated with this `Item`.

**ly:iterator?** `x`  
Is `x` a `Music_iterator` object?

**ly:length** `x y`  
Calculates magnitude of given vector. With one argument, `x` is a number pair indicating the vector. With two arguments, `x` and `y` specify the respective coordinates.

**ly:lexer-keywords** `lexer`  
Return a list of `(KEY . CODE)` pairs, signifying the LilyPond reserved words list.

**ly:lily-lexer?** `x`  
Is `x` a `Lily_lexer` object?

**ly:lily-parser?** `x`  
Is `x` a `Lily_parser` object?

**ly:line-interface::line** `grob startx starty endx endy`  
Make a line using layout information from `grob grob`.

**ly:listened-event-class?** `disp cl`  
Does `disp` listen to any event type in the list `cl`?

**ly:listened-event-types** `disp`  
Return a list of all event types that `disp` listens to.

**ly:listener?** `x`  
Is `x` a `Listener` object?

**ly:make-book** `paper header scores`  
Make a `\book` of `paper` and `header` (which may be `#f` as well) containing `\scores`. 
**ly:make-book-part** *scores*

Make a bookpart containing scores.

**ly:make-context-mod** *mod-list*

Creates a context modification, optionally initialized via the list of modifications mod-list.

**ly:make-dispatcher**

Return a newly created dispatcher.

**ly:make-duration** *length dotcount num den*

length is the negative logarithm (base 2) of the duration: 1 is a half note, 2 is a quarter note, 3 is an eighth note, etc. The number of dots after the note is given by the optional argument dotcount.

The duration factor is optionally given by integers num and den, alternatively by a single rational number.

A duration is a musical duration, i.e., a length of time described by a power of two (whole, half, quarter, etc.) and a number of augmentation dots.

**ly:make-global-context** *output-def*

Set up a global interpretation context, using the output block output-def. The context is returned.

**ly:make-global-translator** *global*

Create a translator group and connect it to the global context global. The translator group is returned.

**ly:make-grob-properties** *alist*

This packages the given property list alist in a grob property container stored in a context property with the name of a grob.

**ly:make-moment** *m g gn gd*

Create the moment with rational main timing m, and optional grace timing g.

A moment is a point in musical time. It consists of a pair of rationals (m, g), where m is the timing for the main notes, and g the timing for grace notes. In absence of grace notes, g is zero.

For compatibility reasons, it is possible to write two numbers specifying numerator and denominator instead of the rationals. These forms cannot be mixed, and the two-argument form is disambiguated by the sign of the second argument: if it is positive, it can only be a denominator and not a grace timing.

**ly:make-music** *props*

Make a C++ Music object and initialize it with props.

This function is for internal use and is only called by make-music, which is the preferred interface for creating music objects.

**ly:make-music-function** *signature func*

Make a function to process music, to be used for the parser. func is the function, and signature describes its arguments. signature’s cdr is a list containing either ly:music? predicates or other type predicates. Its car is the syntax function to call.

**ly:make-music-relative!** *music pitch*

Make music relative to pitch, return final pitch.

**ly:make-output-def**

Make an output definition.
ly:make-page-label-marker label
Return page marker with label label.

ly:make-page-permission-marker symbol permission
Return page marker with page breaking and turning permissions.

ly:make-pango-description-string chain size
Make a PangoFontDescription string for the property alist chain at size size.

ly:make-paper-outputter port format
Create an outputter that evaluates within output-format, writing to port.

ly:make-pitch octave note alter
octave is specified by an integer, zero for the octave containing middle C. note is a number indexing the global default scale, with 0 corresponding to pitch C and 6 usually corresponding to pitch B. Optional alter is a rational number of 200-cent whole tones for alteration.

ly:make-prob type init rest
Create a Prob object.

ly:make-scale steps
Create a scale. The argument is a vector of rational numbers, each of which represents the number of 200 cent tones of a pitch above the tonic.

ly:make-score music
Return score with music encapsulated in it.

ly:make-spring ideal min-dist
Make a spring. ideal is the ideal distance of the spring, and min-dist is the minimum distance.

ly:make-stencil expr xext yext
Stencils are device independent output expressions. They carry two pieces of information:
1. A specification of how to print this object. This specification is processed by the output backends, for example scm/output-ps.scm.
2. The vertical and horizontal extents of the object, given as pairs. If an extent is unspecified (or if you use empty-interval as its value), it is taken to be empty.

ly:make-stream-event cl proplist
Create a stream event of class cl with the given mutable property list.

ly:make-undead object
This packages object in a manner that keeps it from triggering "Parsed object should be dead" messages.

ly:make-unpure-pure-container unpure pure
Make an unpure-pure container. unpure should be an unpure expression, and pure should be a pure expression. If pure is omitted, the value of unpure will be used twice, except that a callback is given two extra arguments that are ignored for the sake of pure calculations.

ly:message str rest
A Scheme callable function to issue the message str. The message is formatted with format and rest.

ly:minimal-breaking pb
Break (pages and lines) the Paper_book object pb without looking for optimal spacing: stack as many lines on a page before moving to the next one.
ly:mm num
  num mm.

ly:module->alist mod
  Dump the contents of module mod as an alist.

ly:module-copy dest src
  Copy all bindings from module src into dest.

ly:modules-lookup modules sym def
  Look up sym in the list modules, returning the first occurrence. If not found, return def or #f if def isn’t specified.

ly:moment? x
  Is x a Moment object?

ly:moment<? a b
  Compare two moments.

ly:moment-add a b
  Add two moments.

ly:moment-div a b
  Divide two moments.

ly:moment-grace mom
  Extract grace timing as a rational number from mom.

ly:moment-grace-denominator mom
  Extract denominator from grace timing.

ly:moment-grace-numerator mom
  Extract numerator from grace timing.

ly:moment-main mom
  Extract main timing as a rational number from mom.

ly:moment-main-denominator mom
  Extract denominator from main timing.

ly:moment-main-numerator mom
  Extract numerator from main timing.

ly:moment-mod a b
  Modulo of two moments.

ly:moment-mul a b
  Multiply two moments.

ly:moment-sub a b
  Subtract two moments.

ly:music? obj
  Is obj a music object?

ly:music-compress m factor
  Compress music object m by scale factor.
ly:music-deep-copy m origin

Copy m and all sub expressions of m. m may be an arbitrary type; cons cells and music are copied recursively. If origin is given, it is used as the origin for one level of music by calling ly:set-origin! on the copy.

ly:music-duration-compress mus fact

Compress mus by factor fact, which is a Moment.

ly:music-duration-length mus

Extract the duration field from mus and return the length.

ly:music-function? x

Is x a Music_function object?

ly:music-function-extract x

Return the Scheme function inside x.

ly:music-function-signature x

Return the function signature inside x.

ly:music-length mus

Get the length of music expression mus and return it as a Moment object.

ly:music-list? lst

Is lst a list of music objects?

ly:music-mutable-properties mus

Return an alist containing the mutable properties of mus. The immutable properties are not available, since they are constant and initialized by the make-music function.

ly:music-output? x

Is x a Music_output object?

ly:music-property mus sym val

Return the value for property sym of music expression mus. If no value is found, return val or '()' if val is not specified.

ly:music-set-property! mus sym val

Set property sym in music expression mus to val.

ly:music-transpose m p

Transpose m such that central C is mapped to p. Return m.

ly:note-column-accidentals note-column

Return the AccidentalPlacement grob from note-column if any, or SCM_EOL otherwise.

ly:note-column-dot-column note-column

Return the DotColumn grob from note-column if any, or SCM_EOL otherwise.

ly:note-head::stem-attachment font-metric glyph-name

Get attachment in font-metric for attaching a stem to notehead glyph-name.

ly:number->string s

Convert s to a string without generating many decimals.

ly:one-line-auto-height-breaking pb

Put each score on a single line, and put each line on its own page. Modify the paper-width setting so that every page is wider than the widest line. Modify the paper-height setting to fit the height of the tallest line.
ly:one-line-breaking pb
Put each score on a single line, and put each line on its own page. Modify the paper-width setting so that every page is wider than the widest line.

ly:one-page-breaking pb
Put each score on a single page. The paper-height settings are modified so each score fits on one page, and the height of the page matches the height of the full score.

ly:optimal-breaking pb
Optimally break (pages and lines) the Paper_book object pb to minimize badness in bother vertical and horizontal spacing.

ly:option-usage port
Print ly:set-option usage. Optional port argument for the destination defaults to current output port.

ly:otf->cff otf-file-name idx
Convert the contents of an OTF file to a CFF file, returning it as a string. The optional idx argument is useful for OpenType/CFF collections (OTC) only; it specifies the font index within the OTC. The default value of idx is 0.

ly:otf-font? font
Is font an OpenType font?

ly:otf-font-glyph-info font glyph
Given the font metric font of an OpenType font, return the information about named glyph glyph (a string).

ly:otf-font-table-data font tag
Extract a table tag from font. Return empty string for non-existent tag.

ly:otf-glyph-count font
Return the number of glyphs in font.

ly:otf-glyph-list font
Return a list of glyph names for font.

ly:output-def? x
Is x a Output_def object?

ly:output-def-clone def
Clone output definition def.

ly:output-def-lookup def sym val
Return the value of sym in output definition def (e.g., \paper). If no value is found, return val or '()' if val is undefined.

ly:output-def-parent def
Return the parent output definition of def.

ly:output-def-scope def
Return the variable scope inside def.

ly:output-def-set-variable! def sym val
Set an output definition def variable sym to val.

ly:output-description output-def
Return the description of translators in output-def.
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**ly:output-find-context-def** `output-def context-name`  
Return an alist of all context defs (matching `context-name` if given) in `output-def`.

**ly:output-formats**  
Formats passed to `--format` as a list of strings, used for the output.

**ly:outputter-close** `outputter`  
Close port of `outputter`.

**ly:outputter-dump-stencil** `outputter stencil`  
Dump stencil `expr` onto `outputter`.

**ly:outputter-dump-string** `outputter str`  
Dump `str` onto `outputter`.

**ly:outputter-module** `outputter`  
Return output module of `outputter`.

**ly:outputter-output-scheme** `outputter expr`  
Eval `expr` in module of `outputter`.

**ly:outputter-port** `outputter`  
Return output port for `outputter`.

**ly:page-marker?** `x`  
Is `x` a `Page_marker` object?

**ly:page-turn-breaking** `pb`  
Optimally break (pages and lines) the `Paper_book` object `pb` such that page turns only happen in specified places, returning its pages.

**ly:pango-font?** `f`  
Is `f` a Pango font?

**ly:pango-font-physical-fonts** `f`  
Return alist of `(ps-name file-name font-index)` lists for Pango font `f`.

**ly:paper-book?** `x`  
Is `x` a `Paper_book` object?

**ly:paper-book-header** `pb`  
Return the header definition (`\header`) in `Paper_book` object `pb`.

**ly:paper-book-pages** `pb`  

**ly:paper-book-paper** `pb`  
Return the paper output definition (`\paper`) in `Paper_book` object `pb`.

**ly:paper-book-performances** `pb`  

**ly:paper-book-scopes** `pb`  

**ly:paper-book-systems** `pb`  
**ly:paper-column::break-align-width col align-syms**

Determine the extent along the X-axis of a grob used for break-alignment organized by column `col`. The grob is specified by `align-syms`, which contains either a single `break-align-symbol` or a list of such symbols.

**ly:paper-column::print**

Optional stencil for `PaperColumn` or `NonMusicalPaperColumn`. Draws the rank number of each column, its moment in time, a blue arrow showing the ideal distance, and a red arrow showing the minimum distance between columns.

**ly:paper-fonts def**

Return a list containing the fonts from output definition `def` (e.g., `\paper`).

**ly:paper-get-font def chain**

Find a font metric in output definition `def` satisfying the font-qualifiers in alist `chain`. And return it. (An alist chain is a list of alists, containing grob properties.)

**ly:paper-get-number def sym**

Return the value of variable `sym` in output definition `def` as a double.

**ly:paper-outputscale def**

Return the output-scale for output definition `def`.

**ly:paper-score-paper-systems paper-score**

Return vector of `paper-system` objects from `paper-score`.

**ly:paper-system? obj**

Is `obj` a C++ Prob object of type `paper-system`?

**ly:paper-system-minimum-distance sys1 sys2**

Measure the minimum distance between these two paper-systems, using their stored skylines if possible and falling back to their extents otherwise.

**ly:parse-file name**


**ly:parse-string-expression parser-smob ly-code filename line**

Parse the string `ly-code` with `parser-smob`. Return the contained music expression. `filename` and `line` are optional source indicators.

**ly:parsed-undead-list!**

Return the list of objects that have been found live that should have been dead, and clear that list.

**ly:parser-clear-error parser**

Clear error flag for `parser`, defaulting to current parser.

**ly:parser-clone closures location**

Return a clone of current parser. An association list of port positions to closures can be specified in `closures` in order to have `$` and `#` interpreted in their original lexical environment. If `location` is a valid location, it becomes the source of all music expressions inside.

**ly:parser-define! symbol val**

Bind `symbol` to `val` in current parser’s module.

**ly:parser-error msg input**

Display an error message and make current parser fail. Without a current parser, trigger an ordinary error.
ly:parser-has-error? parser
    Does parser (defaulting to current parser) have an error flag?

ly:parser-include-string ly-code
    Include the string ly-code into the input stream for current parser. Can only be used in immediate Scheme expressions ($ instead of #).

ly:parser-lexer parser
    Return the lexer for parser, defaulting to current parser

ly:parser-lookup symbol
    Look up symbol in current parser’s module. Return ’() if not defined.

ly:parser-output-name parser
    Return the base name of the output file. If parser is left off, use currently active parser.

ly:parser-parse-string parser-smob ly-code
    Parse the string ly-code with parser-smob. Upon failure, throw ly-file-failed key.

ly:parser-set-note-names names
    Replace current note names in parser. names is an alist of symbols. This only has effect if the current mode is notes.

ly:performance-headers performance
    Return the list of headers with the innermost first.

ly:performance-write performance filename name
    Write performance to filename storing name as the name of the performance in the file metadata.

ly:pitch? x
    Is x a Pitch object?

ly:pitch<? p1 p2
    Is p1 lexicographically smaller than p2?

ly:pitch-alteration pp
    Extract the alteration from pitch pp.

ly:pitch-diff pitch root
    Return pitch delta such that root transposed by delta equals pitch.

ly:pitch-negate p
    Negate p.

ly:pitch-notename pp
    Extract the note name from pitch pp.

ly:pitch-octave pp
    Extract the octave from pitch pp.

ly:pitch-quartertones pp
    Calculate the number of quarter tones of pp from middle C.

ly:pitch-semitones pp
    Calculate the number of semitones of pp from middle C.
**ly:pitch-steps** \( p \)  
Number of steps counted from middle C of the pitch \( p \).

**ly:pitch-tones** \( pp \)  
Calculate the number of tones of \( pp \) from middle C as a rational number.

**ly:pitch-transpose** \( p \) \( \delta \)  
Transpose \( p \) by the amount \( \delta \), where \( \delta \) is relative to middle C.

**ly:pointer-group-interface::add-grob** \( grob \) \( sym \) \( grob-element \)  
Add \( grob-element \) to \( grob \)'s \( sym \) grob array.

**ly:position-on-line?** \( sg \) \( spos \)  
Return whether \( spos \) is on a line of the staff associated with the grob \( sg \) (even on an extender line).

**ly:prob?** \( x \)  
Is \( x \) a \texttt{Prob} object?

**ly:prob-immutable-properties** \( prob \)  
Retrieve an alist of immutable properties.

**ly:prob-mutable-properties** \( prob \)  
Retrieve an alist of mutable properties.

**ly:prob-property** \( prob \) \( sym \) \( val \)  
Return the value for property \( sym \) of \texttt{Prob} object \( prob \). If no value is found, return \( val \) or \texttt{'}() if \( val \) is not specified.

**ly:prob-property?** \( obj \) \( sym \)  
Is boolean prop \( sym \) of \( sym \) set?

**ly:prob-set-property!** \( obj \) \( sym \) \( value \)  
Set property \( sym \) of \( obj \) to \( value \).

**ly:prob-type?** \( obj \) \( type \)  
Is \( obj \) the specified \texttt{prob-type}?

**ly:programming-error** \( str \) \( rest \)  
A Scheme callable function to issue the internal warning \( str \). The message is formatted with \texttt{format} and \( rest \).

**ly:progress** \( str \) \( rest \)  
A Scheme callable function to print progress \( str \). The message is formatted with \texttt{format} and \( rest \).

**ly:property-lookup-stats** \( sym \)  
Return hash table with a property access corresponding to \( sym \). Choices are \texttt{prob}, \texttt{grob}, and \texttt{context}.

**ly:protects**  
Return hash of protected objects.

**ly:pt** \( num \)  
\( num \) printer points.

**ly:pure-call** \( data \) \( grob \) \( start \) \( end \) \( rest \)  
Convert property \( data \) (unpure-pure container or procedure) to value in a pure context defined by \( grob \), \( start \), \( end \), and possibly \( rest \) arguments.
ly:register-stencil-expression symbol
Add symbol as head of a stencil expression.

ly:register-translator creator name description
Register a translator creator (usually a descriptive alist or a function/closure returning one when given a context argument) with the given symbol name and the given description alist.

ly:relative-group-extent elements common axis
Determine the extent of elements relative to common in the axis direction.

ly:reset-all-fonts
Forget all about previously loaded fonts.

ly:round-filled-box xext yext blot
Make a Stencil object that prints a black box of dimensions xext, yext and roundness blot.

ly:round-filled-polygon points blot extroversion
Make a Stencil object that prints a black polygon with corners at the points defined by points (list of coordinate pairs) and roundness blot. Optionalextroversion shifts the outline outward, with the default of -1.0 keeping the outer boundary of the outline just inside of the polygon.

ly:run-translator mus output-def
Process mus according to output-def. An interpretation context is set up, and mus is interpreted with it. The context is returned in its final state.
Optionally, this routine takes an object-key to uniquely identify the score block containing it.

ly:score? x
Is x a Score object?

ly:score-add-output-def! score def
Add an output definition def to score.

ly:score-embedded-format score layout
Run score through layout (an output definition) scaled to correct output-scale already, returning a list of layout-lines.

ly:score-error? score
Was there an error in the score?

ly:score-header score
Return score header.

ly:score-music score
Return score music.

ly:score-output-defs score
All output definitions in a score.

ly:score-set-header! score module
Set the score header.

ly:separation-item::print
Optional stencil for PaperColumn or NonMusicalPaperColumn. Draws the horizontal-skylines of each PaperColumn, showing the shapes used to determine the minimum distances between PaperColumns at the note-spacing step, before staves have been spaced (vertically) on the page.
ly:set-default-scale \texttt{scale} \hspace{1cm} \textbf{[Function]}
Set the global default scale. This determines the tuning of pitches with no accidentals or key signatures. The first pitch is C. Alterations are calculated relative to this scale. The number of pitches in this scale determines the number of scale steps that make up an octave. Usually the 7-note major scale.

ly:set-grob-modification-callback \texttt{cb} \hspace{1cm} \textbf{[Function]}
Specify a procedure that will be called every time LilyPond modifies a grob property. The callback will receive as arguments the grob that is being modified, the name of the C++ file in which the modification was requested, the line number in the C++ file in which the modification was requested, the name of the function in which the modification was requested, the property to be changed, and the new value for the property.

ly:set-middle-C! \texttt{context} \hspace{1cm} \textbf{[Function]}
Set the \texttt{middleCPosition} variable in \texttt{context} based on the variables \texttt{middleCClefPosition} and \texttt{middleCOffset}.

ly:set-option \texttt{var} \texttt{val} \hspace{1cm} \textbf{[Function]}
Set a program option.

ly:set-origin! \texttt{m} \texttt{origin} \hspace{1cm} \textbf{[Function]}
This sets the origin given in \texttt{origin} to \texttt{m}. \texttt{m} will typically be a music expression or a list of music. List structures are searched recursively, but recursion stops at the changed music expressions themselves. \texttt{origin} is generally of type \texttt{ly:input-location?}, defaulting to \texttt{(*location*)}. Other valid values for \texttt{origin} are a music expression which is then used as the source of location information, or \texttt{#f} or \texttt{'()} in which case no action is performed. The return value is \texttt{m} itself.

ly:set-property-cache-callback \texttt{cb} \hspace{1cm} \textbf{[Function]}
Specify a procedure that will be called whenever lilypond calculates a callback function and caches the result. The callback will receive as arguments the grob whose property it is, the name of the property, the name of the callback that calculated the property, and the new (cached) value of the property.

ly:skyline? \texttt{x} \hspace{1cm} \textbf{[Function]}
Is \texttt{x} a Skyline object?

ly:skyline-empty? \texttt{sky} \hspace{1cm} \textbf{[Function]}
Return whether \texttt{sky} is empty.

ly:skyline-pair? \texttt{x} \hspace{1cm} \textbf{[Function]}
Is \texttt{x} a Skyline_pair object?

ly:slur-score-count \hspace{1cm} \textbf{[Function]}
count number of slur scores.

ly:smob-protects \hspace{1cm} \textbf{[Function]}
Return LilyPond’s internal smob protection list.

ly:solve-spring-rod-problem \texttt{springs} \texttt{rods} \texttt{length} \texttt{ragged} \hspace{1cm} \textbf{[Function]}
Solve a spring and rod problem for \texttt{count} objects, that are connected by \texttt{count-1} springs, and an arbitrary number of rods. \texttt{count} is implicitly given by \texttt{springs} and \texttt{rods}. The \texttt{springs} argument has the format \texttt{(ideal, inverse\_hook)} and \texttt{rods} is of the form \texttt{(idx1, idx2, distance)}.

\texttt{length} is a number, \texttt{ragged} a boolean.
The function returns a list containing the force (positive for stretching, negative for compressing and #f for non-satisfied constraints) followed by spring-count+1 positions of the objects.

**ly:source-file?**  
Is x a Source_file object?

**ly:source-files**  
parser-smob  
A list of input files that have been opened up to here, including the files that have been closed already. a PARSER may optionally be specified.

**ly:spanner?**  
Is g a spanner object?

**ly:spanner-bound**  
spanner dir  
Get one of the bounds of spanner. dir is -1 for left, and 1 for right.

**ly:spanner-broken-into**  
spanner  
Return broken-into list for spanner.

**ly:spanner-set-bound!**  
spanner dir item  
Set grob item as bound in direction dir for spanner.

**ly:spawn**  
command rest  
Simple interface to g_spawn_sync str. The error is formatted with format and rest.

**ly:spring?**  
Is x a Spring object?

**ly:spring-set-inverse-compress-strength!**  
spring strength  
Set the inverse compress strength of spring.

**ly:spring-set-inverse-stretch-strength!**  
spring strength  
Set the inverse stretch strength of spring.

**ly:staff-symbol-line-thickness**  
grob  
Returns the current staff-line thickness in the staff associated with grob, expressed as a multiple of the current staff-space height.

**ly:staff-symbol-staff-radius**  
grob  
Returns the radius of the staff associated with grob.

**ly:staff-symbol-staff-space**  
grob  
Returns the current staff-space height in the staff associated with grob, expressed as a multiple of the default height of a staff-space in the traditional five-line staff.

**ly:start-environment**  
Return the environment (a list of strings) that was in effect at program start.

**ly:stderr-redirect**  
file-name mode  
Redirect stderr to file-name, opened with mode.

**ly:stencil?**  
x  
Is x a Stencil object?

**ly:stencil-add**  
args  
Combine stencils. Takes any number of arguments.
ly:stencil-aligned-to stil axis dir  
Align stil using its own extents. dir is a number. -1 and 1 are left and right, respectively. Other values are interpolated (so 0 means the center).

ly:stencil-combine-at-edge first axis direction second padding  
Construct a stencil by putting second next to first. axis can be 0 (x-axis) or 1 (y-axis). direction can be -1 (left or down) or 1 (right or up). The stencils are juxtaposed with padding as extra space. first and second may also be '()' or '#f.

ly:stencil-empty? stil axis  
Return whether stil is empty. If an optional axis is supplied, the emptiness check is restricted to that axis.

ly:stencil-expr stil  
Return the expression of stil.

ly:stencil-extent stil axis  
Return a pair of numbers signifying the extent of stil in axis direction (0 or 1 for x and y axis, respectively).

ly:stencil-fonts s  
Analyze s, and return a list of fonts used in s.

ly:stencil-in-color stc r g b  
Put stc in a different color.

ly:stencil-outline stil outline  
Return a stencil with the stencil expression (inking) of stencil stil but with outline and dimensions from stencil outline.

ly:stencil-rotate stil angle x y  
Return a stencil stil rotated angle degrees around the relative offset (x, y). E.g., an offset of (-1, 1) will rotate the stencil around the left upper corner.

ly:stencil-rotate-absolute stil angle x y  
Return a stencil stil rotated angle degrees around point (x, y), given in absolute coordinates.

ly:stencil-scale stil x y  
Scale stencil stil using the horizontal and vertical scaling factors x and y. Negative values will flip or mirror stil without changing its origin; this may result in collisions unless it is repositioned.

ly:stencil-stack first axis direction second padding mindist  
Construct a stencil by stacking second next to first. axis can be 0 (x-axis) or 1 (y-axis). direction can be -1 (left or down) or 1 (right or up). The stencils are juxtaposed with padding as extra space. first and second may also be '()' or '#f. As opposed to ly:stencil-combine-at-edge, metrics are suited for successively accumulating lines of stencils. Also, second stencil is drawn last.

If mindist is specified, reference points are placed apart at least by this distance. If either of the stencils is spacing, padding and mindist do not apply.

ly:stencil-translate stil offset  
Return a stil, but translated by offset (a pair of numbers).

ly:stencil-translate-axis stil amount axis  
Return a copy of stil but translated by amount in axis direction.
ly:stream-event? obj
Is obj a Stream_event object?

ly:string-percent-encode str
Encode all characters in string str with hexadecimal percent escape sequences, with the following exceptions: characters ‘-’, ‘,’ ‘/’, and ‘;’; and characters in ranges 0-9, A-Z, and a-z.

ly:string-substitute a b s
Replace string a by string b in string s.

ly:system-font-load name
Load the OpenType system font name.otf. Fonts loaded with this command must contain three additional SFNT font tables called LILC, LILF, and LILY, needed for typesetting musical elements. Currently, only the Emmentaler and the Emmentaler-Brace fonts fulfill these requirements.

Note that only ly:font-get-glyph and derived code (like \lookup) can access glyphs from the system fonts; text strings are handled exclusively via the Pango interface.

ly:text-interface::interpret-markup
Convert a text markup into a stencil. Takes three arguments, layout, props, and markup. layout is a layout block; it may be obtained from a grob with ly:grob-layout. props is an alist chain, i.e. a list of alists. This is typically obtained with (ly:grob-alist-chain grob (ly:output-def-lookup layout 'text-font-defaults)). markup is the markup text to be processed.

ly:transform? x
Is x a Transform object?

ly:translate-cpp-warning-scheme str
Translates a string in C++ printf format and modifies it to use it for scheme formatting.

ly:translator? x
Is x a Translator object?

ly:translator-context trans
Return the context of the translator object trans.

ly:translator-description creator
Return an alist of properties of translator definition creator.

ly:translator-group? x
Is x a Translator_group object?

ly:translator-name creator
Return the type name of the translator definition creator. The name is a symbol.

ly:transpose-key-alist l pit
Make a new key alist of l transposed by pitch pit.

ly:truncate-list! lst i
Take at most the first i of list lst.

ly:ttf->pfa ttf-file-name idx
Convert the contents of a TrueType font file to PostScript Type 42 font, returning it as a string. The optional idx argument is useful for TrueType collections (TTC) only; it specifies the font index within the TTC. The default value of idx is 0.
ly:ttf-ps-name ttf-file-name idx
Extract the PostScript name from a TrueType font. The optional idx argument is useful for TrueType collections (TTC) only; it specifies the font index within the TTC. The default value of idx is 0.

ly:type1->pfa type1-file-name
Convert the contents of a Type 1 font in PFB format to PFA format. If the file is already in PFA format, pass through it.

ly:undead? x
Is x a Undead object?

ly:unit
Return the unit used for lengths as a string.

ly:unpure-call data grob rest
Convert property data (unpure-pure container or procedure) to value in an unpure context defined by grob and possibly rest arguments.

ly:unpure-pure-container? x
Is x a Unpure_pure_container object?

ly:unpure-pure-container-pure-part pc
Return the pure part of pc.

ly:unpure-pure-container-unpure-part pc
Return the unpure part of pc.

ly:usage
Print usage message.

ly:verbose-output?
Was verbose output requested, i.e. loglevel at least DEBUG?

ly:version
Return the current lilypond version as a list, e.g., (1 3 127 uu1).

ly:warning str rest
A Scheme callable function to issue the warning str. The message is formatted with format and rest.

ly:warning-located location str rest
A Scheme callable function to issue the warning str at the specified location in an input file. The message is formatted with format and rest.

ly:wide-char->utf-8 wc
Encode the Unicode codepoint wc, an integer, as UTF-8.
## Appendix A Indices

### A.1 Concept index

(Index is nonexistent)

### A.2 Function index

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